WEB-BASED INFORMATION RESOURCES

Title of the Paper: Web based Information Resources

Unit 1:
General Introduction - Nature and characteristics of information; Role of electronic resources in - scholarly communication; trends in scholarly communication

Unit 2:
Electronic Information Resources - Definition, characteristics and types; Information Resources on the Internet – E-books, E-journals, information gateways

Unit 3:
Open Course Ware, MOOC , DRM, DOI, Link resolvers, open access resources, open data initiatives , preprints, discussion forums, technical reports, OPACs, ETDs, Patents, reference sources,

Unit 4:
search tools, subject directories, courseware, software - Prominent sources in different subjects
Databases: Bibliographic, Full-text, numeric,

Unit 5:
Ready Reference Sources – dictionaries, encyclopaedias, yearbooks, directories, biographical sources, geographical sources, handbooks and manuals and statistical sources

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UNIT – 1

Objectives:

- To learn the basic things about web-based information resources
- To learn about the nature and characteristics of information
- To gain knowledge on the role of electronic resources

Introduction:

The history of humanity has already witnessed three revolutions, and is on the fourth threshold. The first revolution occurred hundreds of thousands of years ago when language first emerged. The second cognitive revolution was the advent of writing, tens of thousands of years ago. The third revolution took place in our own millennium with the invention of printing press in 1500. The post Gutenberg's era witnessed complete and absolute control of printing technology and printed artefacts as a media of scholarly communication over scientific and literary world. The Internet and its application offshoot, i.e. World Wide Web and the electronic publishing, represent fourth revolution that has humbled monopoly of printed artifactsas sole media of scholarly communication. The revolution is likely to have lasting impact on the publishing and information delivery system in 21st century. The emergence of Internet and the World Wide Web (WWW) as a new media of information storage and delivery provide an unparalleled media for delivery of information with greater speed and economy. The Internet and web technology has already changed the way information is stored, retrieved, communicated and broadcasted, it is likely to revolutionize the way publishers, publishing industry and scientists functioned in the era predominately guided by the printing technology. These technologies have triggered large-scale commercial and non-commercial digitization programmes the world over because digital contents are infinitely malleable and globally deliverable across the networks. Increasing number of commercial and society publishers are using the Internet as a global way to offer their publications to the international community of scientists and technologists. Resultantly, increasingly large numbers of STM (Science, Technology and Medic al) electronic journals are appearing on the web. The web-based electronic information products not only eliminated paper, physical storage and transportation costs, it also offer a hosts of other possibilities for incorporating multimedia and hyper-link features to electronic documents hitherto impossible on paper media.

The technology-led developments have created new opportunities and challenges for the players involved in creation, promotion, mediation and storage of information. This, in turn,

has led to the generation of new services hit her to nonexistence as well as modification of existing services and their deliverables. The web based digital resources and services cannot, however, be discussed in isolation. It would be imperative to take up other associated activities and functions who's coordinated and concerted use generate web-based digital resources and services. This article delves into technological evolution, Cultural Revolution and contents enrichments that led to modified and newly added web-based library services. The article touches upon various aspects of building, accessing and organizing digital resources and collection. Hardware and software infrastructure requirements, both at server-end and client-end are enumerated. Lastly the article describes

i) web-bases library services that are modified versions of existing services

ii) technology-driven web-based library services.

Digital resources and digital library are used interchangeably in this article given the fact that digital resources are basic and important ingredients of a digital library.

Evolution of Digital Resources and Services:

Although the terminology associated with the digital resources and digital services gained popularity in the last decade of 20th century, it has, however, evolved along the technological ladder for past thirty years. In early 1970s, information systems for libraries were built around mini and mainframe computers providing remote access and online search and retrieval services to users. It was around this time when the libraries, especially in the developed world started applying a growing range of information technology to the management of the predominantly print collections available in the libraries. Several integrated library packages were launched to automate in-house functions of the Library including circulation of books, ordering of books and online public access catalogue (OPAC). Online public access catalogue came as a replacement for the traditional card catalogue that made the manual processes more efficient, and also opened-up the library collections to the researchers (Lynch, Clifford, 2000). Through the online catalogue, users could search the holdings of the library from remote location without having to come to the library.

As the Internet began to grow, several Library catalogue, with their web interfaces, started appearing on the net which could be accessed remotely from anywhere in the world. Creation of online bibliographic databases was another landmark in the library-related information technology applications. Sophisticated online databases were built during 1970s and 1980s

using state-of-the-art technology of distributed database management system linking different remote systems using data files generated in the process of electronic phototypesetting of printed abstracting and indexing services and other primary journals. As such, online hosts like DIALOG and STN were not only offering online databases but also full-text online journals for past several years although as a simple ASCII or text files without graphics and pictures. In 1989, there were almost 1,700 full-text sources in sixteen online systems.

Availability of CD ROM in late 1980s, as a media with high storage capacity, longitivity, and ease of transportation triggered production of several CD ROM information products which were earlier available through online vendors or as conventional abstracting and indexing services in printed format. Moreover, several full-text databases also started appearing in late 1980s and early 1990s launching the beginning of digital era. Some of the important full-text digital collections available on CD ROM include: ADONIS, IEEE / IEE Electronic Library (IEL), ABI/INFORM,UMI's Business Express and Library & General Periodicals, E space World, US Patents, etc. bases can only be used to find bibliographic details without their contents in full text. The need was felt for full-text articles in digital format. Prior to WWW, the beginning of full-text "digital library" involved building-up several client systems usable in a multitude of environments. However, 1990s brought-in a true revolution in network-based digital services with advent of World Wide Web (WWW). The WWW offered web server at the server-end and web browser at the client-end for all prevalent platforms. The availability of ready-to-use, publicly available, user-friendly graphical web browser for all prevalent platforms eliminating the need of extensive support and user's training. Standard WWW clients such as Netscape Navigator and Internet Explorer are being upgraded regularly for added functionality such as e-mail client, support for JAVA and Active X and the ability to view important document formats without having to install plug-ins for them. HTML, the de facto language of the web, is extremely simple yet powerful tool for presentation of web-based services.

The static HTML web pages can be transformed into vibrant, dynamic and interactive web creations using ever evolving web technologies like CGI Script / Perl, Java, JavaScript, ASP, DHTML, XML and open database connectivity (ODBC) for delivering web-based services. The Internet and associated technologies, made it possible for web-based services to include multimedia objects such as text, image, audio and video. These technologies thus brought in the graphical components in web-based services that were missing in earlier full-text automated services. There has thus been a steady move up the technological scale for IT

applications in the libraries from online bibliographic databases and OPAC to low end electronic publications available as ASCII files, to being organized and searchable on gophers (1992), and to being tagged and graphically viewable full-text systems (digital libraries) on World Wide Web sites (1994). Side box 1 lists major shift in technology and its applications that led to the development of web-based library services. Side box 2 lists cultural and ideological shift consequent to major technological upheaval.

Side Box 1

Technological Changes: Web Technology

From Gopher to WWW

Gopher pre-dates the World Wide Web and could accommodate only text. A Gopher server presents its contents as a hierarchically structured list of files. With the ascendance of the Web, most Gopher databases are being converted to Web sites. World Wide Web is a system of Internet Servers that support documents formatted in HTML that support links to other documents, as well as graphics, audio and video files. There are several applications called web browsers that make it easy to access the WWW. Two of the most popular Internet browser are Netscape Navigator and Microsoft's Internet Explorer.

From CGI+Perl to ASP

Common Gateway Script (CGI) programming, often written in PERL, was the first method developed to processing data in web forms, and it still has place in development of complex web applications. However, several common task can now be accomplished using Active Server Pages Technology and VBScript. ASP Server Side Scripts are usually written in VBScript. ASP technology requires Windows NT Internet Information Server. Unix and complaint web server can use ASP with add-on available from Chili!Soft or other vendors.

From HTML to DHTML to XML

Hypertext Mark-up language (HTML), the de facto language of the web, is extremely simple yet powerful to use. Dynamic HTML is a set of technologies ranging from HTML extensions to programming features designed to allow web authors to create more interactive pages that respond to user's actions. XML (Extensible Mark-up Language), developed especially for web documents by the W3C, is a pared-down version of SGML. It allows designers to create their own customized tags, enabling the definition, transmission, validation, and

interpretation of data between applications and between organizations. Whether XML eventually supplants HTML as the standard Web formatting specification depends a lot on whether it is supported by future Web browsers. Microsoft Internet Explorer version 5 handles XML, but renders it as CSS.

Technological Changes: Scripting Languages

JavaScript

JavaScript codes are embedded in HTML documents and run on the browser side. JavaScript provides interactivity to a web page so essential for digital library implementations. As oppose to VBScript, JavaScript is usually used for client-side validation. Java, Java Applets and Servlets Java is an object-oriented language similar to C++, but simplified and made suitable for the web. Compiled Java code can run on most computers. Small Java applications are called Java applets and can be downloaded from a Web server to run on client machine. Applets that runs on a server are called Servlets. Java servlets are becoming increasingly popular as an alternative to CGI programs.

Technological Changes: Network Technology

From Host-terminal to Client-Server / Peer-to-Peer Architecture

Most online search services worked on host / terminal architecture where a centralized mainframe host is accessed by relatively dumb character-based terminals. In network based Client-server architecture, servers are powerful computers or processes dedicated to managing disk drives hosting resources. Clients are PCs or workstations on which users run client applications to access resources on the servers. Peer-to-peer is another type of network architecture where each node has equivalent responsibilities. Both client / server and peer-to-peer architectures are widely used, and each has unique advantages and disadvantages.

From IP Validation to Patron Validation

Most electronic publisher allow IP address authentication. Technologies are available that allow secure access to vendor’s server from legitimate patrons who are not on an institutional LAN. Use of CGI scripting / proxy servers allow a subscribing institution to authenticate patrons from its server and then pass them through to the vendors with the assurance that they are in fact legitimate costumers irrespective of their log-in location.

Technological Changes: Databases

Large Central Database to Distributed Smaller Databases

The technology now supports services from smaller distributed databases that are more manageable in comparison to large central databases. The scattered databases may have to be periodically synchronized to make sure that they all have consistent data.

From Online Search Services to Web-based Search Services

Most Online Search Services like DIALOG and STN now have web-based interfaces that makes them much easier for novice users to search.

Side Box 2

Cultural and Ideological Shifts

Ownership to Access on Demand

Accessibility of resources on the Internet has triggered a shift in the acquisition process from the policy of "Ownership" to "Ac cess on Demand".

"Just in Case" to "Just in time"

Traditional practices and policies of buying and storing journals in libraries on the basis of "Just in Case" are being challenged by the advent of full-text electronic resources causing a shift in acquisition from "Just in Case" to "Just in time".

Library as Physical Entity to Library as an Information System

With increase in digital resources available in libraries or accessible from a library, the libraries are being viewed not as a physical entity but as information system that facilitate access to electronic resources.

Collection Building in Anticipation to Need-based Collection Building

Increased availability of full-text electronic resources has caused shift to need-based collection building from collection building in anticipation.

Library as Provider of Information to Library as Intermediary Facilitator

With proliferation of network-based information resources made accessible through the libraries subject gateways, the librarians are being considered as information facilitator.

Technical Infrastructure:

Establishing digital library resources and services require a great deal of new technical infrastructure that is not available off-the-shelf as packaged solution. Use of open architecture and standard protocols, however, makes it possible that pieces of required infrastructure, be it hardware, software or accessories, are gathered from different vendors in the marketplace and integrated to construct a working environment. Several constituents of technical infrastructure established for generating and distributing web-based library services would be internal to the institutions, but several others would be distributed across the Internet, owned and controlled by a large number of independent players. The task of raising technical infrastructure for generating web-based library services, therefore, requires a great deal of integration of various components (Flecker, D., 2000). Technical infrastructure required for generating web-based library services can broadly be divided into the following three categories:

- Collection infrastructure
- Access infrastructure
- Hardware & Software Infrastructure

Collection Infrastructure:

The physical libraries are unlikely to get transformed into digital libraries. Most libraries would, however, acquire access to the ever-growing digital collections including those developed by scholarly societies and commercial organizations. A major portion of library's digital collection would be provided through external systems providing access to e-journals and other electronic resources. The libraries would, however, have significant local collections in digital form as it continue to digitise its local contents or acquire collections in digital form. The contents of a digital collection would come from different sources inside or outside the institution.

Acquisition of Digital Resources:

Availability of CD ROM, and more recently DVD ROM, as a media with high-storage capacity, longitivity and ease of transportation, triggered production of several CD ROM-based information products including several bibliographic databases which were earlier available only through online vendors or as abstracting and indexing services in printed format. Thousands of CD ROM databases are currently available from multitude of CD ROM producers including Silver Platter, which alone produces more than 200 CD ROM

information products. Moreover, several full-text databases also started appearing in late 1980s and early 1990s launching the beginning of a new digital era. Some of the important full-text digital collections available on CD ROM include: ADONIS, IEEE / IEE Electronic Library (IEL), ABI/INFORM, UMI's Business Express and Library and General Periodicals, Espace World, US Patents, etc. CD ROM networking technology is now available for providing web-based simultaneous access to CD ROM databases on the Local Area Network (LAN) as well as on Wide Area Network (WAN). More evolved technology allows caching the contents of CD ROMs on to a server, which, in turn, provides webbased simultaneous and faster access to the information contents of CD ROMs on LAN / WAN. The libraries have an option to subscribe to these full-text databases as a part of their digital resources.

Buying Access to Digital Resources:

The Internet has long been a favourite media for experimenting with electronic publishing and delivery. The technology is now available that allow creation of fully digitized multimedia products and their accessibility through the Internet. Technological changes, especially the Internet and web technology, continue to attract more and more traditional players to adopt it as a global way to offer their publications to the international community of scientists and technologists. Most of the important publishers now have their web-based interfaces to offer full-texts of their journals. Some of the major players in electronic full-text journal publishing include:

Elsevier Science Publishers (Science Direct)

Academic Press (Ideal Library)

Springer Verlag (Link Electronic Service)

American Chemical Society (ACS)

Wiley Interscience

American Physics Society (APS)

Total number of electronic journals, one of the corner stone of the digital library, available on the web has grown steadily from less than 10 in 1989 to 3634 in 1997 (ARL, 1997). These journals are made available through the web at varying price models. The electronic subscription to journals in most of the cases are linked to its printed counterparts, i.e. it may be offered free with print subscription (e.g. publications of American Society for Physics and

AIChE) or priced at a fixed % over the print subscriptions (e.g. journals published by Elsevier Science, Springer Verlag and IEEE) or it may also be offered exclusively in electronic media. Besides, electronic journals, there are several online databases that are now available through the web including Medline (several versions), AGRICOLA and ERIC (all free). Reference works like encyclopedia, dictionaries, handbooks, atlases, etc. are also making their electronic appearance on the web. However, amongst electronic resources created exclusively for the web, imbibing all features and facilities offered by the new technology, include web-based educational tutorials called "online courseware". The online courseware are proliferating the web as a strong contender for distant education. Telecampus, Canada (www.telecampus.edu/) lists more than 12,000 online courseware available on the web. Moreover, highly specialized web sites are now coming-up in various disciplines which offer information in totality including all kinds of resources in electronic format, EI Engineering Village (http://www.ei.org/), ISI Web of Science (http://www.isinet.com/), ACM Digital Library (http://www.acm.org/dl/) IEEE / IEE Electronic Library (http://www.ieee.org/ieeexplore/), Engineering Sciences Data Unit (http://www.esdu.com) are some of the important examples.

Conversion of Existing Print Media into Digital Format:

Several digital library projects are concerned with providing digital access to materials that already exists with traditional libraries in printed media. Scanned page images are practically the only reasonable solutions for institutions such as libraries for converting existing paper collection without having access to the original data in computer processible formats convertible into HTML / SGML or in any other structured or unstructured text. Scanned page images are natural choice of large -scale conversions for major digital library initiatives. Printed text, pictures and figures are transformed into computer-accessible forms using a digital scanner or a digital camera in a process called document imaging or scanning. The digitally scanned images are stored in a file as a bit-mapped page image, irrespective of the fact that a scanned page contains a photograph, a line drawing or text. A bit-mapped page image is a type of computer graphic, literally an electronic picture of the page which can most easily be equated to a facsimile image of the page and as such they can be read by humans, but not by the computers, under stably "text" in a page image is not searchable on a computer using the present-day technology. An image-based implementation requires enormous disc space for data storage and transmission. There are several large digital library

projects using page images as their primary storage format, including project JSTOR (www.jstor.org) at Princeton University funded by the Melon Foundation.

The project Jstor has a complete set of more than 120 journals scanned and hosted on web servers that resides at the University of Michigan and is mirrored at Princeton University. Using technology developed at Michigan, high resolution (600 dpi) bit-mapped images of each page are linked to a text file generated with optical character recognition (OCR) software. Linking a searchable text file to the page images of the entire published record of a journal along with newly constructed table of contents, indexes, permits high level of access, search and retrieval of the journal material previously unimaginable (Guthrie, 1997). Capturing page image format is comparatively easy and inexpensive, it is a faithful reproduction of its original maintaining page integrity and originality. The scanned textual images, however, are not searchable unless it is OCRed, which in itself is highly error prone process especially when it involves scientific texts.

Optical Character Recognition (OCR):

A scanned document is nothing more than a picture of a printed page. It cannot be edited or manipulated or managed based on their contents. In other words, scanned documents have to be referred to by their labels rather than characters in the documents. OCR (Optical Character Recognition) programs are software tools used to transform scanned textual page images into word processing file. OCR or text recognition is the process of electronically identifying text in a bit-mapped page image or set of images and generate a file containing that text in ASCII code or in a specified word processing format leaving the image intact in the process. The OCR is performed in order to make every word in a scanned document readable and fully searchable without having to key-in everything in the computer manually. Once a bitmapped page image has gone through the process of OCR, a document can be manipulated and managed by its contents, i.e. using the words available in the text.

OCR does not actually convert an image into text but rather creates a separate file containing the text while leaving the image intact. There are four types of OCR technology that are prevailing in the market. These technologies are: matrix matching, feature extraction, structural analysis and neural network.

Matrix / Template Matching: Compares each character with a template of the same character. Such a system is usually limited to a specific number of fonts, or must be “taught” to recognize a particular font.

Feature Extraction: Can recognize a character from its structure and shape (angles, points, breaks, etc.) based on a set of rules. The process claims to recognize all fonts.

Structural analysis: Determines characters on the basis of density gradations or character darkness.

Neural Networking: Neural networking is a form of artificial intelligence that attempts to mimic processes of the human mind. Combined with traditional.

OCR techniques plus pattern recognition, a neural network-based system can perform text recognition and "learn" from its success and failure. Referred to as "Intelligent Character Recognition", neural network-based systems are being used to recognize hand-written text as well as other traditionally difficult source material. Neural network ICR can contemplate characters in the context of an entire word. Newer ICR combines neural networking with fuzzy logic.

Access Infrastructures:

An effective and efficient access mechanism that allow a user to browse, search and navigate digital resources becomes necessary as electronics resources of a collection grow in number and complexion. The access infrastructure for a digital resource consists of webPACs, multi-webPACs for library catalogues, specialized collection web sites for specialized image -based local collection, portals or subject gateways for web resources and a search and browse interface for local collections.

Search and Browsing Interfaces:

The search interface provides a visual window for users to search relevant information stored in a digital resource. Designing interfaces for digital resources involve use of principles and practices of information management with rapidly evolving technological developments. The interfaces should maximize the interaction with information resources and minimize their attention to the system itself. Moreover, a web-based interface should support both browsing and searching strategies. Marchionini (1998) prescribes following goals for designing an interface for a digital library:

- Minimize disorientation by reducing navigation and anchoring users in a consistent context;

- Provide primary information at the earliest point in the interaction as possible instead of forcing a user to navigate through deep menu hierarchies or execute a query; and
- Support rapid relevance decisions through over viewing and previews.

New developments in web technology allow creation of user-friendly interfaces providing features and facilities hitherto impossible in traditional command-based or menu-based search interfaces. Several important search components that a user had to input in a menu-based or command-based interfaces can be given in selection / combination boxes or radio buttons for a user to select from. New opportunities and better search interfaces in the web environment has attracted many online search services to migrate to the new technology. Some of the important features that most digital library implementations provide in their search interfaces include:

1. Distinct option for browsing / searching the digital contents;
2. Searching the digital library contents with one or more of the following restrictions provided as radio buttons / selection boxes / combination boxes:

    a. Range in terms of number of years;

    b. A predefined collections / category of documents or all documents;

    c. Searching a given digital library or search the Internet for a given subject;

    d. Select maximum number of hits desired; and

    e. Sort results (by author, title, jour nals, etc.)

Besides search interface, a browsing interface is also a necessity for a digital resource to give a user a sense of the amount and variety of material and the attributes of these materials available in a digital library. Taking advantages of flexibility of electronic presentation, digital libraries can have several options for browsing the collection. Browsing helps a user in selecting collection and locating sets of items in a collection with similar attributes. It helps a user to learn about the collection in general, topics covered and kinds of material available in a digital collection (Marchionini, 1998). Thus helping them to formulate their search queries. The browsing facility may have a combination of attributes, which may include, year, type or format of material, topics or subject, physical or geographical locations, etc. Browsing options for a digital resource can be dynamic query-based interface or table of content (ToC) interface based on directory and file structure of the site.

Information Retrieval:

A typical digital library implementation may employ a variety of information retrieval techniques including meta-data searching, full-text document searching and content searching or combination or two or all of them. Information retrieval is made more effective and user's-friendly by pre-processing digital documents to extract additional metadata before storing them in a database. The database is then configured to generate indices from selected fields including author(s), titles, abstracts, etc. or it may also be configured to generate indices from the full-text articles with a pre-defined stop-word list. The success of information retrieval can be measured in terms of percentage of relevant. "Contents" or "Table of Contents" (ToC) primarily extend a browsing interface to the users although search can also be restricted to the ToC in a digital library implementation.

Portal or Knowledge Gateways:

The portal sites or subject gateways redirect a user to the site holding the original material. A detailed description of portals or subject gateway is given under "Newly added Web-based Services" in this article.

Hardware and Software Infrastructure:

A typical digital library in a distributed client-server environment consists of hardware and software components at server side as well as at client's side. Clients are machines that are used for accessing digital library by users while the server hosts databases, digital objects, browse and search interfaces to facilitate its access.

Server-side Hardware Components:

Servers:

Servers are the heart of a digital library. Server for digital library implementation need to be computationally powerful, have adequate main memory (RAM) to handle the expected work, have large amount of secure disc storage for the database(s) and digital objects and have good communication capabilities. A digital library may need a number of specialized servers for different tasks so as to distribute the workload on to different servers. It would require one or more library server(s) to host indices and databases and one or more object server(s) to store digital objects and other multimedia objects. However, for a smaller library, many distinct activities can be performed on a single server. It is important that the server is scalable (such

as Sun Enterprise Server) so that additional storage, processing power or networking capabilities can be added wherever required.

Input Devices:

Image-based digital library implementation requires input devices like scanners, digital cameras, video cameras and Photo CD systems. A large range of choices is available for these image capturing devices. Scanners are available in all sizes and shapes. Flatbed scanners or digital cameras mounted on book cradle are more suitable for libraries.

Storage Devices:

Since digital libraries require large amounts of storage, particular attention needs to be given on the storage solution. Digital library collections that are too large to store entirely on a disk use hierarchical storage mechanisms (HSM). In an HSM, the most frequently used data is kept on fast disks while less frequently used data is kept in near line such as an automated (robotic) tape library. An HSM can automatically migrate data from tape to disk and vice-versa as required. Intelligent storage networks and snap servers are now available in which the physical storage devices are intelligently controlled and made available to a number of servers. Although hard disc (fixed and removable) solutions are increasingly available at an affordable cost, optical storage devices including WORM, CD-R, CD ROM, DVD ROM or optomagnetic devices in standalone or networked mode, are attractive alternatives for long-term storage of digital information. Optical drives record information by writing data onto the disc with a laser beam. The media offer enormous storage capabilities. A number of RAID (Redundant Array of Inexpensive Disks) models are also available for greater security and performance. The RAID technology distributes the data across a number of disks in a way that even if one or more disks fail, the system would still function while the failed component is replaced.

Communication Devices:

Setting-up a digital library also require communication equipment like communication switches, routers, hubs, repeaters, modems and other items required in a Local Area Network. These hardware and software items are required for setting-up any network and are not specific to a digital library.

Server-side Software Components:

A typical digital library require a number of software which may be obtained as a single integrated package from a single vendor or it may be a system with components added onto an open architecture framework. IBM Digital Library and Elsevier's Science Server are amongst very few integrated digital library solutions that are commercially available. IBM Digital Library (Hulser, 1997) is an integrated solution for storage, management and distribution of all types of digital contents including text, images, audio and video. It incorporates functions of creating & capturing, storage & management, search & access, distribution and right management of digital intellectual contents in an open, scalable, multi-platform environment such as Windows NT and AIX. The IBM Digital Library's successful installation include: ISI Electronic Library Project, Indiana University School of Music, Case Western Reserve University and the State University System of Florida.

Elsevier's Science Server (Science Server, 1999) provides an effective and powerful information system that provides an integrated access to databases and digital collections hosted on the local intranet servers as well as other international bibliographic and full-text databases that the Library is authorized to use. In effect, it provides easy and centralized access to multiple information sources including local intranet resources (local electronic journals & abstracting and indexing services) and remote subscribed Internet services (electronic journals and online databases) through a single interface. Science Server offers tools to create a fast, powerful system with proven scalability and performance, browsing and full-text searching capabilities from a single intuitive web interface. The Science Direct supports several platforms including Sun Solaris, Digital Unix, HP UNIX, IBM AIX, UNIX and Windows NT. A number of digital libraries are being constructed at present utilizing a mixture of information retrieval, media management and web server packages. All these pieces of software need to be integrated so as to present a cohesive environment and to avoid problems with growth and expansion. Some of the important software used in construction of a digital library are:

Web Servers:

Setting-up a web-based digital library requires a web server program. Many server programs are available for different platforms, each with different features and cost varying from free to very expensive. Some of the important web server programs are HTTPD (NCSA), Apache 6.0, Jigsaw 2.1.1, Netra, and Internet Information Server (IIS).

Image Capturing or Scanning Software:

The process of converting a paper document into a computer-processible digital image is done using a software variably called document imaging system, electronic filing system or document management system, etc. Several document management software are available in the market. A simple scanning software also comes with the scanners.

Image Enhancement and Manipulation:

The captured images may need manipulation to enhance their quality. Some of the image enhancement features include: filters, tonal reproduction, colour management, touch, crop, image sharpening, contrast, transparent background, etc. Important image enhancement packages include Adobe's Photoshop 5.5 and Paintshop Pro 6.02.

Information Retrieval:

Internet search engines may be used on their own or be connected to an integrated library system or DBMS to provide a fully searchable collection. All Internet search engines are basically free text search engines, i.e. they index each and every word in a document. Important search engines that can be downloaded for installation at the local site (free of cost) or can be interfaced to a local site for search are: ICE: Indexing Kit for Web Servers, Extropia, Oingo Free Search, Swish-E, Web Search, WhatyoUseek intraSearch, Excite, Google, etc. Besides, a number of information retrieval software packages offer global finding aids that make an entire digital collection more accessible, i.e. without sacrificing the metadata and thesauri of each individual resource. These packages are: KnowledgeCite Library, Database Adviser, Pharos, Northern Light, etc.

Optical Character Recognition (OCR) Software:

Most document imaging software have OCR package in-built. However, OCR packages are also available as separate utilities. Important OCR packages are: Text Bridge (Xerox) and OmniPage (Caere).

Database Management Software:

The database management software provides structured storage and retrieval facilities to the contents of a digital library. Digital libraries use a variety of database management system ranging from relational and extended relational database management systems to object-oriented database systems. Relational DBMS are most often used for the storage of metadata

and indices with attributes that contain pointers to files in a file system. Most of the commercial RDBMS also support storage of binary large objects (BLOBs). Object-oriented database systems are slowly gathering acceptance. The relational DBMS software that can be accessed by using SQL (structured Query Language) are: Oracle, Informix, Sybase, SQL Server, etc.

Client-side Hardware & Software Components:

Clients are the machines that reside on the user's desks. Planners of the digital library, therefore, need to prescribe minimum level of hardware and software that a user would require so as to achieve efficient and effective interaction with the digital library. Most digital library require an Internet-enabled multimedia PC (or Machintosh) equipped with an Internet Browser like Internet Explorer or Netscape Navigator as their clients. The client-side PCs may also require the following software packages (plug-ins) to download format-specific deliverables from a digital library.

Characteristic nature of information:

Purpose:

Information, in essence, does not constitute a specific or specialized area; it is not a particular discipline or field. Rather, information is the basis of all communication; it is used in the process of categorizing our environment helping us to cope with it. Therefore, the study of information in all its aspects pertains to many disciplines: from Science to Philosophy. Information allows us to think about reality, as well as to communicate our thoughts about it. Depending on one's point of view, information represents reality or is used to construct it. In either case, when you are deprived of information, the world becomes darker and oppressive. Without information, without records, reports, books, news, education, etc, the reach of experience trails off into the shadows of ignorance. Therefore, information accomplishes a two-fold purpose.

First, information conveys our representations of reality. Second, information is destined to (be communicated to) someone or something. These two aspects of information, though distinct, are nevertheless not separated---one does not exist without the other. At first we may well presume that a token of information is simply a factual representation of reality, but representation of reality to whom? The act of representing something as a piece of knowledge implies the separate existence of the thing being represented and the representation of the

thing, between the known and the knower. What happens here is already a form of communication: the representation of an object communicates the existence of the (known) object to the knower who recognizes the representation.

