Post-Graduate : Library and Information Science

[MLIS]

Paper - II

Information Source, Systems and Services

Modules : 1 – 4

Unit ❑ 1 Physical Media of Information

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1.0 Objectives

The library of the recent past was not what the library is today. Obviously the library of the future will be quite different from what it is today. If we take time to identify library changes since World War II, it would be evident that changes have occurred in both degree and king. We find libraries

providing information in many different media : books, microforms, arts prints, periodicals, disc records, audio tapes, motion picture films, slides, film strips, models, realia. Libraries thus have taken on a new role : dissemination of information produced in different media. In this unit we introduce you to the physical media of information. These media have evolved since mankind started keeping records of events, activities and achievements. After reading this unit you will understand the concept of physical media and their evolutionary pattern.

1.1 Introduction

A peep into the past reveals that the history of libraries parallels the history of writing and evolution of media. For about 6000 years, people have made pictorial and written records of their ideas, their relations with others and the world around them. They have preserved their records on a variety of materials – bone, clay, metal, wax, wood, papyrus, silk, leather, parchment, paper, film, plastic and magnetic tape. At about every stage of development of these media, people have organised collections of records into their libraries. The organisation of libraries is inextricably mixed up with them. The earliest libraries in a real sense were the collections of recorded media for the use of living. Currently we are beginning to witness the introduction of video-tapes and computer terminals into the stock of services provided. We need to examine the basic social and technological factors that are affecting the services provided by libraries.

The modern society is immersed in the epoch of electronic communication, which means that information media is keeping pace with technology as a means of serving the needs of library uses. In fact, the electronic information is opening a new era of information services. Now we shall study the various physical media that have evolved over the years.

1.2 History of Recording Media

Information has to be ordered, structured or contained in some way, otherwise it will remain amorphous and unusable. The reason for this lies in our humanity, that is, the limitations of our sensory apparatus. We are unable to transcend the bounds of our senses – with due respect to mystics and to the practitioners of extra-sensory perception. Information has to be represented

for us in some way, and conveyed through a channel of some kind. According to Marshall McLuhan, 'only electric light is pure information.' Every other medium has to have another medium inside it. For instance, documentary information may be enshrined in anything a person might write, compose, print, draw, sketch, or convey by similar means. By means of speech, we use the sound waves to convey a message to another person. Animals can send *chemical* messages to each other, and even our domestic pets have access to sensory information denied to us. Whatever the message, it must be structured in some way; it must be recorded.

1.2.1 Early Attempts

Early writing materials commonly used were many and varied. Probably 'the first writing material was stone, the first writing an inscription and the first pen a chisel'. Indeed, the earliest writing material was rock or stone on which rude scratchings were at first traced by scribes and then actually cut by stone-cutters, who probably had no idea of their meaning. These rock or stone inscriptions seem to have been the world's early writings, the evidence of which is still found on the pyramids in Egypt and on hill sides, columns and pillars of stone in India. The instrument with which this writing was done was a metal tool called chisel which had a sharp edged end.

1.2.2 Clay Tablets

As the stone blocks were heavy and could not be easily carried from one place to another, the need for something lighter and more portable than stone as writing material was felt and as a result, bricks or clay tablets came into common use at the hands of the chaldeans, a Semitic tribe that flourished in ancient Babylonia. They used to impress the Characters with some kind of stamp or stylus into the tablets of soft clay which could then be baked in order to give the writing permanence. One of the specimens of such claybooks, now in the British Museum, is an account of the flood and this is perhaps the oldest example of writing which is believed to have been inscribed about the year 4000 B.C.

1.2.3 Metals

Metals like lead, copper, brass and bronze were used as writing materials at a considerably later stage, the letters being inscribed on them with something like a sharp pointed metal tool.

1.2.4 Lminen

Egyptians used linen as writing material and later Romans followed. But this was discarded afterwards.

1.2.5 Wooden Boards

Wooden boards as the media of writing had been in use in India during the Buddhist period. We find reference to it both in the Vinaya-pitaka and the Jātakes. These writing boards were then known as Phalakas which were used by the beginners for learning the alphabets. From the Buddhist work 'Lalitavistava' we come to know that boards made of sandal wood were used like slates in schools. Wooden boards were used for writing manuscripts. The Bodleian library at Oxford possesses an Indian manuscript written on such wooden boards.

During the Greek and Roman periods, the commonest form of writing was by means of a stylus, a sort of pointed metal pencil upon wax-covered wooden tablet. One of the greatest advantages of these wax-covered wooden tablets was that the same tablets could be used over and over again for writing only by melting the wax. There was also very liberal use of bamboo and the true bark as writing materials in some parts of the world. Palen and other leaves were also used for writing purposes in some countries of Eastern Asia like India, Ceylon and Burma.

1.2.6 Papyrus

During the period that people of Mesopotamia were using clay as writing material, the Egyptians were writing on papyrus sheet, made from the papyrus reed. This reed grew in the marsh-lands of the Nile river. The great libraries of ancient Egypt, Greece and Rome consisted of collections of papyrus scrolls. The Greeks also used papyrus. The stems of these plants were at first cut into very fine strips of two-foot lengths by splitting them down-wards with a sharp knife. These strips were then laid side by side on a board and coated with a paste made from a mixture of flour and Nile-mud. A second layer of strips was then set across the first and the two were then either hammered or pressed. The sheet thus assembled was afterwards dried in the sun and polished with a bone-tool so that its surface could be written upon in ink with a soft quill, the hollow stem of a feather used as a pen or with a reed

pen made of the stack of grasses or of canes and bamboos. Papyrus was the material of practically all the books of antiquity.

1.2.7 Animal Skins

When papyrus was not available, scholars of ancient world began to write on leather, made from animal skins. During the 1940's and early 1950's, hundreds of manuscripts made of leather scrolls were found in the caves near the shore of the Dead Sea. These were called Dead Sea Scrolls. It is presumed that these scrolls belonged to the library of a Jewish religious group called the Essenes. The Essenes lived in the highlands near the Dead Sea at about the time of Christ.

1.2.8 Parchment

The parchment was used as early as 1500 B.C. But it could not gain popularity and extensive use until the beginning of the Christian era. There is, however, a legend about the origin of parchment. In the Second Century B.C, Eumenes II, king of Pergamum, an ancient city of Mysia (Asia Minor) in order to build a large library appealed to king Ptolemy Epiphanes of Egypt to supply him a large quantity of papyrus for this purpose. When Ptolemy refused to export so much quantity of papyrus, Eumenes instead of abandoning his project prepared his entire library on parchment made from the skins of sheep, goats and pigs. Parchment has probably taken its name from the city of Pergamum which was then the centre of its trade.

1.2.9 Vellum

Vellum as a writing material is made from the skin of a newborn calf. It requires much treatment before its surface can be written upon. After cleaning it in a long exposure in lime, it is stretched in the sun and dried and then trimmed with a knife. It is then dusted with chalk and rubbed smooth with pumice stone. Prepared thus the piece of Vellum can be written upon. The finest vellum known as *Uterine Vellum* was made from the small skins of calves which were unborn or died at birth and it was used for the most expensive manuscripts. It is heavier than parchment and more expensive and is perhaps the most beautiful and the most durable of all materials used for books. The oldest illuminated manuscript written on vellum is the Virgil which is now in the Vatican.

1.3 Paper

The Chinese invented paper by about 105 A.D. Cai Lun who served the court of Emperor Hi Di Tsai-Lun, invented paper and used the inner bark of the mulberry tree for fibre. Later the Chinese obtained the fibres by pounding rags, hemp rope and old fishing nets into a pulp. The art of paper making reached Baghdad by 800, Egypt by 900 and Europe by 1100. By 1500 A.D. paper almost completely replaced parchment.

1.3.1 Manufacture of Paper

The principal raw material of paper are cotton, linen rags, esparto, straw, hemp, bamboo and wood. Of these cotton rags yield by far the purest cellulose and therefore, the finest grades of paper are made from them. Their fibres are nearly an inch long on the average, very fine and strong. They are the most durable of all papers.

Rag materials are at first reduced to cellulose pulp from which paper is made. As soon as these materials arrive at a paper mill, buttons, fasteners and rubbers are all removed and they are cut into small pieces over a sieve. In order to remove dirt and grit they are then air-dusted. Next comes boiling process. The chopped pieces of rags are then boiled in water under pressure for several hours and alkalis such as caustic soda or soda ash or lime is added in order to wash away the colouring and inter-cellular matter. The rags then go into a machine called 'breaker' or 'Hollander' in which they are washed in water and reduced to pulp. This stage is called 'half-stuff'. The half-stuff is then passed into another machine called 'beater'. The pulp at this stage is known as 'stuff', the working material of the paper-maker. The beating process being over, colouring matter, China clay or size may now be added in the 'beater' according to the quality of paper to be made.

Though most papers are now machine made, hand-making is still continued in certain mills producing the finest grades of paper. The 'stuff' from which paper is made is then stored in vats. As the vatman dips the empty mould into the 'stuff' in a vat and lifts it up, he finds it all covered with a semi-liquid pulp. He then shakes it in his hands in two directions-backward and forward and pours side to side almost simultaneously. This shake is very important since it causes the fibres in the stuff to interlock in all directions and thus imparts strength to the resulting sheet of paper.

In paper we often see a design or a device in transparent lines which

goes by the name of watermark. This is made in the paper by twisting and soldering the wires of the mould in the form of a design or a pattern. It is generally found at the centre of one half of the sheet and one can see it clearly if one holds the sheet up to light. It is particularly useful in determining format, in dating an undated work.

1.3.2 Writing

It seems likely that writing in the first phase of human civilization had purely utilitarian purposes to fulfil. As man grew a little more civilized, he was in one sense compelled to discover some method of writing for three urgent needs. In the first place, he could not afford to forget certain things which had, therefore, to be recorded. Secondly, he had at times to communicate with persons who were at a great distance and thirdly, in order to protect his own property he had to mark his own things like the cattle, sheep, horses and the like in some distinctive manner. So man had to evolve the art of writing by means of visual symbols or signs and once he had evolved it and made it known, he used it for preserving his war-songs, prayers, the legends and myths. There were many types of graphic sign systems; the alphabet was not alone, and it did not just happen. The evolution of these sign systems can be divided into.

Pictographic : Representations of objects, actions or ideas.

Ideographic : an activity, object or idea represented by a single sign.

Syllabic : Signs representing groups of letters.

Human beings began with primitive pictography. Over the passage of time these pictoral signs become stylized, losing their primary pictoral values to become a secondary system of ideograms or ideographs. Ideographic scripts are still influential in modern communication systems. Chinese and its derivative Japanese script, **Kanji** are well-known examples of descendants of ideographic scripts. These 'idea signs' are called logographs or logograms, where a sign represents a word or part of a word. Mathematics and logic use logographic systems and the dollar sign should be well-known to us all.

Historians of the alphabet draw a dividing line between the alphabet proper and the representational signs. They do so for a very sound reason. Writing proper uses visual signs to represent sounds or sound groups : it links the visual world with the world of sound.

With the invention of paper, writing activities proliferatd. The needs of commerce and industry made writing an essential ingredient in the culture

of time. Paper made the stable media for recording. Thus the writing revolution was the first of the great communication revolutions in the history of mankind and one to which all sulesequent ones are indebted.

1.3.3 Printing

Writing was to be the most advanced communications technology from the fourth millennium BC to the fifth century AD when Johan Gutenberg set movable for the first printed book. The five centuries since Gutenberg set up his printing press in Mainz (C. 1450) have been shaped in profound and varied ways by a device which is in essence extremely simple. That is extremely simple once it has been invented and demonstrated. In essence, it is a technical device for reproducing texts in identical and virtually unlimited numbers. Printing has been defined as : 'the device of placing together movable pieces of metal type, each having on its upper end an alphabetic character in relief, which being inked and impressed upon suitable material leaves a mark or print.'

This was the invention that was to be so potent in spreading European power and influence thoughout the world. This connection with European power and cultural dominance is a point to be noted at the outset. Printing was not originally a European technique. The art of printing began in China. The oldest dated 'printed' book extant–a Chinese version of the famous Diamond Sutra – was produced in China in 868 A.D.; it is printed from wooden blocks on sheets of mulberry bark paper which are pasted up into a continuous roll. Despite a lengthy tradition of book production in China and Korea, the only part of the process that seeped through to the West was the secret of paper making. When the Arabs conquered Samarkand in 751 A.D, they acquired the art, and it was introduced by the Moors into Spain and Sicily.

The context of demand for a new medium of communication was growing steadily. Ever since the 12th century there had been a substantial increase in the number of universities in Europe. The desire for 'the new learning' led to an increase in student numbers. The teaching methods of the day were based entirely on the book as a medium of information storage and transfer. The only book available tended to be the one in the teacher's possession. He read aloud from the book and the students took notes as best they could. Our modern term 'lecturer' comes from Latin **lector**, meaning a reader. The only copying facilities available were those provided by the

stationarii, the university booksellers. Manuscript copying by the 'Scriveners was labour intensive task, therefore it was expensive and beyond the means of many poor scholars. More than that, the **stationarii** could not keep pace with the demand; there was a waiting market for a technique that could produce texts in sufficient numbers at reasonable cost. For Gutenberg it had to be a mass-production activity requiring a technological base and an expert division of labour. He also needed investment capital; information production was no less a commodity than it is now. He was fortunate. Overseas trade had brought wealth to Mainz as to many other European cities, so he was able to find people with necessary risk capital. Inventions generally require for their commercial success, a perceived need, the necessary expertise and adequate financial investment. They also need a sound technological base in the current 'state of the art' in ancillary technologies. Printing, in the words of one writer, is, the multiplication of mind' : the fertile matrix of an ever-expanding market of ideas. But markets imply competition and in such contexts the weaker cultures must necessarily be assimilated or disappear.

1.4 Modern Physical Media

Modern technology and contemporary transportation placed us in this world and of it, even beyond it-into outerspace and on the other planets. There is nothing particularly new about innovation, exploration, and discovery; what the modern communications media have done for us, however, is to make us witness to that discovery and exploration. Technology, through some 230 million television sets in a hundred nations of the world, permits us to sit in our living rooms and watch mankind walking on the moon and soon after to see the news clips showing us exactly how the Pope and other dignitaries reacted to the same event. Technology permits us not only instantaneous awareness of natural calamity or historic happening but also simultaneous awareness, making of mankind one gigantic family in its perception of news and one very small and humbled household in its reaction to it. We now discuss the vast array of the modern media forms.

1.4.1 Microforms

Miniaturized graphic communications media, generally on film, but also on paper or card and containing for the most part print, but occasionally diagrams, drawings and other illustrations also. Some equipment or device

for enlarging the image is required in order to 'read' the medium.

There are several types of microform, distinguished by their format and other characteristics. Thy may be broadly categorized into roll microfilm, microfiche, micro-opaques and miniaturized print, but there are other variants.

Microforms have fulfilled an important role in collection development in library and information services and in the broad area of administrative processes also. The use of microforms as a document publishing medium for a variety of material including books, pamphlets, periodicals, theses, papers and manuscripts, has had a significant impact on library collection building. They brought economy in terms of production and duplication, storage and transportation of both original and republished material. They have also contributed to increasing the availability of copies of important and scarce items and at the same time preservation of material. Microform document publishing practices may be divided into categories : original or primary publishing, where material makes its first appearance in microform; parallel publishing, where paper and microform versions appear simultaneously; and retrospective publishing, where previously published paper material is produced or reprinted in microform.

Microforms are a medium dependent on equipment, together with a certain level of user skill. The design and quality of microforms and equipment are therefore critical to their successful exploitation, as is the provision of a suitable reading environment. The availability of viewing and printing machines goes some way to overcoming the user resistance to reading microforms for sustained periods.

1.4.2 Motion Picture Films

Primitive moving pictures were available before the invention of photography, in the form of, for example, optical toys based on the phenomenon of persistence vision. The actual inventor of film is uncertain. Thomas Edison invented the Kinetoscope in 1890 but this was not strictly speaking a projected film system.

Although there had been many earlier experiments with sound, a practical sound system was not actually introduced until 1927. Various forms of colour film were also available before the Technicolour three-colour process was used in 1935. Motion picture films and motion picture film on video formats, important physical media of information became very popular as their characteristics are a visual image with combined effects of colour, sound and

motion. Archives may also make videos available for viewing. Although there are larger type formats available for professional broadcast quality, the most common videotape format for library or home use is the half-inch VHS video cassette. Although VHS became the predominant format in the 1980s, there are still problems of incompatibility due to national variations in broadcasting standards.

However, the comparative robustness of video cassettes, combined with their low cost and easy operation, has meant that they have made films more accessible to their audience than ever before.

1.4.3 Filmstrips and Slides

These belong to earlier forms of non-print media. These are either silent or with sound.

1.4.4 Audio-Visual

The definition of the word 'audiovisual' is fraught with problems as new technological developments result in even more formats. For example, multimedia technologies which enable computer applications to be used with a variety of audiovisual formats (information carriers) are now a major concern for librarians. Definitions therefore need to be 'open' to adapt to these developments.

All forms of recorded information are audiovisual materials in that they are audio, visual or both.

UNESCO's Legal Questions facing Audiovisual Archives present a lawyer's viewpoint :

Audiovisual materials are to be understood as :

(i)Visual recordings (with or without soundtrack) irrespective of their physical base and recording process used, such as films, filmstrips, microfilms, slides, magnetic tapes, videograms etc.

(ii) Sound recordings irrespective of their physical base and the recording process used, such as magnetic tapes, discs, soundtracks or audiovisual recordings, optically read laser discs.

1.4.5 Television

Television is on optical and electric system for continuous transmission of visual images and sound that may be instantaneously received at a distance.

It is an information medium that has been used for many years. Its first demonstration took place in 1922 when Edward Belin of France transmitted flashes of light a few feet. In 1944, David Sarnoff took the initiative in broadcasting television signals. Users can have the facilities to view the film and video tape collections on television. It has a great impact on the library.

1.5 Electronic Media

The electronic media has fundamentally changed society. With all the electronic developments continually taking place have also changed the library's role in society. In near future a huge component of physical media of information will be electronic network. Modern computer systems have gone through five generations of evolution, each one more sophisticated than the last. The electronic information is stored in computer storage discs.

Hardware

John Van Neuman is considered to be the father of modern computers. He gave us a two-part architecture for the modern computer systems. It consists of the memory and the processor interconnected by a communication line as shown in the following diagram.

Most spectacular advances in computer processing took place during the 'third generation', which lasted from 1960s to the early 1980s. This period witnessed the onset of large scale integration (LSI), with thousands of components fabricated on a single chip, and led to the development first of 'mini'- and then of microcomputer could outshine mainframe computers. The appearances of the microcomputer with one or two chips providing Centre Processing Unit, memory and input-output facilities, were to have the most far-reaching of consequences.