The structure of information:

Semiotics When we look at the world and study reality, we see order and structure everywhere. There is nothing that escapes description or explanation, even in the natural sciences where phenomena appear sometimes catastrophic, chaotic and random. A good example of order and information are our roads. Information can be delivered by signs. Drivers know that signs are not distant things, but they are about distant things in the road. What signs deliver are not things but a sense or knowledge of things---a message. For information to work that way, there have to be signs. These are special objects whose function is to be about other objects. The function of signs is reference rather than presence. Thus a system of signs is crucial for information to exist and be useful in a world, particularly for the world of drivers! The central structure of information is therefore a relation among signs, objects or things, and agents capable of understanding (or decoding) the signs. An AGENT is informed by a SIGN about some THING. There are many names for the three parts of this relation. The AGENT can be thought of as the recipient of information, the listener, reader, interpretant, spectator, investigator, computer, cell, etc. The SIGN has been called the signal, symbol, vehicle, or messenger. And the about-some-THING is the message, the meaning, the content, the news, the intelligence, or the information. The SIGN-THING-AGENT relation is often understood as a sign-system, and the discipline that studies sign systems is known as Semiotics. Because we are animals who use language in almost all aspects of our existence, sign and symbol-systems are normally second nature to us---we are usually not even aware that we use them! However, they can come into focus in circumstances where an object oscillates between sign and thing or suddenly reverts from reference to presence. This play on signs as things belongs to a tradition of figure poems, represented in the USA by John Hollander and illustrated by “Kitty: Black Domestic Shorthair”. Within the silhouette of Kitty there is a tale of cats.

The play on signs has also been used extensively in Surrealist and Pop Art (e.g. Magritte and Warhol), often to highlight a conflict between reference and presence and modern music (e.g. sampling in Hip Hop). However, an intelligent informatics student would understand that an object is not simply a sign or a thing; context specifies whether it is one of the other. Unfortunately, our context depends on our current needs and standpoints. The purpose of our actions is also shaped by context. It is not good to steal food for the pleasure of stealing food. However, if we are hungry, we have no money and other resources for obtaining food, stealing food cannot be judged as a bad action. It is the consonance of context that makes the world or reality coherent. Hence in addition to the triad of a sign-system, a complete understanding of information requires four elements: an AGENT is informed by a SIGN about some THING in a certain CONTEXT. Indeed, (Peircean) semiotics emphasizes the pragmatics of sign-systems, in addition to the more well-known dimensions of syntax and semantics. Therefore, a complete (semiotic) understanding of information studies these three dimensions of sign systems:

- Semantics: the content or meaning of the SIGN of a THING for an AGENT; it studies all aspects of the relation between signs and objects for an agent, in other words, the study of meaning.
- Syntax: the characteristics of signs and symbols devoid of meaning; it studies all aspects of the relation among signs such as their rules of operation, production, storage, and manipulation.
- Pragmatics: the context of signs and repercussions of sign-systems in an environment; it studies how context influences the interpretation of signs and how well a sign-system represents some aspect of the environment.

As we shall see throughout this course, Informatics understood as Information Technology deals essentially with the syntax of information, that is, with issues of data manipulation, storage, retrieval, and computation independently of meaning. Other lesser-known sub-fields of Informatics deal with semantics and pragmatics, for instance, Human-Computer Interaction, Social Informatics and Science Informatics as well. In our presentation of sign systems, we left the concept of AGENT rather vague.

An agent can be a cell receiving a biochemical message, or a robot processing some visual input, but it is typically understood as a person. Moreover, it is not true, that any person (or agent), faced with a sign in a certain context, can recognize what the sign is about. It takes

intelligence to do so, normal intelligence for customary signs, unusual intelligence when the signs are extraordinary. Therefore, by an AGENT we mean someone or something with the intelligence or capability to produce and process information in context.

Types of Signs:

Signs carry information content to be delivered to agents. However, it is also useful to understand that some signs are more easily used as referents than others. In the beginning of the 20th century, Charles Sanders Peirce defined a typology of signs:

1. Icons are direct representations of objects. They are similar to the thing they represent. Examples are pictorial road signs, scale models, and of course the icons on your computer. A footprint on the sand is an icon of a foot.

2. Indices are indirect representations of objects, but necessarily related. Smoke is an index of fire, the bell is an index of the tolling stroke, and a footprint is an index of a person.

3. Symbols are arbitrary representations of objects, which require exclusively a social convention to be understood. A road sign with a red circle and a white background denotes something which is illegal because we have agreed on its arbitrary meaning. To emphasize the conventional aspect of the semantics of symbols, consider the example of variations in road signs: in the US yellow diamond signs denote cautionary warnings, whereas in Europe a red triangle over a white background is used for the same purpose. We can see that convention establishes a code, agreed by a group of agents, for understanding (decoding) the information contained in symbols. For instance, smoke is an index of fire, but if we agree on an appropriate code (e.g. Morse code) we can use smoke signals to communicate symbolically.

Clearly, signs may have iconic, symbolic and indexical elements. Our alphabet is completely symbolic, as the sound assigned to each letter is purely conventional. But other writing systems such as Egyptian or Mayan hieroglyphs, and some Chinese characters use a combination of phonetic symbols with icons and indices. Our road signs are also a good example of signs with symbolic (numbers, letters and conventional shapes), iconic (representations of people and animals) and indexical (crossing out bars) elements.

Finally, it is important to note that due to the arbitrary nature of convention, symbols can be manipulated without reference to content (syntactically). This feature of symbols is what enables computers to operate, as we shall see throughout this course. As an example of

symbol manipulation without recourse to content, let us re-arrange the letters of a word, say "deal": dale, adel, dela, lead, adle, etc. We can produce all possible permutations (4! = 4×3×2×1 = 24) of the word whether they have meaning or not. After manipulation, we can choose which ones have meaning (in some language), but that process is now a semantic one, whereas symbol manipulation is purely syntactic. Another example is the (beat) word cut-up method of generating poetry pioneered by Brion Gysin and William Burroughs and often used by artists such as David Bowie. All signs rely on a certain amount of convention, as all signs have a pragmatic (social) dimension, but symbols are the only signs which require exclusively a social convention, or code, to be understood.

Role of electronic devices in scholarly communication:

For use in the education process can be electronic communication summarized to:

- Information - is available to a wealth of communication
- Presentation - anything-can present yourself, your company, school, but also study materials, the results of scientific work, etc.
- Communication - it is possible to create an enabling environment for all participants to communicate with each other in real time.

Participants will hear and see, they can write and draw on shared whiteboard, they can exchange ideas, help each other. If necessary, they can also control each other. The didactic use of Internet features and capabilities is necessary for teaching the use of certain capital assets to ensure transmission of information between the sender and recipient (e.g. Chromy & Drtina, 2012). The basic software tools called Internet services.

Basic Internet services - Web site in communication:

The benefits of web communication include:

x Low cost - issuance of electronic textbooks and publications is economically feasible even if a small circle of readers, while sometimes printed publications are not sold out despite the small load.

- Simple publishing - authors can self-publish e-publication and distribution of the costs are significantly, lower than in other forms and publications.
- x The availability - electronic publication may be available via the Internet anywhere in the world. You can ensure effective protection of copyright by software.

- Support for media - educators can prepare students for a tailor-made texts textbooks, and can classify them into multimedia applications (various media and interactive links). The publication can place links to other resources located externally, such as on the Internet.
- A benefit for handicapped - can enable the computer program controlling a mouse or voice, reading a written text for the visually impaired using a computer program, etc.

The list of benefits suggests that the benefits of e-books are essential and can be the basis for a positive prognosis for their future development. In this context, it should be noted that the electronic text, which is possibly equipped with a multimedia extension, it is really powerful and effective tool in the hands of teachers, but it is advisable to ensure its inclusion in the process of teaching (e.g. Chromy & Drtina, 2012). In any case, it can´t not be considered and proceed without prior definition of the concept of teaching. In terms of communication are the foundations of web pages rather one-way communication. The minimum two-way communication is necessary to adjust Web sites such as the inclusion of at least one optional element that will be the sender of a communication means to evaluate. This can be a traffic count at least part of individual web pages or the inclusion of simple questionnaires using closed answer. One of the most used and old Internet service is electronic mail. It represents an inexpensive, fast and convenient replacement for postal mail.

Moreover, by e-mail can send files that contain only static media (text and images immobile), but also files containing dynamic media (audio, moving images). Audio and video recordings are now a common part electronic (e-mail) correspondence. A positive effect of such teaching is the ability to continuously monitor the specified seminar work and help students to focus on the issue, which is mainly in combined form of study for students invaluable. There are also easier using e-mail. For example regular sending of documents will enable students to prepare for teaching. This opportunity of educator is not suffer because only sends initial messages and get feedback from students to the classroom. Students can print documents need not be addressed in the course of teaching writing and drawing, and can focus more on interpretation.

On-line communication:

In teaching, and in activities that relate to it, every teacher must have a certain amount of support. This support is characterized by being individualized, and must allow a relatively wide range of activities. In analysing the functions this support should fulfil, it is necessary to

begin with the main activities that make up the instructor's total teaching experience (e.g. Hubalovsky & Sedivy, 2011). Consequently, it is necessary to combine the various functions of support for the teacher's activities into one system that will be interactively available in all the required moments. (E.g. Hubalovsky & Sedivy, 2011). It is describes this as Computer Managed Instruction (CMI). Representative of older hypertext documents (web pages) are the programmed textbooks, recommending that students go to other parts, such as by the accuracy of answers to given questions, as described in (e.g. Hubalovsky 2011). Programmed learning thus avoided the Internet (Arpanet network was 1969). At present, we can say that, conversely, the Internet, especially websites provide very effective support of programmed learning. Websites were at the origin of e-learning and blended learning, which will also be addressed. Very special web pages are analogous to electronic journals designated e-zine or book called e-book. Electronic text can be defined as a digital file with specific content that is not merely a text file. It may contain in addition to text and image content and navigational aid. The benefits include:

- Low cost- Simple publishing
- The availability of- Support for media
- A benefit for handicapped.

The list of benefits suggests that the benefits of e-books are essential and can be the basis for a positive prognosis for their future development. In this context, it should be noted that the electronic text, which is possibly equipped with a multimedia extension, it is really powerful and effective tool in the hands of teachers, but it is advisable to ensure its inclusion in the process of teaching. In any case, it can´t not be considered and proceed without prior definition of the concept of teaching. In terms of communication are the foundations of web pages rather one-way communication. Newsgroups or discussion groups are very similar to mailing lists. They differ but the overall procedure, as a way of registration and login and exploited environment. Newsgroups are usually used by websites. Another possible use is for consultation as students combined study. For learning groups, especially larger ones, are these options on-line communication virtually unusable. In particular, social networking, but also other possibilities of electronic communication, incl. play network games, also lead to a loss of most of free time, especially children, and consequently to their addiction. This time they have left on the innate way of communication, which could lead to problems in interpersonal relationships. Electronic communication, often with strangers, can lead to changes in the system of values, loss of inhibitions, increased openness and the

corresponding consequences (e.g. Hubalovsky, 2012). On the one hand, we do not know whether the one with whom we communicate is who they claim to be. This is supported by the use of nicknames, called nicknames. Under the appropriate nick knows the relevant user community but do not know his real name, even as sex. People who know the name of the contrary, you may not know the appropriate nick. This may partially lose their identity. On the other view for many people, which will to tell various important information from their life. If we were to use the on-line communication have decided we must respect the basic didactic aspects of teaching. In the electronic environment can be used in addition to such other technologies that are specifically created for teaching using the Internet and computer networks. Examples are:

- LMS (Learning Management System) - includes features for managing the activities of students, evaluation, and monitoring their activities, etc.
- LCMS (Learning Content Management System) - contains functions for creating course content, their import, export and sharing. Vastness of the Internet and the huge number of available resources are prerequisites for its use in teaching.

However, we must realize that when searching for important and informative information can also come across the pages of dubious levels, even downright illegal sites which may impair the mental and moral development, particularly youth (promotion of racism, violence, etc.). The educational system must also use the Internet to teach, among other things fulfill three important functions in the teaching process:

- To provide information,
- Give instructions, additional guidelines for information processing,
- Obtain feedback on the information processing.

Basic assumptions and Internet services allow the introduction and use of online study in this environment. Significantly, this study is usually finely detailed and if it uses the above possibilities of online communication are those observed basic didactic aspects of teaching. Advantages of e-learning consists in saving time, individualizing instruction, objective feedback and usability not only for teaching but also for the transmission of information, in which the emphasis is on their way transmission. Important for the use of e-learning is that there is no significant difference in relation readiness in the use of e-learning and the age of the students, as shown in a survey of high school students, described. This means that you can expect seamless use of e-learning students. Educators as the other side of didactic

communication within teaching (e-learning), a central value of easy updating of training materials, the possibility of a permanent two-way contact with students. Surprisingly note that interest in contact with the teacher is the on-line system, is significantly larger than in classical studies. It's only an alternative in many areas suitable complement classical mode. Educators in the creation of e-learning realize the basic didactic aspects of teaching (e.g. Hubalovsky 2012). A similar view and provides some reservations pedagogical-psychological nature that appear in e-learning. He mentions, for example, the promotion of technology in education at any cost, that affects the very understanding of e-learning. The original understanding of "e-learning is an educational process, coupled with a computer" to New "e-learning is the use of multimedia technologies and the Internet to promote the quality of the educational process." Newer understanding that defines the role of e-learning in teaching, i.e. its application wherever there is a shift in the quality of the educational process. Further developments shifted the understanding of the notion of e-learning in the current approach to the concept of teaching without full share of its forms. This is advantageous from the viewpoint of maintaining the "purity" of definitions of terms. This is based on the fact that full-time teaching only "live" teacher is different from full-time teaching, which forms an important part of teaching using electronic communication options, and both are different from teaching only to the use of electronic communication capabilities. They differ in many respects, including:

- The preparation of teaching
- Used didactic means
- Teaching style of the teacher
- Learning style of the student

Based on the above was another concept of blended learning, which we in the narrower sense, understood as a combination of e-learning and other non-electronic (especially full-time) forms of learning at different rates, depending on the objectives and other didactic aspects of teaching. In a broader sense, the term can be understood as the combined instruction, the combination of full-and part-time forms. The issue of teaching in the context of dealing with a number of author. About creating custom web applications to support teaching and use of the possibilities offered by different programs and databases, discusses a number of domestic and foreign authors. Some say a brief overview of options that allow modern web technologies and databases. When learning from the Internet can lead to all kinds of communication noise. In electronic communication usually lack non-verbal

communication, which would effectively support the encoding passed message. Even, if the video is only visible part of the second caller, usually also poorly. Text Communication provides for necessary brevity usually only clean content of the communication, and thus may lead to its connotation, and then the communication noise. E.g. even seemingly simple sentence "Today is warm." can be decoded in two ways, if we do not know the context. Forms of redundancy needed for better communication passed decoding is disappearing due to aforementioned brevity. To some extent this can be replaced by using emoticons, but this leads to the suppression of natural language, see above. Significant problems in the social sphere are also related to the digital divide and the resulting uneven current opportunities for all people in a globalized world (e.g. Sedivy & Hubalovsky 2012).

Problem Formulation:

Vastness of the Internet and a huge number of usable resources are prerequisites for its use in teaching. We note, however, that prolonged sitting at a computer can lead to the following: Meeting with pages of dubious levels in adolescents- some sites can like some computer games lead to loss of ability to distinguish between real world and reality, or extremely motivated, and thus provide the basis for addictive behavior. There are restrictions on movement and thereby adversely affecting the spine, circulation, sight, etc. Educators must be able to show how to work with information as to evaluate how to communicate with other people, how to create new digital documents. This is just part of the requirements that determine not only the use of the Internet, but the media and multimedia in teaching. Students with different learning styles prefer different media and different styles of practice. From the above it is clear that learning styles play an important role in teaching using the Internet.

Problem Solution:

Research was conducted at three universities in the Czech Republic. Its aim was to map the potential conflict between the demands of students and teaching experience (opinions) teachers. The first hypothesis was that students will prefer learning with the use of certain Internet services that enable more "dynamic" and online communications, such as Facebook. The second hypothesis was that teachers will prefer more "static" form of communication that is based on pedagogical principles. It is also easier to create learning materials. For this occasion, we also conducted benchmarking exercise against the interest of students and teachers of learning using mobile devices (mobile phone, iPad). The third hypothesis was that

students would prefer the monitors. Teachers will hesitate between iPad and non-use of mobile devices in teaching.

Trends and scholarly communication:

Concept and Definition:

Scholarly communication is frequently defined or depicted as a lifecycle documenting the steps involved in the creation, publication, dissemination and discovery of a piece of scholarly research. Scholarly communication covers a wide spectrum of activity, broadly in two areas – publishing and disseminating the results of research, and providing access to the published material. Roosendaal and Geurts (1997) describe scholarly communication in terms of five main forces and their interplay:

- Registration, which allows claims of priority for a scholarly finding.
- Certification, which enables the validity of a registered scholarly claim.
- Awareness, which allows scholars to remain aware of new claims and findings.
- Archiving, which preserves the scholarly record over time.
- Rewarding, which rewards actors for their performance, based on metrics derived from the scientific system.

ACRL (2015) defines scholarly communication as "the system through which research and other scholarly writings are created, evaluated for quality, disseminated to the scholarly community, and preserved for future use. The system includes both formal means of communication, such as publication in peer-reviewed journals and informal channels such as electronic listservs. Bhaskar (2009) defined scholarly communication as formal and informal connections among scholars and disciplines.

Role of Scholarly Communication in Research:

Menzel (1958) summarized the seven roles of scholarly communication in research:

1) Providing answers to specific questions.

2) Keeping scientists updated about new developments in their fields.

3) Helping scientists to acquire an understanding of new fields.

4) Verifying the reliability of a source of information by additional testimony.

5) Providing scientists with a sense of the major trends in their fields.

6) Providing scientists with feedback on their own work and its relative importance within the research field.

7) Redirecting or broadening the span of interest and attention of scientists.

Characteristics of Scholarly sources:

Sources Scholarly sources (also referred to as academic, peer-reviewed, or refereed) are written by experts in a particular field and serve to keep others interested in that field up to date on the most recent research, findings, and news. These resources will provide the most substantial information for writing research and papers. The authority and credibility evident in scholarly sources will contribute a great deal to the overall quality of the papers. Use of scholarly sources is an expected attribute of academic course work.

Scholarly Article:

The following list provides the features of a scholarly article:

1. Scholarly articles reflects the systematic and through study of a single topic and often involves original research, experimentation and surveys.
2. Scholarly article is written by researcher or expert in a field in order to share the results of their original research or analysis with scholarly community.
3. It has a clear structure so indicates that it is a scientific research study.
4. Structure here refers that scholarly articles will usually have an abstract followed by headings/sections indicating the study's purpose, design, results and discussion of findings.
5. Scholarly article uses advanced vocabulary and formal and technical language in compare to trade source and popular source having a professional jargon and plain and simple language respectively. Since the author follows the standard language they assume the reader already possesses a basic understanding of the field of study. That is why a higher level of education and knowledge is requires to understand the contents provided in scholarly articles.
6. A scholarly article will have an objective point of view and logical, argumentative tone with many citations to published research that support its claims.
7. These articles often go through a process known as peer review where the article is reviewed by a group of experts in the field

Scholarly Journal:

The following list provides the features of a scholarly journal:

1. A scholarly journal is a periodical that contains articles written by experts in a particular field of study. The articles are intended to be read by other experts or students of the field and are usually much more sophisticated and advanced than the articles found in popular magazines.
2. Scholarly journal provide a forum for the production and critique of knowledge.
3. Scholarly journals may also be called academic journals or peer-reviewed journals.
4. Titles of scholarly journals often contain the word "Journal", "Review", "Bulletin", or "Research". Example: Harvard Business Review
5. Many scholarly journals, though by no means all, are sponsored by professional associations, such as the American Chemical Society or the American Psychological Association.
6. Many instructors assign research papers or projects that require students to use articles in scholarly journals.
7. Scholarly journals generally have a serious look and lacks advertising.

Scholarly Communication Process:

1. Scholarly communication is the process that starts with a research idea that may be acquired from reading the work of other researchers and that certainly builds upon the work of others.
2. This is followed by the research work and writing of the manuscript and ends with a formal scientific publication that through peer review is accepted as an “extension of certified knowledge” or, in fact, ends with the scientific knowledge being used in society in, for instance, policy-making or product development.
3. All discussions related to the research idea, presentations and seminars, online or offline, between the moment of getting the research idea and when the manuscript is published as a scientific publication, are part of either informal or formal scholarly communication.
4. Although there are many aspects to scholarly communication, the formal scientific publication is crucial in every discipline. Kircz (1998) writes that “the scientific article is the object around which the whole fabric of writing, publishing, and reading is centered.”

5. While the scientific article is the repository of knowledge, citations place the article in time and connect it to earlier research.
6. There are several actors or stakeholders present at the various stages in this lifecycle, including researchers, funders, peer reviewers, publishers and of course, libraries.

Trends in Scholarly Communication:

Internet:

The Internet is not just about finding information; it also encompasses publishing, broadcasting, establishing networks and interactive services. With the introduction of software for hypertext navigation and display in 1993, it became a 'worthwhile tool for scholarly work'. Gradually it enhanced researchers' information handling capabilities offering them unimaginably ever growing Internet based products from hypertexts and hypermedia to the digital library and many more. The quality and credibility of Internet resources has been a concern in scholarly communication. For most scholars, the ways research is conducted, conveyed, and shared are far different today than just a few years ago. Now the technology-driven transformation of scholarship is on the horizon. Internet has affected the scholarly communication in following ways:

Knowledge sharing is possible via blog postings, announcements posted on institutional or professional web sites, or even via online video conferences/online meetings. Most of the sites are enabling researchers to build communities, then use logarithms to push relevant / important new research to the forefront of search results and in the process help people weed through mountains of publications to

(1) Find important research and

(2) Discover is one idea has already been researched.

There is more opportunity for scholars in small, underfunded, institutions to gain access to knowledge as anyone with Internet access can (a) set up an RSS feed and immediately learn of exciting new developments in their field, or (b) easily communicate with leaders in their field regardless of where they are located. Scholars are utilizing the Internet to do collaborative research with non-scholars. The web has also evolved from more static to user-oriented, interactive, and co- produced, increasingly informal, interactive, and part of a much larger public than earlier. Social and interactive tools that are easy to use are developed so that we can share information, pictures, photos, or ideas.

E-Publishing and interactive technology such as Wikis, enable scholars to jointly build educational tools. Discipline-specific Pre-Print Repositories (arXiv, RePEC), scholarly hub sites (Information for Practice) and open data - often locatable via data hubs – are providing scholars with one-stop shopping for information specific to an area of research. Scholars and institutions of higher education are sharing their knowledge via a multitude of sites from Internet Brand sites to institutional sites that host Open Educational content. Most of these sites also include Creative Commons Licenses, making it easy to learn about your rights to use or repurpose this content. Scholars and Librarians are providing people with tools that facilitate searching for quality research materials via tools like Open DOAR, Directory of Open Access Journals, Peel's Prairie Provinces or the Indigenous Studies Portal. Scholars of all areas are bringing their research to life with the wider world via the use of Social Media and via open invitations to learn from institutional resources. It enables scholars to identify new opportunities to acquire and share knowledge in manners heretofore unavailable to them.

E-Journals:

Many print journals have introduced their digital or online edition, popularly known as electronic journals. Electronic journals have many more functionalities than traditional print journals. E-journals are made available through online platforms of regional journal gateways or open access channel and they get worldwide visibility, readership and attract global authors contributing from other countries. Their print or online subscription in other regions can also be increased due to their increased global visibility and accessibility.

New journals with backing from scientific networks, special interests groups or scholarly societies are being launched around the world with new methodological approaches. Many of these journals have differentiated their approaches through innovations in delivery mechanism or in peer-reviewing process. Some of the journals have started open review system, inviting authors and reviewers in a common interactive platform for well articulation of arguments and two-way flow of ideas.

New career promotional principle of “Publish or Perish” (PoP) for scientists and academics, more particularly in the developing countries, forces many journals receiving poor quality manuscripts with errors in methodological, language, structural and theoretical frameworks.

The scholarly communication services are beginning to include greater support for research metrics. Access to and facility with publication data and associated tools has led to the development of bibliometric and other services which measure in some way the impact of

research conducted at the home institution. OA, institutional repositories, and Internet opportunities are making publishers look at new business models.

Library:

Academic and other research libraries clearly have a significant role in the scholarly communication process as information providers and access facilitators. Technological innovation in production and dissemination of scholarship, challenges to traditional publishing practices concerning business models and intellectual property management, and efforts to increase access to scholarship have presented opportunities for libraries to leverage their services and expertise to advocate for and bring about positive change.

Many publishers have open access models of their own, and academic libraries are building offices of scholarly communication and taking on formal publishing responsibilities in some cases as well. Many academic libraries today invest in scholarly communication – which typically includes, at a minimum, efforts to support and reformthe dissemination of research. These scholarly communications investments are designed to pursue an array of objectives and to serve a variety of roles. Three main fields in which librarians could contribute to scholarly communication are suggested by

Thomas (2013).These are: a. OA publication, that is, helping scholars in making their research accessible through OA journals and teaching them about the various models of OA; b. copyrights and agreements, including teaching scholars about fair use and how to copyright their materials, and assisting them with publisher agreements; c. research support, such as helping researchers evaluate the materials that they use and locate research grants, budgets, and support. In addition to training librarians for these tasks, it is also important to develop scholarly communication in academic libraries through a structured program that includes a range of activities. The first and foremost activity is to provide education and information to faculty, students and research scholars and to work closely with faculty members to understand their changing workflows and patterns of scholarly communication.

ACRL(2020) described the ways in which libraries have innovated their services and programs and tapped into their collective expertise to become less of a mere consumer of scholarly resources and instead a prominent actor and information producer in the scholarly communication lifecycle include: adoption of collection development policies and

reprioritization of collection development budgets to strategically support open scholarship and positively respond to economic challenges of traditional scholarly publishing development of tools or schema to assist in the evaluation of both subscription and open access journals. assistance to researchers with maximizing the impact of their research by supporting systems of researcher identification and promoting the use of altmetrics development and hosting of local publishing platforms utilization of the right of fair use, and advocating others to do the same, in order to promote preservation, access, use and discovery of materials in research and instruction education of authors on their intellectual property rights and assisting with the interpretation and amendment of publication contracts advocacy for open access to scholarship facilitation of compliance with funder public access mandates development and management of institutional repositories for the purpose of collecting, showcasing and maximizing discovery of institutional research output Further ACRL (2020) has provided means through which librarians can further engage in and learn about scholarly communication. These are participation in scholarly communication forums and presentations, reading original research etc.

Review questions:

1. What do you know about information resources?

2. Briefly explain about the role of electronic devices in scholarly communication.

3. Define e- journal.

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UNIT – 2

Electronic information resources

Objectives:

- To get introduced to electronic information resources.
- To get familiar with the definition, characteristics and types.
- To learn about the abundant information resources on the internet.

Introduction:

Rapid advancements in Internet and its related technologies have revolutionised the computer and communications world and have resulted in the widespread use of electronic information. There is an extremely wide variety of material on the Internet. Information is everywhere on the Internet, existing in large quantities and continuously being created and revised. This information exists in a large variety of kinds namely facts, statistics, opinions, interpretations, stories, etc. and is created to serve many purposes like to inform, to present a viewpoint, to sell or to persuade. Internet has thus become an effective communication medium enabling collaboration and interaction between individuals and their computers regardless of their geographic location. The most popular part of the Internet is the World Wide Web, where anyone can access hypertext pages with the click of a button.

The recent development and widespread deployment of the World Wide Web has led to a tremendous growth in the quantity of all types of publications. The World Wide Web (the "Web" or "WWW" for short) is a hypertext system that operates over the Internet. It is a collection of "Web pages" created by Hypertext Mark-up Language (HTML) and viewed by Web Browsers. A web browser is a program which retrieves pieces of information (called "documents" or "web pages") from web servers (or "web sites") and displays them on your screen. Web pages contain anything from personal information to broad topics of interest.

You can then follow hyperlinks on each page to other documents or even send information back to the server to interact with it. The act of following hyperlinks is often called "surfing" the web. The web has become a reliable and effective mechanism for information dissemination. It has provided a medium for collaboration and interaction between

individuals, through computers, regardless their geographic location. The web has grown to encompass a variety of information sources – electronic journals, electronic pre-prints, e-prints, technical reports, databases, library catalogues, educational materials, career sources, information on organisations, associations and so forth. In order to "publish" a web page, one does not have to go to a publisher or other media institution. One just needs access to a website either on his/her institute's web server or on one of the numerous websites that offer free space. Thus web technology offers an opportunity to "publish" information or make it available publicly on the Internet to anyone; and potential readers could be found in all corners of the globe. More and more individuals and institutions are increasingly using this opportunity to "publish" information on the net since it has become easier to write, publish, archive and disseminate information. Increasing number of commercial and society publishers are using the Internet as a global way to offer their publications to the international community of scientists and technologists. A large number of electronic resources of all kinds are appearing on the web. Today the Internet has established itself as the most widely-used information resource by all kinds of people for variety of reasons. A wide range of information resources are available on the Internet. In this unit we will discuss the documentary information resources which are available on the Internet.

Electronic information resources:

Definition:

An electronic resource is defined as a resource which require computer access or any electronic product that delivers a collection of data, be it text referring to full text bases, electronic journals, image collections, other multimedia products and numerical, graphical or time based, as a commercially available title that has been published with an aim to being marketed. These may be delivered on CD ROM, on tape, via internet and so on. Over the past few years, a numbers of techniques and related standards have been developed which allow documents to be created and distributed in electronic form. Hence to cope with the present situation, librarians are shifting towards new media, namely electronic resources for their collection developments that the documents of users are better fulfilled. The e-resources on magnetic and optical media have a vast impact on the collections of University libraries. These are more useful due to inherent capabilities for manipulation and searching, providing information access is cheaper to acquiring information resources, savings in storage and maintenance etc. and sometimes the electronic form is the only alternative.

Types of electronic information resources:

Primary sources:

Electronic Journals:

The term Electronic journals refer to any journal, magazine, newsletter or type of electronic serial publication which is available over the Internet. Electronic journals, also called "e-journals", are those journals and newsletters that are prepared and distributed electronically. With the Internet becoming a fast and easy mode of communication several traditional journals are now being published both on the Web and in print. Current issues or content lists for most of the journals are available on the Web or distributed to subscribers as e-mail text messages. The 37th edition of the Ulrich's International Periodical Directory (1999) reports that of total 1,57,000 serials listed in the Directory, 10,332 are available exclusively online or in addition to its paper counterpart. Publication of electronic journals is faster and economical and offers quicker access to desired articles. Table of contents as well as full text of journals are now available on the web. Electronic journals could be electronic versions of print journals, electronic versions only or journals accessible free on Internet. Some of the important journals available in full-text on the web are:

- D-Lib Magazine
- Ariadne: a print and Web magazine of Internet issues for librarians and information specialists.

Examples of Indian Journals freely available on the web are:

- Indian Journal of community medicine (full text)
- Indian journal of Pharmacology (full text)

Electronic Conferences:

Electronic conferences, variably known as electronic forums, electronic user group, listservs, discussion groups, form an ideal tool for collaborative or cooperative learning. Electronic-conferencing enable researchers and scholars to interact with each other and share

information and ideas without the constraints of time and location Electronic Conferencing can be synchronous (realtime) or asynchronous and includes (but is not limited to): discussion boards, chat rooms, instant messaging, e-mail, and white boards. In "real-time" synchronous conferences all participants communicate at the same pre-arranged time. (NetMeeting is one such program from Microsoft). Web conferences also take place in an asynchronous environment where participants logon to the conference site when convenient and respond to comments and concerns of other participants. Usenet newsgroups, also called bulletin boards, are e-mail conferencing systems in which messages are posted to Usenet sites or thousands of newsgroups worldwide. Millions of people around the world regularly read newsgroup messages, following their favourite topics of interest. New newsgroups are added and old ones deleted every day. Listservs are also called mailing lists or discussion lists. These are accessed by subscription.

A LISTSERV mailing list is handled by computer programs such as LISTSERV. It distributes messages from any member(s) to the whole group thus enabling communication within a large group of people. When e-mail is addressed to a LISTSERV mailing list, it is automatically broadcasted to everyone on the list. To subscribe to a listserv conference, one generally sends an e-mail message to the computer that maintains the subscription list. After subscribing, the subscriber receives a message that includes detailed instructions, commands and options available. There are more than 18,000 active listservs.

Listserves in the field of library and information science are:

Indian:

- Digital Library Research Group
- IASLIC (Indian Associaton of Special Libraries and Information Centers) List
- NCSI (National Center for Science Information) Lis-Forum
- NMLIS (New Millenium LIS Professionals)

International:

- ARL (Association of Research Libraries) E-Journal Forum
- IFLA General Discussion list for the IFLA community
- Open Source Systems for Libraries (OSS4LIB) Discussion list
- WWWISIS Discussion List

Online-Courseware and tutorials:

The web-based educational tutorials or guides are online courses that offer courses in various subjects online. These online courses provide distance learning irrespective of geographic boundaries. They also offer a higher degree of interactivity, flexibility and benefit of self-pace to the users. The online courses are the best example of technological, multimedia and instructional innovations designed to provide computer based training to users over the Internet. The courseware available on the Internet varies to great extent, in terms of their coverage and quality. It could be basic lecture notes and lecture support material to integrated and highly interactive tutorial packages. Some of these are tutorials focused on developing practical skills that can be applied immediately. These are electronic resources using all features and facilities offered by the new technology like graphics, animations and images etc. Institutions of higher learning are actively supporting the development and implementation of these computer-assisted instructions and multimedia courseware.

Patents and Standards:

Patents are specifications concerning the design or manufacture of products and processes that are protected and secured for the exclusive profit of the designer or inventor for a limited number of years that varies in different countries from fifteen years to twenty years. The department that controls the registration of patents in a country is known as the Patent Office. Most, Patent Office, provide full-text of patents registered in their respective countries through their web sites. Information on patent laws and filing procedures of various Patent offices located worldwide is also available on the web. All patents registered in US are available free of cost through the United States Patent and Trade Mark Office. A free e-mail service called "Patent Alert Service" is also available for the people interested in patents. Some important patent related sites are:

NIC Patent Cell	http://pk2id.delhi.nic.in/ sera.html
US Patents & Trademark Office	http://www.uspto.gov/main/ patents.htm
World Intellectual Property Organisation	http://www.wipo.org

Standards are agreed targets for performance, or an accepted format for the operation of a system. Standards are issued by various national and international organisations like BIS, ANSI, ISO, IEEE, and NIST. The information regarding these is available on the Internet. Some of these websites are accessible free while others require subscription on pay-per-transaction basis. Information regarding various national and international standardisation

activities and services is also available online. In India, Bureau of Indian Standards (BIS), an independent national body funded by the Government of India, is the largest originator of standards. Some web sites providing information on standards are as follows:

Bureau of Indian Standards http://www.bis.org.in/

British Standards Institution http://www.bsi-global.com/

American National Standards Institute (ANSI) http://www.ansi.org/

Electronic Preprints:

A preprint is a draft of a scientific research paper before peer review. There might be a succession of revised drafts, all preprints, until the final accepted draft. As peer review takes quite some time (several months to one year), preprints are the medium of choice to communicate current results within a scientific community. Even after publication, the draft might be further revised to correct errors. These post-publication drafts (including the official, accepted, published draft itself) are called post prints.

E-prints are either preprints or post prints in electronic form. E-prints are scientific or technical documents circulated electronically to facilitate peer exchange and scientific advancement. In certain research areas it is common to publish very specialised or technical results of temporary importance only as e-print without submitting them to a peer-reviewed journal as they are expected to become superseded during the review delay. It has benefits such as low cost, the reduction of time in announcing research findings, and the provision of access to all with Internet capability.

Ginsparg preprint archive (http://www.arXiv.org/) which started in 1991 has become a fundamental means of communication for a growing number of fields. It started with theoretical high-energy physics, later spread to other areas of physics, and now covers computer science and mathematics. A few examples of preprint servers in other disciplines are:

Open Archives Initiative http://www.openarchives.org/

PubMed Central http://www.pumedcentral.nih.gov/

Chemistry Preprint Server http://www.chemweb.com/preprint

Science News and Communication:

Science and research news are important sources of information for scientists and technologists. Several core disciplines have periodicals devoted exclusively to science, research and technical news for a given discipline. Some of the important resources on science and research news include:

UniSci: International Science News	http://unisci.com/
Combigenix News	http://www.combigenix.com/news/
The Scientific World News lab	http://www.thescientificworld.com/
Scoop! Personalised News Service	http://www.scoopdirect.com

Technical Reports:

A technical report is a document written by a researcher detailing the results of a project and submitted to the sponsor of that project. Typically, a technical report includes research about technical concepts. A technical report also follows a strict organisation. This way, when other researchers read it, they can quickly locate the information that interests them the most. These reports are not published in journals or conference proceedings. These documents are now being made accessible over the Internet.

Electronic Theses and Dissertations:

Electronic theses and dissertations (ETDs) consist of masters or doctoral research work that is submitted or archived electronically by an institution, either on an internal network or on the web. Although a large number of doctoral theses are submitted to every university each year but they are kept as closed-access collection. Several universities and institutions have already implemented electronic submission of doctoral dissertations under an international digital library initiative called “Networked Digital Library of Theses and Dissertations” (NDLTD).

The Networked Digital Library of Theses and Dissertations (NDLTD) is a project initiated at the Virginia Tech University and funded by the SURA and SOLINET. The NDLTD promotes electronic submission of doctoral dissertations and make them accessible to scholars the world over. The Virginia Tech has developed tools for students for submission of their electronic dissertations both as SGML and PDF. Vidyanidhi, University of Mysore, is a digital library and e-Scholarship portal that aims to be a national repository for Indian theses

and dissertations. IIT, Bombay, IIT, Kharagpur, and University of Hyderabad are also its members.

Software:

There are a large number of free software and scripts of all kinds and types available on the Internet. These software could be commercial demos, games, Internet tools, development tools, graphics and multimedia, various utilities and tools, etc. Most of the software are free, few are available for a limited period during which they can be downloaded and used. People can run, copy, distribute, study, change and improve the software under General Public License (GPL). Some of the sites that provide free software are as follows:

Downloads.com	http://download.cnet.com/
GNU Free Software Directory	http://www.gnu.org/directory/ listing.html
Freeware Home	http://www.freewarehome.com/
Engineering Software on the Internet	http://www.engcen.com/ software.html

Online Databases:

Bibliographic Databases:

Bibliographic databases contain references to articles (often with an abstract) but not the full text of articles. Bibliographic databases called general databases cover a very wide range of topics. Some are subject specific databases specialising in indexing the literature of a particular subject area. Increasing number of bibliographic databases with abstracts of chapter in books, journal articles and conference proceedings are now available on the web with added functionality and features. Some of the important online databases accessible on the Internet include:

INDMED	http://indmed.nic.in/
AGRICOLA	http://www.nal.usda.gov/ag98/
ERIC Databases	http://ericir.syr.edu/Eric/
PubMed Medline	http://www.ncbi.nlm.nih.gov/PubMed/
SciBASE	http://www.thescientificworld.com/scibase/

PubScience http://pubsci.osti.gov/

Full-text Databases:

Full-text databases are similar to bibliographic databases. In addition to citations, they also include the actual content of the item referred to by the article citation. For example:

– Elesevier Science Direct (sciences and social sciences) – scholarly

– American Mathematical Society Journals (mathematics) – scholarly

– Scientific Electronic Library Online [SCIELO]

Hybrid Databases:

Hybrid databases contain a mixture of references to articles and the full text of articles. EBSCO host Academic Search Premier and Wilson Web Omni File are examples of Hybrid databases.

– Historical Abstracts (history) – scholarly

– PubMed (medicine) – scholarly, professional

– Social Sciences Abstracts Full Text via Wilson Web (social sciences) – scholarly

Numeric Databases:

Numeric databases provide numeric data such as statistics, financial data, census information and economic indicators, etc. Two well-known numeric databases are those published by The Bureau of Labour Statistics and Yahoo's Daily Finance Report. Some examples of statistical databases include Census Information (http://www.censusindia.net/) – which provides statistics of All India population totals as per the Census 1991 and Census 2001; Department of Statistics, Government of India, which provides broad statistical information; Global Statistics – which deals with statistics on the human population. It contains data on the population of regions, countries, provinces and cities and other factors like wealth, infrastructure, etc.

Multimedia Databases:

These databases may contain images, audio (sounds), or video. Image databases contain visual information, such as illustrations, artwork, or photographs. Database records for

images may have additional information added to make it possible to search by specific criteria, such as subject, artist, date, etc. The web hosts a rich collection of sounds and images, many of which can be used for commercial as well as personal purposes.

Reference Sources:

Statistical sources:

There are a number of websites providing information such as statistics, financial data etc. For example Penn World Data is a website which provides online access to statistics on all the major world economies, from 1950 to 1998. Census Information (http://www.censusindia.net/) – which provides statistics of All India population totals as per the Census 1991 and Census 2001.

Dictionaries and Encyclopaedias:

A wide variety of reference resources including a number of general-purpose and subject-specific dictionaries are now available on the web. A few important dictionaries available on the Internet are:

Important Online Dictionaries http://www.yourdictionary.com/

Cambridge Dictionary Online http://disctionary.cambridge.org/

Merriam-Webster Online http://www.meriam-webster.com/

Web versions of several important encyclopaedias are available over the Internet.e.g.,

Encyclopaedia Britannica http://www.britannica.com/

Nupedia.com http://www.nupedia.com/

Columbia Encyclopaedia http://www.bartleby.com

Biographical sources:

Internet serves as an excellent source of information for biographical information whether the information is available in a biographical source or through websites of individuals/ organisations. For example, Biography.com (http://www.biography.com/) is one such website providing biographical information on the Internet.

Thesaurus:

A thesaurus more commonly means a listing of words with similar or related meanings. Subject headings are words or group of words under which books and other material on a subject are entered in a catalogue in which the entries are arranged in alphabetical order. Typical examples of standard subject headings used in libraries are: Library of Congress Subject Headings (LCSH), Medical Subject Headings (MeSH), Subject Headings in Engineering (SHE) and Sears List of Subject Headings. Now some of these thesauri and subject headings are available on the Internet. Roget's Thesaurus (http:// www.thesaurus.com/Roget_Alpha-Index.html) and Medical Subject Headings (http://www.nlm.nih.gov/mesh/meshhome.html) are two such reference sources available on the Internet.

Handbooks:

Handbooks are treatise on a special subject containing concise information written primarily for practitioners. A number of handbooks are available on the web in various subject specialties. Some of them are:

Handbook for Digital Projects	http://www.nedcc.org/digital/ dighome.htm
Handbook of Forensic Services	http://www.fbi.gov/hq/lab/handbook/ intro.htm

Geographical Sources:

Internet contains a large number of sites that provide maps and other geographical information. Examples of sites that provide maps are:

Map.com	http://www.maps.com/explore/atlas/
HRW World Atlas	http://go.hrw.com/atlas/norm_htm/world.html

Directories:

A large number of directories including telephone directories and yellow pages directories, providing information about personalities, subject experts in specific fields are also available on the Internet. These directories provide details regarding their areas of expertise, affiliation, contact information, other research interests etc. Thus through these directories users can easily identify and locate people working in related areas. Some examples are:

Bharat Sanchar Nigam Limited (http://www.bsnl.co.in/onlinedirectory.htm) – telephone directories of Indian states and metro areas.

Indian Yellow Pages (http://www.indianyellowpages.com/) – complete India based city-wide business directory.

IndiansOnNet.com (http://www.indiansonnet.com/) – personal and business directory of Indians.

Libraries and Subject Gateways:

Digital Libraries:

A digital library, like a traditional library, is a collection of books and reference materials. Unlike a traditional library, however, the collection of a digital library is digital, and is usually served over the World Wide Web. Virtual library, library without boundaries and more recently, digital library are some of the terms which have been used at different times to represent these electronic libraries. A digital library includes electronic (digital) as well as print and other (e.g. audio, video, graphics, animation, etc.) materials.

These materials are organised and made accessible to the user community. The Internet and web technology are principal mechanisms deployed in a digital library to search, navigate and deliver electronic resources across the globe. A digital library provides a one-step timely access to a vast amount of resources lifting traditional barriers of time and space. It provides customers, irrespective of their location, with immediate, ubiquitous access to a tremendous amount of information.

End users or clients receive direct access to the information requested regardless of where the data is physically stored. A digital library can also be linked through web, with other electronic resources located at distant places. Libraries are being restructured for the information age. Some of the largest and most successful digital libraries are Project Gutenberg, Ibibio and the Internet Archive. Some digital libraries, such as Project Gutenberg, work to digitise out-of-copyright works and make them freely available to the public.

Virtual Libraries:

The World Wide Web virtual library is a directory of e-texts and information sources on the web. The term “Virtual library” or “library without wall” usually refers to portals that extend virtual accessibility of digital collections from several diverse sources without the users even knowing where the resource actually resides. A virtual library could be a comprehensive

source linking huge collections from all around the globe or it could be very small, consisting of a few hundred links to digital resources maintained by an individual.

Subject-based Gateways:

Subject gateways are online sites that provide searchable and browsable catalogues of Internet based resources. Subject gateways typically focus on a related set of academic subject areas. The simplest types of subject gateways are sets of web pages containing lists of links to resources. Some gateways index their lists of links and provide a simple search facility. Some offer enhanced services consisting of a resource database and various indexes searchable through a web-based interface. Most gateways allow the end-user to either search or browse the database of resource description. These are also known as subject based information gateways, clearing houses, subject trees, pathfinders, etc.

Internet Public Library (IPL):

Internet Public Library is a project of the University of Michigan School of Information and Library Studies. It is the first public library created of and for the Internet community and its style and service is similar to any large library. On the surface level, the IPL consists of a ready reference collection, youth and teen divisions, an exhibit hall, a reading room, services to librarians and a MOO (a multi-user real-time telnet accessible environment). However, the IPL is a library that from the beginning was conceived on and for the Internet community.

IPL aims to provide an online, 24 hour public library, chaired by an assemblage of librarians and information industry professionals. It was created as an experiment trying to discover and promote the most effective roles and contributions of librarians to the Internet and vice versa. This site is a tremendous database of the Internet's resources. Its main mission is to serve the public by finding, evaluating, selecting, organising, describing, and creating quality information resources. The services provided are online reference, youth services, user education, and professional services for librarians.

Institutional Repositories:

Institutional repositories capture the original research and other intellectual work generated by an institution's members, integrate it into a consistent presentation and make it available online. Thus they make the research work accessible within and outside the institution. Institutional repositories are now being created to manage, preserve, and maintain the digital assets, intellectual output, and histories of institutions. An institutional repository may

contain any digital work generated by the institution's students, faculty, non-faculty researchers, and staff that the institution chooses to preserve. These institutional repositories also coordinate with repositories of other institutions, thus enabling wider access.

An example is Dspace, a repository project (http://dspace.org) of MIT libraries. MIT created a federation of universities which includes Cambridge University, Columbia, Cornell, MIT, Ohio State, University of Rochester, University of Toronto, and the University of Washington. The MIT repository contains a variety of research materials deposited in accordance with the policies developed by departments and research units at MIT.

Library Catalogues (including Union Catalogues):

Libraries are putting their contents on the web to enable their easy accessibility. The library catalogues are now accessible on the web. The library catalogue lists all the material available in the library with information on where to find it, whether it is available or not. Most standard library software packages also have web interfaces to their catalogues. These online library catalogues help in identifying books available in the library and enable other libraries also to select books for acquisition. Thus helping in building up resource sharing among the libraries. The library of Congress Online Catalogue (http://catalog.loc.gov/) is one such example.

Museum and Archives:

The virtual museum websites facilitate virtual visits of users to a museum and examine the exhibits closely from their desktop. Using various tools and techniques, user is also able to rotate an object in any direction. Art auction sites are also using similar techniques to promote auction of their art works. Some of the virtual museum and auction sites are:

Virtual Library museums pages (VLmp)	http://www.icom.org/vlmp/
Smithsonian Institution	http://www.si.edu/
World Wide Arts Resources	http://wwar.com/
Art Museum Network	http://www.amn.org/

Commercial Vendors:

Organisational Websites:

Internet is also a host to a large number of websites providing information about organisations, companies, institutes etc. These websites include details of products and services offered to the users and information about the objectives, policy, mission and activities of the organisation. These organisations also provide the newsletters and magazines published by them on the internet. This provides wider visibility to these organisations. It becomes easier for the user to locate any particular organisation or institute working in a specific field, and acquire all the information about it irrespective of location.

Product Catalogues:

A web-based catalogue is a listing of products along with complete specifications about the product which is available on the Internet. Online product catalogues are generally searchable and are especially helpful in identifying the recent products available in the market in order to purchase them. Reviews of the product from users are also included on the site. Important examples of product catalogues are:

Camie-Campbell Product Catalogue	http://www.camie.com/ prod_brochures.htm
Sony Electronic Products	http://www.sonystyle.com/home/ home.jsp

Online Shopping Malls:

Internet provides a comprehensive platform to sell the products rapidly and reliably, directly to the customers worldwide. There are services that host online store/shopping cart that are set up to sell digital goods, apparels, computers, jewellery, watches, electronic goods, gifts and flowers etc. For example eBay is an online marketplace, enabling trade on a local, national and international basis. Active Plaza is a unique combination of Searchable Online Shopping Catalogue, Online Shopping Mall, and Shopping Directory.

Amazon.com started with its online bookshop and has been expanded to include other products like CDs, Music, electronics, toys, art works, computers, and other store items. There are several sites that are now in the business of online selling. Some of them are mentioned below:

Abebooks.com	http://www.abebooks.com/
Amazon.com Bookstore	http://www.amazon.com/
Barnes & Noble.com	http://www.barnesandnoble.com/

Such commercial websites provide an easy access to top online merchants, thousands of products, and shopping related websites.

Employment and Career Sources:

There are several employment and career sources also available on the Internet. These sites maintain a database of resumes and job listing which can be posted as well as searched. Thus they cater to the needs of both the jobseekers and recruiters. These websites have helped in breaking down the barriers of time and space. Jobseekers from any part of the world can post their resumes on the website and can apply to the jobs listed on these websites. These jobs could be from any part of the world. Most of these websites are free.

Miscellaneous:

Internet is also host to a number of astrology websites offering astrological services like free personalised horoscope, daily forecasts, numerology etc. for example astrology.com (http://www.astrology.com). There are various websites giving information about health, fitness and nutrition. Example of such a site is personalhealthzone.com (http://www.personalhealthzone.com). There are websites offering music, fun games and videos which can be downloaded or played. Examples of such sites are indianmelody.com, and musicindiaonline.com.

Internet resources:

The term internet resources refers to various resources in electronic format that provide information or an indicator to the information and are accessible over the Internet. The enhanced use of Internet tools in electronic commerce, information acquisition, and community operations etc. has led the influence of the Internet resources to reach the various segments of the society. The resources available on the Internet and electronic world are similar to the traditional sources of information and may be regarded as electronic equivalent to the printed resources but there are several other innovative products also which do not have their print equivalent. Moreover, they cannot be replicated in the print format because of the limitations of the print media.

Meta sources:

A Meta resource can be defined as an organised and structured guide to Internet based electronic information resources in a defined subject area. Meta resources are variably called

subject gateways, subject-based information gateways (SBIGs), subject-based gateways, subject index gateways, virtual libraries, clearing houses, guide to Internet information resources etc. These sites redirect a user to the holders of the original digital material. A Meta resource thus serves as a discovery tool, directing the user towards contents that are freely available but difficult to find using a non-specific search engine. A Meta resource site is inherently reliable because the resources included in it are selected on the basis of predefined selection criteria, catalogued by following consistent practices and are analysed by people with expertise in the relevant subject discipline. A Meta resource offers a community of users a single entry point to resources for a given topic or sets of topics. There are several thousand general purpose and subject specific Meta resources and portal sites available on the internet. A few of the important Meta resources are:

LibrarySpot.com (http://www.libraryspot.com) which is a free virtual library resource centre for students, researchers, librarians and anyone exploring the web for valuable research information.

Argus Clearing House (http://www.clearinghouse.net) which provides a central access point for value-added topical guides that identify and describe internet based information resources.

Galaxy (http://galaxy.einet.net/) is a searchable internet directory.

Livinginternet.com (http://www.livinginternet.com) is a website that provides comprehensive, in-depth information about the internet.

Re-QUEST dot Net (http://www.re-quest.net) is a free online library offering substantive, fully annotated, links to valuable resources on the Internet.

Electronic books:

An e-book is an electronic (or digital) version of a book. In more elaborate terms it is a digital reading material that a user can view on a desktop or notebook personal computer, or on a dedicated reading device with a large storage capacity (1,500 to 500,00 pages). While any book-length electronic document could be considered an e-book, true e-book software is optimised for reading rather than developing content, and most e-book software attempt in some way to simulate the experience of reading a paper book. Security measures are also included to protect the content from duplication. The digital material or contents that make an electronic book are simply textual and graphical files. It is designed to be viewed on some combination of hardware and software ranging from personal computers to the new reading

appliances. More and more traditional book publishers are seeing the potential of digital publications and are working in the direction of production of electronic books. Readers can download published content such as books, newspapers, comics and Internet sites.

The electronic books consist of two distinct components digital material or contents and hardware including e-book reading appliance.

The hardware available for an eBook are:

i) Dedicated e-book readers;

ii) PDAs and pocket PCs with book reading software;

iii) Hybrid devices.

These are small, lightweight devices with backlit screens and embedded dictionaries. Often they enable searching, bookmarking and the ability to make annotations, and can either be connected to a PC or contain internal modems so that content can be downloaded from the Internet. Apple Newton Message Pad was the first dedicated e-book reader developed by Alan Kay.

Rocket e-book, a paperback sized device that could hold about 10 books (4000 pages of text and graphics) was the first modern e-book reading appliance launched by the Nuvomedia in 1998. SoftBook from SoftBook Press was other appliance which could hold as many as 250 books (1,00,000 pages). The SoftBook comes in leather cover, which, when opened, automatically starts up the book. Now REB1100 and REB1200 have been developed.

PDAs and Pocket PCs are usually smaller than dedicated e-book reader and often they also offer Internet access, word processing, spreadsheet and MP3 playing capabilities. Palm Reader, MobiPocket Reader and Microsoft Reader are some of the e-book reader or viewer software.

Hybrid devices perform the task of dedicated eBook readers as well as that of a PDA and pocket PCs besides having a few more added functionalities. eBook Man and MyFriend are such hybrid devices that have larger screen intended for reading long stream of text, buttons for turning pages and with usual e-book capabilities such as bookmarking and annotating. It also has builtin capabilities to perform task like e-mail, address book, things to do listings, Internet browsing and MP3 playing.

A growing list of original and converted e-book titles is now available on the Internet. Digitisation of public-domain texts for download started in 1992 under Project Gutenberg. A large number of publishers are now involved in the business of making thousands of book available online for libraries and individuals at relatively lower cost. The users can buy and download titles from the Internet and transfer them to their devices via a serial cable. Three major companies that have recently emerged in this market are Questia, ebrary and NetLibrary. All three platforms offer e-books, journal articles and encyclopaedia articles besides other services as value addition.

Questia: the Online Library (http://www.questia.com/) Questia plans to deliver 2,50,000 electronic books in the field of humanities and social sciences to the users directly at a reasonable subscriptions for access. More than 235 publishers have signed-up to provide contents to the Questia. Collections at the Questia can be searched free of cost.

Ebrary (http://www.ebrary.com/) Ebrary markets its services directly to libraries in order to "augment the library services and provide its patrons with access to complete text contained within published, authoritative content". E-brary has negotiated arrangements with more than 100 publishers. Searching and browsing in e-brary is free, users pay for downloading and printing. Unlike other eBooks publishers, e-brary obtain the files direct from publishers in PDF rather than digitising them.

NetLibrary (http://www.netlibrary.com/) NetLibrary targets academic, public and corporate libraries and has more than 40,000 titles. Access to titles within NetLibrary mimic traditional library circulation model, i.e., only one user at a time can view a copyrighted text within the collection and browsing is allowed for up to 15 minutes. OCLC has recently bought NetLibrary.

Advantages of internet sources:

Electronic information sources offer many advantages. The required information can be delivered from the most appropriate source to the user; the user can re-specify his or her needs dynamically; the information is obtained when it is wanted. The user selects only the required information and the information can also be stored if the user desires. Electronic information can therefore, provide a number of advantages over traditional print based sources.

These advantages include the fact that electronic information sources are often faster than consulting print indexes. They are more straightforward when wishing to use combinations of keywords. They provide the possibility of searching multiple files at a time, a task accomplished more easily than when using printed equivalents. Electronic resources can be printed and searches can be saved to be repeated at a later date. They are updated more often than printed tools. One main advantage, especially to distance learners or those with limited time to access the library, is their easy availability and accessibility from any location.

Evaluation of internet resources:

The World Wide Web's accessibility and ease of use has led to an exponential increase in the amount of information available on the Internet. As a research tool, however, the Web lacks the quality assurance that editors provide with print publications or that librarians provide when collecting materials for their library. Therefore, given that some Websites are out-of date, biased, or inaccurate, it is very crucial for information professionals to learn how to critically evaluate the material they find. There is an extremely wide variety of material on the Internet, ranging in its accuracy, reliability, and value. Unlike most traditional information media (books, magazines, organisational documents), no one has to approve the content before it is made public. There are no universal quality controls for the information that is published on the Internet. It's the searcher's job to evaluate the information that is located, in order to determine whether it suits their needs.

Once the desired resource or information has been located, either through a purposeful search or serendipitous browsing, the resource or information should be evaluated. This evaluation process is really no different than the process people use in evaluating the information they acquire from a neighbour, friend, newspaper, television broadcast or bulletin board flyer. However, because information available on the Internet is not regulated for quality or accuracy, unlike similar information found in newspapers or television broadcasts, it is particularly important for the individual Internet user to perform a personal evaluation of the resource or information. Resources on the Internet may be compared to a huge set of electronic filing cabinets into which just about anything can be placed. This is in contrast to the printed resources that we use daily.

For example, most journal articles go through an editing process that helps control the quality (to maintain the reputation of the journal) and quantity (to control publishing costs) of the information presented. Since the quality of the huge amount of information available on the

Internet varies widely, the user must take care to evaluate these resources. The following aspects may be considered while evaluating various Internet resources.

Scope:

The scope of a particular information resource is a measure of the intended coverage of the source, the actual coverage of the topic it provides and the currency of the information it contains. Scope includes the examination of the breadth, depth, of the article, book, website or other material. Whether it is a general work that provides an overview of the topic or it is specifically focused on only one aspect of your topic. It is possible to guess at the scope by browsing around a given information resource.

Purpose and Audience:

Most Websites are not designed with the student researcher in mind. Companies design Websites to advertise products to the browsing public at large; special interest groups create sites for select audiences, and scholars may publish research on the Web for professional academic audiences. To determine if the information is appropriate, consider the authors' purpose and audience. Is the site supposed to be educational or entertaining, informational or promotional? Who is the intended audience for this source? Is the material too technical, elementary or basic? If, for example, there is an article, "How Plants Grow," and children are the intended audience, then the material may be suitable to a researcher as well. More important to the evaluation of information is the purpose for which the information was created. Be sure that the intended audience and purpose of the article are appropriate to your requirements or at least clearly in evidence so that you may take them into account. Information pretending to objectivity but possessing a hidden agenda of persuasion or a hidden bias is among the most common kind of information in our culture.