Memory

In the earlier days, the main memory was built using magnetic cares. Computer memory embodies a number of technologies : electronic and non-

electronic. The non-electronic technologies include a number of 'moving surface' type memories. The major developments in electronic memory have been in storage density and access times, the former increasing dramatically to the one-megabyte-per-chip level. There are two categories of semiconductor memories : Read Only Memory (ROM) and Random Access Memory (RAM) ROM has a fixed content and is used for permanently resident program and fixed data tables. RAM is used for transient program and data. ROM is of three types : First, ROM in which the data is placed at the time of manufacture. Second, the field is programmable by the user and is known as programmable ROM (PROM). The third type is erasable programmable read-only-memory (EROM). RAM has two major circuit divisions, static (SRAM) and dynamic (DRAM). SRAM has lower density on the chip than DRAM.

The dominant form of moving surface memory is the disk, either in hard or floppy form, providing fast, random access to large capacity storage. A second type of moving surface memory is optical storage. Magnetic types are typically used as archival storage. Optical storage technology offers an alternative to magnetic storage for both online secondary storage and offline archival storage. Optical storage can be grouped under three broad categories : Write Once Read Many (WORM), Read Only Memory (ROM) and rewritable memory. The most popular implementation of optical ROM is the CD-ROM (Compact Disk - Read-Only Memory).

1.5.1 Compact Disk - Read Only Memory (CD-ROM)

This is the trademark name for aluminised disc, made of polycarbonate, on the surface of which print information is recorded. There are many types of compact discs - Compact Disc - Read Only Memory (CD-ROM), Compact Disc - Interactive (CD-I), Digital Video - Interactive (DV-I), Compact Disc-Video (CD-V).

The ability to store large amounts of data on the 4.72" single-sided disc, which is relatively heat and scratch resistant makes CD-ROM the ideal storage and distribution medium for various types of information. This is a computer based document, records or catalogues information storage and retrieval medium based on laser-technology. CD-ROM can store still and/or moving images in black and white or colour; digital program files such as word processors or spreadsheets, and digital information files such as documents, records or catalogues. CD-ROM requires the interfacing of CD-ROM player and a micro-computer. A single CD-ROM disk can hold 2 lacs pages of

printed text. It is easy for the user to use and search.

CD-I is a technical specification for a multimedia system capable of simultaneously handling audio, video, data text executable codes, graphics and computer programmes. It offers high data capacity combined with television quality image on a standardized player that includes sophisticated graphic processing capabilities.

DV-I provides the means to display full motion video, as well as high-resolution still images, computer animation three dimensional graphics and video images, and multi-track audio with CD quality, combined with foreground video objects and dynamic graphics–all under user control.

CD-V stores video as analog signals, though CD digital video storage also exists. It is capable of holding upto 9000 still frames, and it can be accompanied by some tracks. Compact Video Disc (CVD) is a hybrid analog/ digital system. At a speed of 900-1800 rpm, it is capable of running twenty minutes of full screen video, and can hold upto 18,000 still frames per side.

1.5.2 DVD

Digital Video Disc refers to numerous configurations that define the physical structure and data contained on a 12cm. disc. This is an optical disc with multiple data layers that exceeds the capacity of a standard CD-ROM and that may contain video, audio or any other type of digital data. It has a laser beam with a shorter wave length than CD-ROM, smaller pits on the disc surface, a denser track pitch, and more efficient channel encoding.

DVD contains two separate types of information : navigation data, which controls the media, and presentations data, which consists of the objects themselves. DVD configurations are - **DVD-ROM** - a high capacity read only optical disk capable of rapid data transfer that may be used as a general purpose computer storage device. A DVD-ROM holds any type of digital data, and is readable by a DVD-ROM drive connected to a computer.

DVD-Video - It is a high capacity read only optical disc capable of rapid data transfer that is used for the interactive play-back of movies and games.

DVD-Audio - A high capacity read-only optical disc, capable of rapid data transfer that is used for high - quality audio.

DVD-R - It is a new high capacity write-once optical disc, with rapid data transfer rates that can be used as a general purpose computer storage

device. It may be recorded, but not erased. It is able to read and write up to 3.9 gigabytes of data.

1.6 Summary

We have discussed the evolution of various physical media of information from clay tablets to DVD. Printing started in China and spread over Europe. We have discussed the vast array of modern media forms Microforms play an important role in the collection development of libraries. The modern age is leaning towards electronic media from computer to DVD. The combination of paper and printing has played a dominant role in the process of preservation of man's achievement more than any other singular accomplishment. It is obvious that in the future libraries will be interconnected with vast electronic information network and every user will have direct access to the stored information according to his requirement.

1.7 Exercise

1. Describe the historical phases of early writing materials before the introduction of paper.
2. Who invented paper? Discuss its manufacturing process.
3. Discuss the vast array of the modern media forms.
4. Write short notes on CD-ROM and DVD-ROM.
5. What is optical storage? Illustrate.

1.8 References and Further Study

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Unit 2 ❑ Print Media, Multimedia (Hypermedia) and Hypertext

Structure

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2.0 Objectives

Communication can be classified in a number of different ways. One useful classification is a dichotomous division into formal communication and informal communication, which corresponds to a division into written communication and oral communication. Formal communication is mostly communication by means of documents, usually documents in some type of printed form, whereas informal communication is mostly communication through conversations, face to face or by telephone. In the formal communication the major step involved is the transfer of information through published documents. Here you will be aware of print media, its components and characteristics. You will be in a position to explain whether other media like electronic will be able to replace the print media. You can foresee whether books and other components will continue to survive in the present form. You will have idea abovt multimedia, hypermedia and hypertext and their importance in the future communication world.

2.1 Introduction

The present unit gives an overview of print and paper media. It also presents a brief account of multimedia, hypermedia and hypertext.

Since the invention of printing from movable type in the middle of the fifteenth century, and more especially since the development of the scientific periodical some 200 years later, the formal channels of professional communication have been heavily based on printed documents. We tend to take this medium completely for granted. But can we assume that print on paper will always be a major vehicle for formal communication in science and other professional fields? Will paper be as important in the information systems of the year 2020 as it is today? Almost certainly not.

The limits of what can be communicated by printing, storing and retrieving pieces of paper may be at hand. Certainly, for only real improvement in the accessibility of information an alternative must be envisaged. The solution, the National Science Foundation has suggested in 1975, is an electronic alternative to paper-based systems. One possibility is to capture new information from its originators in computer-sensible form and store it in central facilities for presentation at terminals wherever and whenever it would be required.

Media are categorised as print media, projected visual media, audio media, audiovisual media, and interactive media. As all media play their roles, their integrated use depends on the guidance of information professionals. Thus they should be well acquainted with their functioning. It is in this context it is quite in the fitness of things to highlight the essential aspects of print and paper media as well as multimedia (Hypermedia) and hypertext.

2.2 Print Media

The impact of printing on the history of civilisation is immense. It was not only the rapidly increasing number of available copies but the change in their contents that so influenced the intellectual climate of the time. Hitherto, books had been mainly theological in content; now they began to embody the ideas of new sciences in the works of Kepler, Einstein and other pioneers of the new natural philosophy. Newspaper, periodicals and books now represent print media.

In physical terms this new medium was to follow the path of miniaturization that was to characterize the non-book media of later times. The codex form itself was the product of this 'make it handy' tendency in human nature. We can summarize some of the main effects of printing:

Printing enabled the vernacular languages to grow and fructify.

It stimulated the incipient growth of nation states, national religions and national ienteties. Printing accelerated and widened a commercial interest in the publishing and sale of books, newspapers and magazines.

The availability of different texts inculcated the scientific method of criticism and comparison. Scholars began to investigate problems empirically and the prestige of the text as a sole authority began to decline.

Like every new medium of communication, the new device of printing began to clash with the existing legal framework. In some striking ways this conflict prefigured the legal difficulties that were to face the computer. New laws were made to control or suppress the free flow of ideas.

Printing influenced the organization and retrieval patterns of recorded knowledge. A heavy reliance on alphabetical order is basic to the culture of print. The telephone directory is now cited as a typical example of the Gutenbergian mode of communication.

A printed book not only involves a different technology from that of a manuscript; it results in a different product. Whereas manuscripts were copied in small quantities, early books were printed in editions that averaged 250 to 1,250 copies. In the late twentieth century an academic book might have an edition of 1,500 copies. This economy of scale means that copies can be rapidly disseminated.

The new invention of printing had a potential that was only progressively realised as the arrow of time sped onwards. However, like its successors, it only developed because people saw a need for its manifestations. One cannot meaningfully separate the medium and its users.

2.2.1 Components of Print Media

Print media comprise the following :

Books (General book, text book or reference book)

Periodicals

Newspapers

Pamphlets, etc.

Each of the elements keeps in view a specific type of audience.

2.2.2 The Book

Libraries have been looked upon as 'Treasurehouses of books', 'Temples of knowledge' and 'Repositories of civilisation'. The city decays, the nation loses its grandeur. But the library remains the silent and enduring affirmation that great books still speak and not alone but somehow altogether. Books are humanity in print. Television extends human sight, computers extend memory and ability for calculation, books extend wisdom. It is therefore natural that they take considerable share of library's collections. According to the norms prescribed by UNESCO, a book should have at least 49 pages, 22 to 32 cms. height and 1.5 to 4 cms. thickness. A book is either a general book or a text book or a reference book. A general book gives a general exposition of the subject. A text book supports a teaching programme. Both a general book and a text book are meant for thorough reading. But a reference book is consulted for a specific piece of information. A book may be a simple book or a composite one. A simple book written by a single author or by two or more authors gives a continuous exposition of the subject. A composite book is written by more than one author. Some are called ordinary composite books, others are artificial composite books. Some of the books which fall under the category of ordinary composite books are anthologies, hymn-book, prayer book, festschrift, etc. An artificial composite book consists of two different books bound together, with two separate titles. An ordinary composite book has a single generic title to denote all contributions collectively.

Books are forever. The writings of thousands of years and the records of the past are still relevant, important as well as essential for today's needs to know the cultural heritage of the past and the ancestry of human knowledge. Modern society is fascinated by the development of new technologies for packaging and transferring information, but those wonderful electronic media are not capable to meet the voracious demands of the present-day users because of financial, technological, sociological, psychological, becavioural and environmental constraints. Moreover, the whole gamut of knowledge of the mankind during the past thousand years cannot be repackaged in electronic media.

2.2.3 Periodicals

E. W. Heldwick neatly defines periodical as any publication which comes out periodically. Besides the element of periodicity and continuity, a periodical publication has a distinguishing number of each successive volume, known as its volume number. A serial is also a periodical publication but each volume carries more or less similar publication but updated. Periodicals provide a platform for the communication of new knowledge. They carry current thoughts in the forms of articles. Journals and magazines are considered as periodicals. Conventionally, the term 'journal' has been associated with research oriented or scholarly periodicals, the term 'magazine' has been associated with popular periodicals. Serials include journals, newspapers, magazines, yearbooks and annuals. In library collections the position of periodicals or serials lies next to books. But in special libraries they get the predomiant position in the collections.

2.2.4 Pamphlets

A pamphlet is bound in paper. It has a few printed pages, usually less than 49. Often, contents of pamphlets range from descriptive accounts of a topic to scholarly exposition. Sometimes information they contain may not be available from any other sources.

2.3 Future of Print Media

In the present age of electronic databases, communication technology and multimedia, the place of printing media is being altered significantly. Such change has become inevitable because of the change in attitude of the people in the socio-technological environment. The first indication is that the print media are not being considered as the primary source of information as well as updated source of information. The second indication is that reading of books, particularly serious reading, is considered as personal affair, matter of privacy and introspection requiring advanced education. Common people are not interested in reading for education and knowledge. They are interested in awareness and information.

2.3.1 Print vs. Electronic Publishing

There are many types of print material which are far more portable than an electronic equivalent. Newspapers, magazines and standard sized single

volume books are the obvious examples. Compared to the cost and size of a portable electronic medium they are cheap and readily usable anywhere. The issue shifts in favour of electronic media when it is major reference works which are considered. A portable computer plus 10 CD's give the access to a quality of data which would not be carriable by one person by print form. The advantage of portability and cheapness of print will decline as size and cost of portable computer falls. Electronic publishing gives a variety of ways of engaging with a text : it can be read as if it were a conventional paper book; listened to; watched if a video version is available. Print can only carry still images on its pages, electronic publishing gives options for moving images and sound as well.

Electronic text is certainly far superior to print when searching for data. For example, the Bible on disc makes searching for a word and checking each of the references until the correct one is found very much faster than doing the equivalent using a printed Bible and a concordance; when this is also linked to atlases and other background works, data can be pulled together incredibly without the user moving from their desks-or from their train seat if using a portable computer..

Print is at present cheaper for source products. However, in the future it should be possible to download one's newspapers from the Internet and then use it in electronic format which may cost no more, or even less than is currently spent on a paper.

Relative costings of print and electronic media are not straight forward. It is easy to cost print media because it is a totally stand alone product. Electronic media is more complex to cost as it is not clear how to incorporate the cost of the computer necessary to read it. Once the computer has become an essential the costing of electronic material becomes directly comparable with the cost of print. When looked at in this light, electronic media are considerably cheaper than print.

Levelling in Society

A commonly expressed idea at present is that we are moving into the information age. If this is the case then there are two basic issues in this : access to that information and ability to use it. In this shift of emphasis in our culture there is the possibility for the current divide between rich and the poor, powerful and the marginalised to be levelled out. There is also the possibility of existing gaps to be widened and new divisions created. At

present, use of computers and access to the Internet is largely by those who have higher formal education, and higher incomes. However when looking at use of current resources in society the first two of these apply. While the Internet and access to CD-ROMs is linked to computer it will remain the preserve of the younger and better educated. However when Internet access is via the TV and there is merging of different communication technologies, there will be the potential for everyone to have access to the same amount of information.

The problem is that by this stage those who have been used to using the current and developing computer based versions of this will, be way ahead of those who only become introduced to it via domestic TV. Current trends would indicate that those who are currently poor in both financial and personal resources will use such technology for entertainment and completely ignore much of the information element available. Those who are currently rich in both financial and personal resources will be able to use such new communication technology alongside development of current computer based IT for entertainment when it suits them and information dissemination and retrieval when it suits them.

Will this create a situation that is any different from the current print based system? It is mainly the better educated who use all the print resources that are currently available. If we end up with a situation where the Internet is accessible from the domestic TV then far more information will be available to far more people with far less effort required to access it than with current print based information. There appears therefore to be the potential for electronic media to have a levelling effect of access to information.

Nevertheless, the print media, "a medium unto themselves", the object 'that is stand alone' is not just at the dead end. The people in computer industry acknowledge that the creative literature as well as non-literary texts do not gain much from being on the display screen. The electronic media cannot be the substitute for the historical records of mankind cumulated for hundreds of years. The past records in any physical format and the records in print-on-paper are the continual flow of human knowledge. Considering the future of print media, UNESCO has been involved to save the print-on-paper since the early seventies. The ocean of information, however large and extended it may be cannot be identical to education and knowledge, not to speak of wisdom. Information is universal but education and wisdom are personal and extremely personal attainment.

2.4 Multimedia

Multimedia describes the use of a combination of sensory elements, often to entertain or to educate. As CPU's become faster and more powerful, they are better able to accomodate presentations that include combinations of sophisticated sound, graphics and video. For example, a computer encyclopadia may include a short video that shows an animal in its natural habitat complete with ambient sounds or a voice over narration, or both; an entry about music may show a full orchestra playing and then introduce each of the instruments with samples of the sound it makes. A software application may include an introduction or a tutorial that uses sound and animation to illustrate program features.

Computer systems are designed to capture, store, process and retrieve, display and play back multiple types of information : text, picture, sound, animation and/or video. However, text and picture (still image) combinations would be more appropriately described as illustrated database, just as picture books and photoalbums are not called multimedia works.

Multimedia has been used in the arts to describe works of art that are composed of different media. In librarianship multimedia has not been used to describe collections or materials that include kits, artefacts, audio, video and/or computer-readable materials in addition to the traditional print materials. It has also been a widely used term in education to describe a technology or method that uses slides, films, video and audio illustrations to enhance traditional chalk-and-talk presentations.

The quantity of multimedia elements usually leaves much to be desired, and producers of multimedia databases need to make compromises. The reason for this is that high-resolution (photographic-quality) colour pictures, hi-fi-quality audio and particularly animation and video require enormous amount of data and extremely fast data transfer rate.

Animated sequences and video clips are typically short in duration (30-50 seconds) and are sparingly used. They are played back at half or quarter screen size at significantly lower speed than customary on television. Audio itself needs to be compressed. Wave format music recordings (WAV files) are often replaced by synthesised sounds (known as MIDI files). This makes the national anthems in the encyclopaedias and atlases sound so bizarre. Narration and voicecover cannot be synthesised but they require much lower sampling size (8 bit) and sampling frequency (llKHz) than genuine CD-audio quality

(16 bit and 44 KHz) recordings.

In spite of these hurdles there are some databases with remarkable multimedia quality that really enhance the product. The Xiphias version of the American Heritage Dictionary does not offer pronunciation while the softkey version and the Microsoft version do pronounce 80,000 words. Microsoft's Encarta encyclopaedia offers pronunciation of names of countries and cities, and common phrases and proverbs in sixty languages have audio rendering. The new Multimedia Grolier Encyclopaedia has narrated and animated maps to illustrate strategic moves in wars or spread of suffrage, and all the animations have voiceovers, while in Encarta they are offered selectively for animations and not at all for animated maps. An animated and narrated explanation for the articles about volcanoes are excellent in Encarta and Grolier and the lack of narration in Compton's makes the animation much less effective.

Audio and graphics are superbly used in the Discis series of story books (Arthur's Teacher Trouble, Just Grandma and Me, The Tortoise and the Hare), which allow the pronunciation of the entire story in English and Spanish. The narrated video clips in the 20th Century and Time Almanac are of good quality and watching and listening to Churchill's speeches or the hysterical address of Hitler is highly educational. So are the excellent combinations of audio, video, 3D graphics and animation for the functioning of the cardiovascular system in Bodyworks. The quality of multimedia depends as much on the original recording as on the power and quality of the computer system used for playback.

2.4.1 Need for Multimedia

Multimedia meets the demand for better access and presentation of information. It can present the variety and quality of information to satisfy the varied needs of different users. Apart from entertainment it can be effectively used in education, business and professional fields, publishing, and libraries.

2.5 Hypermedia and Hypertext

Hypermedia is often used as a synonym for multimedia. Multimedia (that is, a combination of moving pictures, sound, text, graphics, digitized speech) applications which also contain hypertext elements. These permit the user to

follow associative links between units of information by clicking on part of a graphic with a mouse. The first major tool to establish hypermedia as a practical environment for applications of multimedia was **Apple's Hypercard**. It is the process of linking together multimedia data elements and allowing various options for getting from one to another. Often, the two terms hypermedia and hypertext are used to mean the same thing. Hypertext strictly refers to textual information and presents information in a non-sequential manner.

The paper often cited as the origin of the concept 'hypertext' is 'As We May Think' by Vannevar Bush.

2.5.1 Hypertext

As noted earlier, hypertext is concerned with the presentation of information in non-sequential manner. It is a system of managing information that allows apparently discrete elements of data to be connected using associative links. Hypertext consists of a number of 'nodes' connected by links. A node is a collection of information that can be accessed via a single screen, including text, graphics and sometimes, sounds or moving picture sequences. The links connecting the nodes are also represented on screen and can be followed by the user with a simple action, such as clicking the mouse button or pressing a key. This links the user to another part of the file where relevant or related data is to be found. This may, in turn, generate further links or choices of links. This enables the user to browse through the information with considerable freedom. Hypertext systems usually provide other aids to navigation through the information, such as a graphical browser – an overview of nodes and the links between them in diagram form.

2.5.2 Menus and hypertext displays

Menus based on classification and relational displays are used widely to guide users, especially novice users, into the organization of electronic databases or texts. Usually, only between ten and fifteen choices are presented in each menu, so that users must choose whatever heading seems closest to their objective. Large databases require manu many levels, as many as ten, twenty or thirty, and navigating such means can be challenging. Experienced users often prefer to bypass menus, which can be quite time consuming, and either search directly on one or more terms or browse alphabetical indexes.

Hypertext has been developed to display in electronic media the same kind of internal indexing common to print encyclopaedias and handbooks, where it has long been customary to highlight terms that have their own entries. Users who want to pursue the topic or feature represented by such a term can turn directly to its entry. Hypertext permits the same kind of direct access without requiring the user to consult an index. Any terms that are highlighted can be clicked on, and text (linguistic, aural or visual) linked to that term will come to the screen or will be played via a sound system.

2.6 Summary

Here we have discussed the print and paper media. We have elaborated the various parts of the print media. In the present age of electronic media we have indicated the place of printing media. Finally we have noted that the electronic media cannot be the substitute for the historical records of mankind. We have discussed the need for multimedia in the present society.

2.7 Exercise

1. Give an example of Gutenbergian mode of communication. Discuss the potential of print media.
2. In the wake of modern technology, discuss the future of print media.
3. Highlight the potential of electronic media.
4. Why does the modern society need multimedia?
5. What is hypertext? How does it differ from hypermedia?

2.8 References and Further Reading

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Unit 3 ❑ Non-print Media : Mioroform, Electronic and Optical Media

Structure

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3.0 Objectives

Current technology may be recent or may be old but for our purposes, must have some established use and some vitality. Here in this unit you will know the characteristics of different types of non-print media and will understand the features of each of non-print media in the storage, retrieval and dissemination of information.

3.1 Introduction

Emerging technologies generally complement active and mature technologies rather than replace the older technologies; rarely does an old technology

vanish overnight. New technology sometimes replaces old technology, bu the process is almost always a gradual one. Each method of storing an transmitting information represents complex technology. Carriers and medi are of special interest to libraries, either to store and circulate information fc direct use by patrons or to store and transmit information on behalf of th library. Among such different media, some have been on the scene for severa years, while some have emerged only in the last few decades. Here we sha discuss mircoforms, magnetic and optical media.

3.2 Microforms

Microform is the Rodney Dangerfield of information media : it does not ge any respect. Libraries need microfilm and microfiche, but users will accep them only when no other medium is available. There are good reasons fc the almost universal disdain and avoidance of microform materials. Ther are also good reasons why microforms will be with us for some time to come and represent an essential technology for certain library applications Microform technology is neither mysterious nor arcane. Microfilm is hig resolution, high-contrast film; microfilm production is simply another forn of photography. If you take a picture of a landscape using a 35 milimetr camera and print the results on paper, with the print size larger than photographic image, you're engaged in photography. If you take a picture o a book or magazine page using a 35-milimeter camera (probably with differen film, probably with a specialized camera) and copy the results to anothe piece of film, with the copy size equal to the photographic image, you ar creating a microform.

Microforms go back more than a century about one hundred twenty years. J. B. Dancer produced microphotographs in 1839, microfilm wa suggested as a publication medium for scholarly material in 1853; pigeon flew microfilmed news dispatches into besieged Paris in 1871. An 189 proposal set forth the basics of the current design and format for microfiche Commercial microphotography dates back to 1928; the first planned use wa to photograph cancelled checks as a deterrent to fraud. Kodak formed th Recordak Corporation, which perfected the 35-milimeter microfilm camera by 1935. Recordak issued a file of the **New York Times** on microfilm in th 1930s. University Microfilms was founded in 1938, the same year that Harvarc began the Fonrign Newspaper Microfilm Project.

Writers proposed microfilm publication as a replacement for book publication as early as 1944, at least for library storage. In 1950, Readex Microprint Corporation began to publish research materials as opaque microprints. Other microforms emerged during the 1960s and since. The contemporary standard size and format for microfiche stabilized around 1960. Ultra-high-reduction fiche involves processes first developed in 1960; the first commercial uses of such fiche began about 1970. The 1960s and 1970s may have been the "glory years" for microform, with no competitors for low-cost, small-run publishing and compact storage of information.

3.2.1 Types of Microform

There are two types of microform : Roll and Flat. Roll microforms consist of varying lengths of microfilm, usually 16 mm or 35 mm wide, wound on a holder called reel or loaded into a cartridge or cassette. Flat microforms comprise microfiche, micro-opaques and others.

Roll Microfilm

It is customarily available in standard widths of 35 mm or 16 mm and is generally supplied on open reels. The 35 mm format, with its relatively large frame size, is particularly suitable for recording newspaper pages, engineering drawings, charts and plans. The 16 mm format is useful for recording periodicals and has found a role in special applications such as recording correspondence and business archives. Alternatives to the open reel, employing permanent housing of the film within a container, such as a cassette (with two built-in reels or cores) or a cartridge (with a single reel or core), have been developed to overcome some of the basic inconvenience and risk of damage associated with handling loose film and threading it into viewers.

Several systems have been developed for coding role film to identify individual forms to facilitate document image retrieval.

An adaptation of roll microfilm is unitized microfilm, in which short lengths of cut film are used for image storage. In this way small documents, or single periodical articles, can be individually treated but there are some attendant handling difficulties. A further development, which was of some significance when punched cards were popular for sorting and retrieval, was the use of unitized microfilm in aperture cards. These incorporated a piece of microfilm as an insert in a 'window' in a standard punched card.

35-milimeter roll microfilm offers a combination of clarity and capacity

that seems to suit many library needs. Roll microfilm is nuisance to use and store, but libraries can produce such microfilm in-house. One small reel holds 1200 to 1500 pages, the equivalent of three good sized books or a stack of newspapers, with little danger of pages or portions of pages being torn out. 35-milimeter microfilm is the most popular for library purposes.

Microfiche

Microfiche is basically a flat rectangle of sheet film over which images are recorded. Several sizes of microfiche may be encountered but the most common currently available is equivalent to the international A6 paper size. Superfiche and ultrafiche are variants created by more sophisticated and precise technology. Superfiche images are reeduced by 75 times to provide about 1,000 frames per sheet. Ultrafiche images are recduced by 150 times to provide ablut 3,200 frames per sheet. Jacketed fiche, which may be regarded as an extension of unitized microfilm, features the use of transparent carriets of 'Jackets' into which short lengths of film are inserted to facilitate storage and protection when handling.

Fiche offer several advantages over roll microfilm. Access can be fast : each fiche contains an eye-readable heading and, normally, an index, and standard grids make it easy to move to a given frame. Readers can be quite expensive. Fiche are compact, can be directly reproduced at low cost, can be mailed in regular envelopes, and are generally easy to handle. Microfiche work particularly well for technical reports and other brief documents such as technical standards. Fiche also serves well for lengthy computer-generated publications used for brief lookup and requiring a small number of copies, anywhere from two or three to a thousand or more.

Computer Output Microfilm (COM)

It is a term which does not strictly describe a microform format but rather the means by which information is recorded on the medium. Information from computer processing is directly output and recorded on to microfiche rather than paper (or screens), utilizing special equipment to produce it. COM is particularly useful when multiple copies of output from the computer is needed.

Mirco-opaques, also called microcard or microprint, are sheets of opaque flat card on which images are recorded, either photographically or by photolithography. Partly because of the need for specialized viewers and

because of the difficulty of achieving quality of enlarged images comparable to microfilm and microfiche, their appeal is not great. Miniaturised print represents the transition from true microform to conventional print. For this format material is reduced by two or four times from the original and produced photolithographically. It can just be read with the naked eye, although it is more useful and comfortable to use hand magnifier. This format allows a significant reduction in the volume of material to be accommodated but without the need for sophisticated equipment. Miniaturise print has found a particularly useful application for otherwise bulky reference books, of which the **Oxford English Dictionary** and the British Museum Catalogue of Printed Books are examples.

Microforms in Library and Information Services

Mircoforms have fulfilled an important role in collection development in library and information services, and in the broad area of administrative processes also. The use of microforms as a document publishing medium for a variety of material, including books, pamphlets, periodicals, theses, papers and manuscripts, has had a significant impact on library collection building. They have brought economy in terms of production and duplication, storage and transportation of both original and republished material. They have also contributed to increasing the availability of copies of important and scarce items and at the same time contributed towards the preservation of material. Microform document publishing practices may be divided into three categories : original or primary publishing, where material makes its first appearance in microform; parallel publishing where paper and microform versions appear simultaneously; and retrospective publishing, where previously published paper material is produced or 'reprinted' in microform. They formed an important stage in the evolution of the library catalogue with the introduction of COM for the production and distribution of catalogues.

Microforms are media dependent on equipment together with a certain level of user skill. The design and quality of microforms and equipment are therefore critical to their successful exploitation, as is the provision of a suitable reading environment.

Microform material has established a very useful niche in library and information services and it is now a feature of services and collections in libraries of various types and sizes. In the 1940s, there was speculation that microforms would rapidly displace paper and print material for many

purposes. More recently the speedy eclipse of microform by the newer electronic media, particularly CD-ROM has been forecast. Still they will continue for some time to provide a useful and inexpensive means of achieving and distributing specialized documentation.

3.3 Electronic Media

The term 'electronic media' covers magnetic, optical, and magneto-optical media. Here we shall discuss magnetic and optical media. Today, large amount of text, images and numeric data are created and distributed in electronic form. Information in electronic form is machine readable and the searching is done by computer software. Editing, sorting and updating data in electronic form can be accomplished very fast. In electronic form information can be transmitted quickly to remote locations.

3.3.1 Magnetic Storage

Magnetic tape, hard disks and floppy discs, all use the same basic technology as audio cassettes and video cassettes. That technology typically begins with rust (ie., ferric oxide, Fe_2O_3). Some magnetic media now use materials other than ferric oxide, but it is reasonable to say that computer memory tends to be rusty.

Magnetic Recording

In 1898, Valdemar Poulsen wound a steel piano wire in a spiral groove around the surface of a drum. A rod next to the drum held an electromagnet. By rotating the drum and pulling the electromagnet down the rod, current from a microphone would magnetize the steel wire. The signal could be played back over the headphones. As demonstrated at the 1900 Paris Exposition, magnetic recording had begun.

All magnetic recording involves the use of an electromegnetic recording head to cause particles within a medium to take on a desired magnetic orientation, and the use of a playback head (which may be the same head) to sense the magnetic orientations. Those orientations may be read as patterns analogous to waveforms. (as in audiotape and videotape) or may be treated as strictly zeros and ones (as in all magnetic storage for computers).

Magnetic Tape

Magnetic tape for computer storage functions in much the same way as does magnetic tape for audio recording. Fixed heads (one per channel) record, and playback information on moving tape. Even the tape coatings are similar, to the point that computer tape can, if slit to the width of audiotape, be used to make relatively low quality sound recordings.

Computer tape recording is both more difficult and simpler than audio recording. Audio recording requires linear (or predictably nonlinear) response over a wide range of frequencies and wide amplitude range, while digital recording requires nothing more than off-and-on sequences. But computer tape must start and stop rapidly and predictably; and minor errors in digital recordings will cause much more damage than in audiotape. Computer tape recording also involves much higher-speed motion and data transfer than audiotape, imposing more strenuous demands on the tape backing, the magnetic formulation (particularly the smoothness and durability of the coating), and the recorder mechanism.

Most contemporary computer tape units use nine tracks and heads, one for each bit in a character and a ninth for a parity bit. A parity bit is an extra bit that is set either so that every character has an odd number of "on" bits or an even number of "on" bits, for odd or even parity respectively. Parity bits provide a crude form of error detection : if any one bit is read incorrectly, the parity will be wrong. Most open-reel computer tapes store information either at 1,600 characters per inch or 6250 characters per inch, with a few older units still restricted to 800 characters per inch.

Computer tape represented an enormous improvement in storage density and handling speed over punched cards. In the years after computer tape recording because practical, it came to dominate mass storage and mass data communications application. Tapes became higher quality and generally cheaper; tape mechanisms came down strongly in price and improved steadily in performance. But tape was never an ideal mechanism for direct data storage, for in order to get to a particular piece of information the computer must read through the tape from the beginning or end. Even though some modern computer tape sule systems can read an entire reel in two or three minutes, that is still an eternity when you are using information interactively.

For some years, hard disks represented the medium of choice for interactive applications but were so expensive that tape still seemed appropriate for operations in which immediate access was not required. As

hard disk prices come down and capacities improve, the emphasis continues to shift to disk storage.

3.3.2 Advantages and Uses

Tape still has its uses, some of which appear likely to remain for years to come. It is still the cheapest and most reliable way to save backup copies of hard discs, particularly since tapes can be sent to off-site locations for protection. It is still the best way to send large quantities of information from one computer to another when the two lack a direct high-speed connection. It is still the best way to store large quantities of information when the information is never needed instantaneously and rarely needed at all.

The key advantages of tape are that it is cheap, compact and proven. A single 2,400-feet reel of tape recorded at 6,250 bpi (bits per inch or characters per inch on 9 track tape) using 32,000 characters per block, can store roughly 170 million characters.

3.3.3 Disadvantages

The disadvantages of tape are that it is not a true archival medium and that access is slow and sequential. Slow and sequential access rule out tape for interactive retrieval. The other disadvantage only matters if people mistakenly use tape as an archival medium. It is not. Specks of dust and uncontrolled humidity and temperature levels can cause tape-reading errors.

3.4 Hard Disks

The computer industry recognised the need for random access early in its history. Rey Johnson of IBM began work toward a random-access data storage system in 1952, and in 1955 IBM announced the IBM 305 or RAMAC (Random Access Method of Accounting and Control) disk drive. This drive was 24 inches in diameter, with 50 disks rotating at 1200 revolutions per minute. It had a total capacity of five million characters.

Hard disks made interactive computing possible and preceded online information services. In more than five decades of use, hard disks have continued to evolve toward smaller sizes, higher capacities, faster speeds and better cost/performances ratios.

3.4.1 Uses and Advantages

Most library automation systems use hard disks, and any library personal computer that will be used heavily should probably have a hard disk. It is not possible to maintain or manipulate large databases on diskettes, and increasingly difficult to use modern software without a hard disk.

There are no current alternatives to hard disks for very large databases, at least none with similar capacity, ease of updating, and speed of access.

3.4.2 Disadvantages and Problems

There are three basic problems with hard disks : they can crash, making large quantities of information unavailable; for personal computer use, the very large capacity may make it difficult to find files; and they cannot be removed and replaced as readily as diskettes or tapes.

3.5 Floppy Disks

Skipping over some of the early magnetic computer media (such as magnetic drums), we come to the low-cost workhorse of personal computing : the floppy or flexible disk. Flexible disks combine some aspects of magnetic tape and some aspects of hard disks. Like magnetic tape, they use magnetic coating on a Mylar backing (but are coated on both sides of the plastic). Like magnetic tape, the head actually makes physical contact with the medium. Like hard disks, floppy disks spin during use and privide reasonably fast direct access to any information on the surface. IBM pioneered floppy disks, and the first floppy drives were 8-inch drives in various IBM computer peripherals, used to read in basic operating instructions.

Uses and Advantages

They offer the best means of distributing programs and moving moderate amounts of information from one computer to another. They are reasonably durable, light, easy to mail or carry, and offer relatively good access.

3.6 Optical Media

3.6.1 Optical Disk

Optical disks use magneto-optical or phase-change methods, which make them re-writable, unlike CD-ROMs. Data is read from an optical disk by a low-power laser, which assigns binary values to small areas on the disk. Data is written by heating those small areas by means of a high-power laser so that when they cool, their polarization (in magneto-optical disks) or their state (in phase-change disks) determines the binary value.

3.6.2 CD-ROM

CD-ROM is neither the first digital publishing medium nor the only current one; it is not even the first one to be used in libraries. Compact disc – read only memory (CD-ROM) is a new publishing medium with some unusual strengths and some important weaknesses. CD-ROM publishing can produce very large quantities of textual information at relatively low cost and can potentially mix graphics, sound, computer software, and other nontextual items with text. That makes CD-ROM a powerful medium for certain uses, but does not make it a general replacement for books.

Philips and Sony, the patent holders for basic compact disc technology, established the precise specifications for compact discs in a published set of technical standards usually called the **Red Book**. Compact discs follow licensed standards and maintained by Philips and Sony assuring that all CDs and all CD players are compatible.

The first consumer-oriented CD-ROM publication was a version of Grolier's **Academic American Encyclopaedia**. CD-ROM is closely based on CD that blocks of information are actually referenced by minute, second, and block : there are 75 blocks per "second", each block containing 2,048 characters or character-equivalents. Since CD-ROM is read with a light beam, no physical damage should result from constant or continuous use. Libraries should pay attention to the legitimate uses of CD-ROM. The arguments in favour of CD-ROM are clear :

1. CD-ROM can store enormous quantities of text and can include software, sound and images (although sound and images take up much more space than text or software)

2. Shipping data or text in CD-ROM form is more economical than shipping it in any other form.
3. Although CD-ROM is still expensive to master, copies become quite inexpensive at relatively low numbers (in the hundreds). It is a good short-run publishing medium, well suited to special products.
4. While CD-ROM access is much slower than hard-disk access, it is still relatively fast. With good indices, CD-ROM can be a flexible and effective information retrieval mediem, with no "line charges".
5. CD-ROM can only be used with a computer, making computer manipulation of CD-ROM data a natural part of CD-ROM use. Text retrieved from CD-ROM is already ready for word processing or other manipulation.

Usage Considerations

Rewritable optical disks come in 3.5 in., 5.25 in, and 12 in. diameters (CD-ROM is 4.75 in.) Expanding storage capacity drives the take-up of rewritable optical disks. A typical juke box unit the size of a fridge can hold up to 144 optical disks, giving it a storage capacity of some 200 Gb.

Rewritable optical disks are typically half the price per megabyte of magnetic storage but they have slower data-transfer and access times. A transfer rate of 2.2 Mb per second has been achieved from an optical disk, but only by spinning the disk much faster than normal. Magnetic storage can reach transfer rates of 10 Mb per second. Accessing data in magnetic storage takes under half the time than access on optical disk would take. Optical disk access times rise dramatically if 'juke boxes' are used, as disks have to be fetched, mounted and spun before data access can be attempted.