Authority:

Verifying the authority of a web document is one of the most challenging aspects of evaluating Internet resources. Unlike most "traditionally" published resources, anything and everything from virtually anyone is potentially available on the Internet. Examine headers, footers, and the site address to see who is producing or sponsoring the document. Look for an "About This Page" or "About This Company/Organisation" link; Look for a link back to a home/ main page or an individual author's home page. The author's name and e-mail address

should be provided at the bottom of every page of the site, or at least somewhere on the site's home page.

Accuracy:

The goal of the accuracy test is to assure that the information is actually correct, up to date, factual, detailed, exact, and comprehensive. For example, even though a very credible writer said something that was correct twenty years ago, it may not be correct today. Similarly, a reputable source might be giving up-to-date information, but the information may be only partial, and not give the full story. Is the information in the resource accurate? You can check this against other resources, or by checking some information about which you have special knowledge.

Objectivity:

There is no such thing as pure objectivity, but a good writer should be able to control his or her biases. Some organisations are naturally not neutral. Think about perspective and be on the lookout for slanted, biased, politically distorted work.

Currency:

How frequently is the resource updated, or is it a static resource? Are dates of update stated, and do these correspond to the information in the resource? Does the organisation or person hosting the resource appear to have a commitment to ongoing maintenance and stability of the resource?

Quality of writing:

Is the text well written? While hypertext linking and multimedia are important elements of the Web, the bulk of the information content on the Web still lies in text, and quality of writing is important for the content to be communicated clearly.

Context:

To do accurate research, it is necessary to examine a wide variety of sources, and compare them against each other. For the sake of verifying the accuracy of a Web source, it is a good idea to examine it alongside printed periodicals and published books on the same topic. Make sure that each Web article you plan to cite has a complete list of works cited. This list should contain a reasonable number of printed sources to balance any online sources it may cite.

Content:

Try to determine whether the source offers something new, or if it just rehashes what other sources have already expressed more forcefully. Does the author base his/her entire argument on assumptions of facts and ideas which are known to be mistaken? Does this page present a new perspective on the topic, or does it just summarise other sources? If it is just a summary, use it to find the originals, but do not cite it as a source. Original sources always carry more weight than second-hand citations. Some information from corporate sites consists of descriptions of products, techniques, technologies, or processes with which the corporation is involved. The researcher must be careful to distinguish between facts and advertising.

Timeliness:

When was the source published? If it is a website, when was it last updated? Avoid using undated websites. Library catalogues and periodical indexes always indicate the publication date in the bibliographic citation. In technology, science, medicine, business, and other fields always in flux, we must remember to check and re-check our data from time to time, and realise that we will always need to update our facts. The searcher must be careful to note when the information was created, and then decide whether it is still of value (and of how much value).

Design:

Is the resource interesting to look at? Do the visual effects enhance the resource, distract from the content, or substitute for content? The design features used throughout the resource should be consistent and helpful. If audio, video, virtual reality modelling, etc. are used, are they appropriate to the purpose of the source? What navigation tools are provided within the resource: links that help navigate through a page, such as a table of contents or “return to top”; links that return the user to other important pages associated with the resource, etc.?

Cost:

The Internet is often touted as a free resource, however, costs do exist and are likely to become important. Costs can be divided into costs of connecting to the resource and costs associated with the use of the intellectual property contained in the resource. Accessing the Internet requires, minimally, a computer, modem and an Internet service provider. The cost of doing so can vary greatly. Not all of the information resources on the Internet are free. There are numerous fee-based databases and other services for which users must pay if they

want to use them. Libraries have a role in negotiating subscriptions and site licenses for organisational access to charged services. If online transactions are used to pay for information, the security of these transactions at a site may become important. Charged services may be available with limited functionality, or for trial periods, for free; librarians will need to decide whether to provide the enhanced or the limited version.

Information resources on the internet:

The current evolution in Information technology brings major changes in the way of Information communication. Information Communication technology developments opened up new avenues to e-resources, publishing in a big way. The E - resource is distribution of information in any electronic form such as CD- ROM, Floppy Disk or Magnetic tape or across a computer network like e-journals, E-Books, ETD etc. An electronic resource is defined as a resource which require computer access or any electronic product that delivers a collection of data, be it text referring to full text bases, electronic journals, image collections, other multimedia products and numerical, graphical or time based, as a commercially available title that has been published with an aim to being marketed. These may be delivered on CD ROM, on tape, via internet and so on. According to AACR2, 2005 Update, an electronic resource is: "Material (data and/or program(s)) encoded for manipulation by a computerized device. This material may require the use of a peripheral directly connected to a computerized device (e.g., CD-ROM drive) or a connection to a computer network (e.g., the Internet)." This definition does not include electronic resources that do not require the use of a computer, for example, music compact discs and videodiscs. According to Library and Information Technology Glossary "Term used to describe all of the information products that a library provides through a computer net...”

Need of E-Resources:

E-Resources enable the librarian to provide better service to the user community. The few considerable points are mentioned bellow;

1. To get access to an information source by the more than one users.
2. E-Resources can be searched quickly.
3. These can be found easily by the user.
4. These resources can be stored in huge amount.
5. Amount of time spent on the E-Resources use.
6. Analyses the purpose of using e-resources by respondent

7. Know different types of e-resources commonly used by respondents
8. To collect, store, organize information in digital form.
9. To promote efficient delivery of information economically to all the users.
10. To encourage co-operative efforts to save and share the investments in research resources, computing and communication network.

Types of e-Resources:

E-Book:

Electronic-Book is characterized as any Book, which can be downloaded and read on a computer or personal devices. Sometimes E-Books are the electronic versions of Print Books and it has easy search facility which reader can see visually and it can be saved on a pen drive, CD etc and transferred to CD-ROM. The content is indistinguishable with the exception that there are additional features such as, bookmark and link between issues and solutions. E-books also offers the convenience of portability since, it can be stored on personal library of E-book on Computer, laptop and on other handheld gadgets. E- Books is in many formats including Adobe PDF, Microsoft Reader, eReader, Mobipocket Reader, Kindle and iPad etc.

E-Journal:

An e-journal is very important part of every library collection. E-journals (electronic journals) are scholarly journals or intellectual magazines that can be accessed via electronic transmission. Some journals are "born digital" in that they are solely published on the web and in a digital format, but most electronic journals originated as print journals which subsequently evolved to have an electronic version, while still maintaining a print component. Online journal articles are a specialized form of electronic document, they have the purpose of providing material for academic research and study, and they are formatted approximately like journal articles in traditional printed journals.

Advantages of E-journals:

1. The contents of pages and/or the full text of journals can be easily found out and articles related to any certain subject can be easily searched.

2. Journal articles are on your desktop; you don't have to be in the Library.
3. It can be very easy to email articles to yourself or download them for printing.
4. The article that you want to read will always be available, even when the Library is closed.
5. Hypertext links allow you to move to different sections within individual journals or articles and can link you to related resources on the Internet.
6. Journals can include more images and audio-visual material.
7. Journals can be interactive you can e-mail the author or editor with your comments.
8. Access to E-Journals: There are two kinds of e-journals are available

- Paid E-Journals
- Free E-Journals

E-Newspaper:

An E- newspaper is also known as online newspaper or web newspaper that exists on the World Wide Web or internet.

E-Magazines:

An E-Magazine is very important part of every library collection. E-Magazines are one application of information technology.

Databases:

The Macmillan dictionary of information technology defines `a database as collection of interrelated data stored so that it may be accessed by authorised users with simpler user-friendly dialogues'. Databases are store large quantities of information. The larger the mass of information, the bigger the benefit of using a database. Databases make it easy to retrieve information quickly and flexibly. Databases help to organize and reorganize information. User can quickly switch between schemes. Databases provide facilities to print and distribute information in a variety of ways.

Bibliographic database:

Bibliographic Database provides a descriptive record of an item such as author, title, subject, publisher etc. Rather than complete monograph, bibliographic database generally contain rich description in the form of short summary or abstract and keyword etc. in electronic format.

There are many Dictionaries, Almanacs, and Encyclopaedias, which are available on reference database.

Full-text database:

Full-text database are either free or with charges. E-databases is an organized collection of information of a particular subject or multidisciplinary subject areas, information within e-databases can be searched and retrieved electronically. A full-text Database is a compilation of documents or other information in the form of a database in which the complete text of each referenced documents are available for online viewing, printing and downloading. For instance, IEEE-Xplore, not only provides index, citation and reference to journals articles, but also provides entire text of the article and paper on computer science, electrical, and electronic engineering etc.

Statistical database:

These databases contain the numerical data useful for the mass community.

Image:

Due to adventure of e- collection images facility this type of databases is developed.

Multimedia products:

These include audio visual, text, etc.

E-Thesis:

These databases contain PhD thesis and Dissertation published through e-format. The Oxford English Dictionary defines a thesis as “a long essay or dissertation involving personal research, written as part of a university degree” (OED). Merriam-Webster Dictionary defines a thesis as “a position or proposition that a person (as a candidate for scholastic honors) advances and offers to maintain by argument” as well as “a dissertation embodying results of original research and especially substantiating a specific view; especially one written by candidate for an academic degree.”

E-Clipping:

The main objective of e-clipping is retrospective search and comprehensive analysis of new items.

E-Patents:

E-patents is the exclusive right granted by the government to make use of an invention for a specific period of time. Patent protection for invention cannot be commercially made, used, distributed or sold without the owner's consent. Usually, patent rights are enforced in a court, which, provide facilities to hold the authority to stop patent infringement. Conversely, a court can also declare a patent invalid upon a successful challenge by third party. The owner of a patent has the right to decide about who may or may not use the invention. Owner may give permission or license to other parties to use inventions on mutually agreed terms or may also sell the right to other parties, who will then, become new owner of the patent. But, once a patent expires, the invention will enter the public domain. It means the owner cannot hold exclusive right to the invention for longer time.

E-Standards:

Written definition, limit rule, approved and monitored for complains by authoritative agency. A standard is a document that provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose (www.iso.org). Standards are based on industrial, scientific and consumer experience and they cover everything from consumer product to energy, environment, water and many more. Standards are regularly reviewed to keep pace with advance technologies. There are three kinds of standards: international, regional, and national.

International standards:

Developed by ISO, IEC (International Electro-technical Commission), and ITU (International Telecommunication Union). Countries can adopt these standards directly for their national use.

Regional Standards:

Prepared by a specific region, such as the European Union, which develops EN standards. Similarly, joint Australian/New Zealand standards can be considered Regional Standards.

National Standards:

These can be developed by a National Standards body (like Standards India) or other accredited bodies

Utilities of E-Resources:

1. E-publishing may be less costly than paper.
2. E- Resources are created in any file format like text, audio, video and images.
3. E-resources are available for 24 hours of a day and save library space.
4. The E-resources search is easy because of user friendly interface.
5. They provide users faster, more convenient and anytime access from home, campus or library.
6. E-resources can be accessed by the support of advanced search and retrieval system.
7. The content can be reproduced, forwarded, modified and leading to problem with copyright protection and preserving authenticity.
8. The electronic environment enables to library to integrate with other libraries and make use of their resources also.
9. Those who have limited time to access to the libraries can effectively access to the libraries by dialling up process.
10. The libraries provide access to very large amount of information resources.
11. Libraries are focused on providing access to primary information.

Issues of E-Resources:

1. Licensing: E-Resources need the license from the published to the library for making use of it.
2. IPR: E-Resources can be easily copied and forwarded to the another person so librarian should be alert about IPR (Intellectual Property Rights)
3. Standards of metadata: There are standards for metadata description like MARC21 but the available e-resources in the market are not standardizing by MARC21.
4. Low budget: Libraries are non-profit organization so they cannot purchase and afford the costly electronic resources.
5. Skill manpower: to handle the electronic collection the proper skills are required among the staff but libraries are lacking of skill manpower.
6. Lack of infrastructure: Electronic collection is supported by Information and communication Technology components.

Nature of E-Resources:

These electronic resources could be of varied nature. Broadly, we could categorise them as follows:

1. Primary Sources of Information: These include electronic conferences, electronic journals, electronic pre-prints and e-prints, electronic theses and dissertations, patents, standards, technical reports, project reports including status reports of current ongoing projects, news, software courseware, tutorials, manuals and the like.
2. Databases, Data sets and other Collections: These include abstracting and indexing databases; digital collections comprising images, audio, video; scientific data sets comprising numeric, properties, structural databases; library catalogues; virtual libraries; museums and archives, etc.
3. Electronic Books: Such as NetLibrary (http://www.netlibrary.com/); Ebrary (http://www.ebrary.com/), etc. Generally online book selling and print-on demand features also facilitated. For instance NetLibrary has entered into print-on-demand marketplace. Similarly Amazon.com (termed as the largest library — though not a library in true sense of the word) facilitates online book selling (http://www.amazon.com/)
4. Reference Sources such as dictionaries; encyclopaedias; biographies; handbooks; thesauri and the like.
5. Organisations and People: Information about organisations and people ranging from funding agencies to libraries; information centres; research institutes; and experts; directories of people of varied nature (scientists; archaeologists, etc.)
6. Meta Resources: Resources that facilitate easier access to network based resources in a defined subject area and a plethora of such resources under various names available on the Internet, such as subject gateways; virtual libraries; clearing house; pathfinders and the like.

Review questions:

1. What do you know about electronic resources?

2. What are the characteristics of electronic resources?

3. Name a few internet information resources.

4. Write a short note on eBooks.

5. Define e-journals.

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UNIT – 3

Open course ware and link sources

Objectives:

- To get to know about open course ware.
- To learn about link sources.
- To gain knowledge on patent and reference sources.

Introduction:

The success of open and distance education system depends mainly on the quality and effectiveness and of its teaching-learning materials in print and non-print media. Distance teaching-learning materials are popularly called self-instructional materials (SIMs) or self-learning materials (SLMs). As we know the concepts of learning and communication are interrelated. With effective communication the probability of learning at a distance can be

enhanced and also distance learner can be enabled to exercise his autonomy in learning and overcome the barriers of distance and time. An understanding of the factors involved in human learning and communication can guide the distance educator in designing and developing effective SIMs/SLMs. In this Unit, we therefore make an attempt to enable you to learn about how the learning and communication theories are helpful in the practice of distance education in general, and in designing self-learning materials (SLMs) or selflearning print materials (SLPMs) in particular.

Open course ware:

SIMs or SLMs are inevitable means of delivery of open and distance education. Moreover, when print medium forms major medium of instruction, it gets supplemented and complemented by other media. These media of instruction together encompass the entire gamut of instructional strategies. The instructional strategies the distance educators use help shape learning environments and represent professional conceptions of learning and of the learner. Since distance education is more learner-centric in its nature, instructional strategies need to encourage active role of the distance learner in the learning process. Hence, teaching and learning at a distance needs special instructional strategies to help students achieve their course and programme objectives. There exists a range of instructional strategies adopted by open and distance education institutions. Let us discuss, in brief, the main strategies.

Text Material Strategies:

Specially designed printed text forms a popular strategy in distance education. The printed texts are developed on the basis of the principles of designing the SIMs/SLMs. The students learn from these materials independently, which, of course, their learning depends upon their skills of reading / study. We shall discuss the concept, principles and process, among others, of designing of SIMs/SLMs in detail in the subsequent sections of this unit.

Broadcast Strategy:

Radio broadcasting or telecasting either by using specially developed audio or video cassettes or by direct broadcast or telecast of the programmes is another important strategy adopted by open and distance education institutions.

Mixed mode or multi-media strategy:

In involves more than one medium in development and delivery of teaching and learning material or instruction to the distance learners. Of course, a combination of instructional strategies is always more effective than one strategy.

Online Strategy:

This is the latest strategy followed by open and distance education institutions using high-tech or advanced information and communication technologies for offering education to distance students having access to the same individually, or as a group, either at their homes or at designated places of the institution.

Supplementary and complementary strategy:

In addition to the above strategies, there is often need to supplement and/or complement the offer of programmers/courses by engaging the distance students in using different activities such as project work, face-to-face contact, peer group discussions, audio-visual materials, teleconference, etc.

Project Work: Broadly, the objective of the project work is to develop abilities and skills in students by applying the knowledge gained through (studying) the units. The project work helps the students link their knowledge with the real life situations and apply their knowledge to solve the problems.

Face-to-Face or Personal Contact Programmes: These programmes are organized to answer queries of students and to enable them achieve higher level objectives, including acquiring psychomotor skills. These programmes can be organized in different ways keeping in view the relevant objectives. Seminars, workshops, counselling sessions, laboratory work, residential schools, etc., can be the face-to-face programmes primarily meant for group interaction between the students and teachers, and also among students.

Peer Group Discussion: Distance learners generally do not get an opportunity to interact and share their problems/ideas/experience (related to their study). Learning through peer group interactions is quite effective in distance education. In addition to the above mentioned face-to-face contact programmes, the study centers of distance education system work as contact places for peer group discussions on different occasions. Recently, the ICT has revolutionized the group formation and information sharing through e-mail and many social media, among others, serving as boon for distance learners.

Audio-Visual Materials: The use of multiple media strengthens distance teaching / learning process by exploiting the potential of each individual medium. Appropriate media are selected to supplement and complement each other or to integrate them to achieve a variety of course objectives in cognitive, affective and psychomotor domains.

Teleconference: Audio conferencing through telephone technology, one-way video and two-way audio conference and two-way video conference through a combination of satellite technology with other technologies including computer conferencing are also widely used by open and distance education institutions to provide audio-visual experiences to the students. No one instructional strategy is best in all situations and in all situations. Each instructional strategy may be best only in given situation and with particular target group of learners. The instructional strategies are decided mainly keeping in view the instructional design.

Instructional design:

Instruction is defined as the combination of teaching and learning, where teaching and learning are mutually inclusive. Student performance is the focal point of instructional design and teaching is regarded as a means to facilitate and improve student performance. Design refers to a plan or set of artefacts produced to illustrate thought and provide guidance for constructing new knowledge. Learning design applies concepts, theories and practices about the construction of knowledge to day-to-day realities. Instructional design is commonly manifested as a coherent collection of cognitive tools that extend the capability of the teacher as well as extend intellectual and skill capacity of the student that is based on some identifiable organizing theme.

According to Merrill, et al (1996) instructional design may be thought of as a framework for developing modules or lessons that:

• increases the possibility of learning;

• makes the acquisition of knowledge and skill more efficient, effective, and appealing; and

• encourages the engagement of learners so that they learn faster and gain deeper levels of understanding.

Instructional Design is defined as “a systematic process that is employed to develop education and training programs in a consistent and reliable fashion”

(Reiser and Dempsey, 2007). As we know a framework contains some components, while the process involves certain steps. The instructional design is both a framework representing a model with an integral process involved in using it. While designing instruction, it is essential to follow certain principles.

Principles:

General principles of designing instruction cover cognitive, affective and psychomotor levels. Locatis and Atkinson (1984) have discussed these principles in detail, an overview of which is presented below.

Cognitive learning:

• Introduce novel events at the start of the instruction.

• Inform learners about the expected learning outcomes. There should be some provision for learners to assess their performance.

• Recall relevant pre-requisites and base the presentation in SLMs on the prerequisites.

• Present only relevant and essential information to help learners achieve the objectives.

• Analyse and organize content in a manner that is easy for learners to comprehend. For this, advance organizers should be used to tell learners about what they are going to learn or do.

• Follow teaching maxims, such as simple to complex, concrete to abstract, general to specific, etc.

• Provide prompt and cue to direct learners' attention. Highlighting, underlying or superimposing words can draw attention to important learning points.

• Present relevant examples and illustrations to make the difficult and abstract concepts comprehensible. Examples should present perspectives of a concept.

• Provide appropriate practice to attain mastery learning. By doing so we can motivate learners to apply knowledge to new situations.

• Provide constructive feedback to learners at each stage of their learning, which will reinforce learning.

• Review and repeat important learning points to recapitulate what has been discussed.

Affective learning:

• Take the learners into confidence and tell them that the behaviour they are going to acquire is useful and important. Also, apprise them of the significance of discussion.

• Make adequate provision for external reward on displaying expected behaviour.

• Ensure that learners experience success and accomplishment. They should successfully complete the learning tasks.

• Associate content with objects, which can capture and sustain their interest.

• Use multiple media and multimedia approach to effect learners' behaviour patterns.

Psychomotor learning:

• Identify skill characteristics. Each psychomotor skill requires different teaching conditions and ways of demonstrating and practising the skill. Most skills have multiple characteristics, and hence combination of conditions for learning must be obtained.

• Demonstrate and explain the skill: Demonstration should be followed by explanation.

• Provide ample practice and feedback on performing the skill.

Massive open online course (MOOC):

Advent of internet and development of fast growing ICT Tools like smart phones, palmtops and book readers have changed the student teacher relationship completely. It is possible to record world's most elite faculties to upload their teachings and communicate it to the mass beyond their conventional classrooms. Over the past one-decade, MOOC's are very much popular. MOOCs are breaking the geographical, political and ethnical boundaries between teachers and students. MOOCs are high quality course supplements available to the students round the clock. The only disadvantage of MOOC is lack of personal touch and eye contact between students and faculties but that can be overcome by this virtual classroom teaching using different technology and ICT tools based on the need felt. The MOOC and technology can never replace the classroom interactive teaching but it can only work as a supplement to the classroom teachings. In India and internationally, the MOOCs are being used by the students and they are getting well informed in today's competitive world.

Structure and features:

MOOC offers anyone to understand courses from any academician without any required course prerequisite. These courses present stipulated period of duration and follow a set of

syllabus. As the courses are free and open to all, the number of takers is usually at most engaged thousands of students. Also dropout rates are maximum. At most MOOC have completion rates single digit of percent. That percentage, however, represents maximum number of students than maximum no of professors would teach in person in a lifetime. (Schwartz, 2013). In order to ensure all courses are implemented in a well-organised manner, MOOC needs platforms or providers. Among major MOOC providers are forprofit and the non-profit establishments such as Udacity, EdX, Edemy, Khan Academy and Coursera. Coursera, with its inception in April 2012, has partnered 62 elite institutions and "registered 2.8 million students". Coursera offers over 300 courses, in a wide range of subjects including humanities, human science and science & technology (Empson, 2013). Participants or students in MOOC have to follow alongside of the course over a set length of time. The teaching process includes the use of recorded web lectures, online reading list, weekly homework problems, and final exams. Students may complete as little or as much of the courses as they wish and at their own pace (Martin, 2012).

MOOCs are at this moment still offer a course-one-by-course basis. However, a growing demand for recognition and transferable credits, San Jose State University (2013), for example, is collaborating with Udacity to offer several online courses for credit. American Council on Education's College Credit Recommendation Service (ACE CREDIT) recently, in February 2013, completed an evaluation of five courses offered through Course and recommended all of them for college credit (Kolowich, 2013).

Librarians Involvement in MOOC:

There are many potential roles that librarians can be involved in MOOC. The MOOC creates unique challenges and its opportunities for academic libraries (Wu, 2013). However, as it is important to recall that this MOOC concept is very useful at an infant stage, the research on librarians' roles are very limited. The roles of librarians in MOOC, obviously, are not comparable and significant with the traditional courses and higher education environment. Among the roles and challenges to ensure this MOOC become effective, are obtaining clearing copyrighted content, promoting open content and Open Educational Resources (OER) to MOOC community, and teaching information literacy skills. It was noted that MOOCs provide opportunities and librarians are working with academics to assist in transition from the traditional teaching to suit the teaching requirements of a MOOC environment.

Some librarians are involved in the development of MOOCs and some are taking advantage of the available MOOCs in librarianship to develop professionally. The major challenges faced are the copyright issues. The author recommends that librarians should be involved in copyright clearance, offering information literacy and alerting users on the available MOOCs, making MOOCs accessible to all users including the physically challenged. Librarians should develop a collection of open access materials that they can recommend for MOOCs.

MOOC in INDIA:

India is top 2nd in terms of the percentage of visitors visiting such MOOCs" (Alexa, 2015). Now in India first time MOOC course started by IIT Mumbai with the title "Introduction to Computer Programming". The course is divided in two part and IIT offers learners with basics in Computer Programming. The second course started by IIT Mumbai was in Mechanical Science titled "Thermodynamics". IIT Mumbai stared courses on EdX platform in academic year 2015. Now 20+ courses are offered by IIT Mumbai. IIT Delhi also started MOOCs. In India 2015- 2016 Massive Open Online Course (MOOC) is the very buzzword for higher education and skill development programme. Now in India is having some MOOCs that are renowned and acceptable nationally as well international such as- IIT BombaiX, NPTEL, SWAYAM, IGNOU MOOCs, etc. The INFLIBNET Centre is one among the institute for imparting training on MOOC regularly.

The Future:

As mentioned in earlier part of the paper, there is a strong and growing demand towards offering for credit MOOC by institutions. Hence, in next few years, there will be more MOOC to be credited. Secondly, in future, MOOC will be accepted as universities' existing on-campus curriculum. MOOC will be used to enhance traditional teaching methods with the introduction of MOOC blended learning. Thirdly, there will be more corporate institutions to join in the MOOC movement. In May 2013, the Georgia Institute of Technology announced that American Telephone & Telegraph Company (AT&T) has contributed funds to enable them to launch a professional online master's degree in computer science via the MOOC platform Udacity (Young, 2013). There will be in person examination for the course. The cost for this course will be a lot cheaper than the traditional full-time course. As MOOC evolve towards for-credit, curriculum embedded offerings and participation of corporate

sector, the roles and requirement for the services of the librarians are set to increase (Gore, 2014).

Digital Rights Management (DRM):

DRM is a systematic approach to copyright protection for digital media available in Cyberspace. So, the term DRM includes all the technical systems designed to facilitate the management of rights in respect of digital content. DRM technologies can be used in connection with both offline and online media. Examples are copy-protected CDs or DVDs and download services such as Apple's iTunes. Figuratively speaking, DRM systems put up electronic fences in order to keep unwanted visitors away and only provide access to invited guests.

Although online content is protected by copyright laws, policing the Web and catching law-breakers is very difficult. The purpose of DRM is to prevent illegal distribution of paid content over the Internet. DRM products were developed in response to the rapid increase in online piracy of commercially marketed material, which proliferated through the widespread use of various Internet based technologies like P2P and hyper linking. DRM systems are aimed at enforcing certain business rules in respect of the use of content protected by copyright. Typically, these business rules concern questions like, who is entitled to access a work, at what price and on which terms. These terms address questions such as whether a user is entitled to make any copies of the work; or how long a user is entitled to access a work; whether a user can excerpt the work or make changes to it; whether a user can access the work on one or on multiple devices, etc. In effect, DRM systems aim to automate the process of licensing works and of ensuring that license terms are complied with.

Since people who download contents from the Internet without paying for it are potentially very many, DRM technology focuses on:

- Identifying the content and its owner
- Making it impossible to steal Web content in the first place which is a much surer approach to the problem than the hit-and-miss strategies aimed at apprehending online poachers after the fact
- Making it possible to identify infringements of work and/or who is responsible for it so as to enforce one's rights

The elements associated with DRM systems are:

(1) Identifiers, i.e., numbers or codes permitting the unique identification of a piece of content (comparable to, for example, the ISBN number in case of books);

(2) Metadata, i.e., information about the piece of content which may include, for example, the identity of the rights holder, the price for using the work, and any other terms of use of the work; and

(3) Technological protection measures, i.e., systems designed to ensure that certain usage rules are complied with, in particular those concerning access and copy control.

The first two are classified as 'Rights Management Information' and the third as 'Technological Protection Measures'.

Rights management information:

The primary requirement for the automated grant of rights in a digital context is that the protected work and subject matter can be identified as such belonging to the relevant authors and right holders and the licensing terms must also be available electronically. On the one hand, this information must be easily readable for a potential user and on the other hand it should not be easily erasable so that it remains embodied during the subsequent stages of exploitation in connection with the work. In addition, rights holders must be able to prove their authorship and ownership of rights in case of infringement; the relevant information should not be discernible to third parties and should remain embodied within the work even after the latter has been adapted, or where parts of the work are used. This is possible only if certain data which identifies the work, the author of the work, the owner of the work, or information about the terms and conditions of use of the work which are necessary for licensing and payment of licence fee, are embedded in the work. This data is classified as 'rights management information' in the WIPO Copyright Treaty (WCT) and the WIPO Performers and Phonograms Treaty (WPPT). Article 12(2) of the WCT defines rights management information as, "Information which identifiers the work, the author of the work, the owner of any right in the work, or information about the terms and conditions of use of the work, and any numbers or codes that represents such information, when any of these items of information is attached to a copy of a work or appears in connection with the communication of a work to the public."

If we look on to the offline world 'rights management information' is not all that unknown. Identifiers have been used in case of books and cassettes by way of putting the name of

author, publisher, price tag and ISBN. But in the digital age copyright products like video films, sound records, software, text, etc. have become container-less. They increasingly appear as part of 'information' in the form of bits and bytes in cyberspace. So, 'rights management information' has to be imbedded in the work itself. Moral rights which are a part and parcel of the overall copyright philosophy give rights to the author of a work to be identified as such and to object to any distortion or mutilation of his work. In the digital age it has become very easy and within the reach of ordinary people to detach the author's name from the work and put someone else's name in its place; manipulate with a work so as to distort or mutilate the same.

So, 'rights management information', in this regard, becomes extremely important from the angle of moral rights as well. A considerable amount of work is being done on 'copyright tagging' and developing 'unique identifiers' so that the owners of digital material will be able to identify their property wherever it is and however it has been modified or distorted. Moreover, this technology, together with the development of 'intelligent agents' or 'bots' which are capable of trolling around cyberspace identifying these tags, will help track the copyright material across the Internet wherever it may be. 'Rights management information', as a technological adjunct providing legal support to network based rights management systems is expected to enhance the ability of rights holders to exploit their property on the Internet, and allow consumers to rely on the accuracy of the information they receive so they can feel secure transacting online. As this 'rights management information' is the result of a technology it is also possible to erase the same with the help of technology itself. Therefore, legal recognition and protection to rights management information have been provided in WCT and WPPT and have come up in a number of national legislations which penalize anybody tampering with such 'rights management information' employed.

Contracting parties to the Internet treaties have agreed to provide legal remedies against any kind of removal or alteration of any of the above information as well as distribution or communication to the public of copies of work with such removals or alterations. Art. 12(1) of WCT states, "Contracting Parties shall provide adequate and effective legal remedies against any person knowingly performing any of the following acts knowing, or with respect to civil remedies having reasonable grounds to know, that it will induce, enable, facilitate or conceal an infringement of any right covered by this Treaty or the Berne Convention:

(i) To remove or alter any electronic rights management information without authority;

(ii) To distribute, import for distribution, broadcast or communicate to the public, without authority, works or copies of works knowing that electronic rights management information has been removed or altered without authority." In this direction suitable amendments have been proposed be made in the Indian Copyright Act on lines of the WCT and WPPT.

Future of DRM:

Because the technology holds the promise of curbing rampant piracy of copyright works, rights owners have placed a great deal of faith in DRM, and technological protection measures in particular, as a means of enforcing their rights in the digital environment. The case for DRM is that without a strong system in place to ensure only paying consumers can access media, piracy will run rampant and cut drastically into profits for producers and distributors. With declining sales, so the argument goes, creative input will also drop and the overall quality of media produced will decline. But DRM systems devised till date have had their failings as well. To date, all DRM systems have failed to meet the challenge of protecting the rights of the copyright owner while also respecting the rights of the purchaser of a copy. Just to take an example, DRM using Physical protection employs separate hardware to ensure protection.

Examples include hardware dongles that had to be attached to the computer prior to using the content, and USB and smart card devices working in a similar fashion. Physical protection methods consistently failed in consumer markets due to compatibility problems and extra level of complexity in content use; however, they did enjoy limited success with enterprise software. Another example could be of digital watermarking which allows hidden data, such as a unique disc ID, to be placed on the media. Then, the name and address of the purchaser would be taken at the location of sale, and entered into a database along with the unique media ID. This does not prevent copying, but it ensures that any copies made of the media will bear the same hidden information—so if the content appeared on a P2P networks, the ID number could be easily extracted and the purchaser prosecuted.

This scheme is flawed primarily because authenticating the buyer as the infringing party is nearly impossible as the buyer may give a false name and address or present false identification at purchase, the infringing party may be someone who purchased or otherwise obtained the media second hand, the media may have been borrowed or stolen from the original purchaser before the infringement occurred, etc. Advocates for civil liberties argue that the use of digital technology should be unfettered, and that the shift of control to

producers even after sales will ultimately hurt creative expression and damage consumer rights. Most media are protected by copyright, but have a fair use clause which allows for unhampered use in certain situations.

All existing DRM technologies fail to adequately make concessions for fair use, leading many civil advocates to argue that they restrict the legal use of content. Security issues, fair use issues, and issues of creative expression are all at the forefront of the DRM battle, and DRM technologies will undoubtedly be fought over for many years to come. While many within the media industry believe DRM is the only way to save their existing business model, predicated upon the idea of collecting a fee for each use, a number of innovators have begun exploring alternatives, anticipating an ultimate defeat for DRM.

Digital object identifier (DOI):

The Digital Object Identifier (DOI) is an Internetbased global naming and resolution system that provides for the precise identification, retrieval, and trading of digital items in the form of articles, books, images, bibliographies, supporting data, videos, charts, tables, audio, and other electronic files. Development of the DOI system began in 1996 when content creators and technologists jointly recognized that information and entertainment objects could not be commercially distributed on the Internet unless there was a common system of unique identification for those objects. These early stakeholders envisioned an unambiguous, machine-readable identifier that could be used for all electronic communications and transactions involving content throughout its life cycle, including its creation, editing, publication, distribution, and archiving. Such an identifier would be especially critical for commercial transactions, from initial licensing through sales tracking, royalty computation, and financial reporting. The dominant practice used today by publishers for naming Internet-distributed objects involves referring to their location, using an addressing system known as the uniform resource identifier (URL). URLonly naming fails whenever the resources are moved or reorganized. By contrast, the DOI system introduces a level of indirection that ensures persistent or permanent links to objects by way of a global directory. This level of indirection enables object administrators to update a single, centralized database record for each object, such that requests for the object are automatically and reliably redirected to the object itself, wherever it might be located on the network. The DOI also has a multiple-resolution feature that enables a single DOI to be resolved to locations for related services, transactions, or other information that the object’s owner wishes to make available.

Unique, persistent identification:

In order to discover, retrieve, manage, and trade the vast array of creative works that are becoming available in the digital domain, a way to refer to them unambiguously, by means of unique identifiers, is required. While uniqueness ensures that the identifier will refer to only one object, persistence ensures that if that object is moved or if ownership of the object changes, the identification of that object does not need to change. Uniqueness and persistence are facilitated if an identifier is designed as an opaque string or dumb number, meaning that no meaning should be inferred from the assigned value of the name or number. This characteristic distinguishes the DOI from many identifier systems that build "intelligence" into the number itself, a feature that might enable the user to deduce something about the entity that is being identified, or perhaps about the person or organization that registered the identifier. In the case of a dumb number like the DOI, the only reliable way to know anything about an identified object is to view the metadata (description of the object) declared at the time of registration. This ensures that even when the ownership of a particular item changes, its identifier remains the same, with the same descriptive information.

Uses:

The DOI is a persistent identifier of intellectual property entities, where an "entity" is any object that can be usefully identified, including resources made available on the World Wide Web (WWW). In general, "intellectual property" is defined by the World Intellectual Property Organization (WIPO) and related international treaties such as the Berne Convention. Typically, the DOI may be used by publishers to identify the various physical objects that are manifestations of intellectual property, including printed books, CD recordings, videotapes, and journal articles. A DOI may also be used to identify less tangible manifestations, especially the digital files that are the common form of intellectual property expression on the Internet. But the power of the DOI goes beyond its ability to identify manifestations—it may also be used to identify performances of intellectual property or the abstractions, including works such as musical scores or lyrics that are the basis for those manifestations. Finally, the DOI can be used to route users and applications to multiple services related to the named object, such as bibliographic or transaction services.

Prefix and suffix:

A DOI is made up of two components (see illus.). The first element, the prefix, is assigned to an appropriate grouping of content such as the publisher, label, or imprint by a registration

agency. All prefixes begin with 10, followed by a number designating the organization, publisher, or any rights holder or controller who has obtained that prefix and is responsible for depositing the individual DOIs. Organizations such as publishers might choose to request a prefix for each of their imprints or product lines, or they might use a single prefix. The second element of a DOI is the suffix, a unique character string assigned by the prefix holder to the specific object being identified. Existing identifier or product numbering systems used within a particular industry, as well as private naming systems used within the corporation, are typically incorporated within the suffix of the DOI. The suffix may be assigned to entities of any size or granularity (such as a book, article, abstract, chart, album, song, or melody) or any file type (such as text, audio, video, image, or software). The prefix holder decides the level or granularity of identification based on the nature of the objects to be distributed or sold electronically.

Future:

The DOI is currently undergoing a period of rapid development, following the early acceptance of the principles of the system and its adoption in initial applications. As of July 2002, several million DOIs had been issued, with over 200 organizations allocating DOIs; five DOI Registration Agencies had been appointed (with more planned to come); and the DOI had been well integrated into several related standards activities, with many applications actively under development. That development is evident in all aspects of the DOI System—technology, procedure, and policy. For background information see DATABASE MANAGEMENT SYSTEM; INFORMATION MANAGEMENT; INTERNET; MULTIMEDIA TECHNOLOGY; WORLD WIDE WEB in the McGraw-Hill Encyclopaedia of Science & Technology. John S. Erickson Bibliography. N. Paskin, toward unique identifiers, Proc. IEEE, 87(7):1208–1227, 1999; Syntax for the Digital Object Identifier, Z39.84–2000 Document Number: ANSI/NISO Z39.84–2000, National Information Standards Organization Staff and National Information Standards Organization, 2000.

Link resolver:

Industry context:

The Open URL1provides a means for librarians, via link resolvers, to take charge of directing users at their institutions or organizations to appropriate, subscribed resources for content, whether in electronic or print form. Open URL linking not only improves the online working environment for library patrons by reducing the number of linking dead ends but it also – by

improving content visibility – increases the usage of the library's licensed and subscribed materials and potentially reduces document delivery spend. All of these are appealing outcomes for librarians.

However, the Open URL is only one of two key components that make a context-sensitive linking framework possible. The knowledge base that underpins the link resolver is also a critical piece of this framework. Currently, a number of commercial link resolver suppliers independently collect and collate data regarding the different incarnations of online journal and book content from many different information providers, to create proprietary knowledge bases for their own products. Some libraries have also built knowledge bases themselves as part of 'home-grown' resolver applications, such as Gold Rush. In this 'distributed' knowledge base model, and in the competitive marketplace for link resolvers, the knowledge base is used as a key differentiator in sales discussions.

Its accuracy and comprehensive-ness plus the frequency with which it is updated are all arguments used to persuade the librarian to opt for one solution rather than another. Having selected a linking solution from the market place, the librarian (or their resolver supplier) localizes the 'out of the box' knowledge base to reflect local subscriptions and conditions: subscribed or preferred web resources, content packages and individual journal/book titles are made active in the system. Additional resources such as the local library catalogue are also configured to ensure that links to print materials are offered to users where relevant. A link resolver then draws on its configured knowledge base for a given institution to deter-mine the appropriate link(s) to offer to a user for a specific Open URL. Whilst the Open URL is the enabling technology that provides the link resolve with key input data, it is the interaction with the knowledge base that – critically – determines the appropriate options for a particular citation or reference and delivers the user to their chosen destination.

As a result of the significant value they add and the local control over linking they provide, link resolvers have risen rapidly in profile in a short space of time and are now viewed by many academic librarians as an essential software component in their technology toolkit. It is therefore imperative, as digital collections become more and more critical to libraries, that the data residing in link resolver knowledge bases is current, accurate and reliable, if users are to discover and access the content that is selected and acquired for them by librarians. And yet the experience of many librarians is that whilst resolver technology has a real potential to enhance access to digital collections, in practice it has also introduced a range of new

problems: there can be significant delays in the updating of knowledge bases; the information about titles in packages from content aggregators can be inaccurate; and identifying who needs to do what to solve such problems can be difficult.3, 4In July 2006 the UKSG invited tenders for a research project to explore the new data flow, or supply chain, that has developed to facilitate the creation of knowledge bases by resolver suppliers. This supply chain involves a number of organizations: publishers and other content hosts, subscription agents, librarians, providers of link resolver software tools, and others. By exploring the views of the various parties it was felt that a study would be able to better understand the present supply chain, clarify current roles and expectations, identify any performance issues and barriers that need to be overcome to ensure a smooth flow of data to the end-user, and consider how the problems identified in the supply chain might be alleviated. Scholarly Information Strategies (SIS) began work on the project in September 2006, with the final project report submitted to UKSG at the end of January 2007.

Open access resources:

Open Access (OA) was initiated in the developed countries and was marked by three notable declarations known as Budapest Open Access Initiative (BOAI) in 2002, (http://www.soros.org/openaccess/read.shtml), Bethesda statement in June 2003 (www.earlham.edu/—peters/fos/bethesda.htm), and the Berlin declaration in October 2003 (http://www.zim.mpg.de/openaccessberlin/ berlin.decleration.html).

According to the Budapest Open Access Initiative (BOAI), Open Access is defined as “Free availability of journals on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles crawl them for indexing, transmit them and data of software, or technical obstacles other than those independent from acquiring access to the internet itself. The author can control the integrity of their work and the right to be properly acknowledged and cited. The scholarly literature is freely accessible online which scholars give to the world without any expectation of subscription. Most OA definitions have key features in common i.e. open access exists where there is free, immediate and unrestricted availability of digital content. Those definitions of various experts are given below:

According to Suber (2006) “Open access to the scientific article means online access without charge to readers or libraries. Committing to open access means dispensing with the financial

technical and legal barriers that are designed to limit access to scientific research articles to paying customers"

Bjork (2004) defines OA as that "a reader of a scientific publication can read it over the Internet, print it out and even further distribute it for non-commercial purposes without any payments or restrictions. At most the reader is in some cases required to register with the service in question, which for instance can be useful for the service providers in view of the production of readership statistics. The use of the content by third parties for commercial purposes is, however, as a rule, prohibited"

Therefore, OA is simply the free online availability of digital contents, scholarly journal articles, research results, which authors publish without expectation of payment and is based on 'an ethical argument that research funded by the public should be available to the public' (Jeffery, 2004). OA operates within the legal framework and owns the original copyright for their work. Authors can transfer the rights to publishers to post the work on the web or else can retain the rights to post their work on the archives.

Open access resources:

There are various mechanisms by which open access is achieved. Harnard et al. (2004) identified two main roads to OA 'gold' and 'green'. The gold road refers to OA journals which are openly accessible immediately on publication. The green road refers to OA self-archiving. The green road is faster and cheaper, whereas the gold road is more costly but better maintained and managed. The OA mechanisms can be classified as:

- Open access periodicals providing complete and unrestricted access to web-based OA journals, e.g. journals such as D-lib, PLoS Biology.
- Domain-specific, subject-specific institutional and digital repositories where the authors or authors institutions or institutions administered by an organization or scholarly society make publications available free online e.g. Arxiv.
- Limited access i.e. conventional journals that allow open access to certain sections of their issues e.g. Nature.
- Delayed OA version is another mechanism i.e. periodicals going OA after a specified period of time from the date of publication, e.g. High wire press journals.

- Dual mode is subscription based print on paper edition along with OA online edition, e.g. British Medical Journal.
- State of economy based access is a mechanism where conventional periodicals are made available as OA periodicals to countries based on economic criteria, e.g. HINARI, AGORA.

Features of Open Access:

- Open Access literature is digital, free of cost and free from copyright.
- Open Access is appropriate with copyright, peer review, revenue, print, preservation, prestige career advancement, indexing and supportive service accompanied by conventional scholarly literature.
- Open access campaign concentrates on the literature that authors give to the world without expectation of any penny.
- Open access literature is not free of cost to produce for publishing.
- Open Access is appropriate with peer review and all the major open access initiative of scientific and scholarly literature insists on its importance.

There are two basic vehicles for delivering open access to research literature viz.

- Open Access Journals
- Open Access Archives

Open access movement:

The concept of open access existed at the time of distribution of scientific materials globally without any barriers, but it was expensive in the past decade. Open access provided worldwide by researchers when the possibility was opened by the advent of the Internet and the World Wide Web. The momentum was further increased by a growing movement for academic journal publishing reform with it gold and libre open access. Electronic publishing created new benefits as compared to paper publishing, but beyond that, it contributed to causing problems in traditional publishing models.

The revolution of the open access movement started in the 1990s with the releasing of the information retrieval initiative World Wide Web by CERN and Tim Berners-Lee. World Wide Web is a strong hypermedia information retrieval project, which gives access to large

numbers of documents to the world without any restriction. If a person wants to access information through the World Wide Web, he/she needs to get help from a browser like Internet Explorer, Mozilla Firefox, Google Chrome, etc. This is one of the important milestones in the movement of open access.

Another precipitating factor to open access movement is that existence of arXiv.org, a repository of e-prints or pre-prints of scientific papers in the fields of mathematics, physics, astronomy, computer science, quantitative biology, statistics, and quantitative finance, which could be accessed online in the year 1991. It was originally developed by Paul Ginsparg, and is now hosted and operated by the Cornell University. The arXiv is not peer review repository; we can submit a document in any of format including LaTeX, PDF, MS Word other than TeX or LaTeX.

In 28 November 1994, Stevan Harnard at the Network Services Conference in London proposed to the authors to self- archive their own research output in their own website. His purpose was to provide open access of research materials. Self-archiving of research outputs as well as book chapters and theses in their own institutional repository or archive gives maximum accessibility, usage, and impact. Thus, in 1994, the Social Science Research Network (SSRN) was founded in collaboration with Michael Jensen and Wayne Marrthe. It is an open access repository of scholarly research in the field of social sciences and humanities owned by the Social Science Electronic Publishing, Inc. (SSEP). Later, the PubMed experimental data base was released in 1996 under the Entrez retrieval system with full access to MEDLINE. PubMed was searched approximately two million times for the month of June 1997, while its current usage exceeds three million searches per day. It was redesigned with lots of useful features including a MeSH, the Single Citation Matcher, Name of Substances synonym mapping, the Details button, and Loansome Doc. This is one of the important milestones in the era of open access. The above sentence leads to green open access and also for gold open access publishing.

The Internet archive was founded in the year 1996 to build an Internet library. It is whole and sole archival system, which suits to all kinds of academic community including persons with disability. It facilitates access to documents and files in all formats of text, .doc, audio format, video format, font magnification system, PDF, and also downloads a text content to read in the kindle eBook reader. In 1997, the idea of Scholarly Publishing and Academic Resources Coalition (SPARC) was mooted at the annual meeting of the Association of Research

Libraries. This supports free access to all kinds of research and believes in open access of research outputs to the people.

Many meetings, discussions, and decisions were taken and implemented by the scientists/departments/institution related to open access sources throughout the world. Meanwhile, scientists wanted to share information among themselves. So, the need of technical interoperability standards for archives to share catalogue information arose. The Open Archives Initiative (OAI) is an organization, which attempts to build a "low-barrier interoperability framework" for the archives. This allows people to harvest metadata to provide "value-added services".

According to Suber, Peter (2008), Open access comes in two degrees:

• **Gratis open access**, which is online access free of charge, and

• **Libre open access**, which is online access free of charge and with some additional usage rights.

In general there are two ways authors can provide open access. They are:

• **Green open access** is the self-archiving of articles or other materials published in an institutional or central repository or other Open Access websites. Articles do not need to be published in Open Access journals to be green as long as they are archived in an Open Access database or repository. For example, articles archived in circle would be considered Green.

• **Gold open access** is when articles are published in any journal that is Open Access with immediate, free access. The number of Open Access journals is growing quickly as the Open Access movement grows (University of British Columbia, 2014).

Preprints:

A preprint is a scholarly manuscript posted by the author(s) to a repository or platform to facilitate open and broad sharing of early work without any limitations to access. The preprint content is generally similar to a manuscript submitted to a scholarly journal, and it is usually posted around the same time to submission to a journal. Typically, after a basic screening process, the manuscript is posted on the preprint server within a few days of submission, without peer review, and it is made freely available online. Preprint servers do not require

copyright transfer, allowing the authors to retain copyright and to post the paper under different licenses that enable others to reuse the work (permitted uses will vary depending on the license). The main appeal of preprints is that they allow authors to share their work openly, early, and rapidly, with a much shorter turnaround than is required for publication in a peer-reviewed journal.

With the preprint model, authors can control the dissemination of their work and share their research with the scientific community as and when they are ready to do so without being limited by the processing timeline associated with formal publishing. What constitutes a preprint and the content types supported by preprint servers continues to be a topic of discussion in the scholarly community (Rieger,Oya Y., 2020). Repositories hosting preprints may also include post prints, conference papers, working papers, reports, white papers, literature reviews, book chapters, slide decks and posters. Some preprint servers such as arXiv and preprints.org support the submission of supplementary files (at modest file sizes) associated with the paper (e.g., images, spreadsheets, program code etc.). Preprint servers generally hold preprints in perpetuity, offering in some cases to link to a subsequent version of record when possible. About 50-70 percent of the papers posted as preprints are eventually peer-reviewed and formally published.

Benefits of preprints:

Preprints present several potential benefits, both for researchers and for overall scientific progress. Preprints give researchers the freedom to communicate their work rapidly, broadly and when they are ready to do so. Relative to publication in a journal, preprints allow authors much more control of when and how to disseminate their work. John Inglis, co-founder of the preprint servers bioRxiv and medRxiv, has referred to preprints as ‘the directors’ cut’ of the manuscript (10 Tips for Submitting a Successful Preprint, n.d.), the version that the authors consider an accurate representation of their work, knowing that the manuscript may later undergo changes following peer review. Preprints are posted within days of submission, so can be disseminated much more rapidly than journal publications, where the peer review and editorial process can take months or even years. While some publishers can boast relatively efficient processing (Guest Post – MDPI’s Remarkable Growth, 2020) and many journals have worked to expedite their review process to facilitate the publication of COVID-19 research, traditionally a peer-reviewed manuscript takes around five months from submission to publication. This five-month period does not account for the possibility of the manuscript

being rejected by one journal and having to undergo a new editorial process at another. By comparison, a preprint server can provide immediate posting or take just a few days (Nouri et al., n.d.), and while submissions may be rejected during the preprint server's screening process, the rejection rate is significantly lower than that at most journals.

Preprints offer a number of additional benefits for researchers (Berg et al., 2016) beyond speed of publication:

● Preprints are made freely available to everyone. Preprint servers offer no restrictions to access associated with journal subscriptions or paywalls.

● Preprints are permanent citable records and provide evidence of research productivity. They can provide evidence of the researcher's work to funding agencies and promotion and hiring committees. This can be particularly relevant for early career researchers since the time for students to publish their first first-author peer-reviewed paper has increased by over a year compared to the 1980s (Vale, 2015).

● Preprints can bring additional visibility to the work. Several studies of published research have shown that posting a preprint is associated with higher social media attention and citations for the publication at a peer-reviewed journal (Fraser, Momeni, et al., 2020; Fu & Hughey, 2019; Serghiou & Ioannidis, 2018). Posting a preprint can also facilitate invitations to present at scientific conferences or even, perhaps, opportunities for collaboration among groups working in related projects.

● Preprints allow authors to get feedback on their work. Some preprint servers provide a forum for public comments on the preprint, and scientists may also provide comments privately over email. This feedback can help authors revise and improve the paper prior to eventual submission to a journal, and this allows a broader range of perspectives on the work than do the views of a couple of scientists involved in a journal's peer review process.

● The preprint allows the author(s) to establish priority for their findings. In several subfields of physical sciences, preprints are the main mechanism for disseminating work and establishing priority. As discussed in the next section, while some concerns remain about the possibility of scooping (another researcher/group may see the preprint and rush to publish similar work to claim priority over the findings), communities in the life sciences may evolve to a similar approach to that of some subfields of physics and recognize priority for research posted as a preprint (Vale & Hyman, 2016).

● Preprints allow researchers to disseminate work and ideas which they may not intend to submit for journal publication (such as proposal documents or open letters), and can also provide an avenue to share findings that traditionally have been harder to place as a journal publication, such as null, negative, or inconclusive results.

● The preprint has the potential to help journals select manuscripts for publication. Several journals (e.g. PLOS Genetics, Open Biology, Proceedings of the Royal Society B) have appointed designated 'preprint editors' who scout the latest research posted at preprint servers and invite submissions to their journal.

If we consider the research ecosystem more broadly, preprints also provide potential benefits to the overall scientific enterprise:

● The dissemination of new knowledge can accelerate additional discoveries, and thus the rapid sharing of the latest scientific findings can benefit society. The COVID-19 pandemic has provided a clear example of a large-scale crisis in which the open and prompt sharing of information can make a difference from a public health and societal perspective.

● From the perspective of research investment, preprints can help leverage research outputs. In the current journal system, it can sometimes be difficult for researchers to disseminate all of their work, either because the findings may not 'fit' the format of the journal article (e.g. negative results, short observations) or because other circumstances make the bar too high to invest in the preparation of journal submission (e.g. a graduate student or a postdoc moving to a different institution and no longer being available for a lengthy revision process). Preprints provide a means of sharing those types of work and thus maximizing the knowledge shared from the same project grant.

● The sharing of ideas months prior to the journal publication can also avoid duplication of effort. If a preprint reports that a line of research may be unproductive, other scientists can adjust their work to prevent repeating that line of research. A survey carried out as part of a review of the IEGs reported 346 occasions when information circulated in the group had prevented needless duplication of effort (Univekiity, n.d.). From an economic perspective, the results from the survey suggested savings of approximately 10,000,000 USD/year (the equivalent to 74,500,000 in 2018 dollars).

Discussion forums:

Discussion forums are perhaps the earliest form of social media platform. Early adopters of Internet technology may recall news groups or special interest groups (SIGs) that were hosted on the early websites and systems connected to the Internet. These communities were rooted in technical topics but eventually expanded to cover just about any category that could attract an audience. These platforms matured and are now hosted on consumer-oriented social networking sites.

Discussion forums are especially valuable from a social analytic standpoint as they are highly focused in their content and provide a candid view of the topic being discussed. The content is often unstructured in nature but contains various social data types that can be leveraged into better enterprise decision workflows. Flyertalk.com is an excellent example of a discussion-driven community, which hosts discussions centric to the airline industry. Topics include frequent-flyer forums, travel news, luxury hotel discussions, and advice on all things airline related.

Content created within this community can be utilized to identify trends, brand awareness, and sentiment and other valuable content directly focused on the airline and travel industry. Communities like Flyer talk can create vast repositories of data; the site's "Mileage Run Deals" discussion area has 32,000+ discussion threads that contain more than 460,000 individual posts and comments. Each of these posts is written by a community member who is an avid flyer in search of deals and routes that will add to his or her frequent-flyer account, helping him or her to achieve the highest level of airline status. These types of flyers are invaluable to the airline industry, so it makes sense that understanding them better and engaging with them on a topic they find important will add value to the relationship between them and their favourite carrier.

Technical reports:

"A technical report is a document written by a researcher detailing the results of a project and submitted to the sponsor of that project." TRs are not peer-reviewed unless they are subsequently published in a peer-review journal.

Characteristics (TRs vary greatly): Technical reports....

- may contain data, design criteria, procedures, literature reviews, research history, detailed tables, illustrations/images, explanation of approaches that were unsuccessful.

- may be published before the corresponding journal literature; may have more or different details than its subsequent journal article.
- may contain less background information since the sponsor already knows it
- may have restricted access
- classified and export controlled reports
- may contain obscure acronyms and codes as part of identifying information

Disciplines:

- Physical sciences, engineering, agriculture, biomedical sciences, and the social sciences, education etc.

Documents research and development conducted by:

- government agencies (NASA, Department of Defence (DoD) and Department of Energy (DOE) are top sponsors of research
- commercial companies
- non-profit, non-governmental organizations
- Educational Institutions

Format:

- Issued in print, microform, digital
- Older TRs may have been digitized and are available in full text on the Intranet
- Newer TRs should be born digital

OPAC:

Online Public Access Catalogue (OPAC) is a catalogue of a library's collection that is open and accessible to the public through the internet. It is an online open access bibliography of a library holding. A library catalogue provides users a platform to search and locate books and other materials available at the library. A library catalogue is a register of all bibliographic items found in a library. A bibliographic item can be any information entity (e.g., books, journals, computer files, graphics, maps, etc.) that is considered library material. An OPAC is just the electronic version of the manual card catalogue. An OPAC makes use of the Z39.50

protocol to handle search requests from users. Z39.50 is a standard communications protocol for the search and retrieval of bibliographic data in online databases. Z39.50 is widely used in the library environment and is often incorporated in

Library Management Systems (LMS) like KOHA, Insignia Software and Librarika.

According to Cutter, (n.d), the objectives of catalogues in libraries are:

1. To enable a user find a book based on:

a. the title

b. the subject

c. the author

d. the date of publication

2. To show the collections of a library:

a. by a given author

b. on a given subject

c. in a given kind of literature

3. To assist the user in the choice of a book

a. as to its edition (bibliographically)

b. as to its character (topical

These objectives are still considered today in setting up a library's catalogue. The catalogue serves as the inventory of the library's collections. If a library material is not found in the catalogue, then it is assumed that it is not part of the library holding. OPACs have greatly enhanced the use of catalogues in libraries. It has the following advantages over the traditional card formats:

1. The online catalogue does not need to be sorted statically; the user can choose author, title, keyword, or systematic order dynamically.

2. Most online catalogues allow searching for any word in a title or other field, thereby enhancing the ways to search and find a record.

3. Many online catalogues allow links between several variants of an author's name. For example, if an author's name "John Adams Smith" is keyed in differently also as "John A. Smith" and "J.A. Smith" in a catalogue, there would be links between the three names thereby enhancing find ability.

ETD:

A dissertation or thesis is a work submitted in support of candidature for a doctorate or master's degree, respectively, which presents the author's research and findings. Electronic versions of theses and dissertations are called ETDs. Theses and dissertations must first meet the requirements of each author's advisory committee and department, and then be submitted for final approval by the Graduate School. ETDs replaced paper theses and dissertations at Virginia Tech officially on Jan. 1, 1997 when online submission became a requirement. ETDs can be similar to their paper predecessors in that they may have figures, tables, footnotes, and references. The title page has the author's name, the ETD title, the official name of the university, the degree sought, the names of the committee members, date of the defence, keywords, and often a statement of copyright.

An ETD documents the author's years of academic commitment. It describes why the work was done, how the research relates to previous work as recorded in the literature, research methods used, the results, interpretation and discussion of the results, and a summary with conclusions.

The ETD is different, however. It provides a technologically advanced medium for expressing the author's ideas. By providing access to theses and dissertations as electronic resources, everyone benefits.

More access to research:

- Research is available on campus.
- Research is accessible worldwide.