Yet, optical disks continue to be employed because of their storage capacity; this trend will continue. More storage capacity can be gained by a number of routes. More tracks can be squeezed on to a disk, the areas of binary data can be reduced in size if lower spectrum laser light is used and each area can contain more than just one bit of information.

3.6.3 Applications

The inefficiences of managing information using paper as a storage medium are manifold. It is both difficult and costly to control the creation and use of paper documents. Storage systems for paper require expensive clerical effort to maintain. Even so, paper documents are frequently mislaid or lost. A

single copy of a paper document cannot be used by many people at once. Copying paper documents serves to exacerbate storage problems.

All these problems can be avoided by scanning paper documents and storing the resultant images in a computer system : this is known as document image processing. The only drawback is the large storage requirements of document images, and here the solution is optical disk storage.

3.6.4 Problems and Issues

While an individual CD-ROM will certainly require much less space than the print equivalent, there are drawbacks to CD-ROM as a print replacement, even for large reference products. A multi volume reference set can be used by several people simultaneously, each working in a different part of the alphabet, just as dozens of people can use a card catalogue simultaneously. For several people to use a single CD-ROM reference product simultaneously, a library must either invest in several players and several copies of the CD-ROM, or must install a networked CD-ROM system (given the slow retrieval speeds of CD-ROM, networked retrieval to a single disc may not even be realistic).

A library wishing to provide several CD-ROM services must also choose between purchasing a player and PC for each service, dealing with changing the discs, or using a "juke box", or multiple player system. And unless the same software can be used for all of the CD-ROM services, moving from one service to another with be difficult and disruptive.

CD-ROM has been touted as a medium to replace shared cataloging systems such as Online Computer Library Centre (OCLC) and as a replacement for online public access catalogues. In both cases, what should be a supplemental role has been marketed out of proportion to its real advantages and problems. CD-ROM catalogues can be effective interim measures on the road to online catalogues, can serve as effective backups, and can serve well for multi-institutional catalogues lacking online links. In other words, a CD-ROM catalogue is basically a superior microfom catalogue. But CD-ROM catalogues do not replace online catalogues effectively; they can only provide current status information through links to an online circulation system and can only provide current acquisition and cataloguing information through hard-disk storage. Even with such extensions, a CD-ROM catalogue can rarely provide the flexibility and speed of access of a well designed online catalogue.

Libraries should consider the possibility that they may eventually add

CD-ROM discs to their array of circulating media, but should not be rushing out to establish circulation collections at this point.

Before CD-ROM can be a successful publishing medium, it must be a single medium. If you need different players or even different software to use different disc, you do not have a coherent medium. The Philips-Sony **Yellow Book** sets forth a physical standard for CD-ROM discs and players : data format, track layout, disc diameter, type of rotation. This means that every CD-ROM disc is playable on every CD-ROM player, in the sense that the player can convert the pits and lands of the disc into a stream of characters or other information. Early proponents say that CD-ROM works because it follows international standards; unfortunately, the international standards do not provide enough information to make discs interchangeable or readily useful.

3.7 Summary

In this unit, we have discussed different forms of non-print media : microform, electronic and optical media. Microforms cover books, magazines, newspapers, etc. Microforms comprise of two kinds : Roll Microform and Flat Microform. Another form of non-print medium is Electronic medium. We have highlighted various kinds of electronic media, their advantage and disadvantages. Optical media is the third form of non-print media. CD-ROM is a publishing medium, no more and no less. It may falter because of standard problems, unrealistic expectations on the part of publishers, or the failure to identify and target proper avenues. It may never succeed as a mass medium, but is likely to succeed within appropriate markets including libraries. Libraries have been uniquely important for CD-ROM since the beginning, and should continue to make good use of the medium while recognizing its limitations.

3.8 Exercise

1. Why is there an ever-increasing demand for machine-readable storage?
2. What is document image processing? Discuss the applications of optical disk storage.
3. Enumerate different types of electronic media.
4. Discuss the role of microforms in library and information sources.

5. What are key advantages of tape? Illustrate.
6. What are the advantages of having CD-ROM in libraries?

3.9 References and Further Reading

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Unit 4 ❑ Humanities

Structure

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4.0 Objectives

This unit presents you an idea about subjects that represent Humanities. Unlike sciences, social sciences and defence science, Humanities has no documentation centre. In order to eliminate duplication of research work and to coordinate information sources and systems, a documentation centre is all the more necessary. You will realise the gaps in the national library system. After reading this unit, you will know the existence of different information centres to cater to the needs of researchers and scholars in the field of Humanities. Librarians should take the initiative to guide the researchers in different subjects to appropriate information centres.

4.1 Introduction

Humanities help us make sense of our lives and our world. They are concerned with human values and human culture. For our purpose we have included Philosophy, Religion, Arts, Language, Literature, History, Archives, Museums as subjects of Humanities. There are information centres generating information for researchers and scholars of Humanities. Librarians should be

aware of their existence and type of information sources they generate. We shall introduce the National Library System in the field of Humanities. We shall discuss important information centres, and systems in various fields of Humanities.

4.2 Definitions and Scope

Dictionary >> words starting with H >> huffish ... humiliation >> humanities

Etymology : from French **humanite**, from Latin **humanitas**. The Humanities are often defined as a group of academic disciplines. According to this definition, which was used by the U.S. Congress when the National Endowment for the Humanities was established in 1964, the Humanities include, but are not limited to, history, literature, philosophy and ethics; foreign languages and cultures; linguistics; jurisprudence or philosophy of law; archaeology; comparative religion; the history, theory, and criticism of the arts; and those aspects of the social sciences (anthropology, sociology, psychology, political science, government, and economics) that use historical and interpretive rather than quantitative methods. The Foundation finds it more useful to define the Humanities as a way of thinking about and responding to the world as tools we use to examine and make sense of the human experiences in particular. The Humanities enable us to reflect upon our lives and ask fundamental questions of value, purpose, and meaning in a rigorous and systematic way.

The Humanities enrich and ennoble us, and their pursuit would be worthwhile even if they were not socially useful. But in fact, the Humanities are socially useful. They fulfil vitally important needs for critical and imaginative thinking about the issues that confront us and as human beings; reasoned and open-minded discussion of the basic values that are at stake in the various policies and practices that are proposed to address these issues; understanding and appreciating the experiences of others and the ways in which the issues that confront us now have been understood in other times, places, and cultures.

The Humanities concern themselves with the complete record of human experience–exploring, assessing, interpreting, and refining it, while at the same time adding to it.

We need Humanities. Without them we cannot possibly govern ourselves wisely or well.

The University Grants Commission (India) includes the following subjects in the field of Humanities :

Classical languages, modern languages, English and foreign languages, linguistics, philosophy, history, art history, mythology.

The Humanities are the stories, the ideas, and the words that help us make sense of our lives and our world. The Humanities introduce us to people we have never met, places we have never visited, and ideas that may have never crossed our minds. By showing how others have lived and thought about life, the Humanities help us decide what is important in our lives and what we can do to make them better. By connecting us with other people, they point the way to answers about what is right or wrong, or what is true to our heritage and our history. The Humanities help us address the challenges we face together in our families, our communities, and as a nation.

The Humanities should not be confused with "humanism", a specific philosophical belief, nor with "humanitarianism," the concern for charitable works and social reform.

4.3 National Library System

Research scholars pursuing research in Humanities are large. Let us see how far the national library system satisfies the research requirements of Humanities scholars.

The national library, Kolkata is the apex body in the library system in India. Besides, there are other national libraries in India. The Khudabax Oriental Public Library in Patna and the Thanjavur Maharaja Serfoji's Saraswati Mahal Manuscripts Library are recognised as National Libraries by the Government of India. These two libraries are very important for Humanities research scholars. Let us discuss the National Library of India, located in Kolkata.

4.3.1 National Library, Kolkata

The National Library, Kolkata receives by legal deposit one free copy of each book and periodical published in the country. Under the Delivery of Books and Newspapers Act, 1956, it is entitled to receive all published books in India. The unique feature of the library holdings is series of bequests it received during the last sixty years. The first of those was the personal collection (more than 87,500 volumes) of Sir Asutosh Mukhopadhyaya in 1949. A number

of donors came out to form the following Collections : the Ramdas Sen Collection (1960), the Hidayat Hussain collection (1952), the Tej Bahadur Sapru Papers (1952), the Barid Baran Mukherjee Collection (1953), the Zakariya Collection (19530, The Imambara Collection (1956), the Jadunath Sarkar Collection (1959), the Surendranath Sen Collection (1960), and Vaiyapuri Pillai Collection (1960). These special Collections are invaluable source for research scholars in Humanities.

The Collection of Munshi Sayyid Sadruddin Ahmad-al-Musawi, Zamindar of Buhar, is known as Buhar Collection which holds manuscripts on different subjects including science. These manuscripts are written in Arabic, Persian and Urdu languages. A 2-volume catalogue **'Raisonne of Buhar Collection'** represents almost the whole of Buhar Collection. Buhar Collection is valuable to scholars doing research in Humanities. The National Library has brought out a number of catalogues and subject bibliographies. In collaboration with Sahitya Akademi, the National Library has published **"Bibliography of Indian Literature from 1901-1951"** in 4 volumes.

The special collections obtained as gifts are an indispensable source of information for Humanities scholars. Still the National Library should come forward involving all the libraries at the national, regional and local levels to organise a network in the field of Humanities to render better service to its scholars.

4.3.2 Thanjavur Maharaja Serfoji's Saraswati Mahal Library

Conceived and christened the Royal Palace Library, the Nayak kings of Tanjore (1535-1673 AD) nourished it for intellectual enrichment. The development of the library into a monumental institution was due to the Maratha Kings of Thanjavur. Maharaja Serfoji (1676-1855 AD) was an intellectual mandarin and eminent scholar. While on pilgrimage to Benaras, he employed many pandits to collect, buy and copy a vast number of works from all the renowned centres of Sanskrit learning in the north and other areas. It is on account of his singular devotion to this cause that the library is called 'Thanjavur Maharaja Serfoji's Saraswati Mahal Library'. The Saraswati Mahal Library is a priceless repository of culture and time defying treasure house of knowledge to Humanities scholars, built up by the successive dynasties of Nayaks and the Marathas of Thanjavur. The library embodies a rich and rare collection of manuscripts on art, culture and literature.

The Library has the richest collection of manuscripts which are truly

reflective of the culture of South India. In addition to the central collections, the Library was able to get possession of the Private Libraries of several pandits and patrons living in and around Thanjavur. The manuscripts are available both in palm-leaf and paper form on various subjects in Indian languages like Tamil, Telegu, Marathi and Sanskrit. The major part of the manuscripts are in Sanskrit and number over 39,000. They are written in different scripts such as Grantha, Devnagari, Telegu, etc.

Apart from these manuscripts, there are bundles of the Maratha Raj records available in the library. The Raj records were written in the Modi script (fast script for Devnagari) of the Marathi language. These records encompass the information on the political, cultural and social administration of the Maratha kings of Thanjavur.

The book collection of the Library, exceeding 51,000 is eclectic. The rare book collections were made by king Serfoji during his lifetime. The book collection covers a number of subjects in the field of Humanities, written in Tamil, English, Telegu, Sanskrit, Marathi and Hindi. The personal collection of Serofji comprise books in English, French and Latin Languages. The Library has brought out a number of works as critical appraisal on the manuscripts. It has published **'Descriptive Catalogues of the Sanskrit Manuscripts'**, 22 volumes, **'Catalogue of Tamil Manuscripts'**, 3 volumes and **'Marathi Catalogues'**, 4 volumes. These catalogues are helpful to researchers in Humanities to have access to the knowledge contained in the manuscripts.

The Library is publishing rare and unpublished manuscripts in book form to disseminate the knowledge contained in the manuscripts. The Microfilm unit of this Library is engaged on microfilming Sanskrit manuscripts for the Indira Gandhi National Centre for Arts, New Delhi for preservation and national accessibility.

4.3.3 Khuda Baksh Oriental Public Library

Close to the banks of the Ganges in Patna, stands the Khuda Baksh Oriental Public Library. It is a unique repository of about 21000 oriental manuscripts and 2.5 lakh printed books. Though founded earlier, it was opened for public in October, 1891 by the illustrious son of Bihar, Maulavi Khuda Baksh Khan with 4,000 manuscripts, of which he inherited 1,400 from his father Maulavi Mohammed Baksh. In appreciation of the immense historical and intellectual value of its rich and valued collection, the Government of India declared the Library as an institution of National importance by an Act of Parliament in

1969. The Library is now fully funded by the Ministry of Culture. The Library is well on its way to become the country's first library to computerize its hand written collection for universal dissemination through internet in fulfilment of the wishes of Pandit Jawaharlal Nehru, which he penned down in the Visitor's Book during his visit to the Library on November 1, 1953 in these words - "I should like to see them reproduced by the latest techniques, so that others can see them and share in this joy."

This Library has emerged as on outstanding research library embracing a large number of rare manuscripts, some of them richly illuminated viz. "Tarik-e-Khandan-e-Timuriya", the only copy in the world, contains beautiful paintings by the famous court artists of Akbar the Great, and a writing of Jehangir. Khuda Baksh Library is not merely a library, it is in fact a nucleus of multidimensional activities. It caters to the needs of intellectuals and scholars, promotes research, advocates communal harmony and also serves the public. It organises extension lectures, talks, group discussions and debates. Eminent personalities have delivered lectures on a variety of subjects.

The Library encourages scholars and provides them all research facilities including free accommodation. It awards 10 research fellourships - 3 senior and 7 junior - for a period of 2 years and helps them do Ph.D./ D. Litt. It also assigns different projects to them, for example, editing of manuscripts, compilation of descriptive catalogue of manuscripts, indexes of Urdu periodicals, subject bibliographies, etc. The Library has so far published 36 volumes of Descriptive Catalogue of Manuscripts covering about one-third of the total collection. Moreover, the hand-list of manuscripts in Arabic (3 vols.) Persian (3 vols.) and Urdu (1 Vol.) have also been compiled and printed for the benefit of readers.

The Library arranges exhibitions of its collection from time to time. It keeps on regular display new arrivals. Apart from the exhibition of books, it has also displayed it rare calligraphic masterpieces, gorgeous paintings and manuscripts on Quraniyat (Quranic Sciences) and Islamic Sciences at different occasions in the Library. Digitisation of Descriptive Catalogue of Manuscripts has already been completed and it has been published over the internet for global dissemination.

4.4 Information Centres and Systems

The field of Humanities in India is almost neglected. But many information centres have been developed in the country. Humanities lack the documentation centre unlike Social Sciences and Sciences. Here we shall discuss how far the individual centres fulfil the needs of scholars and researchers in Humanities.

(a) Philosophy :

Indian Council of Philosophical Research (ICPR)

Unfortunately, there has not been sufficient efforts in the professional field at a systematic review and definition of Indian Philosophy, except in a few brilliant expositions attempted by Dr. S. Radhakrishnan and some others. There are indeed, learned professors in universities and other centres of learning where critical and philosophical thinking is going on unobstrusively. Among these professors, as also a number of other researchers, there are experts of eminence. They have contributed significantly to the continuance of philosophy not only as an important domain of curricular study but also as a living force of our culture. They have provided a dignified forum for the assimilation and fertilization of the idealist tradition of the West as well as new philosophers, such as those of Marxism, empiricism and existentialists. There has been considerable research in comparative philosophy, and valuable exposition of some of the main trends of Indian and Western thoughts. A noticeable tendency in recent philosophical research is manifest in its concern for the contemporary man, his predicament and his possible future, and the most significant line of thought is preoccupied with man, both in his individual and collective entities.

Since independence, there has been a persistent demand from the intellectuals of the country, voiced in different professional philosophical and non-philosophical fora to review the ancient and modern systems with a view to evaluating them and deriving from them fresh lines of purpose for the changing requirements of our times. There seems to be an unmistakable thrust towards the emergence of an independent Indian identity in philosophy.

It has been felt that there is an urgent need at various levels to strenghten philosophical research and studies in India. In the mid-seventies, a team of scholars made a careful study of the whole question relating to the revitalization of the Indian tradition of philosophizing and suggested that in

addition to other efforts, the Government of India should come forward to establish an Indian Council of Philosophical Research (ICPR). In 1976 the basic concept of ICPR was accepted, and in March 1977, the Council was registered as a society under the Societies Registration Act, 1860. However, the Council became active only in July 1981. The Council publishes **'Journal of the Indian Council of Philosophy Research'.** It compiles subject bibliographies on different aspects of Philosophy. It publishes conference proceedings, monographs, and scholarly works. In current awareness service it circulates the contents pages of the periodical. It supplies photocopies of the articles on request at reasonable cost.

Besides, there are : Academy of Comparative Philosophy and Religion, Adi Sankara Advaita Research Institute, Radhakrishnan Institute for Advanced Study in Philosophy, Vedanta Institute, etc. which serve scholars and researchers as an when required.

(b) Religion

Guru Nanak Foundation and Information Sources on Sikh Studies

Guru Nanak Foundation was founded at Delhi in May 1965 to propagate the mission and philosophy of Guru Nanak and to further the causes of peace, brotherhood and mutual understanding among the peoples of the world. During the last five decades, the Foundation has partially fulfilled its aims and objectives by establishing research institute, college library, and branches all over India and in London and by publishing high quality research material on different aspects of Sikh studies. For the support of the research activities, the Foundation has a well established library with open access facility.

The Library of the Foundation provides photocopying facilities, loan facilities, inter-library loan facilities, and monthly documentation list on Sikh studies. Besides these, bibliographies on demand are compiled and supplied to scholars on specific subjects relating to Sikhism.

Besides the Guru Nanak Foundation, there are Indian Institute of Islamic Studies, Central Institute of Buddhist Studies, Theological Research and Communication Institute, etc., which have individual libraries to provide reference and information services on respective religions.

(c) Arts

Indira Gandhi National Centre for Arts (IGNCA)

The Indira Gandhi National Centre for the Arts, established in memory of

Smt. Indira Gandhi in 1985, in visualised as a centre encompassing the study and experience of all the arts–each form with its own integrity, yet within a dimension of mutual interdependence, interrelated with nature, social structure and cosmology.

The view of the arts, integrated with, and essential to the larger matrix of human culture, is predicated upon Smt. Gandhi's recognition of the role of arts as essential to the integral quality of person, at home with himself and society. It partakes of the holistic worldview so powerfully, articularted throughout Indian tradition, and emphasized by modern Indian leaders from Mahatma Gandhi to Rabindranath Tagore.

The arts are here understood to comprise the fields of creative literature, written and oral; the visual arts, ranging from architecture, sculpture, painting and graphics to general material culture, photography and film; the performing arts of music, dance and theatre in their broadest connotation; and all else in fairs, festivals end lifestyle that has an artistic dimension. Through diverse programmes of research, publication, training creative activities and performance, the IGNCA seeks to place the arts within the context of the natural and human environment.

The significant factor in organising a resource centre of this nature is its holistic approach in merging data on arts–written, oral and visual and allowing possible scanning and synthesising of concepts at various levels from storage as well as for research and dissemination with the help of modern technology. The two main components of this section are : (i) Library and Information Service, and (ii) Data Bank on Art and Culture.