Less expense to authors and libraries:

- No paper costs
- No copying costs
- No physical shelf space
- Lower cataloguing costs

Better presentation of research (not available in paper format):

- Addition of multimedia files
- More dynamic presentation of data
- Hyperlinks
- Programs and code

ETDs are prepared using almost any word processor or document preparation system. The electronic format allows graduate students to fully utilize current and future technology as tools to express their research and findings.

A goal at Virginia Tech is to have all graduate student research and findings openly available to the public through the Worldwide Web. But, authors, with the agreement of their advisors, may temporarily restrict access to their ETDs to just the VT community or they may temporarily have all access withheld, for example while they apply for a patent. With permission from the Dean of the Graduate School, an ETD may be comprised of multiple files, and those files may have different levels of access levels.

Patents:

A patent is a government grant or exclusive privilege which allows making use or selling of a new invention for a term of year. A patent takes the form of an official document, having the seal of government attached to it, which confers an exclusive privilege or right over a period of time to the proceeds of an invention.

Patents are regarded as a part of the primary sources because an invention has to be new, only then it can be patented. Very often, there may be no published description of the idea incorporated in a patent or its application. It may be mentioned that patents are of special interest to chemists and engineers. In each country, there is one publishing agency and these are serially numbered.

Harrods Librarian Glossary define patent as;

1. A specification concerning the designs or manufacture of something which is protected by letters patents and secured for the exclusive profit of the designer or inventor for a limited number of years which varies in different countries from fifteen to twenty years. The department which controls the registration of patents is called a ‘Patent Office’.

2. A publication, issued by such an office, which gives details of designs and processes.

Reference sources:

Reference books are useful for quick fact checking and for background information. As such, they remain in the building. Examples of reference books include: almanacs, atlases, dictionaries, directories, encyclopaedias and indexes. Reference sources are most useful when you are beginning to work on a topic and need to acquire some background knowledge about it. You may not end up citing them in your bibliography or Works Cited page, but they can help you to get started.

Types of Reference Sources:

Almanacs

One volume summaries of current and historical facts and general knowledge. Examples: *World Almanac and Book of Facts, Guinness Book of Records*

Atlases

Book of maps. There are many kinds of atlases — physical, political, statistical, historical. Example: *The Times Atlas of the World*

Dictionaries

Alphabetical list of words and definitions. These can also focus on specific subjects. Examples: *Random House Webster's College Dictionary, the Dictionary of Celtic Mythology*

Encyclopaedias

Contain more extensive articles than do dictionaries. There are general encyclopaedias such as The New Encyclopaedia Britannica and specialized encyclopaedias, such as *The McGraw-Hill Encyclopaedia of Science and Technology*

Indexes

Print and electronic collections to periodical literature.
Example: *Book Review Digest*

Other types of reference sources include:

- bibliographies (lists of sources on specific topics)

- biographical sources (information on the lives of individuals)
- chronologies (dates and timelines for events)
- directories (address and phone number information)

Government documents and statistical sources are also considered reference. However, much of this information is available electronically.

Review questions:

1. Define Open courseware.

2. What is a link resolver?

3. Explain briefly about open data initiatives.

4. Define OPAC and ETD.

5. List a few reference sources.

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UNIT – 4

Search tools and databases

Objectives:

- To learn about search tools.

- To gain knowledge on subject directories and course wares.
- To further learn about databases, bibliography etc.

Introduction:

Internet has created revolutionary changes in this era of Information Technology. For many, it is one stop platform to find or locate any information they are interested in. Traditionally, librarians had the job to assist their users to locate the information they needed. But, now the scenario has changed a lot. Internet has in offer a variety of search tools such as search engines, search directories to locate the information on web. A search on web is a simple process and can be conducted by simply issuing a query to the search tool. The search tool in return will look for the information in its web based information databases and retrieves those, which are relevant to the query.

Searching is an iterative process i.e. one needs to keep working on their query unless the exact information is located. The very first tool used for searching on the Internet was Archie. The name stands for "archive" without the "v." It was created in 1990 by Alan Emtage, a student at McGill University in Montreal. Veronica (Very Easy Rodent-Oriented Net-wide Index to Computerised Archives) and Jug head (Jonsy's Universal Gopher Hierarchy Excavation and Display) were two other popular search programs. There are three basic types of search tools that most people use to find what they are looking for on the Web: Search Engines, Subject Directories and Meta Search Tools. Search Engines are more generic and much larger than Subject Directories. Meta Search Tools get their results from several search engines. The following sections will provide an elaboration on these search tools.

Search tools:

Search engine is a tool for locating information from a collection. Search engines uses information about the information (such as metadata, catalogue) stored in the database to locate information. Sometimes they perform full text search within the document from first character to last character. The search is done on pattern matching algorithm whether it is a database or full text.

Types of search tools:

Search Directory:

Search directories are classified collections of documents. They are good for searching with a context. These directories are good for browsing. In subject directories, documents are pre classified by a person. Librarians' Internet Index; Google Directory; Yahoo!; dmoz are some of the examples of subject directories. There are two basic types of directories:

Academic and Professional Directories: These are often created and maintained by subject experts to support the needs of researchers. INFOMINE, from the University of California, is a good example of an academic directory.

Commercial Directories: These cater to the needs of general public. Directories of Yahoo! and Google are examples of commercial directories.

Search Engines:

World Wide Web is a network of several information databases. In recent years, an exponential growth in these databases has made it difficult to locate a particular piece of information. Internet offers a powerful tool known as search engine to manage, filter and retrieve the information for their users. Search engines are automated tools for searching information from a collection using metadata stored in the database of search engine. In other words, it is an information retrieval system and assists in locating information on web. Google and Yahoo! are most popular search engines.

Meta-search Engines:

Meta Search engines are online tools (search engines) which performs simultaneous search on more than one search engine at a time. These search engines aggregates the results into a single list and displays them according to their source. E.g. Dogpile is a Meta-search engine and gets its results from Google, Yahoo, MSN Search, Ask, About, MIVA, LookSmart, and more.

Example: Dogpile, WebCrawler, Browsys

Features of search tools:

The searching tools follows pattern matching algorithm. There are many types of searches can be done using search tools.

Keyword Search:

When searching is done using a keyword it is known as Keyword searching. Keyword may occur at any place in the document or in the metadata field. This kind of search has higher recall value.

Boolean Search:

Logical AND, OR and NOT are known as Boolean operators. When Boolean operators are used for searching it is known as Boolean search. The operators are used for combining more than one word with certain conditions. These kind of searching also known as combinatorial search.

AND:

This operator will retrieve all the documents which contains all the keywords occurringat both ends of the AND operator.

Syntax: <Search Term A> AND <Search Term B>

Example: Library AND Information

Output:

1) The above query will retrieve only those documents which contains both the terms

Library and Documentation

2) The precision in search is more. The number of documents retrieved will be less hence less is the recall value.

OR:

This operator will retrieve all the documents which contains all the keywords occurring at both ends of the OR operator.

Syntax: <Search Term A> OR <Search Term B>

Example: Library OR Information

Output:

1) The above query will retrieve all documents which contains both the terms Library and Documentation

2) The recall in search is more. The number of documents retrieved will be more but the precision in retrieved documents will be less.

NOT or AND NOT:

These operators increase the precision of the search result. The query can be made more specific by using these operators. Using the capitalised AND NOT operator preceding a search term eliminates documents that contain that term.

Syntax

<Words to be searched> AND NOT <Words not to be searched>

Example:

If user is looking for information on Drivers and do not want documents that include information relating to the Screw Drivers the query could be “Driver” AND NOT Screw.

Proximity Search:

This is another kind of combinatorial search where the proximity of two words is checked. The term proximity means ‘nearness of words’. Proximity is given in terms of number of words by which two words should be separated. There are two kinds of proximities,

1) Near Proximity

2) Exact Proximity

1) Near Proximity

Near Proximity brings range of search results where the number of proximity is from adjacent to the mentioned number proximity. For example, for two Key Words COLLEGE and LIBRARIANS, if the proximity of 3 is applied between them it will bring the results as follows,

COLLEGE LIBRARIANS

COLLEGE FOR LIBRARIANS

COLLEGE OF LIBRARIANS

COLLEGE WITHOUT LIBRARIANS

COLLEGE WITH THE LIBRARIANS

COLLEGE OF INDIAN LIBRARIANS

COLLEGE OF THE LIBRARIANS

The Near Proximity would bring the results where the search terms would be separated by no word to n-1 word (where n is number of proximity). In other words, near proximity brings all the proximities which are lesser than the mentioned number.

2) Exact Proximity

Exact proximity brings the results with exact number of proximity mentioned. It does not bring the results which have lesser number of proximity. For example, if the number of proximity is set to 3 between two keywords i.e. COLLEGE and LIBRARIANS.

The retrieved result would be,

COLLEGE WITH THE LIBRARIANS

COLLEGE OF INDIAN LIBRARIANS

COLLEGE OF THE LIBRARIANS

Truncation Search:

Truncation means concatenation of words. In other words, if the root string of the words is searched it brings all the derivatives derived out of the given root string. Truncation is of three types based on truncation techniques:

1) Left Truncation

When the root string is concatenated from the left side, it is known as left truncation. For example, if the left truncation is implemented for the root string ISM, it will bring all the words which ends with the string ISM, like

BRAHAMINISM

COMMUNISM

SUPHISM

2) Right Truncation

When the root string is concatenated from the right side it is known as right truncation. For example, right truncation is used with the root string CLASS, it will bring all the words which starts with the root string CLASS, like

CLASS

CLASSIFICATION

CLASSIFICATIONIST

CLASSIFIER

Case Sensitive Search:

One of the major features of search tools is their support to search words based on their case. In other words, search tools can differentiate between Upper and lower cases. For example, DUKE and duke will bring different search results based on the case. In an ordinary/plain search, search tool performs searching irrespective of their cases. However, if case sensitive search is invoked, search tool brings exact search string based on the case of search string.

Limiting Search:

There are certain conditions based on which the searches can be narrowed down, for example, by Date, by Domain, by media type, by Document Directory Depth, by Page Depth and so on. This kind of condition reduces the number of search results and increases the relevancy of final output.

Fields Search:

Field Search is a kind of limiting search to a particular field of the database. Searching can be done within a given context. For example, searching within Title or searching within Author or searching within both the fields. This kind of searching is known as Field search.

File Types Search:

When the searching is restricted to a particular file type like, MS-Word, PDF, PPT etc. it is known as file type search.

Stop Words:

While searching documents in a collection or over Web, some frequently occurring words like prepositions, conjunction etc. should be avoided. In order to avoid such redundant words from the search results, the tools contain a file called stop word file. This file lists all the words which are to be avoided from being indexed. This saves space of storage and reduces time of search.

Ranking:

Search tools present the search results in some order. Normally, when system is small 5 7 the presented results are arranged in alphabetical order. But when results run in several pages, it becomes important to present the most relevant document on the top followed by less relevant one. Thus, it is important to rank the retrieved documents based on their relevancy to their users. Search engines have an automated mechanism to rank the retrieved results according to the relevancy of each retrieved search result. For example, PageRank of Google is an algorithm for measuring weightage of results based on link analysis.

Family Filters:

Family filters are used to reduce, if not remove, the objectionable matter to appear on search results. Search engines do provide functionality for setting family filters as safe search. Family filters are used by Google (as Safe Search), AltaVista, Yahoo and so on. Apart from the search engines there are tools (e.g. Naomi, which is a freeware) which can be loaded on computers to stop display of obscene matters.

Fuzzy Search:

Fussy search is one of the major features of today's information retrieval system. It brings out results based on approximations. In other words, these are error correction algorithms. For example, if a keyword is miss-spelt search algorithm used in searching attempts to render the search result according to correct spelling. Such algorithms are known as Soundex and Metaphone algorithms. Levenshtein distance algorithm is one such kind of algorithm used by Lucene search engine, an open source search tool.

Subject or Web Directories:

Directories are the Yellow Pages of the Internet. They contain information that has been submitted to them by their indexers or by users who submit entries. The subject directories are often manually maintained, browsable and searchable web-based interfaces. Yahoo is the most famous subject directory. Yahoo! has several subject headings. A subject directory contains information that is organised into categories and subcategories or topics and subtopics. Like a search engine, one can search a subject directory for all entries that contain a particular set of keywords. Although directories can be searched using keywords, it is often as easy to click on a category, and then click through specific subdirectories until one finds the desired subject. Most web directories are designed to be searched by browsing the subject

categories. Directories differ from indexes; however, in the way they organise information. Web indexes simply compile a growing number of records while directories, in contrast, organise information into groups of related records. Besides, Yahoo!, the best-known directories include-Open Directory Project (Dmoz.org) and LookSmart. Search Engines Directories contain fewer resources than search engine databases. It is because resources in a directory are manually selected, maintained and updated. This, in turn, can be to the advantage of users especial Iy if he or she is searching for a general topic. The directories, therefore, increase the likelihood of retrieving relevant results and increase the possibility of finding high quality, reliable websites. The directories also have some rirawhacks. It is possible that items with similar topics may be placed under two different subject categories in a directory. Directories may not be as current as search engine databases because while the search engines update their databases automatically using robots or spiders, directories are updated manually after new entries are selected, rated and categorised. The directories may also miss out on some of important resources, since resources are selected manually.

Subject Gateways or Subject Portals:

Subject gateways, variably called as Meta resources, subject-based information gateways (SBIGs), subject-based gateways, subject index gateways, virtual libraries, clearing houses, subject trees, pathfinders and guide to Internet resources are facilities that allow easier access to network-based resources in a defined subject area. For consistency of terminology, this Unit would use 'subject portals' in preference to other prevailing terminology. Subject portals redirect a user to the holders of the original digital material. It may provide its own indexing and search services or it may combine original resources from a number of different providers. The subject portals restrict their operation to providing linkages to electronic resources hosted on other servers. A subject portal can be defined as an organised and structured guide to Internet-based electronic information resources that are carefully selected after a predefined process of evaluation and filtration in a subject area or specialty. Subject portals are often independent web-sites or part of an institution or library's web site that serve as a guide to Internet resources considered appropriate for their target audiences. A subject portal site that is a part of an institutional website or the library's web site, may include resources that are on subscription by the parent organisation and are accessible for free to all. A subject portal may also be built by a commercial enterprise that is accessible free of charge up to the bibliographic level. However, a user may be required to pay if he / she wishes to access the full-text. Home pages of all the major education and research institutions,

especially in the developed world, provide an organised and structured guide to electronic resources available on the Internet. Some of the examples of subject portals are LibrarySpot, Librarian's Index to Internet, Argus Clearing House, BlOME and BUBL.

Courseware:

Approaches to Media use for Course Development:

The earlier units of this course state that courseware is developed and delivered through print and audio-visual media. Web based delivery is also becoming common. Even though different media can deliver courseware, an institution decides the medium/ combination of media for delivering courseware. Therefore, an institution usually has a policy that guides the approach to media use. Ideally the pedagogic potential of a medium vis a vis the nature of the content should be the main criteria for the choice of media. However in comparison to courseware development for audio and video media that for the print medium requires lesser investment in terms of time, money, technical facilities and other resources. Further learners can easily access print medium. Therefore, these factors are also considered by the institution while deciding its 'approach' to media use, especially when they use multiple media for delivering instructions. The various approaches to media use are:

Supplementary media approach: Print is the master medium. Audio and video programmes represent and reinforce the content, which is already covered in the self-learning material (SLM) in the print medium (Khan, 2006). Audio and video media therefore perform a supplementary role in the instructional system. The assumption underlying this approach is that learners who do not get access to audio video programmes will not be deprived of the 'core content'. IGNOU and several open universities of India follow this approach.

Complementary media approach: The audio/visual media present content, which complements that taught by the print medium. For example to complement the printed explanations of the pedagogies used for teaching language to elementary level children, videos are used to show how children should be taught.

Integrated media approach: It is somewhat similar to the complementary media approach, but in this case, the audio /video components provide cross references and additional content for enriching the content covered through the print medium. For instance a section in the print instructs 'now listen to the audio programme and then read the next section '. A video may impart the instruction 'you have seen how we should counsel children, now read about it'.

The integrated media approach works when print and audio/video programmes reach students as cohesive multiple/ multimedia learning packages.

Independent media approach: In this case, the content of audio/ video/ print/web based material is stand-alone content and content in one medium is not linked to that in another. For example a series of radio /television programme can be the main learning resource for teaching a course.

Course Development Models:

Open Distance Learning (ODL) institutions follow various course development models. Panda (2004) says that in ODL, we come across three main models, which are as follows:

Course team model: The course team model involves a nodal person who is the course coordinator, and the course team comprises of experts including subject matter experts (SMEs), educational technologists, media experts and others. There are some other variations of this model, for example Coordinator-Writer-Editor Model which has been adopted by IGNOU for most of its courses. This model fits into the overall framework of course team model as the course coordinator (a teacher) plays a pivotal role as a 'manager' who has to make sure the course is developed on time. For this purpose, s/he uses the services of SMEs, who are course writers, and write units for the course. The course coordinator first edits the content written and thereafter an SME is engaged for editing the course.

Existing material model: This model saves resources including time as an existing courseware is adopted/ adapted. Many state open universities and other universities of India are using IGNOU's courseware in this way. Management of courseware in this case involves identifying suitable courseware and procuring it from the institution producing it, adapting/adopting the content as per the institutional needs and delivering it to learners.

Fast track model: Fast track model comprises workshop and seminar models. Course team members assemble and write the course content. The content editor and format editor carry out editing of the courseware so that at the end of the workshop/seminar, the courseware is ready. Management in this case involves organizing the workshop, inviting SMEs as participants, and coordinating the workshop activities.

Management of ODL Courseware:

IGNOU uses the course team model, and has supplementary media approach to media use. We shall use these as the perspectives for discussing management of courseware development. But what is management? Management is the process of designing and maintaining an environment in which individuals, working together in groups, efficiently accomplish selected goals (Koontz & Weihrich, 2005). On the basis of Henri Fayol's (Henri Fayol [1841 – 1925] was a mining engineer and management theoretician)14 principles of management, the acronym POSDCORB (Planning, Organizing, Staffing, Directing, Coordinating, Reporting and Budgeting) was coined by Luther Gulick and Lyndall Urwick (Mulder, 2018) for describing the processes of management. We have used POSDCORB as a framework for discussing the management of courseware production. Further, courseware production comprises two stages, which are- pre production, and post production stage. In the post production stage the courseware is ready and we plan its delivery.

Software:

The term software in computer science can be compared as the life of any living organism without which it has no significance. If you use a player piano as an analogy, the piano can be thought of as the hardware and the roll of music as the software. A computer can neither think nor make any judgment on its own. Also it isimpossible for any computer to independently analyze a given data and follow its own. method of solution It needs a program to tell it what to do. A program is a set of instructions that are arranged in a sequence that guides the computer to solve a problem. These instructions are written in programming languages (like; BASIC, PASCAL, C...) to help simplify the development of applications. Computer software provides instruction that tells the computer how to operate. Software is also called programs. Programs are usually developed using some language called "programming language". Computer software can be categories into two main categories. These are system software and application software. Function of system software are:

System software:

System software is that category of software, which manages all the resources of computer, and is loaded in the beginning or booting of computer. These are designed to make the computer easier to use. System software controls the operation of input/output devices, memory and processor etc. Windows operating

system such as Windows 95, Windows 98, Windows 2000, Windows XP Windows Vista etc, are some examples of system software. Some functions of system software are:

• Used by the computer to accomplish a task.

• Manages all the resources of computer

• Create database and keeps it update after every transaction

• Arrangement of files in alphabetical order

• Controls the internal functions of computer

• Controls other devices connected to the CPUs

System software can be further compared as a type of program that acts like a conductor in an orchestra. It directs all the activities and sets all the rules for how the hardware and software work together. MS DOS and Microsoft Windows are examples of system software or operating system software.

Some System Software are inbuilt into the computer. Examples of such software can be given as ROM chips. This software helps to setup the computer and start it.

Types of System Software

System software can be classified into following categories:

1. Operating system
2. Translator and
3. Utility programs

From the application programmer's point of view, system software should initialize hardware timely and efficiently and also provide better programming environment. For example the libraries may consist of math library (for performing mathematical functions), input/output library, graphics library (to draw different kinds of images etc.).

Operating System:

The operating systems (OS) are most important system software to run the computer system. Every system must have an operating system. It directly interacts with all kinds

of hardware to provide an interface to other system software and application software whenever it wants to access system resources such as CPU, memory, I/O devices.

The fundamental objectives of operating system is to optimize, utilize and control various kinds of resources: CPU, memory, I/O devices etc. so that the executions of user' programs become easier. The operating system must be loaded into main memory which is al so called booting from
the system. One part of an operating system also called supervisor program, which remain in the primary memory all the time. Other part of the program are loaded into primary memory whenever it is required, otherwise it resides on hard disk. Commonly used operating systems are MSDOS, MSWINDOWS, UNIX, LINUX, XENUX etc.

History of Operating System:

In the early 1900s there were no operating systems. The lack of any operating system meant that only one person could use a computer at a time. Even in the research lab, there were many researchers competing for limited computing time. The first solution was a reservation system, with researchers signing up for specific time slots, for performing computing.
The high cost of early computers meant that it was essential that the rare computers be used as efficiently as possible. The reservation system was not particularly efficient. If a researcher finished work early, the computer remained unused until the next time slot or next user comes. If the user time ran out, the researcher might have to pack up his or her work in an incomplete state at an awkward moment to make room for the next user.
Let us now discuss the idea of common operating system which came into existence by the computer researchers in early 1900s.

Common Operating System:

Originally the operating system was created by each company that manufactured a processor and motherboard. So each operating system was proprietary, that is, unique to each manufacturer.

Functions of Operating System:

The operating system resides in the main memory of the computer system. Following are the basic functions performed by an operating system **(i) Resource Management**:

Operating System is responsible for allocating various resources such as I/O devices, memory etc. to the user effectively. It schedules the processes by time management and memory management. It also keeps track of all the I/O devices and CPU so that there would be no wastage of time and all the devices remain busy all the time.

(ii) File Management: File Management Program makes it easier to manage your files and folders. Many programs were written to help the user find files, create and organize directories, copy, move, and rename files.

(iii) Disk Management: Programs involve formatting and defragmenting disks. The term de-fragmenting means, putting files on the disk, so that the whole file is in sequence. This reduces the time to access the file. Some disk management programs even let you specify the files that are accessed often, like the operating system itself and other frequently used programs.

(iv) Memory Management: Memory management software handles where programs put their current data in RAM. They move certain memoryresident items out of the way. This can effectively increase the memory available by getting all the unused pieces together in one spot.

(v) Security of data: The operating system handles different programs and data in the memory, so that they do not mix or interfere with each other. It protects your computer and data from attacks and damage from outside. Only trusted websites and programs could be allowed to access your computer with security software.

Translator:

The translators are the system software's. They are used for translating the instructions into computer readable form i.e., binary form. The instructions are written in any computer programming language such as C or some other programming language and are converted to computer readable form. There are many programming languages such as machine language, assembly language, high level language. These languages allow a person to write the software programs for system maintenance as well as applications. These instructions are converted to binary form by translator software such as assembler, compilers and interpreters. Let us now discuss these translator software one by one to understand the need of language translators in programming.

Assembler:

The first step in the evolution of programming language was the development of assembly language. In an assembly language mnemonics are used to represent operation codes and strings of characters to represent address.
It is the translator program which is used to translate the assembly language instructions in binary form.
In order to execute an assembly language program on a computer, it should first be translated to its equivalent machine language program. The translator which does this is known as assembler. The input to an assembler is the assembly language program and is known as source program. Its output is the equivalent machine language program and is known as the object program.
The assembler is a system program which is supplied by the computer manufacturer. Assembly language programs are also called low level language programs.

The main advantage of using an assembly language programming is the efficiency of the machine language programming resulting from it. Some of the commands which are used in assembly language program are READ, ADD, STO & HLT and the function of these commands are read, add, stop and halt of the execution of instruction of a program.
The main disadvantages of an assembly language are:

(i) It is machine dependent i.e., the programs written for one model of computer can't be executed on another model.

(ii) It is very difficult to write programs in assembly language and needs rigorous training and expertise.

(iii) Assembly language programming is time consuming in comparison to high level language programming.

Now let us see some code of the Assembly language program: following assembly language program code is explained as:

Code **Explanation**

LDA, 12: Load register A with 12

LDB, 15: Load register B with 15

ADD A, B: A A + B ←

LD (200), A: Save the result in the location address

200 HALT: Halt the process

You can see in the above assembly language program LD, ADD and HALT commands makes readability of program simpler for programmer.

Compiler:

Since, computer doesn't directly understand high level language programs, written in English language to which it has to process. There is need of translators to translate the high level language into machine language called compiler. Compilers take input as high level language programs and produces output the machine language code of the machine on which it is executed.
These high level language programs must be translated first into machine language and the software which is used to convert high level language programs into machine language (in the form of binary number, 0 & 1), is called compiler.

Compiler scans the entire program first and then checks for syntax (grammatical) errors. If there is any error, the computer generates a printout of the errors it has detected. Process of detecting and removing errors from a high level language program is called debugging.

Interpreter:

It is another translator program for high level language. It analyzes and executes high level language program statement line by line without looking entire program at one go (as in the case of compiler). Each time of the program is executed; every line is checked for syntax errors and then, is converted to equivalent machine code. It is slower than the compiler.

Utility Programs:

A utility program performs tasks related to the maintaining of your computer's hardware or data. Some utility programme are included with the operating system and some is updated every year/time you become online with internet. By updating it becomes better equipped to handle the needs and security of computer systems. A few examples of utility programs are:

1) Software to convert a .pdf file format into a .doc format and vise versa.
2) Multimedia converter software to convert mp3 file format to mp4 or mpeg etc and vise versa. 3) SORT/MERGE software for sorting and merging large volume of business data into single sorted list.

Application Software:

Although system software is essential for the running your computer and manage all the resources of it. You need application software to enable the computer to solve a specific data processing task such as payroll processing, inventory control, and insurance company data. A software package is a group of programs for solving a specific task.
A number of powerful application software packages, which does not require significant programming knowledge, have been developed. These are easy to learn and use as compared to the programming languages. Software can be used by people to solve general problems. It can be used to do more than one task such as:

• Planning

• Writing

• Record keeping

• Calculating

• Communicating

• Drawing

• Painting etc.

There is no limitation of activities can be done by this softwares.
What can be done with general purpose application software is only limited by the imagination of the user. Use of variety of software depends upon the requirement of the type such as letter typing, making presentation, making tables and storing data in a databases. Some examples of such application software are:

1. Word Processing Package

2. Spreadsheet Package

3. Graphics Software, and

4. Database Management Software

1. Word Processing Package:

The word processing means typing, editing and formatting the documents such as letters, documents, books, and balance sheets etc. In general word, processing refers to the processing of words i.e., simple text. A word processor is such a software package that allows the user to create and edit the documents.
Creating the documents involves typing text in the internal memory of the computer system and saving it on the disk. Editing a document involves correction of spelling mistakes and deleting or moving words, sentences or paragraph, i.e., arranging text at appropriate place in the document.

Microsoft Word is a word processing software which can be used to create, edit save and print documents. A window of MS-Word software is shown above for illustrating the various menus present in this software. Let us now discuss the menus of this software.

Title bar: It displays the name of the program, name of the currently active word document and control button etc.

Menu bar: It is placed below the title bar and is used for performing various tasks, such as open, close, format etc. of the document.

Status bar: It displays information about the active task on which user is currently working. This includes page number, line number etc. on which the user is currently working.

Advantage of MS-Word:

MS-Word processor software allows us to do following tasks:

(1) Type a document through the keyboard and save it on the disk.

(2) Correct, delete and insert characters, words, lines anywhere in the document.

(3) Retrieve documents from the disk as and when required.

(4) Move or copy paragraphs from one place to other or from one file to other.

(5) Formatting of the document as per the need of the user.

(6) Searching of files in folders of the system.

(7) Save the edited document in the disk

(8) Print a letter or document

Electronic Spreadsheet Package:

Although MSWord is a very good software package for word processing task, but it is not convenient in entering data in tabular form, doing mathematical calculation and presentation of result in graphical form.

MS Excel software package is used in place of paper sheet or ledger used by the people in management. It is used to store information in the memory of computer system, calculate the result, and display information on computer screen in a desired manner.

Some, common applications of MS Excel worksheet are: Inventory control, Payroll, Income Tax calculation, Price list and invoice billing. Let us now discuss the menus of this software.

Title bar: It displays the name of the program, name of the currently active MS Excel worksheet and control button etc.

Menu bar: It is placed below the title bar and is used for performing various tasks, such as open, close, format etc. of the worksheet.

Status bar: It displays information about the active task on which user is currently working. This includes page number, line number etc. on which the user is currently working.

Features of Spreadsheet:

The common features of MS Excel worksheets are:

(1) Worksheet contains rows & columns. There are 65536 rows and 256 columns in a worksheet of MS Excel.

(2) Intersection of rows & columns gives cell, which is used for data entry.

(3) Each cell of the worksheet has unique address.

(4) New rows and columns can be inserted in a worksheet.

(5) Cell address is used for defining the formula in any worksheet.

(6) Entry in worksheet may be numbers, character values or numeric values.

(7) Currently active cell is identified by the position of the cell pointer.

(8) The cursor can be moved from one cell to another by arrow keys.

Advantage of MS Excel Spreadsheet:

MS Excel software allows us to do following tasks:

(1) Result of calculation is accurate and fast.

(2) Project reports can be prepared easily and quickly by the user.

(3) Worksheet is saved in electronic file and can be modified when required

(4) Mathematical formula's such as trigonometric formulas, statistical formulas are inbuilt along with this software and can be used for analysis of project results.

(5) Data can also be used to generate graphs for the comparison and analysis of project reports.

(6) Two worksheets can be merged for the purpose of report generation from two worksheets.

Graphic Software:

Graphic software is used to create and manipulate presentation graphics, freehand graphics, charts etc. Some common graphic software's are MS Power point, LotusGraphics, Harvard Graphics etc. Image processors such as Photopaint and Photoshop are also called graphic software.

In this section, we will discuss some components of graphics software, PowerPoint.

PowerPoint is a complete presentation graphics package. It gives you everything you need to produce a professional looking presentation text handling, outlining, drawing, graphics, clip and art, and so on. It also offers rich speaker support and aids to help you create truly effective presentations.

PowerPoint makes you, the presenter and independent producer of your own high equality presentations.

It is located at the top of the screen, displays the name of the presentations.

Menu bar: It is located below the title bar and lists the options.

Status Bar: Used to display Messages regarding page number, slide number etc at the bottom of the window.

Advantage of PowerPoint:

PowerPoint graphics software allows us to do following tasks:

Create a blank presentation

Text can be added by using text box

Change the fonts, size and color of the text

Add drawing objects

Presentations can be saved in the memory of the computer

Pictures and sounds files can be inserted at appropriate place in the presentation

Project reports can be presented by using PowerPoint

Data Base Management System (DBMS):

DBMS has its role in almost every field of our life such as school, office, industry etc. It allows storing and managing large amount of data. Various DBMS software's are FoxPro, Oracle, SQL, Sybase, and MS Access etc.

Features of DBMS:

• Creating data files on a computer.

• Maintaining these file by adding, deleting, editing and updating a given set of data items

• Generating reports based on data files

• Querying on those data files and

• Generating reports.

Databases:

Databases are available in many forms and formats. In library world two categories are the mostly in use. These are online databases and CDROM databases. Online databases are again categorized into two groups as far as mode of access is concerned – Direct access (leased line based) databases and Web-enabled databases. As far as nature of contents is concerned databases are as follows –

 Bibliographic databases: Offers access to the literature of a subject field with or without abstract

 Catalogue databases: Comprises the catalogue records of one or more libraries

 Source database: Contains total contents of documents e.g. maps, full text, numeric data etc.

 Reference database: Contains facts and figures useful as ready reference tools

 Multimedia databases: Includes information in many forms together in interactive mode e.g. streaming video, audio, text, graphs, charts etc.

 Mixed database: Contains mixture of bibliographic, full text and quick reference data

The databases on different disciplines can be accessed in two ways – online databases and CDROM databases. Online databases may again be available in two ways – as vendor-driven utility (using proprietary software and systems) and Web-enabled databases.

Database Access:

Databases that are available in libraries for remote access via online search or for local access via CDROM/ DVDROM can be categorized as:

 Reference databases: They refer users to another source such as a document, an organization, an individual or full text of a document. These may be grouped as:

- Bibliographic databases: Provide information on contents, location and summarization through citations, bibliographic references and abstracts.
- Catalogue databases: Provide information on the stock of a given library or group of libraries. These databases generally include monographs, journal titles and other library materials.
- Referral databases: Include directory type data such as the names and address of organizations or individuals.

 Source databases: Contain original source data and act as one type of electronic document.

These are grouped as

- Numeric databases: Contain numerical data e.g. statistics and survey data.
- Full text databases: Contain databases of newspaper items, journal articles, patents etc.
- Alphanumeric databases: Contain textual as well as numeric data e.g. annual reports, handbooks etc.

- Multimedia databases: Contain information stored in a mixture of formats (e.g. text, sound, video, picture animation etc.).

CD-ROM Database Service:

Optical discs, particularly in the form of CD ROMs have become important medium for storage and retrieval of information. CD ROM databases act as alternative information access system to online database services via telecommunication network and www. CD ROM databases can be accessed in a standalone PC (single user – single CD ROM) or over CD ROM network (multiple user – multiple databases). Multiple accesses to CD ROM databases are provided through network file server or dedicated CDROM server or jukebox system. CD ROM databases contain bibliographic datasets, catalogues, source databases, reference databases or multimedia databases. The selection of CD ROM databases should be based on some well-defined criteria, including but not limited to database contents, currency, availability of back files, quality of retrieval software, user interface, printing and downloading facilities, SDI service facility, data access time, cost and standardization.

Databases:

The file type or data type is one distinguishing factor to determine the type of database itself, like textual, numeric, etc. The most common types are the following:

Textual databases:

The content is mainly text. The most common textual databases among several others that are generally used in library and information centre are:

a) Mailing Lists Contents and their Types

b) Library Bibliographic Databases

c) Full-text Databases — Theses and Dissertations

d) Information Databases such as abstracting and indexing services

e) Membership (library and other organisations) Databases

Example of a Mailing list

The mailing list contains information regarding persons, their affiliations, addresses and other details.

Library Bibliographic databases:

Libraries are intensive database users and producers. The most familiar databases are databases of library catalogues that give bibliographic information of its collection. Normally they are textual data but many library automation packages also give facilities to add multimedia components. Library databases form valuable source of information for the user community to browse and search required material from library collection. The organised collection tremendously helps the end users saving their time in finding relevant documents. The usual data that is fed into library databases are items like the author, title, publisher, place of publication etc. These databases sometimes also provide bibliographic citations and some of them may also furnish summaries or descriptions of the items.

Abstracting and Indexing Databases:

The abstracting and indexing databases provided by various publishing agencies are examples of information service oriented databases. These databases furnish abstracts and provide indexes to the relevant material collection (and contain bibliographic data) of journal articles, conference and seminar papers and other research publications. They are very important secondary and tertiary information sources helping users to search and access information by their subjects.

Full-text Databases:

Full-text databases contain the complete text of publications. They are not just bibliographic data but also contain full text of the documents. Whereas in the other types of databases discussed earlier, the full text is not provided. Only the bibliographical details and abstracts are provided. For example, netLibrary contains entire books; and Lexis-Nexis and EBSCOhost provide the full-text of articles from newspapers, magazines, and other publications. Full text databases are maintained by publishers and are available on subscriptions. Digital library collections also maintain full documents with many academic collections that have open and free access. The popular resources are the theses and dissertations collections of colleges and universities.

Membership Databases:

Like mailing lists these databases also contain details of persons who are members in particular organisations. Example are library membership database, library professionals databases (maintained by INFLIBNET) etc. The content generally gives the names and affiliations along with addresses and depending on the purpose of the database, it may also give details like what department they belong to, subject interests etc.

Numeric Databases:

Numeric databases provide mostly numeric data such as statistics, financial data, census information, economic indicators, etc. Statistical data forms the basis of several research and survey projects and hence are very important. One of the main advantages of numeric databases is that the data can be transformed and manipulated by macros or computer programs to get the desired output. The most common numeric databases are in accountancy departments (in addition to the use of spreadsheets). A standard formula can be fed into the computer to compute the salary of the employees.

Image databases:

Over the years, the capabilities of DBMS have been improved upon to incorporate more than just textual and numeric data. Image databases are becoming increasingly available, especially through the Web. These databases could include art work, photos, animations, symbols and logos etc. Entire art galleries are available in the image databases formats. The applications of image databases are many and varied. In case of geographical information systems, image databases play an important role. In addition, they also provide the basis of giving valuable services in terms of giving exact directions to locations in cities and towns. Image databases provide a means of identification where pictures of persons may be related to their individual or personal data. One of its very attractive applications is in the area of animations and cartoon film productions. The image processing has practically revolutionised the cartoon industry. The images may be stored and retrieved for further productions. There are a wide variety of image databases such as photo galleries, museum exhibits, geographical image information systems, botanical species databases.

Multimedia databases:

Multimedia databases are quite different from standard databases with multimedia storage and handling capabilities. The term “multimedia” attracts a lot of attention, as more than one medium is used for exposition of the content. As the name implies, multimedia comprises

different kinds of media, including image, video, audio, graphics, animation, text, etc. Examples include fingerprints databases, electrocardiograms, maps and photos, commentaries, music collections, annotated video etc. Some of the challenges of multimedia databases are as follows:

Unlike numeric or character data, multimedia data requires huge amount of storage capability and increased processing speed.

Indexing becomes a main issue while retrieving non-textual data.

Compatibility issues dealing with different bit streams.

Advantages of Multimedia databases:

The prime advantage of multimedia databases is that to the users it is more appealing than just text. Moreover multimedia databases can be used to develop interactive modules. Popular packages are developed for use in e-learning environments. Using a multimedia database makes the data structure logic available to other multimedia applications and simplifies the script so that many scripts can share the same multimedia metadata. In addition, when a multimedia database is organised and annotated for one application, other applications can use those annotations without going through the same time consuming process. This capability adds great value to the data through reuse and controlled redundancy.

Review questions:

1. What do you know about search tools?

2. Name a few popular search tools.

3. Explain about software.

4. Define databases.

5. What are the types of databases?

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UNIT – 5

Ready reference resources

Objectives:

- To learn about various ready reference resources.
- Sources including encyclopaedias, directories etc.

Introduction:

Reference tools, also referred to as reference sources have undergone considerable developments since the early encyclopaedias which for a long time were the only sources of information. Today's reference sources are authoritative, carefully designed to fit into a defined scope and to be accurate, objective and readable in treatment of information, logically arranged, appealing in format and useful in their special features. The present day reference sources are so effective in their potential for enabling users to locate needed information that reference sources may be said to be the most efficient information retrieval devices devised by man. The library's reference collection has to be adequate to meet the users' information needs. The beginning of reference books can be traced to man's early attempts to record thoughts, concepts, ideas and events.

Ready reference resources:

In libraries, there are questions or queries all the time. The reference and information access tools are the most logical place to start with while providing answers to them. If for example, a user asks, - "Where can I find some information about Australia?" - An encyclopaedia is the proper source of information. Or, another user wants to know, -" What are the names and addresses of some persons involved in Chemical Industry?" - The answer will be available in a Directory. Or a third user queries, "How can I locate a few recent articles published in the subject of Information Technology?" - An indexing or abstracting journal in Information Technology - the particular subject, will be the most suitable source. Man has been communicating over the centuries through various media and formats on a variety of subjects.

All this eventually led to finding of information when it was wanted from various forms of materials. There is a large quantity of printed material available throughout the world today. Librarians and the library users have always put up with the problems posed by the r: tented literature as it is very much scattered not only in literary forms but also in various physical forms. The whole of available literature has been classified into three broad categories by several experts into - primary, secondary and tertiary sources of information. Knowing about

primary, secondary and tertiary sources is useful as they indicate the relative currency and relative accuracy of the materials. The primary sources are most original and current sources of information often not seen by anyone else before publication. These are in the form of journal articles, books or mono-graphs, reports, dissertations, pamphlets, conference papers, etc. Very often the primary source contains the research findings of a scientist. In order to control or use primary sources in the library, we make use of the reference works referred to as secondary sources like the indexes, abstracts or bibliographies.

An index is a secondary source if it is used to locate primary sources. A secondary source, thus, has information about original or primary information which is usually rearranged and modified for use by users. Thus, any work reporting about findings of others becomes a secondary source. The tertiary sources consist of information which is collection of primary and secondary sources of information. Any sources not falling in the category of primary and secondary is a tertiary source. The tertiary sources usually list all kinds of secondary sources. There are another type of information source which provides information of a particular query wherein specific answer is required, for example, address, telephone number of a person or institution. This is referred to as reference sources. In reference work, access to various information and access sources is very important.

The reference and information access sources are encyclopaedias, dictionaries, biographical sources, geographical sources, fact finding sources, etc. All these are based on most of the information otherwise available but in a scattered way and thus fall in the category of secondary sources. The various reference sources have been prepared and published keeping in mind the various types of reference queries. In the subsequent sections we will study about the various kinds of reference sources which will provide answers to various type of questions related to books, facts, some organizations; places, trends, current awareness, background information, spellings, meanings, statistics, etc.

The ready reference sources are those sources of information that help in locating the right and factual answers to questions. They usually contain brief, pinpointed answers and are serial publications. These are published annually and mostly cover information about the previous year. The ready reference sources are of different types, namely, yearbooks and annuals, almanacs, directories, handbooks, manuals, guides to statistical sources.

An almanac (also spelled as almanak) is a publication usually an annual, containing a variety of useful facts of a miscellaneous nature and statistical information. It was originally a

projection of the coming year by days, months and holidays covering miscellaneous matters such as astronomical events, planetary tables, astrological predictions and anecdotes, etc. An almanac is different from an yearbook although both are annual publications. An yearbook is an annual compendium of data and statistics of a given year and records year's activities by country, subject of specialized area whereas an almanac usually covers retrospective information too. The difference therefore, is in coverage in the form of duration.

The yearbooks and almanacs as combined publications provide recent information on a subject or personality with brief facts. Because of their recency, almanacs and yearbooks directly or by implication indicate trends in the development or regression of civilization. Besides this, events, persons, places of importance and scientific advances over the previous year are chronicled. They also contain informal indexes, directory and biographical information.

Origin of Reference Books:

A reference book is one which is designed by its arrangement and treatment to be consulted for definite items of information rather than to be read consecutively. For example, one looks up a dictionary only to find out the meanings of the words and not for continuous reading. A reference book therefore is a book published primarily for consultation rather than for continuous reading. We can trace the origin of reference books to man's early attempts to record thoughts, concepts, ideas and events.

When man first sketched the outlines of animals, he hunted, on the walls of the caves where he lived, we can say that the rudimentary form of reference books had begun. This is because these sketches were used by him to refresh his memory. Later on, man after he learnt to read and write began recording his thoughts on the clay tablets, tamrapatra (copper plates), cloth and leaves. Some of these are still found in many archives and museums.

Types of reference sources:

For many years, there was no problem in identifying the reference and information access tools or sources in libraries with regard to their physical aspect as the majority of the materials were only printed ones. But the situation is fast changing. It is true that printed sources still predominate but the others are fast becoming more obvious, more varied and more important. The printed books have been known to exist since the 16th century in the

libraries. The news-papers and periodicals became visible only in the later part of the 18th century. It was only in the twentieth century and that too in the last two decades that came to distinguish the documentary sources from the non-documentary sources.

The printed sources of information have been in use for a long time and they have umpteen number of problems. Therefore, any alternative to them was welcomed by both the librarians and the library users. These non-print media reduce to a large extent the problem of study, searching age. They have the ease of searching that results in quick reference. Although the new information media too have their own problems which include high cost and use of sophisticated equipment, still their very ease of handling and use has made them very popular with a wide variety of users. 18 On the basis of their very physical nature, use and arrangement, the reference and information access tools can be put into two broad categories: Documentary and Non-Documentary.

Documentary reference tools:

Various types of documentary reference tools (usually referred to as reference books) have been identified:

1. Dictionaries
2. Encyclopaedias
3. Bibliographies
4. Biographical Sources
5. Geographical Sources
6. Ready Reference Sources
7. Government Publications
8. Indexing and Abstracting Sources
9. Patents and Standards
10. Reference Sources for Current Events

Dictionaries:

A Dictionary is a book explaining the words of a language, or the terms of a subject, arranged in some definite order, usually arranged in alphabetical order, with explanation of their meanings and use. It also usually gives the Orthography, pronunciation, usage and meaning of each word. A dictionary is mostly compiled from the written and spoken words as its source. Later on new words and new meanings, when occur, are added.

Some of the uses identified for the dictionaries are:

Definition

Spelling

Pronunciation

Usage

Synonyms, antonyms and homonyms

Abbreviations, signs and symbols

Slangs

New words, new meanings for old words

Dialect

Foreign terms in English writings

Grammatical information

Etymology

Dictionaries differ according to the range of words they define and the kind of information they give about each word. There are four types of dictionaries: abridged, unabridged; bilingual and multi-lingual dictionaries. Dictionaries especially the ones purchased for the libraries are usually hard bound. It is important to remember that the larger the scope of the dictionary, the more expensive a dictionary is to produce and keep up-to-date. Those published by reputed publishers are usually current as they are updated every 3-4 years. The use of computers at present helps a lot in production of good quality dictionaries.

Examples

Oxford Dictionary.

Webster's New World Dictionary of American English. 3rd College ed. 1988.

Advanced Learners Dictionary of Current English

Encyclopaedias:

An encyclopaedia is a systematic summary of the knowledge that is most significant to man-kind. It is a work containing information on all subjects or limited to a special field or subject, arranged in systematic (usually alphabetical) order. Encyclopaedias may be in one volume, in which case very brief information will be given, or they any be in many volumes in which the various kinds of matter will be comprehensive. Encyclopaedias are usually written by experts, and sometimes contain bibliographies and illustrations. It is different from dictionaries in the sense that dictionary, tells "what", about a word whereas an encyclopaedia tells "what", "when", "how", "where", and "why" of an idea, a person, a place, air event or things. Encyclopaedias are major reference sources, containing so much information that at one time, good encyclopaedias were referred to as the backbone of the reference service in the libraries.

The etymology of the word encyclopaedia is Greek and means a cycle of instruction, which otherwise means good education. The term was first used in the book Johann Henrich Alsted's Encyclopaedia Cursus Philosophici, Herbom, 1608. The first known encyclopaedia was written by Aristotle, the ancient Greek philosopher, which resulted from his assembled treatises. That is why Aristotle is referred to as the father of encyclopaedias although he never intended to write one. The first encyclopaedia to be published in English was John Harris's Laxion Technicum, or, An Universal English Dictionary of the Arts and Sciences, London, 1704. One of the' earliest encyclopaedias was the Spanish Archbishop Isidore of Seville's Etymologiarum sine originum libriXX which was completed in 623 A.D. More than a thousand manuscripts of this survived, and in printed form it had an undiminished appeal as late as the 17th century.

Encyclopaedias are of various types. Two major kinds are the General encyclopaedia like the Encyclopaedia Britanica and the subject encyclopaedias like the Encyclopaedia of Religion.

General Encyclopaedias:

The popular general encyclopaedias are most impressive by their size and number of volumes. The famous adult encyclopaedia are remembered as the ABC's - that is Americana, Britannica and Collier's. These encyclopaedias are very useful for comprehensive coverage of various topics. For example, if one wants to know all about aeroplanes or butterflies, a good general encyclopaedia would be a good starting point. For any American topic, say some

historical aspect or geography of some place, the Encyclopaedia Americana would be particularly useful.

Examples

Collier's Encyclopaedia. 24 volumes. Annual Revision. First Published 1949-51.

Encyclopedia Americana. 30 volumes. Annual Revision. First Published 1929-33. The New Encyclopaedia Britannica. 15th Edition. 32 Volumes. Annual Revision. First Published as

The New Encyclopaedia Britannica since 1974. Published earlier as Encyclopaedia Britannica since 1768-71, first edition.

Subject Encyclopaedias:

The increased specialization in various subjects has resulted in users requiring more information in narrow fields. This has led to publication of subject encyclopaedias in various subjects. The subject encyclopaedias provide in a single volume much more detailed overview of a subject than that could be found in a single article in a multi-volume general encyclopaedia. However, subject encyclopaedias also exists in multivolume.

Example:

McGraw-Hill Encyclopaedia of Science and Technology. 6th ed. New York: McGraw-Hill Book Company, 1987, 19 Volumes and Index.

Encyclopaedia of Library and Information Science. 1968-. 35 vols. Supplements 1-

Bibliographies:

A bibliography is defined as a well-organized list of written, printed or otherwise produced record of civilization, e.g., of books, articles in periodicals, etc. It serves the librarians and users in finding documents that they are not aware of (or not sure of existence). Usually common in the libraries are requests for documents by author, title or subject which are served by help of library catalogue. But this fails when a part of a book is required or a book not available in a library is required, or when a type of material not available in the catalogue is being hunted for a user. At times, the author or the title supplied by the user may be incorrect. For all these problems, the bibliographic tools help in locating the needed materials. During the course of their work, information specialists and librarians frequently consult bibliographies. Their use, therefore, includes selection, identification and verification

and eventually location of materials.. Bibliographies are available in several forms. They can be universal, trade or national. An-other most useful form is the subject bibliography, which is meant for the research workers and for others in specialized areas. Bibliographies should thus be complete, providing information access to the whole document or a part of it and be available in various forms.

Examples:

British National Bibliography, British Library Bibliographic Services Division, British Library, Boston Spa, 1950-.

Cumulative Book Index,

H.W. Wilson, New York, 1898-. Forthcoming Books, R.R. Bowker, New York, 1966 -. Indian Books in Print, New Delhi, 1967-.

Biographical Sources:

A large part of the literature of reference consists of works that contain information about people, otherwise called the biographical sources. Their abundance can be explained simply by the fact that people are interested in people. Besides, all significant social, cultural and political events involve personalities and the reference librarians are called upon to provide biographical information about them all the time. For example, when a new President of India occupies office everyone becomes interested in knowing all about him, or if somebody receives some distinction in science, arts or literature we all are keen to know more about that person. All such queries are best answered through the biographical sources.

Biographical questions can be classified as follows:

- Notables (both living and dead), which include statesmen, artists, religious leaders, scientists, athletes, soldiers, philosophers, etc.
- Specialists, in science, social sciences, humanities; professionals from medicine, law, engineering, teaching community; persons in trade, business and industry.
- Socialites, from royalty, nobility, first families, social clubs.
- Persons from all walks of life, from a country, from a region, in the news recently, in advertisements, etc.

In order to answer queries about the categories of persons mentioned above, three kinds of sources have been designed:

- Universal and National Biographical Dictionaries
- Retrospective Biographical Dictionaries
- Current Biographical Dictionaries also called Who's Who

These sources take care of diverse inquiries about a person, living or dead, with regard to his date and place of birth, nationality, educational background, professional achievements, significant contributions in life, writings and works, important landmarks in life and brief sketch of personal life. In addition to the biographical sources, this information is also available in other publications, for example, encyclopaedias, yearbooks, newspapers, and dictionaries or at times, in directories.

Examples:

International Who's Who. London: Europa Publications, 1935- annual. Who’s Who in America. Chicago: Marquis, 1899-.

India Who's Who. New Delhi: INFA.

Who's Who in Commerce and Industry, Chicago: Marquis. 1936-.

Geographical Sources:

The geographical sources are a category of reference books that help in answering queries related to places. They provide information like description and location related to countries, states, regions, districts, cities, mountains, rivers, lakes and all places throughout the world. The geographical sources can be divided into four categories:

- gazetteers
- guidebooks, handbooks
- maps and atlases
- a globe

A gazetteer provides historical, political, cultural, social, industrial, demographic and administrative details about a place. It also provides geographic data and location by providing longitude and latitude.

A guidebook is a, handy book for travellers that gives information about a city, a county, a region, a religious place or about a building or a historical monument. These are usually meant for tourists and people who want to visit various places. The guide books usually

provide all the information about routes, travel facilities, hotels to live in, cultural, social, religious aspects, eating places and shopping centre, etc.

A map is a graphic presentation of a place normally drawn to scale and it provides location and direction which otherwise is difficult to define by written documents. An atlas is a collection of maps bound up in the form of a book. If the map is a graphic image of earth drawn to scale, on the other hand a globe is a spherical representation of the earth's surface. It is a hollow ball of metal or plastic having the world map drawn on its surface.

Examples:

The World Book Atlas, 1972.

Rand Mcnally Commercial Atlas and Marketing Guide, 1876-

Yearbooks:

Yearbooks are also known as annuals. As it is evident from the literal meaning of the term, a yearbook is a serial publication issued every year. It is called a compendium because it provides comprehensive account in a concise form of otherwise a vast subject. It contains current information on one or more subjects - in brief, descriptive or statistical form. Yearbooks are published as independent publications or as supplements to an encyclopaedia. Therefore, year-books can be divided into two major groups:

a) Yearbooks

b) Supplement to Encyclopaedias

a) Yearbooks

The basic purpose of yearbooks is to record annual developments in a geographical area, in a subject discipline or in an organisation. Depending upon the geographical area covered year-books can be:

- ✓ International or
- ✓ National/Regional

Again both International as well as National/Regional yearbooks can be grouped according to their scope: (i) General, (ii) Subject, (iii) Organisational.

International Yearbooks:

General International yearbooks of a general nature are very handy, authentic and reliable manuals of descriptive and statistical information about each country of the world. They also include information about international and regional organisations such as, the United Nations and the Commonwealth or SAARC, etc. They cover descriptive and statistical survey of each country - its area, population, constitution, government, political parties, trade and industry, communications, finance, defence, social welfare, transport, tourism, educational and cultural institutions, etc. They also give a brief list of references on the country. Some contain even biographies of internationally known personalities. Europa Year Book: A World Survey. London: Europa Publications, 1959. Annual. 2 vols. It started publication in 1926, In its present two volume form brought out since 1959, it provides wealth of information about all countries of the World.

• International Year Book and Statesman's Who's Who. East Grinstead, W. Sussex: Reed Information Service, 1953. Annual.

• Statesman's Yearbook: Statistical and Historical Annual of the States of the World. London: Macmillan, 1864. Annual.

International Yearbooks – Subject:

Unlike general yearbook of international scope, a subject yearbook restricts itself to cover worldwide development in a particular subject field. It describes activities of organisations in the field, data on the subject and major trend in research in the subject.

- ✓ World Armaments and Disarmament, SIPRI Yearbook. Stockholm: Stockholm International Peace Research Institute, 1968-69. Annual.
  It gives reports on world military expenditure, arms production, strategic nuclear weapons, satellites and on the arms trade, each yearbook has special articles too.
- ✓ Green Globe Yearbook of International Cooperation on Environment and Development. Oxford: Oxford University Press for the Fridtj of Naziism Institute, Norway, 1992. Annual. It reveals as openly and objectively as possible the controversies, conflicts and constraints encountered in promoting, development and protecting environment.

International Yearbooks:

Organisational Yearbook of the United Nations. New York: United Nations, Dept. of Public Information, 1946/47. Annual. It summarises the activities, proceedings and decision of the United Nations and its agencies and associated international organisations.

National/Regional Yearbooks:

General National Yearbooks provide descriptive and statistical account of a specific region or country. They include area, population, government and constitution, administration, economy, social welfare, commerce, communications and other major services. They include annual events and activities of the nation. Usually, national yearbooks are government publications.

- ✓ India: A Reference Annual. Delhi: Publications Division, 1953. Annual. From 1998, the title is India 1998 (year is added)
- ✓ Britain: An Official Handbook. London: Statistical Office, 1948. Annual

National/Regional Yearbooks – Subject:

Yearbook on India's Foreign Policy/ed. by Satish Kumar. New Delhi Sage, 1982-83. Annual.

Family Welfare Programme in India Yearbook. New Delhi : Ministry of Health and Family Welfare.

National/Regional Yearbooks – Organisational:

Library Association Yearbook. London : Library Association. Annual

It contains records of various committees and sub-committees of the Association, it's off ice. bearers, list of members etc.

American Baptist Churches in the U.S.A. Yearbook. Valley Forge, Pa. 1973. Annual.

It includes records of the biennial meeting of the Association and reports of activities of the national boards.

The ALA Yearbook; A Review of Library Events. Chicago : ALA, 1986. Annual.

b) Supplements to Encyclopaedias

Since last six decades, the leading publishers of important encyclopaedia sets havebbegun issuing yearbooks. They are known as "Supplements to Encyclopaedias". The first such year-

book was published for "Encyclopaedia Americana" in 1923. The basic objectives of bringing out these annual supplements are:

• to update the basic set;

• to summarise the year's major events; and

• to promote their sale by giving psychological realisation to the customer that the set is always kept updated by incorporating latest developments.

Their prime function is to supplement the main set of encyclopaedia. But in reality, it is observed that these yearbooks are related to their present encyclopaedias only by name. They are usually issued to record the major events of the preceding year rather than updating the original encyclopaedia set, as claimed by the publishers. They vary in their coverage, arrangement, quality and quantity of illustrations, presentation, and inclusion of special features, index and so on. "The Americana Annual" includes articles under the broad headings whereas "Britannica Book of the Year" contains a large number of relatively brief articles on the year's events and special sections on biography and chronology. It possesses a detailed index with `see' and `see also' references and an extensive guide. They are useful to make an easy search.

Usually, the information covered in these supplements is not always incorporated in the later revised editions of the encyclopaedia sets. So, the complete file of these supplements provides the librarians and users a fairly comprehensive view of the events over a period or time. Thus, it is essential for every large library to acquire these supplements regularly.

Some of the examples of important supplements to encyclopaedias are discussed here by grouping them into three categories.

- ✓ Adult Encyclopaedia Supplements
- ✓ Juvenile Encyclopaedia Supplements
- ✓ Subject Encyclopaedia Supplements

Adult Encyclopaedia Supplements:

They serve as annual supplements to encyclopaedia meant for adults.

Americana Annual, An Encyclopaedia ofEvents. New York: Americana Corporation, 1923. Annual

Britannica Book of the Year. Chicago: Encyclopaedia Britannica, 1938. Annual.

Chamber's Encyclopaedia Yearbook. London: International Learning Systems, 1968. Annual.

It was published as "Chamber's Encyclopaedia World Survey" by Newnes, London, 1952-65. It ceased publication and was superseded by "Chamber's Encyclopaedia Year Book" from 1968.

Juvenile Encyclopaedia Supplements:

These are annual supplements to young people's encyclopaedias meant for children, students, and youths.

Compton Yearbook: An Illustrated Factual Record of Outstanding Events. Chicago Compton, Annual.

It is a supplement to the "Compton's Pictured Encyclopaedia" having a well-illustrated, factual record of important events.

World Book Yearbook, an Annual Supplement. Chicago: Field Enterprise Education Corp. Annual.

It serves as supplement to "World Book Encyclopaedia" and records major events of the year.

Subject Encyclopaedia Supplement:

The supplements to subject encyclopaedias are very useful for the subject specialists. They cover important development of a particular year.