Kalanidhi maintains a comprehensive reference library with collections of national importance on art and cultural heritage. Kalanidhi incorporates the National Information System and the Data Bank on Arts, Humanities and Cultural Heritage. There are a number of databases : Union Catalogue of Catalogues, Manuscripts, Art Objects, Sound Recordings, etc. The Library has a large number of back issues of scholarly journals on microfiche.

Kalanidhi has a Cultural Archives Division which consists of six sections : Sahitya, Vastushilpa, Chaya Pata, Sangita, Nritya, Natya.

Other Centres on Art are as follows :

(d) National Academy of Arts :

It is devoted to the promotion of Arts in India.

National School of Drama, New Delhi

The National School of Drama (NSD) – one of the foremost theatre

training institutions in the world and the only one of its kind in India was set up by Sangeet Natak Akademi in 1959. It is a Society registered under Society's Registration Act XXI of 1860. In 1975, it became an autonomous organisation, fully finaced by the Department of Culture. It is housed in Bahawalpur House, Mandi House, New Delhi.

The library of NSD falls into the category of special library and the subjects covered are :

Drama literature : Plays in all modern Indian languages, Sanskrit and English; criticism on plays and playwrights; History and criticism of theatre in India and abroad.

Technical subjects : Play direction (production); acting, movement and mime; speech and voice training; stage make-up; stage designing and lighting; theatre architecture; and designing of stage costume.

Related subjects : Music, dance and opera; yoga and physical education; film, television and radio techniques; playscripts for films, television and radio; history and criticism of literature of India and outside; folklore; social criticism of literature of India and outside; social and cultural history and anthropology (Indian and foreign); some books of poetry and fiction in all Indian languages and English; Fine arts; design and graphics; photography; furniture and interior decoration; general architecture; religion and philosophy.

With regard to related subjects, a selection procedure is adopted. The Library has a good collection of photos of plays staged by Marathi Sangeet Natak companies. The NSD has some rare books. It is a lending library. A proposal for starting the documentation is under consideration. Information regarding plays produced by the School has been collected with one index entry for the title of each play; the cards are arranged alphabetically. Similarly, available brochures, slides and photos have been provided with one entry. Gramophone discs of Indian music are given two entries, one for classified and the other for dictionary catalogue arrangement.

NSD has made a significant contribution in promoting childrens theatre. The Theatre-in-Education Company (renamed as Sanskar Rang Toli) was founded in 1989. Since 1998, the School has orgahised National Theatre Festival for children christened 'Jashnebachpan' during the month of November. It has been proposed that the NSD with its unique library and efficient service can act as a National Documentation Centre for research in theatre.

(e) Sangeet Natak Akademi

Indian's national academy for music, dance and drama is the first National Academy of the arts set up by the Republic of India. It was created by resolution of the then Ministry of Education, Government of India, dated 31 May, 1952 notified in the Gazette of India of June 1952. The first President of India, Dr. Rajendra Prasad, inaugurated it on 28 January 1953 in a special function held in the Parliament House. Maulana Abul Kalam Azad, then Union Minister for Education, in his opening address at the inauguration of the Akademi, said :

"India's precious heritage of music, drama and dance is one which must cherish and develop. We must do so not only for our own sake but also as our contribution to the cultural heritage of mankind. Nowhere is it truer than in the field of art that to sustain man to create. Traditions cannot be preserved but..."

(f) Lalit Kala Akademi

Searching for a fresh cultural identity and nationhood, the first Prime Minister of India, Pt. Jawaharlal Nehru dreamt, conceived and established a few major agencies of culture that rejuvenate and formulate the diverse Indian cultural practices and promote them to play a comprehensive role in the making of a nation. Lalit Kala Akademi, one among such national agencies, emerged as the principal establishment of culture that focuses its activities in the field of visual arts such as paintings, sculptures, graphics, photography, and other arts allied to the field of fine arts. It is an autonomous organisation fully funded by the Ministry of Tourism and Culture, Government of India. The Lalit Kala Akademi was established in 1954 for the development and promotion of plastic and visual arts in India. The objectives are :

1. To encourage and promote study and research in the field of creative arts such as painting, sculpture, graphics, photography, etc.
2. To promote folk and tribal art of the country.
3. To project the vast Indian heritage through researches, expressions in the field of visual arts and to take care of overall vision of our own tradition of arts as well as imbibe new happenings in the international arena : The Akademi takes various creative programmes for the art awareness among children, youth and general public. The Akademi established a workshop studio for the artists at Garhi, Delhi to give opportunities to the working artists, senior and junior with the facility

of a workplace. The workshop studio has the facility for printmaking, metal casting, pottery and paintings. This was the first unique venture in Asia. Subsequently four other Regional Centres were brought up in order to reach out to the artists outside the metropolitan city of Delhi. These Centres are in Chennai, Lucknow, Bhubaneswar and Kolkata with similar facilities of studio workshops.

The Akademi sends from its own collection of art, small exhibitions to smaller towns and cities of the country to create art awareness among the masses. The Akademi also organises special exhibitions of copies of the frescoes, paintings, sculptures, drawings and graphics. It has a regular public programme under ancient and contemporary series. The Journal of ancient series is called 'Lalitkala' depicting Indian heritage, and that of contemporary Indian Art, called 'Lalitkala Contemporary, which deals with the present day art scene.

'Samakaleen Kala' is the Hindi Journal of similar nature. 'Kala Sambad' is the news letter published in Hindi and English. It has a large collection of art works consisting of some eminent artists. The total collection is about 4,700 art works at the centre and around 2000 in the collection of the regional centres.

The Akademi has a reference library for research scholars with about 8000 books on ancient and contemporary art of the world. It also possesses a good collection of archival material including slides, transparencies, ceramics and CDs. It provides the services of video documentation to the artists.

(g) Indian Council for Cultural Relations (ICCR)

The Indian Council for Cultural Relations established in 1951, has been working to project Indian culture abroad and to bring to India the rich manifestations of international culture. It has thus become a major vehicle of international cultural exchanges.

ICCR has been playing an equally important role in the field of education for international students in India. It offers a number of scholarships to foreign nationals to pursue higher studies in Indian universities and other recognised institutes of higher learning. Scholarships are also given for learning Indian Classical Music and Dance, Paintings and Sculptures. In addition, summer camps and cultural tours are organised every year by the Council for international students and scholars to acqucient themselves with the diverse

cultural scenario of India and at the same time, providing opportunities to promote contacts.

Cultural programmes by international Students are organised by the ICCR on appropriate occasions. This permits the international students to present their respective national or regional cultural profiles and promotes mutual understanding and appreciation between participating countries. ICCR also maintains a network of International students' Advisors (ISA) in Indian universities to assist international students in various ways, from arranging admissions, hostel accommodations to extending help in emergencies.

The ICCR headquarters is located in New Delhi at Azad Bhavan and has eight branches. Each regional office has in its jurisdiction the universities and institutions within that zone and is responsible for extending advice and assistance to international students studying there. Addresses of the offices of the ICCR are given below :

ICCR New Delhi
Azad Bhavan, Indraprastha Estate,
New Delhi - 110 002
ICCR Bombay (Mumbai)
1, Hemprabha, 68, Netaji Subhash Marg,
Mumbai - 400 020
ICCR Kolkata
2, Ballygange, Park Road,
Kolkata - 700 019
ICCR Bangalore
No. 357, 13th Main Road, Rajmahal Vilas Extension,
Sadashiv Nagar, Bangalore - 560 080
ICCR Tamil Nadu
201, Lloyds Road, First Floor, Gopalpuram,
Tamil Nadu - 600 086
ICCR Chandigarh
Flat No. 139, Sector 35-A
Chandigarh - 160 022
ICCR Lucknow
B-989, Sector A, Mahanagar,
Lucknow - 226 006
ICCR Thiruvananthapuram
'Rohini' T.C. - 16/131 Eswaravilasom Road.

Thiruvanathapuram - 695 014
ICCR Hyderabad
Kala Bhaban, 2nd Floor, Ravindra Bharathi Complex,
Saifabad, Hyderabad - 500 004

The Council takes care of international scholars from the moment they land in India. Its representatives arrange to meet them on their first arrival and guide them for onward travel to the places of their studies. The Council encourages the international students to learn Indian languages and recommends and arranges through Indian universities to provide teaching facility to international students who wish to learn Hindi and other Indian languages. The Council celebrates Indian festivals like Diwali, Christmas, Republic Day and Independence Day at Mumbai, Kolkata, Delhi and Tamil Nadu.

The Council brings out a monthly newsletter giving information on the various activities being performed by the Council. The Council conducts research by employing research fellows, holds exhibition in India and abroad, holds seminars and conferences, arranges Maulana Azad Memorial lectures, publishes books in English, Hindi and in some foreign languages on Art, Culture, Philosophy and Literature. The Library of the Council holds manuscripts, rare books, and personal collections. It brings out a few journals - **Indian Horizons, Africa Quarterly** and others.

(h) Languages

We discuss here the following two institutions of standing. **The Central Institute of English and Foreign Languages,** (CIEFL) Hyderabad. The Institute was set up by the Government of India in 1958. It was recognised as an institute deemed to be a University under Section 3 of the UGC Act. It is an autonomous institution under a registered society. Courses are provided for the study of English, Arabic, French, German, Russian and Spanish languages and their literatures. The Institute has two Regional centres at Shillong and Lucknow. Stipends, fellowships and scholarships are available for students.

The library was set up in 1958 to support the teaching and research functions of the Institute. The collection consisting of books and periodicals in English, Arabic, French, German, Russian and Spanish languages and in some Indian languages is in the areas of language teaching, linguistics and literature. Some of the important services subscribed by the Library include 'Languages and Language Behaviour Abstracts', 'Linguistic Bibliography', (Annual) 'Linguistic Survey of India', 'Indian Dissertation Abstracts'

(NASSDOC), 'Guide to Indian Periodical Literature', 'Index India', 'Linguistic Abstracts', etc. The Library was named after its former Director as Ramesh Mohan Library. The Library has a databank.

The library provides a number of information services - Literature Search Service; Current Awareness Services, a monthly service; indexing services (CIEFDOC Indexing Bulletin) with three sections on English language, Linguistics and Literature); Bibliographical Services on demand as well as in anticipation; Document Delivery Service; Inter Library Loan Services.

UGC has sanctioned a nodal centre for the Foreign Languages during the seventh plan period. The nodal centre is entrusted with the following tasks :

1. To prepare an annual bibliography of books and articles published in major foreign languages.
2. To prepare a Directory of teachers and translators in the foreign languages in the country.
3. To prepare a directory of training programmes offered in the languages in various universities and institutions.
4. To acquire all syllabi in vogue for the study and teaching of foreign languages.
5. To provide translations from foreign languages into Indian languages.
6. To act as a clearing house for information on the foreign languages in India.

Thus Remesh Mohan Library of CIEFL has emerged as a National Resource Centre in English and major international languages.

(i) Central Institute of Indian Languages (CIL), Mysore

The Government of India passed a resolution on the language policy on 18th January 1968 for the development of Indian languages through interlinguistic research. The collection of the library includes books, journals, reprints, monographs, non-book materials, theses, dissertations, conference and seminar papers, etc. Since its inception the library has built up its collection on various aspects of Indian languages, Linguistics and related areas. The library has a good collection of reference materials and rare materials. Another important feature of the collection is the acquisition of complete set of census reports and Imperial Gazetteers from the beginning upto date in microfiche form. The Institute receives 350 journals through subscription, exchange and as gifts on various aspects of Indian languages; linguistics and related areas.

The expansion of research activities necessitated the Library to provide various services to assist the research scholars, which include : current awareness, reference and interlibrary loan service, compilation of bibliographies, reprographic service and newspaper clipping service. The Library is engaged in preparing specialised bibliographies in the area of Indian Languages and linguistics and related fields. The following are some of the bibliographies prepared by the Library and are available in mimeographed form :

1. A select bibliography on language planning
2. A select bibliography on Phonetics
3. A select bibliography on folklore
4. A select bibliography on Adult Literacy
5. A Bibliography of Semiotics, etc.

A National Information Centre for Indian Languages is proposed. This centre will take the responsibility to cater the information needs to the researchers and scholars.

(j) Literature

Sahitya Akademi

The Sahitya Akademi was set up by the Government of India to foster and coordinate literary activities in all the Indian languages and to promote through them the cultural unity of India. The Akademi was formally launched by the Government of India on March 12, 1954. It was registered as a society on January 7, 1956 under the Societies Registration Act, 1860. The Government of India Resolution describes it as a national organisation instituted to work actively for the development of Indian letters and to set high literary standards.

The main objective of the Sahitya Akademi is to meet the challenge posed by a multi-lingual society. The Sahitya Akademi ceaselessly endeavours to develop a serious literary culture through the publication of journals, monographs, individual creative works of every genre, anthologies, encyclopaedias, dictionaries, bibliographies, who's who and histories of literature. The Akademi has undertaken a variety of programmes such as publishing biographical tools like **Who's Who of Indian Writers**, and **Makers of Indian Literature** and **Contemporary Indian Literature** in all the sixteen major languages of India; **Indian Literature Since Independence** in commemoration of the 25th anniversary; and **Histories of Literature**. The Akademi released in 1972, the first two parts of a 'Tibetan – Hindi' dictionary.

The Akademi has also published a "Russian - Hindi Dictionary" and two editions of 'Bangiya Sabdakosh" compiled by late Haricharan Bandyopadhyay of Shantiniketan, which had long been out of print. The Akademi has undertaken a major project to compile an "Encyclopaedia of Indian Literature".

Since 1957, the Akedemi publishes a bimonthly journal in English called **"Indian Literature".** In 1980 the Akademi launched a new quarterly journal **"Samakaleen Bharatiya Sahitya"**. in Hindi.

Since its inception the Akademi has been actively cooperating with UNESCO in the implementation of UNESCO major project of mutual appreciation of Eastern and Western cultural values and has also been maintaining contacts with several literary and cultural institutions in foreign countries to encourage better appreciation of the Indian literature abroad.

At present it is the only institution that undertakes literary activities in twenty two Indian languages, including English. Besides the eighteen languages enumerated in the Constitution of India, the Sahitya Akademi has recognised Dogri, English, Maithili and Rajasthani as languages in which its programme may be implemented.

(k) History

Indian Council of Historical Research (ICHR)

The ICHR was established as an autonomous organisation by the Government of India in 1972 (Hereafter referred to as the 'council'). Since its inception, the Council adheres to fulfil its objectives as laid down in the Memorandum of Association (MOA) by its founders. The Council does not only devote as per MOA the importance of giving a proper direction to historical research, but also encourages and fosters its golden objective of scientific writing of history, which is widely recognised in the country. It does not only cover research from the national integration point of view, but also from the view of the need to inculcate healthy respect for Indian cultural heritage without encouraging a blind acceptance of superstition, obscurantism, revivalism and imposed ideas.

The Council promotes the study of historical method to study the social sciences and Humanities to achieve the goal of an interdisciplinary approach in historical perspective. The Council provides financial assistance to develop a body of talented young historians, and identifies and encourages research

talent with encouragement to the young teachers in colleges, universities and registered research organisations.

The Council brings historians together by providing financial assistance for holding symposia, congress (regional and national), seminars, workshops, etc. for exchanging views related to history. It also provides publication sabsidy to the seminars, congress proceedings and journals so that these publications must reach researchers and scholars. The Council publishes biannual journal–**the Indian Historical Review**, and another journal **Itihas** in Hindi. It has brought out a series of volumes covering different periods of history in order to make available all major sources of historical information to teachers and researchers.

The Council has a large and expanding Library-cum-Documentation Centre exclusively for researchers and scholars. ICHR has two regional centres, namely ICHR North-East Regional Centre (Guwahati) and ICHR Southern Regional Centre (Bangalore), which have been providing assistance to researchers and scholars.

The Council has made all efforts to cover all the positive aspects, related to history with the primary condition that it must not violate its MOA during the period under report. It is not averse to any new field of historical research, if it does not violate its MOA.

(I)National Archives of India (NAI), New Delhi

The Viceroy's Council, convinced and impressed by George Forrest's recommendations, appointed him as an Officer-in-Charge of Records of Government of India and created an Imperial Record Department in 1891. The Imperial Record Department was located as a part of Imperial Secretariat Building, Government Place, West Calcutta upto 1936. With the transfer of capital from Calcutta to Delhi in 1911, the question of removing the records to the new capital was also taken up. The Imperial Record Department was shifted to the newly constructed building at Queen's Way (now Janpath), New Delhi over a ten year period (1926-1936.) After independence, the Imperial Record Department was renamed as National Archives of India.

The NAI has in its custody Central Government records of enduring value for permanent preservation and use by administrators and scholars. It has in its custody, private papers of eminent personalities of India and microfilm copies of records acquired from abroad. It provides guidance to various Government Departments, voluntary institutions and individuals

regarding technical know-how for preservation of valuable records and papers. The NAI has one Regional Office at Bhopal. It has three Record Centres at Bhubaneswar, Jaipur and Pondicherry.

The Library of the NAI emphasises in its collection mainly on rare books and documents. Many of these documents date back to the eighteenth century. The collection of documents includes books, reports, parliamentary papers, gazettes, etc. It has a rich collection of publications in various languages. Some of the notable collections in the Library are Fort William College Collection (1000 titles in Arabic and Persian), proscribed literature, complete files of Persian and Urdu newspapers of early nineteenth century, British Parliamentary Papers (1807 –), and the Bibliotheca Indica Series. The Library subscribes to 70 journals dealing mainly with modern history. Some of the notable titles in its collection are : "Calcutta Gazette", 'Daily Gazette' (1860-), "Journal of Asiatic Society of Bengal" (1844-), "Statistics at Large" (1814–), "Calcutta Review" (1844–), "Asia Quarterly Review" (1791–), etc.

The NAI has provided a Research Room Where bonafide research scholars can sit and consult documents. Personal assistance is provided here to scholars for use of reference aids and in locating particular records, etc. In addition, a considerable number of gueries from various Government Departments, institutions and individuals involving detailed search amongst the records and published sources are received at NAI both from India and abroad.

NAI also undertakes to develop suitable finding aids such as guides, indices, catalogues, descriptive lists, etc. to the materials in its collection. A large number of reference sources have been prepared by the NAI. An important feature is the availability of old newspapers on microfilms.

(m)Museums

We have a variety of museums, for example, Eco-Museums, Mobile Museums, Regional Museums, National Museums. At the national level, we have National Museum and Indian Museum, Kolkata.