McGraw Hill Yearbook ofScience and Technology. New York: McGraw-Hill, 1962. Annual.

It is a supplement to McGraw-Hill Encyclopaedia of Science and Technology and keeps it up-to-date between the publications of two editions. It is an important ready reference tool for the scientists, engineers, students and science teachers.

The American LibraryAssociation Yearbook. Chicago: American Library Association, 1976. Annual.

It is a supplement to one volume ALA World Encyclopaedia of Library and Information Services. There is a difference in scope between the encyclopaedia and the yearbook. The encyclopaedia covers the world whereas the yearbook deals with America. But it serves as a very useful ready reference tool for the librarians and information scientists, students and

teachers of library science.

Almanacs:

Like yearbooks, almanacs are also periodically published ready reference sources with similar objectives. Almanac literally means calendar of months and days containing astronomical and nautical information about the sun, moon, tides, anniversaries and so on. It is an annual calendar covering miscellaneous matters such as astronomical events, planetary tables, astrological predictions and anecdotes. But the meaning of the word `almanac' has undergone semantic change in recent days. The common meaning of almanac is an annual compendium of statistics and facts, both current and retrospective. It can broadly cover a particular region or subject or it can be limited to a particular nation, country or state. Thus, while the Shorter Oxford English Dictionary defines an almanac as "an annual table or book of tables, containing a calendar of months and days usually with astronomical data and information". Harrods's glossary calls it "a publication, usually annual, containing a variety of useful facts of a miscellaneous nature and statistical information". Librarians frequently use them as ready reference sources of statistics.

At this juncture, let us compare and contrast between the yearbooks and almanacs. Though they are two distinct types of reference books, still they are similar and closely related to each other in scope and use. They are always grouped together as ready reference sources. They have fixed periodicity and are published every year. The major distinction between the two is in coverage in the form of duration. A yearbook is an annual compendium of descriptive and statistical data of the past year whereas the almanac inevitably covers retrospective information too. Again a yearbook is published annually but almanacs vary in periodicity e.g., Congressional Quarterly Almanac or the Almanac of American Politics (biennial), Almanac of Famous People (irregular).

Almanacs are grouped into three distinct categories according to the scope, purpose and coverage of information.

a) Astronomical Almanacs

Every country issues astronomical almanacs annually. They give astronomical and astrological projections of coming year.

• Indian Ephemerics and Nautical Almanac. Delhi: Controller of Publication, 1957. Annual.

• Astronomical Almanac. London: HMSO, 1989. Annual

This mixes Astronomical Ephemerics and Nautical Almanac (US) and Astronomical

Ephemeris (London) and is a standard source of astronomical data.

b) Informational Almanacs

Informational almanacs are basic general almanacs. They depend heavily on government sources for statistical information. They follow the same pattern of subject matter published every year with revised statistics. They cost less and most of the libraries acquire them for their reference section. They are also purchased by the students and common people to enrich their general knowledge and prepare for competitive examinations.

• World Almanac and Book of Facts. New York: World Telegram, 1868. Annual.

(Title and publisher vary)

• Information Please Almanac, Atlas and Yearbook. New York: Simon and

Schuster, 1947 Annual. (Title and publisher vary)

• Whitaker's Almanac. London: Whitaker, 1869. Annual.

• The Readers Digest Almanac and Yearbook. New York: W.W. Norton, 1966.

Annual (Publisher varies)

c) Topical Almanacs

Topical. Almanacs are also known as subject almanacs as they cover some broad subjects. They are usually annual or biennial publications. So they are called yearbooks or compendia.

The Sportsman's Almanac /by Carley Farquhar. New York: Harper, 1985.

Almanac of Business and Industrial Financial Ratios. Englewood Cliffs, N.J.: Prentice Hall, 1971. Annual

The Almanac ofAmericanPolitics: The Senators, The Representatives, Their Records, States, Districts/comp. by Michael Barone, [et al.]. Boston: Gambit, 1972. Biennial.

Directories:

A directory is one more category of ready reference tool possessing rich information needed by the library users. Every library receives a number of queries for directory-type information. So, it is essential for the reference librarian to acquire different kinds of

directories suitable to answer these queries satisfactorily: Directories are tertiary reference sources which aid the searcher in using the primary and secondary sources. Directories can be institutional providing information regarding the name, structure, functions, objectives, operational activities, addresses, officers; members, etc., of various types of institutions. There are directories of persons, which cover information about the name, ad-dress, status, academic qualifications, profession, experience, affiliations, etc., of individuals.

The entries in the directory are systematically arranged in alphabetical or classified order. The term `directory' is also used for a list of events, newspapers, periodicals and so on. They vary in kind, scope, purpose and size. Apart from yearbooks and almanacs which provide a separate section of the directory, such information can also be located in encyclopaedias; biographical sources, geographical sources and also some government and -institutional publications. But 'a reference librarian usually prefers to consult a directory first, as he is sure to get the information from it. Sometimes, he may have to search for directory-type information from other reference sources.

There are various kinds of directories. It is not necessary that the word `directory' should always appear in the title. For example

World of Learning. London: Europa Publications: 1947. Annual.

It enlists learned societies, research institutions, universities, libraries, museums and so on. It gives date of establishment, faculties, senior administrative and academic staff members, etc. A separate section on UNESCO, international council and organisations is included.

National Register of Social Scientists in India/by N.K.Nijhawan. New Delhi : Concept (for ICSSR), 1983.

It is a directory of social scientists numbering about 7500 which provides information about their academic background, research interest, positions held and current addresses. Again, there are a number of titles consisting the terms `Encyclopaedia', `Yearbook'. ' Hand-book', `Register', `Guide', etc., but in reality, they are directories. Let us examine the following titles: Encyclopaedia of Associations. Detroit: Gale Research Co., 1956. Biennial. 3 vols. Vol. 1 - It is a guide to all types of national and international organisations.

Vol.2 - It includes a geographic index arranged by state and city and an executive index listing alphabetically the chief executive of the organisations enlisted in the first volume.

Vol.3 - It contains the information about the new associations and projects added in between the two editions of the encyclopaedias.

Yearbook of international Organisations. Brussels: Union of International Associations, 1948. Annual.

It is a comprehensive directory of currently active international organisations and associations. It is published both in English and French.

Universities Handbook: India. Delhi: Association of Indian Universities, 1975. Biennial.

It provides information about various aspects of Indian universities. American Register of Exporters and Importers.

New York: American Register of Exporters and Importers Corporation, 1946. Annual.

It lists about 25,000 American export and import concerns. It also provides product indexes in English, French, Spanish and German.

Guide to the Coalfields. /ed by R.C. Sansom. Fuel and Metallurgical Journals Ltd., 1986.

As the title suggests, it provides information regarding coalfields. This shows that there are a number of such directories where either the word `directory' does not necessarily appear in the title or it is replaced by the words such as 'Encyclopaedia', `Yearbook', Handbook', `Register' , `Guide', etc. Directories can be basically international, national, regional and local. They can be grouped into two major categories.

a) General Directories:

General directories are further divided into two groups:

• Topographical Directories of Cities and Towns

• Telephonic, Telegraphic and Telex Directories

Topographical Directories of Cities, Towns, etc.:

These are also known as local or city directories. Most of these publications are government publications. They include guides to post offices, army and navy, posts, city guides, etc. They are valuable source of information.

Directory of Cities and Towns in India/by O,P. Sharme..Delhi Kripa, 1989.

Geographical area, population, city status, name of the parent districts are provided for 4023 cities and towns.

Cities of the World, a compilation of current information of cultural, geographical and political conditions in the countries and cities of six continents based upon US Dept. of State's post/ reported by Monica M. Hubbard and Beverly Baer. Ed. 4. Detroit : Gale, 1993. 4 vols.

Great Britain Post Office: Post Office Guide. London: Statistical Office, 1856-. It was called `British Postal Guide' from 1856-1879. It varied in frequency but usually it is an annual with supplements. Since, 1937, associated volumes entitled `Post Office Le 's. United Kingdom' and `London Post Offices and Streets' are published irregularly.

Thacker's Indian Directory. Calcutta: Thacker's Press and Directories, 1870. (99th edition in 1971). It is a comprehensive and up-to-date directory providing state wise information regarding the government and its officials, trade, commerce, educational institutions, societies etc.

Some of the Indian city directories are: Assam Directory and Tea Areas Handbook. Calcutta: Assam Review Pub. Co. Comprehensive Calcutta City Guide and Directory. Calcutta: Newman & Co., 1959. Kerala City Guide and Directory/Compiled by Esjeays. 2nd ed. Madras: G.S.S. Iyer and Sons, 1966.

Telephone, Telegraphic and Telex Directories:

Telephone Directories:

Every nation, country, state and city have telephone directory giving information about telephone numbers of subscribers. These are usually compiled by Posts and Telegraphic department of various national and state governments. It lists the subscribers in alphabetical order. It also provides address along with the subscriber's phone number.

All India Telephone Directory: Classified According to Trade and Professions, Government Departments, Individuals, Institutions etc. 5th ed. Baroda: Indian Export Trade Journal, 1970. 4 vols.

The National Directory of Addresses and Telephone Numbers. New York: Bantam Books, 1977. Irregular.

In U.S.A., Bell and Howell Produces microfiche for 360 major current Bell Telephone Company directories for urban communities and regions in U.S.A. Some city directories have re-verse telephone number services such as, `Numerical Telephone Directories'. Some directories have a classified section, some are `an alphabetical listing of residents and business, a list of streets in alphabetical order with business and residential occupants listed in a dictionary order, and a numerical listing of telephone numbers directing to the subscriber's name and address. The R.L. Polk Company of Detroit founded in 1870, has issued over 800 such directories. It has also published a directory for banks and direct mail concerns.

Every city in India has its own local directory. These directories are published by the State Governments and after agencies at regular intervals.

Delhi Telephone Directory: 1999. New Delhi: Mahanagar Telephone Nigam, 1999. 3 vols.

It used to be published irregularly but since the formation of Mahanagar Telephone Nigain Ltd., it has been published regularly..

This is an indispensable reference source for locating telephone numbers, addresses, organisations, names and designation of offices located in Delhi. It is a highly reliable source of information.

Telephonic and Telex Directories:

Directories giving information regarding telegraphic telex addresses or fax numbers, are very useful ready reference sources. They can have international, regional, national or local coverage. .Iaequer and Waldmann World Telex. Darmstadt: Telex - Verlag Jaequer and Waldmann.

It is published annually in four volumes with quarterly supplements. In first two volumes, entries are arranged in alphabetical order - one for the European countries and the other for the rest of the world. Volume three is classified by activity and the fourth contains a consolidated answerback code index. It is known for its highest reputation and comprehensive cover-age.

Marcon's International Register. New York: Telegraphic Cable and Radio Registry, It is international in coverage. The alphabetical arrangement in separate columns for telex

numbers, answer back code and cable address makes it convenient to refer it. A classified section is followed by an index of cable address.

All India Telegraphic Address Directory. Baroda: Indian Export Trade Journal, 1969. Irregular. It is a national telegraphic directory covering telegraphic addresses of India.

Special Directories:

Special directories can be international, national, or local in coverage. They are divided into three main groups:

• Institutional Directories

• Professional Directories

• Trade and Business Directories

Institutional Directories:

Try to recollect some Yearbooks which have been covered in the section 8.2.1 viz. `Europa Yearbook', `Statesman's Yearbook' and `Yearbook of the United Nations' which include lists and descriptions of international organisations. Again, we have also discussed in this section, some information sources which are actually institutional directories but the word 'directory' does not occur in the title or it is replaced by terms yearbook, handbook, encyclopaedia, guide, register etc. Here, we will introduce you to some more yearbooks and directories dealing exclusively with information regarding institutions. They cover the structure, functions, objectives operational activities, addresses, office bearers, members and other important information about different organisations, institutions, associations etc. Let us now examine a few examples of institutional directories: Commonwealth Universities Yearbook Directory to the Universities of the Commonwealth and the Handbook of Their Associations. London: Association of Commonwealth Universities, 1914. Annual. It was published as `Yearbook of the Universities of the Empire' from 1941-46 and `Yearbook ofthe Universities oftheCommonwealth'from1948-57. It is a very usefulreference tool consisting of detailed information about the universities of Commonwealth countries published in four volumes. The countries are listed alphabetically and within each country, further arrangement is alphabetical by name of the university. It includes information regarding the year of foundation, principal officers, teaching staff, important administrative staff, affiliated or

associated institutions, statistical information of library, courses, admissions, degrees, scholarships, vacation etc.

Directory of Scientific Research Institutions in India, 1989. New Delhi: INSDOC, 1989. 6 vols.

Vol, 1- C.S.I.R., I.C.M.R., D.R.D.O., I.C.A.R.

Vol.2 - Central Government Institutions, State Government Institutions.

Vol.3 - U.G.C.

Vol.4 - Medical, Engineering and Agricultural Institutions.

Vol.5 - Medical, Engineering and Agricultural Institutions.

Vol.5 - Public Sector undertaking, private sector undertaking, international and other institutions.

Vol.6 - Cumulative Indices.

Professional Directories:

The past four decades have witnessed the growth of international, national and local professional associations whereby scholars of a particular field voluntarily get together to foster their knowledge of the field: They strive to promote scholarship and to broaden their activities by organising seminars, conferences and workshops, undertaking research projects, publishing journals, bulletins, newsletters, seminar proceedings, monographs and project reports. These associations publish their membership directories which have proved to be very useful information sources to locate the talented scholars in various disciplines. World Directory of Mathematics. International Mathematical Union, 1979. It enlists 20,000 names of the experts in mathematics within a particular country or area. International Directory of Marine Scientists Rome: Food and Agriculture Organisation, 1977. It enlists over 10,000 specialists from 90 countries and is produced by using computer. International Directory of Anthropologists Ed. 5. Chicago: University of Chicago Press, 1975. First four editions were published between 1938-67 by different bodies. It covers biographical data of more than 43,000 anthropologists and provides geographical, chronological and subject indexes. International Directory of Philosophy and Philosophers. Ed. 2. Ohio: Philosophy Documentation Centre, Bouling Green University, 1966.

First edition was published with the aid from UNESCO. Second edition has been issued as a companion volume to `Directory of American Philosopher' in two parts. Part I covers international philosophical organisations and part 2 lists colleges, universities, institutes, research centres, philosophical associations, journals, and publishers of philosophical works. It also enlists the member of the above organisations. 65 YearBooks, etc. International Directory of Translators and Interpreters. London: Pond Press, 1967. It enlists more than 2100 translators and interpreters throughout the world with both subject and geographical approach. These examples are confined to one particular discipline and profession but has a worldwide coverage. We will now provide examples of the directories of particular professional experts limited to one specific country, organisation and societies. Fire Research Specialists: A Directory. Washington: National Bureau of Standards, 1977. American Architects Directory. 3rd Ed. New York: Bowker, 1970. Directory of Members of Royal Institute of British Architects. American Medical Directory. American Medical Institute. 2 vols. A. L.A. Membership Diredory. Chicago: American Library Association, 1950. Annual. Directories of Libraries and who's who in Library Profession in Delhi/ed. by N.K. Goil, [et al.]. New Delhi: Delhi Library Association, 1964.

Trade and Business Directories:

Almost all countries have their directories of trade, business, manufacturers and industrialists. It is not possible for the general international directories to cover all the aspects of trade and business in detail. Thus, it has to be selective and limit its coverage to major topics. But, subject and professional directories dealing with specific field and occupation can cover detailed information about the major important topics and provide minute particulars about theca. A few examples of trade and business directories of different nations are given below. Kelly's Directory of Merchants, Manufacturers and Shippers of the world: A Guide to the Export and Import Shipping and1trIanufacturing Industries. London: Kelly's Directory, 1880. Annual. It is published in two volumes. First volume covers Great Britain, Northern Ireland, Republic of Ireland, Isle of Man and the Channel Islands. Second Volume covers Europe, America, Asia, Africa and Oceania. It is a very useful directory arranged in alphabetical as well as classified lists. Directory ofAmerican Firms Operation in Foreign Countries/compiled by Juvenal L.Ange. 7th ed. New York: World Trade Academy Press, 1967. Irregular. First edition was issued in 1955. It gives a list of nearly 3200 American corporations, which run more than 15,000 business enterprises in foreign countries. Part 1 is an alphabetical index of American corporations and part 2 lists the international distribution of corporations

alphabetically by country. American Register of Exporters and Importers. New York: American Register of Exporters and Importers Corporation, 1946. Annual. It lists about 25,000 American export and import concerns. It also provides product indexes in English, French, Spanish and German. Kothari's Industrial Directory of India. Madras: Kothari Enterprises, 1936. Annual. Kothari's Industrial Directory of India: 1988-89. 10th ed. Madras: Kothari Enterprises, 1988. This edition has been thoroughly revised not only in contents but also in the format and get-up. It describes economic development, population and employment, the rules and regulations regarding industrial activities, the policy changes in relation to business and industry, new export-import policies from 1988-91 etc. It provides overall picture made in public and private sectors covering essential aspects of Indian economy. It provides useful brief surveys of various industries under important material heads. The new sections of `Electronics' and `Learning Finance and Investment' are added in this edition.

It provides district wise alphabetical list of book sellers, publishers, distributors, exporters, importers, representatives of various publishers, wholesalers, retailers, library suppliers, paper merchants, printers, stockists, etc. The information regarding location of the district, pin code number, geographical, rail route indicators, banking facilities, name of the proprietor, year of establishment, postal address, telegraphic address, telephone and telex numbers, language of publications, specialisation of supply in particular subjects, etc. are covered in detail. Directory of Publishers Registered under the ISBN System/comp by K.P. Rajora. New Delhi: Saraswati B.K, 1993. A directory of more than 1600 Indian publishers who have been allotted ISBN number as on 31st March 1993.

Handbooks, Manuals, Guide-books:

We have a very large group of ready reference sources consisting of handbooks, manuals, sourcebooks and guide books. It is difficult to distinguish them from one another as they have common scope and identical purpose. These terms are used synonymously as they have similar features. They are also known as compendia as they contain concise and comprehensive account of given fields of knowledge. The word `handbook' is borrowed from German word 'handbuch' meaning ' a small book or a treatise giving useful facts.' The literal meaning of the term `handbook' is the book which is 'handy' to use as it contains all sorts of facts and `handy' to carry it conveniently in hand. A `manual' is a corresponding word derived from Latin term `manuals'. It means a guide book, a compendious book, an abridged

handbook or a concise treatise which can be referred for guidance in any occupation, art or study. They are essential ready reference sources consisting of `facts to know' and `instructions to do'. They are sometime known as 'instruction books'. 67 YearBooks, etc. They are usually single volume reference tools. All the handbooks may not be providing facts of popular interest. There are countless subject handbooks consisting of articles based on re-search reports. In order to understand them it is essential to have basic knowledge of the subject. The information is provided in 'compact and concise form but illustrated by various diagrams, graphs, data, equations, formula, principles, symbols, tables, procedures. They have limited scope because they deal with the minute details of the specialised subjects meant for a small group of specialists. In fact, they are valuable for their depth of information in a narrow subject field. There is a rapid increase in publishing of handbooks and manuals. There are countless hand-books on specific subjects. With the growth of knowledge, they become out of date and revised editions have to be published. They are reliable and indispensable reference tools for libraries. They can be grouped into following categories:

Various Types of Handbooks and Manuals:

a) General handbooks e) Official handbooks

b) Statistical handbooks f) Tables

c) Historical handbooks g) Practical handbooks

d) Literary handbooks h) Subject handbook

(i) General Handbooks

They provide facts regarding the first, best of everything. They cover information to satisfy the curiosities and inquisitiveness of the people in almost all the fields of knowledge. The subject-wise arrangement of content and exhaustive index are useful to locate the information easily and quickly.

• Famous First Facts/by Joseph N. Kane. Ed.4 . New York: H.W. Wilson, 1981. It is a very, valuable reference tool giving facts not only for enriching general knowledge but also useful for scholars and researchers. The content is arranged alphabetically by subject. It enlists facts geographically, chronologically and by personal name.

• Awards Honours and Prizes/ed. by Gita Siegman. Ed.78. Detroit: Gale Research, 1987. 2 vols. It includes the awards, honours and prizes in a wide variety of fields. It lists American,

Canadian and international awards alphabetically under the name and subject. It also describes the awards with names and addresses of the sponsors. It provides subject and geographical indexes. It does not give the names of the winners.

• Awards Honors and Prizes : Recipients ed. by Gita Siegman. Detroit: Gale Research, 1988. This volume gives name of the recipients of the aWards, honours and prizes.

• Guineas Book of World Records. New York : Sterling, 1955. Annual. It provides facts and figures on records of human achievement, space, arts, scientific world, animal and plant kingdom, etc. It gives content and detailed index for quick search. The success of the publication has resulted in publishing a series called `Guiness Family of Books' having titles such as ' Guiness Sports Record Book Guiness Book of Surprising Accomplishments' , `Guiness Book of Extraordinary Exploits and so on. The editions of the 'Guiness Book of World Records' are available in twenty-five languages.

• Shanti Swamp Bhatnagar Prizes for Science and Technology: Awardees and Citations, 1958-1984. New Delhi: CSIR, 1986.

• Hinduja Foundation Encyclopaedia of Nobel Laureates, 1901-1987/complied by A.K. Bagchi. New Delhi: Konarak Pub., 1988.

• National Teachers Award and Those Who Received it: 1958-to date/compiled by S.S. Gandhi. New Delhi: The Defence Review, 1987.

ii) Statistical Handbooks

Statistical handbooks cover information regarding various aspects in numerical form. They are also produced by the Governments of different countries. They are very handy for social scientists and research scholars.

• Handbook of Labour Statistics. Shimla: Labour Bureau, 1991.

• European Historical Statistics: 1950-1975/by B.R. Mitchell . 2nd rev. ed. New York: Facts on File, 1980.

iii) Historical Handbooks

Every library receives queries regarding dates and events in history. Historical handbooks provide information regarding events, discoveries, achievements in literature, music, art, science and technology in a particular year in different countries of the world. They are

usually arranged alphabetically or chronologically. They also provide historical information of the world. The Time Tables of History: A Chronology of World Events Based on W. Steins Kulturfahr Plan/by Bernard Grunt. Rev. ed. New York: Simon & Schuster, 1987.

Rulers and Governments of the World. London and New York: Bowker, 1977-78. 3 vols.

Vol.1- Earliest to : 1491/compiled by Martha Ross

Vol.2 - 1492-1929/compiled by Bertold Spuler

Vol.3 -1930-1975/compiled by Bertold Spuler and others.

The People's Chronology: A Year by Year Record of Human Events from Prehistory to the Present/by J. Trager. Rev. ed. New York: Henry Holt, 1992.

iv) Literary Handbooks

There are number of literary one volume handbooks and companions, which are very useful to get information for ready reference queries on literature, literary works literary characters, publication dates, authors, brief summary of classics and master pieces, etc.

• The Oxford Companion to American Literature/by James D.Hart. Ed 5. New York: Oxford University Press, 1983.

The Oxford companions are also available for English, French, German, Spanish and Classical literature.

• The Cambridge Guide to English Literature. Cambridge: Cambridge University Press, 1983.

• Dictionary of lndo-Persian Literature/by Nabi Hadi. New Delhi: Indira Gandhi National Centre for Arts, 1995.

• Bharatiya Sahitya Kosh/ed. by Nagendra. New Delhi National Publishing House, 1981

• Victorian Life and Victorian Faction: A Companion fir the American Reader/by Jo McMurty. Hamden: Archon, 1979.

• A Chronological Outline of British Literature/by Samuel J.Rogal. Westport: Greenwood, 1980.

v) Subject Handbooks

There are countless number of subject handbooks in various disciplines. They are very useful to the academicians and specialists in respective fields. As new research and developments are taking place regularly, these reference books become out of date very quickly. Some of them

Handbooks, Manuals, are revised regularly whereas the others are updated at irregular intervals.

• Handbook of Special Librarianship and Information Work/ed. by Patti Dossett. London: ASLIB, 1992.

• Handbook for Members of Rajya Sabha. New Delhi: Rajya Sabha Secretariat,

1996.

• Handbook of Information Resource Management/ed. by Jack Robin and Edward

M. Jackowski. New York: Marcel Dekker, 1987.

• Electronics Applications Sourcebook/ed. by Harry L. Helms. New York : McGraw Hill, 1986. 2 vols.

• Oxford Handbook of Criminology/ed. by Mike Maguire and others. Oxford: Clarendon Press, 1994.

• The American Movies Reference Book: The Sound Era/by Paul Michael. Englewood Cliff, N.J.: Prentice Hall, 1969.

• Third World Economic Handbook/by S. Sinclair. Ed. 2. London: Euro Monitor Publications, 1989.

vi) Practical Handbooks

Handbooks and manuals providing specific instructions or clear directions to do, to make, to operate, to learn, to perform specialised jobs are called practical handbooks. They are also known as instruction manuals. They are further classified in different groups as:

Family Health, First Aid Handbooks

Home Maintenance Handbooks

Etiquette and Manners Handbooks

Cooking Recipes Handbooks

Recreation, Handicrafts and Hobbies Handbooks

Self-taught and Learn Yourself Handbooks

Equipments and Appliances Handbooks

vii) Tables

There are numerous handbooks presenting numerical and quantitative information in tabular form. As mathematics, physical sciences, engineering and technology are largely concerned with quantification, we have countless handbooks of science having numerical information in tabular form. It is convenient to present numerical data in tables where existence of language barrier is absent. Hence, we have quite a few handbooks of tables in multi-languages in differ-eat countries. Users find it easy to locate and grasp the data available in tabular form. Scientific and technical data regarding boiling and melting points, density, atomic weights, solubility, mathematical calculations for daily wages, taxes, etc. can be very well presented in tables.

• International Tables for X-ray Crystallography Birmingham: Kyoch Press, 1952- 62. 3 vols.

• Tables of Physical and Chemical Constants/by G.W.C. Kaya and T.H. Lay.Ed. 14. Longman, 1973.

• Climatological Tables of Observatories in India, T931-1960/by Meteorological Dept. Government of India, New Delhi, 1983.

• Nuclear Tables/by W. Kunz and I.Schintimeister. N.Y.: Pergamon, 1963.

• Industrial Engineering Tables/by S. Eilon. N.Y.: Van Nostrand, 1962.

• Table of Isotopes/by C.M. Lederer and V.S. Shirley. 7th Ed. New York: Wiley, 1978.

• Penguin - Honeywell Book of Tables/by F. W. Kellaway. Harmondsworth: Penguin, 1969.

• Logarithm and Other Tables with Useful Data: General and Chemical /compiled by V. L. Pradhan. 2nd ed. Poona: Dastane Bros., I

viii) Official Handbook

In order to have consistency in following office rules for people working in Central and State Government offices, rules and regulations have been formulated for various aspects. These are published as handbooks which are extensively used by government servants.

Swamy's Handbook 1990 for Central Government Servants/by Muthuswamy and V Brinda . Ed. 16. Madras: Swamy Publishers, 1989. Annual

Such Swamy's compilations are available for various aspects of service rules in the form of handbooks and guide books such as:

Fundamental Rules and Supplementary Rules -- 5 parts

Pt. I General Rules

Pt. II T.A. Rules

Pt. III Central Civil Services (Leave) Rules

Pt. IV D.A. with rates and Ready Reckoners

Pt. V BRA and CCA

General Financial Rules

House Building Advance Rules

General Provident Fund Rules

Staff Car Rule

Leave Travel Concession Rules

Reservations and Concessions for S.C. and S. T., etc.

Chaudri s Compilation of the Civil Service Regulations: Main Rules (Corrected upto 1st April, 1986)/by S. Lakhi Singh Chaudhri and Satya Chaudhri. Hoshiarpur: Chaudri Publishers, 1986. 5vols.

Volume I - Fundamental Rules

Volume II - Supplementary Rules

Volume III - Civil Service Regulations

Volume IV - Civil Service Regulations

Volume V - Civil Service Regulations

Manuals:

Manual of Law Librarianship: The Use and Organisation of Legal Literature/ed. by E.M. Moys. London: British and Irish Association of Law Librarians, 1976.

Today's Librarian: A Practical Manual for Academic Librarians/by S. Morgan and M. Heery. London: Aslib, 1996.

Handbooks, Manuals, • A manual of Style: For Authors, Editors and Copywriters. Ed. 12. Chicago: University of Chicago, 1969.

• The McGraw-Hill Style Manual/ed. by M. Longyear. New York: McGraw Hill, 1983.

Guides:

• Guide to Current National Bibliographies in the Third World/by G.E. Gormen and J.J.Mills. Ed.2. London: Zell, 1987.

• The World Guide to Performing Art Periodicals/ed. by C.Edwards: London: International Theatre Institute, 1982.

• Entail for Librarians/by Simmon Pride. London : Aslib, 1994.

• Engineers' Guide to Product Information: Sources and Use / ed. by Raymond Wall. London: Aslibo l992

Review questions:

1. Define ready reference sources.

2. Explain briefly about dictionaries.

3. Write a short note on handbooks.

4. Define guides and manuals.

References:

Macmillan Science and Technology Encyclopedia (1998). Indian ed. Bangalore:

Macmillan India Ltd.

Meadow, C.T. (et al.). (2000). Text Information Retrieval Systems. 2nd ed. New York: Academic Press.

Murthy,T.A.V and Satyanarayana, R. (1994). Print Media, Multimedia(Hypermedia) and Hypertext. In: MLIS-02, Block-O1, Unit2. New Delhi: IGNOU.

Odhams Colour Library of Knowledge. Language and Communication. (1970). pp.17,41.

Oppenheim, C. (1992).CD-ROM· Fundamentals to Applications. New Delhi: Aditya Books.

Ulrich s International Periodicals Directory 1999 (1998). 37th ed. New Providence, New Jersey: Bowker