National Museum

The National Museum, New Delhi, as we see it today in the majestic building on the corner of Janpath and Maulana Azad Road is the prime museum in the country. The blue-print for establishing the National Museum in Delhi had been prepared by the Gwyer Committee set up by the Government of

India in 1946. When an Exhibition of Indian Art consisting of selected artefacts from various museums of India, sponsored by the Royal Academy (London) with the cooperation of the Government of India and Britain, was on display in the galleries of Burlington House, London, during the winter months of 1947-48, it was decided to display the same collection under a single roof in Delhi in 1949, and it turned out to be a great success. In turn, the event proved responsible for the creation of the National Museum. On the auspicious day of 15th August, 1949, the National Museum was formally inaugurated by the Governor-General of India, Shri R.C. Rajagopalachari, and it was announced that till a permanent building for housing the National Musuem was constructed, the Museum would continue to function in the Rashtrapati Bhawan. The foundation of the present building was laid by Nehru, on 12th May, 1955 and the new building where works of art were displayed elegantly on scientific lines, was handed over to Museum authorities in June 1960. The Museum was thrown open to the public on December 18, 1960. The Museum has in its possession approximately 2,00,000 works of exquisite art of diverse nature, and its holdings cover a time span of more than five thousand years of cultural heritage. While the splendid chronological display of selected art objects in the various galleries, screening of educational films related to art and culture, guided tours, gallery talks by experts, special lectures and training programmes, facilities for photography and access to the reserve collection and library for the study, and advice on identification of art objects have brought immense laurels to the Museum.

Indian Museum, Kolkata

The Indian Museum is the offspring of the Asiatic Society of Bengal which was founded in 1784. It was not until 1814 that the Society resolved to establish a Museum in its own premises. The Museum started with two sections viz. (a) archaeological, ethnological and technical and (b) geological and zoological. In 1835, the attention of the Government of India was directed towards the development of the mineral resources of the country, and about 1840 a Museum of Economic Geology and opened in the Society's rooms. In 1856 the portion of the collection was removed to No. 1 Hastings Street where the Geological Survey of India was established. In 1878 the Museum building facing the Maidan was built. The Museum is divided into six sections dealing with Archaeology, Art, Anthropology, Geology, Zoology and Industry including Botany.

The Museum has a library containing Art and Archaeological literature. It brings out **'Museum Bulletin'**, holds lectures, seminars and conducts research programmes.

Conclusion

In view of research and development activities in the field of Humanities, India needs a nodal body to coordinate different information systems existing in the country. India has documentation centres in Social Sciences and Sciences and technology.

4.5 Conclusions

In the field of Sciences we have NISCAIR, in the field of Social Sciences we have NASSDOC and in the field of Defence Services we have DESIDOC. In the field of Humanities, India has no documentation centre. We have discussed many information centres to cater to the needs of users in their respective fields. Moreover, their services are limited to members only. Special Interest Group, Humanities Information of IASLIC, strongly recommended to set up Documentation Centre for Humanities. If the recommendations were accepted the Indian Council of Historical Research could take the responsibility of coordinating different information centres and act as the apex body in the field of Humanities. But the recommendations were not implemented to improve the standard of research in Humanities.

4.6 Summary

In this unit we have defined Humanities in various ways. We have introduced you to the National Library System along with Saraswati Mahal Library and Khuda Baksh Oriental Public Library which are very much useful to the scholars of Humanities. We have discussed information centres in Philosophy, Religion, Arts, Languages, Literature, History, Archives and Museums in details. Finally, the need for the documentation centres in Humanities has been highlighted.

4.7 Exercise

1. What is understood by the term Humanities? Why does India need a National Documentation Centre in Humanities?

2. Highlight the services rendered by Khuda Baksh Oriental Public Library.
3. Discuss the importance of Saraswati Mahal Library in the field of Humanities.
4. Discuss how far information centres of philosophy and religion are fulfilling the information needs of scholars.
5. Discuss the services of information centres in the fields of language and literature.
6. Describe the objectives of ICHR and ICCR.
7. Why is there an urgency to set up a national system in humanities in India?

4.8 References and Further Reading

1. Blazek, Ron and Elizabeth, Aversa : The Humanities : A Selective Guide to Information Sources, 3rd ed., Libraries Unlimited, 1988.
2. Gupta, B. M. (ed), Handbook of Libraries, Archives and Information Centres V.9, New Delhi, Aditya Prakashan, 1991.
3. Ramaiah, L. S. and others (eds), Documentation and Bibliographic Control of the Humanities in India, New Delhi, Aditya Prakashan, 1990.

Unit 5 ❑ Social Sciences

Structure

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5.6	Exercise
5.7	References and Further Reading

5.0 Objectives

This unit attempts to make you aware of the major information sources, systems and services in Social Sciences. This unit inspires you to be in a position to serve the clientele better.

This unit enables you to answer information queries in Social Sciences with confidence and ability.

5.1 Introduction

Electronic publishing has not completely superseded print publishing in Social Sciences. There is continued use of print classics such as the **Dictionary of the History of Ideas, the Encyclopaedia of the Social Sciences,** and **The International Encyclopaedia of the Social Sciences**. The **New International Encyclopaedia of the Social and the Behavioural Sciences** (IESBS) (Elsivier, 2001) has the potential to become the Social Sciences Encyclopaedia of the new millennium. Like many other massive reference works (The **Dictionary of Art**, for example), the IESBS is preceded by and accompanied by a Web Page that includes plans for publication, abstracts of articles, several sample articles and a list of topics. After the print version has been published, the Website will continue to offer updates and special features.

Much research in the Social Sciences is recorded in unpublished papers; in conferences whose proceedings are not always published; and in materials produced by national and international organizations, research centres, and corporations. As information has become increasingly available on the Internet, librarians and other information professionals have created sources that identify and control this information. Because many Social Science disciplines depend on recent information, prompt access to these materials is essential. Primary sources and review articles are usually more useful to the social scientist than books, which may not be as up-to-date or as specialised. Reference sources provide access to both types of materials, and if the source is online on a commercial database or the Internet, information is usually even more timely. A need for recent materials often involves online database searching or identifying people or organisations that the researcher can contact to initiate networking activity.

The interdisciplinary nature of much Social Science research requires the use of sources involving several disciplines both within and outside the Social Sciences. For example, an economist working on valuation of natural resources will study human needs for recreation and scenic area. The Social Sciences librarian must be aware of reference sources covering tangential disciplines so that users will not miss relevant materiels that may not be included in reference source specific to their disciplines.

Research in the Social Sciences is complicated by terminlogy that varies according to discipline, reference source, chronological period, geographic location and individual author. Terminology in the natural Sciences is much better defined and more consistent. Controlled subject headings exist for many sources, but others, such as the **Social Sciences Citation Index, Dissertation Abstracts International, NTIS Database** etc, have little controlled vocabulary, and access is dependent upon the titles controlled vocabulary, and access is dependent upon the titles and abstracts authors have written on their papers. The "softness" of Social Science terminology, although not as problematic as in the Humanities, can be a challenge for reference librarians.

5.2 Social Sciences : Definition

We cite the 1930 definition by R.A. Seligman, editor-in-chief of **Encyclopaedia of the Social Sciences** as "those mental or cultural Sciences, which deal with the activities of the individual as a member of a group." Seligman divided the Social Sciences into three groups. The older, purely Social Sciences are political science, economics, history, and jurisprudence. Those "of more recent origin" are anthoropology, penology, sociology and social work. The semi-social sciences are social in origin or have acquired a social aspect : ethics, education, philosophy, and psychology. A third category consists of natural and cultural sciences with recognized social implications : biology, geography, linguistics, and art.

Ralf Dahrendorf presented a more contemporary definition : "The sciences include economics, sociology (and anthropology) and political science. At their boundaries, the social sciences reach into the study of the individual (social psychology) and of nature (social biology, social geography). Methodologically, they straddle normative (law, social philosophy, political theory) and historical approaches (social history, economic history). In terms of university departments, the social sciences have split up into numerous are as of teaching and research including not only the central disciplines, but also such subjects as industrial relations, international relations, busines studies, and social (public) administration."

Indian Council of Social Science Research (ICSSR) has included the following disciplines for supporting Social Science research : Economics (including Commerce), Management (including Business Administration) Political Science (including International Relations), Psychology, Public

Administration, Education and Sociology (including Criminology and Social Work). The ICSSR holds up proposals on Social Science aspects of the disciplines of Anthropology, Geography, History, Law, Library and Information Science and Linguistics, and the like.

Although reference book editors continue to include different disciplines and fields of study within their definitions of the Social Sciences, the importance of trying to reach a consensus about which disciplines are or are not included seems inconsequential next to theoretical approaches, applications and methodology, and the social dimensions and implications of a vast array of other disciplines, from genetics to spatial engineering. Adam Kuper and Jessica Kuper have noted in **Social Science Encyclopaedia** (p. VII) that "[m]any fields have moved on from the preoccupations of the 1980s." It no longer seems as crucial to establish whether business, philosophy, or demography are indeed Social Sciences as it is to examine new or freshly approached fields of study such as post-modernism, subcultures, sex and gender, environmental and resource economics, media studies, and cultural studies.

5.2.1 Indian Council of Social Science Research (ICSSR)

ICSSR was established in the year 1969 by the Government of India to promote research in Social Sciences in the country. The Council was meant to :

Review the progress of Social Science research and give advice to its users,

Sponsor Social Science research programmes and projects and administer grants to institutions and individuals for research in Social Sciences;

Institute and administer scholarships and fellowships for research in Social Sciences;

Indicate areas in which Social Science research is to be promoted and adopt special measures for development of research in neglected or new areas;

Give financial support to institutions, associations, and journals engaged in Social Science research;

Arrange for technical training in research methodology and to provide guidance for research;

Co-ordinate research activities and encourage programmes for interdisciplinary research;

Develop and support centres for documentation services and supply of data;

Organise, sponsor, and finance seminars, workshops and study groups;

Undertake publication and assist publication of journals and books in Social Sciences.

Advise the Government of India on all matters pertaining to Social Science research as may be referred to it from time to time; and take such measures generally as may be necessary from time to time to promote Social Science research and its utilisation.

To fulfil the aforesaid objectives, a National Documentation Centre on Social Sciences (NASSDOC) was set up by ICSSR. ICSSR has under its control 27 research institutions with libraries spread all over India. It has been bringing out a large number of publications from time to time. As a result, ICSSR has become a rich source of information on Social Sciences in India.

Regional Centres Programmes

Regional Centres have been established as a part of ICSSR's programme for decentralising administration and broad basing Social Science research in the regions. Their main roles were defined as follows :

To represent the ICSSR and conduct its programmes in the region; bring the ideas and problems of the social scientists of the region to the notice of the ICSSR for possible action; serve as a link between the social scientists of the region and the national and international community of the social scientists.

The ICSSR has six Regional Centres. Their location and coverage is as follows :

Eastern Regional Centre, Kolkata, covering Bihar, Orissa, West Bengal and Jharkhand, and the Union Territory of Andaman and Nicobar Islands.

North – Eastern Regional Centre, Shillong, covering Arunachal Pradesh, Assam, Manipur, pripura, Meghalaya, Mizoram, Nagaland and Sikkim.

North – Western Regional Centre, Chandigarh, covering Haryana, Himachal Pradesh, Jammu and Kashmir, Punjab and the Union Territory of Chandigarh.

North Regional Centre, New Delhi, covering Delhi, Madhya Pradesh, Rajasthan, Uttar Pradesh, Chattisgarh and Uttaranchal.

Southern Regional Centre, Hyderabad, covering Andhra Pradesh, Karnataka, Kerala, Tamil Nadu and the Union Terrotories of Lakshadweep and Pondicherry.

Western Regional Centre, Mumbai, covering Gujarat, Maharashtra, Goa and the Union Territories of Daman and Diu, Dadra and Nagar Haveli.

The Regional Centres have been undertaking the following activities :

Promoting documentation and bibliographical work in the regional languages;

Organizing seminars/ workshops/ conferences in the region; Organizing lectures by the distinguished scholars, Assisting regional professional associations of social scientists and Social Science journals in the regional languages; Providing accommodation at a reasonable rate (wherever possible) to the scholars/students visiting the place for library or fieldwork;

Awarding study grants to scholars for visiting libraries and institutions;

Providing photocopying facilities to scholars, especially providing photocopies of selected articles from journals etc. Regional Centres have developed infrastructure and research support facilities over the years with the funds provided by the ICSSR and the state Governments. These include hostel/guest houses facilities, additional library space, conference hall, seminar rooms and reprographic facilities; Any other activity which may promote Social Science research in the region and/or which may be delegated by the ICSSR.

Grants-in-aid Schemes

The third category of programmes relates to ICSSR assisted projects which include preparation of indices and bibliographies, provision of grants to libraries and provision of assistance to scholars for visiting research libraries.

Information Dissemination

Information is mainly disseminated by NASSDOC through the state-the-art reports, abstrating journals, and NASSDOC serials and adhoc publications.

Publications

ICSSR has been publishing the following abstracting journals :

1. ICSSR Journal of Abstracts & Reviews : Economics, Quarterly
2. ICSSR Journal of Abstracts & Reviews : Geography; Semi Annual
3. ICSSR Journal of Abstracts & Reviews : Political Science; Semi Annual
4. ICSSR Journal of Abstracts & Reviews : Sociology and Social Anthropology, Semi Annual
5. Indian Psychological Abstracts, Quarterly

6. Indian Dissertation Abstracts and Reviews, Quarterly
7. ICSSR Research Abstracts, Quarterly

Directory of Social Science Institutions and Organisations, compiled and edited by Prem Lata, New Delhi, NASSDOC, 1992.

Research scholars residing /studying in West Bengal, Bihar, Jharkhand, Orissa and the Union Territory of Andaman and Nicobar Islands may send their applications under Study Grant to Hony. Director

ICSSR Eastern Regional Centre
R-1 Baisnabghata Patuli Township
Kolkata - 700 094

5.2.2 Other Social Science Organisations

5.2.2.1 Gokhale Institute of Politics & Economics (GIPE)

The GIPE founded in 1930 is one of the oldest institutions for economics teaching and research in India. Though mainly a research institute, from its inception the M.A. and Ph.D. degrees offered by GIPE were recognised by the University of Bombay. With the establishment of the University of Poona (1949), GIPE became a constituent recognised institution of that University. In 1962, recognizing its contribution to research in agricultural economics, the University Grants Commission selected the Institute as a Centre of Advanced Study in Agricultural Economics. The scope was broadened two years later when the UGC declared GIPE as a centre of Advanced Study in Economics. In 1993, The Government of India declared GIPE as "Deemed to be a University".

The Institute is located in the premises of the Servants of India Society, established in 1905 by the great Indian nationalist leader Gopal Krishna Gokhale (1866-1915). The Gokhale Institute was established in 1930, incorporating the Servants of India Society Library. The Library has a rich collection with the focus on an interdisciplinary approach to the subject.

5.2.2.2 Election Commission of India

The Election Commission of India is a permanent Constitutional Body. The Election Commission was established in accordance with the Constitution on 25th January 1950. Elections are conducted according to the constitutional provisions, supplemented by laws by Parliament. The major laws are Representation of the People Act, 1950, which mainly deals with the

preparation and revision of electoral rolls, the Representation of the People Act, 1951 which deals, in detail, with all aspects of conduct of elections and post election disputes.

The Commission has a comprehensive policy for the media. It holds regular briefings for the mass media-print and electronic, on a regular basis, at close intervals during the election period and on specific occasions as necessary on other occasions. The representaties of the media are also provided facilities to report on actual conduct of poll and counting. They are allowed entry into polling stations and counting centres on the basis of authority letters issued by the Commission. They include members of both international and national media. The Commission also publishes statistical reports and other documents which are available in the public domain. The library of the Commission is available for research and study to members of the academic fraternity; media represntatives and anybody else interested. The Commission has, in cooperation with the state owned media-Doordarshan and All India Radio, taken up a major campaign for awareness of voter.

5.2.2.3 Registrar General of Census of India

India is one of the very few countries in the world, which has the proud history of holding census every ten years uninterruptedly since 1872. Census operation is conducted in two phases : Houselisting Operation, and the Population Enumeration. The data generated by the Census of India 2001 provide benchmark statistics on the people of India at the beginning of the new millennium. This is to mirror a fair representation of the socio-economic and demographic conditions of our people which constitutes about one-sixth of the human population on this planet. The census statistics will be used for assessing the impact of the developmental programmes and identify new thrust areas for focusing the efforts on improving the quality of life in our country. The objective of the Houselisting Operations is to give a fair idea of 'where and how people live?' This is useful in Social Sciences.

5.2.2.4 Central Statistical Organisation (CSO)

The CSO is located in Delhi. It is responsible for co-ordination of statistical activities in the country, and evolving and maintaining statistical standards. Its activities include National Income Accounting, Conduct of Annual Survey of Industries, Economic Censuses and its follow up surveys, compilation of

Index of Industrial Production, as well as Consumer Price Indices for Urban Non-Manual Employees, Human Development Statistics, Gender Statistics, Five Year Plan work relating to Development of Statistics in the states and Union Territories; Dissemination of statistical information, work relating to trade, energy, construction, and environment statistics, revision of National Industrial Classification, etc. Some portions of Industrial Statistics work pertaining to Annual Survey of industries is carried out in Kolkata. All data generated from these activities are indispensable for Social Science research.

5.2.2.5 Indian Institute of Public Administration

Established in March 1959, the main objectives of the Institute are :

1. To promote and provide for the study of public administration and economics and political science with special reference to public administration and the machinery of government and for educational purposes incidental thereto;
2. To undertake, organise and facilitate study courses, conferences and lectures and research in matters relating to public administration and the machinery of Government;
3. To undertake and provide for the publication of a journal and of research papers and books to impart training in and promote study of public administration;
4. To establish and maintain library and information services to facilitate the study of public administration and spreading information thereto.

Against the above backdrop, the library was established in 1959. It publishes a journal namely "Indian Journal of Public Administration". From the very beginning, emphasis has been placed on the provision of documentation and information services to keep the faculty, staff members and others abreast of current developments in the field of public administration. The services provided include : current awareness services, reference and referral services, reprographic services and interlibrary services.

Current Awareness Services : Current Awareness Services are provided by bringing out list of additions, documentation services, press clipping service and IIPA Recent Accession" issued monthly. The entries are arranged in classified sequence supported by an author and subject indices.

Documentation in Public Administration is a quarterly service issued since 1972. It supersedes "Public Administration Abstracts and Index of Articles" which was published from 1956 to 1972.

Press Clipping Service : 13 newspapers are scanned to identify items of interest to the activities of the Institute. About 4000 clippings are added annually. This service is supplemented by the issue of "News Index" for limited internal circulation. This service commenced in 1982.

Literature Search and Bibliographic Service : Over 500 bibliographies on a variety of topics relevant to public administration are available. Many are the results of requests made by the faculty and members of the Institute.

Reprography Service : Photocopies of the original articles are supplied conforming to copyright declarations.

Reference and Referral Services : Reference queries, averaging 2000 per year are attended to. They include from simple identifying of bibliographic details to lengthy literature searches leading to comprehensive bibliographies.

5.2.2.6 National Council of Applied Economic Research (NCAER)

The NCAER was set up in 1956. It is a national institution that undertakes significant research which has relevance to the country's economic development. Its library is nerve centre. The holdings of the library stand at 55,000 which consist of books, periodicals, maps, annual reports, statistical publications and microforms.

The library subscribes to more than 600 current periodicals received through subscriptions, exchange and gifts. It has a collection of 7800 bound volumes of back issues of Social Science periodicals with emphasis on economic and development sciences. Maps and atlas form an important collection. These include road maps, irrigation maps. The library is very rich in its collection of statistical publications originated in Central Government, State Governments and other Central organisations like Central Statistical Organisation, Directorate of Economics and Statistics, Directorate General of Commercial Intelligence and Statistics, Census Commissions, etc. The main publications subscribed in this category include "Statistical Abstracts", "Annual Survey of Industries", "National Accounts Statistics", "Statistics of Foreign Trade of India", "Season and Crop Report", "Bulletin of Food Statistics", "Agricultural Wages in India", "Indian Labour Yearbook", "Five Year Plan Documents", and "Budget Papers". The library has a substantial collection of United Nations publications. There are about 500 research reports in the collection.

The successful application of MINISIS has resulted in the outcome of

"Artha Suchi", as quarterly computerised index to Government reports, journal articles and newspapers write-ups in the field of economics being received in the library.

5.2.2.7 National Council of Educational Research and Training, (NCERT) New Delhi

The National Council of Educational Research and Training was set up in 1961 by merging a number of specialised institutions. The NCERT is an autonmous organisation registered under the Societies Registration Act (1960). The objectives of NCERT are to work for upgrading the quality of school education in the country by assisting and advising the Ministry of Human Resource Development in the implementation of its policies and major programmes in the field of education, particularly school education. For the realisation of the above objectives, the Council undertakes the following programmes and activities :

1. Conducts, aids, promotes and coordinates research in all branches of school education;
2. Organises pre-service and in-service training mainly at an advanced level;
3. Organises extension services for institutions, organisations and agencies engaged in educational reconstruction;
4. Develops and experiments with improved educational techniques, practices and innovations;
5. Collects, compiles, processes and disseminates educational information;
6. Assists the states and state level institutions, organisations, and agencies in developing and implementing programmes for qualitative improvement of school education;
7. Collaborates with UNESCO, UNICEF, etc.
8. Extends facilities for training and study to educational personnel from other countries;
9. Serves as the academic Secretariat of the National Council of Teacher Education.

NCERT consists of the National Institute of Education (NIE), Central Institute of Educational Technology (CIET), for Regional Colleges of Education and 17 field units all over India. The NIE consists of 14 departments and the Department of Library, Documentation and Information is one of them.

The Department of Library, Documentation and Information (DLDI) was set up in its present form in 1967.

Objectives of DLDI

1. To promote research and study atmosphere;
2. To collect, organise and disseminate its resources for all categories of its members;
3. To provide all kinds of current awareness and documentation services and develop research mindedness for members of NCERT community, all educationists and researchers in the field of education;
4. To provide documentation and information support to the programmes of NCERT;
5. To provide reading material to the staff members of NCERT for information, recreation and inspiration;
6. To provide general information support to academic and and educational administrators, planners, teachers and teacher educators;
7. To act as a clearing house for educational information with an objective to become a National Information Centre for Education and develop a network linkage with other states;
8. To coordinate the library services in the NIE and libraries of RCES and others.

The DLDI specialises in documents on education and its allied disciplines, which includes books, reports, serials, pamphlets, charts, maps, microfilms, etc. To meet the needs of the faculty members, researches and other members, it has introduced circulation services, documentation services, reprographic services and the like. It brings out an abstracting service, current contents lists regularly.

5.2.2.8 The Institute for Studies in Industrial Development (ISID)

The ISID is a national-level public funded research and educational institution affiliated to the Indian Council of Social Science Research, Ministry of Human Resource Development, Government of India. The objectives of the ISID include:

- to undertake, promote, and coordinate research in the area of industrial development, with special emphasis on the problems of India and its relationship with other countries of the world; to build and maintain

research infrastracture and databases on the Indian economy in general and the industrial and corporate sectors, in particular,

- to provide a forum for exchange of views for understanding of the operations of socio-economic system in the framework of planned industrial development;
- to provide academic and professional training and guidance to agencies, institutions and scholars engaged in advanced study and research in the areas of industrial economics and related policy issues;
- to organise and conduct programmes of Refersher Courses and Summer Schools for academics, civil servants and others with a view to improving the quality of teaching and policy planning, implementation and research; and
- to develop close working relations in teaching and research in the area of interest of the Institute with Universities and Colleges, Governments (Central and State) and public bodies; societies and associations which are organised to pursue similar objectives.

The ISID has taken the lead in making available its working papers so that interested scholars can download them for free. The National Informatics Centre (NIC) has provided the ISID with Internet connectivity through high speed RF link. The University Grants Commission (UGC) has provided support to enable free access based in Indian Universities and academic institutions to the ISID On-line Data Bases for index to 100 Social Science journals and newspaper clippings.

On 5th March, 1999 the University Grants Commission signed an agreement with the Institute for Studies in Industrial Developments, New Delhi, to provide free access of ISID databases to teachers and researchers in universities and colleges. The database provides the 'missing tool' in the armoury of researchers in Social Sciences. In addition to books, a basic requirement of all researchers and teachers is to identify relevant reading materials, articles in academic journals and current debates in the press. This requirement is met by availability of data/information on website.

An important component of the ISID research infrastructure is the On-line Index to Indian Social Science journals and Press Clippings files of national English dailies.

Publications

- ISID Index Series : Volume Two, Sixteen Economic Journals, a

joint publication of Institute for Studies in Industrial Development (ISID) and Indian Economic Association Trust for Research & Development, New Delhi, 1998.

- ISID Index Series : Forty Years of the Indian Journal of Labour Economics Index : 1958-1997, jointly published by ISID and the Indian Society of Labour Economics, New Delhi, 1998.

- ISID Index Series : Volume One (Economic and Political Weekly 1966-1996), a joint publication of ISID and Indian Economic Association Trust for Research & Development, New Delhi, 1996.

- Delhi Atlas, 2nd Edition, Institute for Studies in Industrial Development, New Delhi, 1996.

- Economic Liberalization and Indian Agriculture, ISID, 1994.

- India's Trade Policy and the Export Performance of Industry, Pitou Van Dijke and Rao K.S. Chalapati, Sage Publications, New Delhi, 1994.

- Delhi Atlas : Colony and Area Maps, Institute for Studies in Industrial Development, 1993.

- Political Economy of India, Chandra Shekhar, Vikas, 1992.

- Patterns in Indian Agricultural Development : A District Level Study, ISID, New Delhi, 1989.

- Monopoly Capital and Public Policy, S. K. Goyal, Allied Publishers, Delhi, 1979.

5.2.2.9 The Indian Institute of Advanced Studies, Shimla

The Indian Institute of Advanced Studies was set up by the Ministry of Education, Government of India as a Society under the Societies Registration Act XXI of 1860, with effect from 6th October, 1964. The Institute started functioning at Shimla on 20th October, 1965 when it was formally inaugurated by the then President of India, Professor S. Radhakrishnan.

The Institute aims at free and creative enquiry into the fundamental themes and problems of life and thought. It is a residental centre for research and encourages promotion of creative thought in areas which have deep human significance, and provides an environment suitable for academic research, patricularly in selected subjects in the Humanities, Indian Culture, Comparative Religion, Social and Natural Sciences and such other areas as the Institute may, from time to time, decide. The Institute provides facilities for advanced consultations and collaboration besides library and documentation facilities.

Library : The Institute has a well-developed Library. It has grown into a most prestigious one in the country through tremendous efforts put into its making by a number of dedicated individuals like Shri B.S. Kesavan, then Director of INSDOC, New Delhi. The library's collection was enriched by acquiring the private collections of eminent scholars and organisations like the British Council, the Asia Foundation and League of Arab Nation's generous gifts of hundreds of rare pamphlets and books. Later, the library obtained rare Sanskrit, Arabic and Persian texts and manuscripts containing miniature paintings.

The Library has built up a collection of about 2.0 lakh volumes of books including around 45,000 back volumes of journals, microfilms, and other documents. The collection of the back volumes of the journals includes many reputed titles like Analysis, Journal of the Asiatic Society of Bengal, Journal of the Bihar and Orissa Research Society, Journal of the American Oriental Society, Journal of Ganganath Jha Research Institute, Mind and numerous other titles. The collection consists of both primary as wall as secondary resources covering both the broad subject areas of research in Social Sciences and Humanities as well as highly advanced areas of interdisciplinary research like Science and consciousness. Working of Mind, various faces of Ancient Indian History, Culture and Civilization, Postmodernism, Theoretical and Cultural Studies pertaining to Philosophy, Religion, Political Science and Sociology, Gender and Environmental Studies, Socio-Economic Planning and Development, Gandhian Studies, Islamic Studies, Applied Mathematics and the like.

Currently, the main focus of the library has been on filling up major gaps in the collection in the areas of research relating to Central Asia, South Asia and Southeast Asia. During the couple of years, the Library has acquired almost all of the publications of more than 20 institutions specializing in Indological Studies.

Besides the main wing of the Library consisting of English language publications, the Library has developed the following separate wings :

(i) Wing Consisting of Hindi language publications;

(ii) Wing consisting of Sanskrit texts;

(iii) Wing consisting of publications in modern Indian Languages other than Hindi;

(iv) Professor R.C. Majumdar collection;

(v) Professor H. C. Roy Choudhuri collection;

(vi) Special collection of classics consisting of publications like Tibetan Tripitaka (168 vols) and the publication brought out under Loeb Classical Library series of Harvard University Press, Sacred Books of the East, Great Books of the Western World, etc.

(vii) Wings consisting of Arabic, Persian and Urdu manuscripts as well as printed publications.

The Library bring out a quarterly list of Additions containing bibliographic data of the books acquired during the preceding quarter. Besides, select bibliographies on the themes of the seminars are also being brought out by the Library.

Summerhill, an academic review Journal is published twice a year (June and December). The principal feature is a rich section of reviews of important recent publications in Humanities and Social Sciences. Articles by well known scholars and interviews with prominent intellectuals and artists add to the interest of the review for the general reader.

One of the urgent tasks that the Library plans to take up in the near future is the development of a virtual library consisting of full text databases of its rare and out of print collections. It also plans to include in the virtual library the full text of the publications brought out by the Institute.

5.2.2.10 Indian Council for Research On International Economic Relations (ICRIER)

The ICRIER is an autonomous non profit research organisation engaged in policy oriented research. It was established on August 18, 1981 with the objective of promoting research on issues which are central to India's international position and its economic exposure to the rest of the world. The process of integration with the world economy in terms of trade, technology and capital flows is gaining momentum. ICRIER provides dispassionate analysis of these trends and their implications for India. Over time, research at ICRIER has also focused on domestic economic issues as the line between domestic and international issues is getting blurred under the impact of globalisation.

In the changing domestic and international scenario, the work of ICRIER acquires renewed significance. It is proposed to strengthen the influence of ICRIER with new research initiatives for a programme of thematic research which focuses on specific themes, such as foreign trade and investment, financial sector reforms, competitiveness of Indian industry, WTO related

issues for Indian industry, WTO and agriculture, and regional economic cooperation. ICRIER also has many public policy workshops which bring together policy makers, academicians, Members of Parliament and the media where issues of major policy interest are discussed and debated. ICRIER invites distinguished scholars and policy makers from round the world to deliver public lectures on economic themes of interest to contemporary India. By providing these channels for information and wider debate, ICRIER acts as India's window to the world.

Research areas include Trade, Openness, Industrial Restructuring and Competitiveness, Financial Liberalisation and Financial Integration, Macroeconomic Management, World Trade Organisation (WTO) issues, South Asia Studies. ICRIER provides an active forum for public debate and discussion on national and international economic policy issues through a series of seminars. It also holds regular conferences on related topics.

Publications include **Policy Briefs, Newsletter, Working Papers, Workshop Proceedings, Public Lectures, Monographs, Books**

5.3 Information Sources in Social Sciences

Majority of information sources in Social Sciences were brought out in printed format only; which you have studied in BLIS Sourse. Here it is worth to note two Indian sources which are not current.

1. Sengupta, B : Indian Reference and Information Sources, Calcutta, World Press, 1981
2. Sharma, H.D. : An Annotated Guide to Indian Reference Material, Varanasi, Indian Bibliographic Centre, 1989, 2 Vols. Vol 2 contains Social Sciences.

   Sheehy, E. P. & ors : Guide to Reference Books, 10th ed., ALA, 1992 and Supplements.

   Walford, A. J. : Walford's Guide to Reference Materials, 7th ed., London, The Library Association, 1996-1998, 3 vols.

   Volume 1 : Science and Technology, 1996

   Volume 2 : Social and Historical Sciences, Philosophy and Religion, 1998.

   Volume 3 : Generalities, Languages, the Arts and Literature, 1998.

   Webb, William H and others eds : Sources of Information in the Social

Sciences : A Guide to the Literature, 3rd ed., Chicago, American Library Association. 1986.

The First (1964) and Second (1973) editions of this bibliographic guide under the editorship of Carl M. White have established it as a basic reference tool for reference/, information specialists and social scientists. The third edition is similar in its structure to the previous publication. It includes separate sections on the evolution of the Social Sciences, general social science reference sources, history, geography, economics and business administration, sociology, anthropology, psychology, education and political science. William H. Webb, the editor of this edition, correctly states that "this selection of disciplines is somewhat arbitrary, since linguistics, statistics and demography are often considered social sciences where history is frequently thought of as one of the humanities." (p.2). Each subject chapter reflects the subject and bibliographic structure of a particular discipline, and some cross-references illustrate the interdisciplinary nature of the Social Sciences. There is no comprehensive discussion of the role of Social Science databases in the context of the Social Science literature and its uses today. The information on bibliographic databases provided is rather limited.

Herron, Nancy L. (ed.); The Social Sciences : A Cross - Disciplinary Guide to Selected Sources, Englewood, Colo., Libraries Unlimited, 1989.

Here is a useful text/bibliography for the Social Sciences comparable to Blazek and Aversa's **The Humanities** (Libraries Unlimited, 1988). This collection of essays and bibliographies has separate chapters on the Social Sciences in general and the specific fields of anthropology, communications, economics and business, education, geography, history, law and legal issues, political science, psychology, sociology and statistics and demographies. A total of 790 predominantly English-language sources are listed, including computer databases. Additional access is provided by separate author, title and subject indices.

5.4 Information Systems and Projects

5.4.1 Development Science Information System (DEVSIS)

We can divide literature of economic and social development into three categories : articles in periodicals, commercially available books as monographs, and the less accessible, unpublished literature which is beyond

bibliographic control. This latter category accounts for almost 60 percent of the total volume of development literature and is made up of unpublished working papers, feasibility and pre-investment studies, theses, research reports, and documents of government and international organisations which are not widely disseminated.

DEVSIS is a mission-oriented information system, not a discipline-oriented one. It is sponsored by UNESCO, United Nations Development for Economics and Social Sciences, ILO, OECD, ITC, UNIDO, CLADES. The International Development Research Centre, Ottawa acts as its coordinator.

It is hospitable to information that is produced in the furtherance of development objectives. Any information that has been produced for development goals is admissible to the system irrespective of the disciplines on which it is based.

All those involved in social and economic development, especially those responsible for defining development policies and plans, and for taking decisions, are benefited by this system. The major users of this system can be policy-makers, planners, managers of development projects, researchers and teachers, communicators and personnel connected with information analysis. The essential care of information is the material generated by the development community itself. Other areas of knowledge covered by DEVSIS are facts and data regarding the socio-economic environment in which the development activities are carried out and information about activities in particular sectors of human endeavour such as agriculture, industry, transport, education, social welfare and public health education. The types of information included in DEVSIS are articles from periodicals, reports, maps and atlases, motion pictures, filmstrips, slides and other projection materials, records and sound recordings and computer readable data. Each item of information is classified not by subject, but rather by purpose in relation to the mission. The major topics to be covered, as categorized by purpose, are

A - Facts, trends and analyses;
B - Prescriptions for decision making;
C - Official policies, plans and programmes;
D - Development action and operational experience;
E - Consequences and evaluation;
F - Resources and tools for development

DEVSIS, being a decentralized system, relies on national participating centres for much of its input. The DEVSIS Central Unit is located at the

International Development Resource Centre (IDRC) in Ottawa, Canada. National participating centres identify and collect nationally produced publications, reports and documents which fall within the scope of DEVSIS.

Records retrieved from the participating centres enter the production cycle of The DEVSIS Central Unit to be merged with other inputs, to all DEVSIS users. The production cycle comprises registration and bibliographic control, correction and output production. Worksheets are scanned for completeness, and keyed on to a computer – readable medium paper tape or cassette. The computer builds a master file from each cycle from the records received. Computer checks are performed and an error list is produced from correction. The records are finally sequenced by category and geographic code as they are to appear in DEVINDEX, the final printed output and permanent record numbers which reflect this sequence, are assigned.

DEVINDEX, the essential printed product of DEVSIS, is a comprehensive bibliography brought out annually. The bibliographic list is accompanied by four indices – Subject Index, Geographic Index, Corporate Body Index and Personal Author Index.

5.4.2 Development Information Network for South Asia (DEVINSA)

On December 24, 1985 a mission-oriented database supported by IDRC, Canada came into being. This project will strengthen national and regional systems in Asia by developing a regional network for socio-economic information for South Asia, encompassing Sri Lanka, Pakistan, India, Nepal and Bangladesh. The Project created a computerised bibliographic database of selected published and unpublished socio-economic literature on South Asia produced within and outside the region; adopted DEVSIS – related standards and tools, adapted them as necessary to suit local requirements and trained DEVINSA personnel in their use; and provided a range of output products and services to planners, administrators, and researchers, etc.

During Phase I (1986-1989) of the project, DEVINSA established a regional network for sharing non-conventional literature on socio-economic issues among members of the committee on studies for cooperation in Development in South Asia. Reports, working papers, research studies, etc., previously unpublished or difficult to access were identified, selected, and stored in the DEVINSA database. The First Technical Policy Meeting was held at the Marga Institute, the network's coordinating centre, in June 1986. It was followed by a two-week DEVINSA Methodology Training Workshop

which dealt with technical issues on the processing of bibliographic records provided by the participating CSCD members. From 1987, DEVINSA started distributing a monthly bibliography and a half-yearly amalgamated abstract bibliography to its focal point institutions; 25 issues of 250 titles each were produced and disseminated during this phase. A National Users' Workshop, held in Colombo, Sri Lanka, on April 29, 1988 was attended by representatives of 15 libraries, potential users of the network. Despite several changes in leadership, the project met all its operational objectives in regional cooperation information networking. Support continued in a second phase.

5.4.3 Asia-Pacific Information Network in Social Sciences (APINESS)

The APINESS programme was established under UNESCO in 1986. Its aim was to coordinate activities relating to the compilation and dissemination of information in the Social Sciences in Asia and the Pacific. Experts in the Social Science field and on information pertaining to Social Sciences, meet every year to discuss progress taking place in their respective countries. Each member country appoints an institution as the National Contact Point for the Country. An Officer from the National Contact Point is appointed to represent the country as the National Liaison Officer. It has seventeen national members.

The National Library of Malaysia was appointed as the National Contact Point for Malaysia since 1986. The liaison officer appointed at that time was the Director of the Support Services of the National Library and later it was taken over by the Director of the Development Division. The liaison officer had attended some of the APINESS Regional Advisory Group "(RAG) Meetings". However, in 1998, no such meeting was held. Instead, this year was devoted to gathering information on the status of the Social Science activities in the respective member countries.

APINESS was set up to break "information isolation" within the region.

Objectives

APINESS aims to stimulate, guide and render catalytic support to its member countries in :

- Advice on Social Science information;
- Referral to other institutions;
- Preparation of information products.

Structure

1. RAG (Regional Advisory Group) reviews the operation of the network and confirms action programmes. It meets every 2 years. The secretariat is at UNESCO RUSHAP in Bangkok.
2. NAG (National Advisory Group) advises NCP. It meets two times a year.
3. NCP (National Contact Point) deals with information systems, services and activities at the national and international levels. Each country has one NCP.
4. PC (Participation Centre) mobilizes resources and takes action to carry out APINESS's projects.

Activities

1. Workshops and training
- "Exchange of Bibliographical data (1992, India)
- "Computerised Documentation" (1993, Bangladesh)
2. Participation in INFOYOUTH and other UNESCO projects.
3. Publishing APINESS Newsletter reporting major Social Science information activities from the region. In India it is brought out from NASSDOC.

Benefits from APINESS

1. Computerization of library and information management services;
2. Pilot projects on specialised information system and services;
3. National information policies and standards;
4. Innovative approaches to education and training of library and information personnel;
5. Document delivery systems and services;
6. Communication and information exchange;
7. Providing information to other countries in APINESS and APINESS Secretariat.

5.4.4 National Social Sciences Documentation Centre (NASSDOC)

The National Social Sciences Documentation Centre, renamed so in 1985, was created in 1970 by the Indian Council for Social Science Research, New Delhi. It serves the information needs of social scientists in India. It has been playing

an active role by building up a comprehensive collection of different categories of documents such as doctoral dissertation; serial publications; abstracting, reprogrphy and translation services; compilation of union catalogues; conducting professional training courses under continuing education programme; and providing financial assistance to documentation and bibliographical projects. The publications of NASSDOC include **Union List of Social Science Periodicals** – four volumes covering periodicals available in Delhi, Bombay, Karnataka and Andhra Pradesh; **Union Catalogue of Social Science Serials**, 32 volumes giving location of about 32,000 Serials in 550 libraries, with a separate volume on National Library, Kolkata; **Union Catalogue of Newspapers in Delhi Libraries; Mahatma Gandhi Bibliography** compiled in English and various Indian languages; **Indian Education Index, Directory of Social Science Research Institutions; Directory of Professional Organisation in India**; and **the Retrospective Cumulative of Indian Social Science Journals**.

Its current awareness publications include **Acquisition Update** (monthly); **Current Contents of Indian Social Science Journals** (Quarterly, 1989); **Conference Alert** (Quarterly, 1986); **Indian Diary of Events** (Quarterly); **Social Science News; Index to Select Newspapers in English** (monthly); and **Samajik Vigyan Samachar** (Monthly, Hindi).

NASSDOC has a good library with a collection of reference books on Social Sciences and of monographs on Research Methodology, Women's Studies and similar others. It has been actively participating in UNESCO's APINESS programme since its inception.

5.4.5 Others

5.4.5.1 SNDT Women's University Documentation Centre

SNDT Women's University was set up in 1916 by the social reformer, Dhondo Keshav Karve who believed the only instrument for making women self-sufficient, self confident and self-reliant. Drawing inspiration from the University at Tokyo, Maharshi Karve began by admitting five students in the first College of the Indian Women, Pune. Impressed with the Maharshi's bold venture, Sir Vithaldas Thackersey, an eminent industrialist of Bombay, offered a donation to the University which was renamed Shreemati Nathibai Damodar Thackersey University in memory of Sir Vithaldas's mother. In 1931, the University established its first college in Bombay. Headquarters of the University shifted from Pune to Bombay. In 1949, the Government of

independent India accorded recognition to the University.

The University has grown steadily and now has 11 undergraduate and professional colleges and 33 departments at three campus sites. In addition, there are 68 affiliated colleges scattered over the states of Maharashtra. The University offers diplomas to doctoral level courses in subjects as varied as Arts, Social Sciences, Community Education, Nursing, Computer Science, Pharmacy, etc. Several of its courses and the research centres of Women's Studies are acknowledged among the best in the country.

The University was the first in the state of Maharashtra to be accredited by the National Assessment and Accredition Centre and received a 5 star grading.

The University has, over the decades, conscientiously reviewed, re-examined and redefined its role changing social contexts. Today, the University has set for itself the following goals :

1. To provide access to higher education to women who have limited or poor opportunities;
2. To develop among women a positive self concept, and awareness of women's issues and rights;
3. To provide for vocational competencies in as many students as possible;
4. To provide for professional courses at entry, middle and senior levels and thus satisfy market needs, employment capabilities among women;
5. To achieve excellence in scholarship and research in both traditional disciplines and professional

SNDT Women's University Library was set up in 1955. Today the library has grown into a system with more than thousand volumes and a range of user-oriented services. The collection is a mix of paper and electronic resource, electronic services complementing traditional ones to increase access to information for the University Community, Internet and CD-ROM searching and SULOC– the University's Online Catalogue. As a part of its services the publications include – Current Awareness Bulletin, List of New Additions, INFOALERT and CONTENT ALERT to keep its members abreast of new developments. Thus the library which was started as a small information cell was developed into a full-fledged Documentation Centre in 1982.

SNDT Women's University Library and Documentation Centre exists to support the teaching, research and extension activities of the University students, faculty and staff, information and documentary resources and services, relevant to their needs. The Library has also since 1986, managed

the National Information Centre in Women's Studies, Sociology, Special Education, Library and Information Science and Gujrati established by the University Grants Commission.

5.4.5.2 The Centre for Women's Development Studies (CWDS), New Delhi

The CWDS was founded in 1980 by a group of scholars and activists transforming accepted notions of gender-related action and Social Science research. The CWDS actively promotes advocacy and policy interventions. Through its research action, documentation networking over the last decades, the Centre has engaged in critical analysis of trends and issues in Women's Studies in order to develop, promote and disseminate knowledge about women's roles in society and economic trend in women's lives and status. CWDS :

- Undertakes, promotes and coordinates both fundamental and applied research on women;
- Organises and assists training programmes for scholars; planners, administrators, development age of members of women's organisations cooperatives, etc;
- Promotes and collaborates with academic institutions, grassroot level organisations and individual's activities;
- Provides advisory and consultancy services on allied issues to institutions and organisations, within Government, including development agencies and cooperatives;
- Develops and promotes (in collaboration with other agencies) educational training and action programme especially for under-priviledged women;
- Undertakes activities that are consistent with the objectives of CWDS and helps to bring about attitude changes for effective participation of women from all levels of society.

CWDS Library holdings include books and monographs, conference papers/reports/periodicals, newsletters, bulletins, annual reports, brochure and pamphlets, also memoranda and women's groups.

Currently the Library maintains five databases : Mahila, the main database; Article database, containing articles and indexed news items; Chitra-audio-visual material database; NGO database, covering profile of organisations and other NGO's and the Periodicals database of journals, etc. received in the Library.

In addition, the Library also provides a number of regular information services which include the monthly Current Bulletin, the Library Reading List Series, a listing of current contents of periodicals and analytical alert service users about the contents of edited volumes received by the Library. Also, the Library prepares thematic bibliographic issues. Three bibliographies were prepared by the Library since 1998, namely :

1. Gender and Democracy at the Grassroots : A Bibliographic Compilation on Women,
2. Gender and the Reservation Debate : A Bibliographic Compilation
3. Poverty Development and Change : An Annotated Bibliography,

Keeping in view the importance of networking the Library has been involved with various networks of information sharing. The two most important of these associations are the membership of Delhi Library Network (DELNET), electronic gateway to development information, a web hosting service and a discussion forum.

5.4.5.3 National Social Science Information Centre (NASSIC), Baroda

This is a UGC sponsored national project, established in 1989 at the Maharaja Sayajirao University of Baroda. It started functioning from 1991. The object is to cater to the needs of students, researchers and academiciand in the Universities and colleges all over the country.

Scope : Economics, Education, Psychology, Political Science and inter/ multi disciplinary subjects.

Objectives : To carry out literature search in the above-mentioned disciplines.

To screen, catalogue and classify and provide keywords for each and every article published in prestigious journals in these disciplines.

To get the articles from periodicals ready for processing, storage, retrieval and dissemination with the help of computers.

To process reports, conference papers, theses, dissertations, etc. in order to ascertain a complete coverage of literature published in the specific disciplines.

To publish in the form of CAS, the current list of articles, books, theses, dissertations giving specific information for the research topics under study.

It publishes **Information Today**, a record of indices to the articles and editorials in the various newspapers and a quarterly Journal **NASSIC Alert**.

Service on the above-mentioned subjects. It also lists names of journals included, new publications, grants for academic activities, NASSIC services, etc.

5.5 Summary

Here we have discussed the definition of Social Sciences. We have highlighted important information sources and centres in the field of Social Sciences. We have dealt with different subjects in Social Sciences. We have described important national and international information systems and services in Social Sciences.

Activities of APINESS and NASSDOC have been discussed in details. Finally, important information centres, for example, SNDT Women's University Documentation Centre, the Centre for Women's Development Studies have been brought to notice.

5.6 Exercise

1. What are the major activities of SNDT Women's University Documentation Centre?
2. What is APINESS? What are its main constituents? Discuss the main functions and activities of NCP.
3. Describe the documents covered by DEVSIS. Discuss how the various items of information are arranged in its database.
4. Emunerate at least ten organisations which generate information for social scientists.
5. List the publications of ICSSR.
6. List the products of NASSDOC.

5.7 References and Further Reading

1. Gupta, B.M. and Jain, V. K. (eds.) Handbook of Libraries, Archives and Information Centres in India. V8, Delhi, Aditya Prakashan, 1990
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3. Webb, William H and others : Sources of Information in the Social Sciences : A Guide to the Literature, Chicago, American Library Association, 1986.

Unit 6 ❑ Science and Technology

Structure

6.0 Objectives
6.1 Introduction
6.2 Information Systems in India
6.2.1 Information Systems under S & T Departments
6.2.2 Information Systems under other organisations of the Government of India
6.3 Information Systems Sources under the State Government
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6.5 Summary
6.6 Exercise
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6.0 Objectives

This unit introduces the literature of science and technology in general. It discusses the primary, secondary and tertiary sources of information. It gives an overview of the S&T information systems in India. It highlights the objectives, structure, functions of major S&T information systems in India.

6.1 Introduction

According to Einstein 'the whole of Science is nothing more than a refinement of everyday thinking'. Karl Peerson, the founder of the twentieth century Science of Statistics, claimed that 'the unity of all science consists alone in its method, not in the material.' This method holds good for all the sciences, and the technologies also, and is of course widely applied in other disciplines. The implication for the literature of Science and Technology are so far reaching that it is essential for the librarian to grasp the elements of the method. As John Gray and Brian Perry have reminded us 'Science would not be science without scientific communication.' In this context it should be noted that the major portion of investment in science and technology is used for organising information centres and information systems. In fact, information requirements

in the R & D activities would be much more than in any other activity.

The original reports of scientific and technical investigations make up the bulk of what is known as the primary literature. They represent new knowledge (or at least new interpretations of old knowledge) and constitute the latest available information. They are published in a variety of forms : periodicals, pesearch reports, conference proceedings, reports of scientific exudations, official publications, patents, standards, trade literature, theses and dissertation.

Many of course remain unpublished, and outside the mainstream of scientific progress and often consulted for their historical interest. For example, laboratory notebooks, diaries, memoranda, etc.; internal research reports, minutes of meetings, company files, etc.; correspondence, personal files, etc.

There are secondary sources which are compiled from the primary sources. They represent 'worked over' knowledge rather than new knowledge, and they organise the primary literature in more convenient form. By their nature they are more widely available than the primary sources, and in every cases more self-sufficient : periodicals (a number of these specialize in interpreting and commenting on developments reported in the primary literature); indexing and abstracting services; reviews of progress, reference books, Treaties; Monographes; and textbooks. They serve not only as repositories of digested facts, but as bibliographical keys to the primary sources.

There are tertiary sources which are to aid the researcher in using the primary and secondary sources. For example, Directories and yearbooks; Bibliographies; Guides to the literature; Lists of research in progress; Guides to sources of information; and Guides to organisations. 'Paperless sources' form a substantial part of the communication system in some disciplines within science and technology. These may be formal and informal. Formal sources are Government departments, central and state; research organisations; learned and professional societies; industry, private and public; universities and colleges; and consultants. Informal sources include discussion with colleagues; 'corridor meetings' at conferences; casual conversations, social gatherings; and telephone calls.

It is worth to note that among the well-organised and effective library systems, library and information systems in any country, majority are in the S & T sector, particularly in the research and development institutions. Since

the R & D activity in the science and technology fields is organised on departmental lines, we shall discuss them in that way.

6.2 S & T Information Systems/ Sources in India

We discuss here the systems under S & T departments of the Central Government. A good number of information systems function under various autonomous organisations.

6.2.1 (a) Department of Agricultural Research and Education (DARE)

(i) Indian Council of Agricultural Research, Delhi (ICAR)

The Minister of Agriculture is the President of the ICAR. Its principal officer is the Director-General. He is also the Secretary to the Government of India in the Department of Agricultural Research and Education (DARE). The General Body, the supreme authority of the ICAR, is headed by the Minister of Agriculture, Government of India. Its members include the Minister of Agriculture, Animal Husbandry and Fisheries and senior officers of the various state Governments, representatives of the parliament, the agro-industries, scientific organisations, and farmers.

Governing Body is the Chief Executive and decision making authority of the ICAR.

ICAR acts as a repository of information and provides consultancy on agriculture, horticulture, resource management, animal sciences, agricultural engineering, fisheries, agricultural extension, agricultural education, home science and agricultural communication. It has the mandate to coordinate agricultural research and development programmes and develop linkages at national and international levels with related organisations to enhance the quality of life of the farming community. ICAR has established various research centres in order to meet the agricultural research and education needs of the country. It is actively pursuing the human resource development in the field of agricultural sciences by setting up numerous agricultural universities spanning the entire country. The Technology Intervention Programmes also form an intergral part of ICAR's agenda which establishes **Krishi Vigyan Kendras** (KVKs) responsible for training, research and demonstration of improved technologies.

The Council launched a National Agricultural Research Project (NARP)

in January 1979 with assistance of World Bank to strengthen the research capabilities of the agricultural universities. During the project's operation up to June 1996, 343 research centres comprising zonal stations and sub-stations have been established and strengthened under the control of the state agricultural universities. The scientists have established income generating technologies for the farmers of 120 agro-climatic zones covering the entire country. A strong Agricultural Research Information System is being established connecting all the ICAR institutes, state agricultural universities and their zonal research centres.

(ii) Agricultural Research Information Centre (ARIC) is responsible for collecting, processing and disseminating information in the science and technology of agriculture generated in India. It acts as a national input centre for AGRIS (International System for Agricultural Sciences).

The Directorate of Information and Publications of Agriculture is the window of the ICAR through which the research and other activities are revealed to the world. It brings out a variety of publications in English, Hindi and regional languages for the use of scientists, researchers, students, policy planners, extensional personnel, farmers and the general public. I– research journals, popular magazines, scientific monographs, technical and popular books, handbooks, low-priced books, bulletins, reports, proceedings of conferences and varieties of miscellaneous titles are brought out by it regularly, along with certain special publications from time to time.

(b) Department of Atomic Energy (DAE)

A premier multidisciplinary Nuclear Research Centre of India having excellent infrastructure for advanced Research and Development with expertise covering the entire spectrum of Nuclear Science and Engineering and related areas. Dr. Bhabha approached Sir Dorabji Tata for starting nuclear research in India leading to the establishment of Tata Institute of Fundamental Research (TIFR), Mumbai, which was inaugurated on December 19, 1945. Atomic Energy Act was passed on April 15, 1948. Atomic Energy Commission was constituted on August 10, 1948 in order to intersify the studies related to the exploitation of nuclear energy for the benefit of the nation.

The Atomic Energy Establishment, Trombay (AEET) was formally dedicated to the nation by the then Prime Minister, Pt. Jawaharlal Nehru on January 20, 1957. Later, Prime Minister Indira Gandhi renamed AEET as Bhabha Atomic Research Centre (BARC) on January 12, 1967 as a fitting

tribute to Dr. Homi Bhabha who died in an air crash on January 24, 1966. The library of the Centre is the one of the largest libraries in the country. It receives more than 1700 current periodicals. The library is fully automated and maintains a database of all the books acquired. BARC provides input to the International Atomic Energy Agency (IAEA), Vienna and receives regularly monthly magnetic tapes from IAEA containing monthly additions to the INIS database. The L & IS Division brings out BARC Newsletter (monthly), BARC Highlights and some ad hoc publications.

TIFR library participates in resource sharing programme with various libraries of Mumbai and other places of the country through inter-library loans.

(c) Department of Biotechnology (DBT)

The setting up of a separate Department of Biotechnology (DBT), under the Ministry of Science and Technology in 1986 gave a new impetus to the development of the field of modern biology and biotechnology in India. In more than a decade of its existence, the Department has promoted and accelerated the pace of development of biotechnology in the country. Through several R & D projects, demonstrations and creation of infrastructural facilities a clear visible impact of this field has been witnessed. The Department has made significant achievements in the growth and application of biotechnology in the broad areas of agriculture, health care, animal sciences, environment, and industry.

The impact of the biotechnology related development in agriculture, health care, environment and industry, has already been visible and the efforts are now culminating into products and processes. More than 5000 research publications, 4000 post-doctoral students, several technologies transferred to industries, and patterns filed including US patents, can be considered as a modest beginning. Department of Biotechnology has been interacting with more than 5,000 scientists per year in order to utilise the existing expertise of the universities and other national laboratories. A very strong peer reviewing and monitoring mechanism has been developed. There has been close interaction with the State Governments particularly through State S&T Councils for developing biotechnology application projects, demonstration of proven technologies, and training of human resources in states and union territories. Programmes with the states of Gujarat, Rajasthan, Madhya Pradesh, Orissa, West Bengal, Haryana, Punjab, Jammu & Kashmir,

Andhra Pradesh and Uttar Pradesh have been evolved. Biotechnology Application centres in Madhya Pradesh and West Bengal have already been started. In India, more than a decade of concerted effort in research and development in identified areas of modern biology and biotechnology have given rich dividends. The proven technologies at the laboratory level have been scaled up and demonstrated in the field. Patenting of innovations, technology transfer to industries and close interaction with there have given a new direction to biotechnology research. The Department deals with various programmes and R&D projects in different areas of biotechnology. For example, Human Resource Development; Bioinformatics; Infrastructure facilities; Basic Research; Agriculture - crop Biotechnology Biofertilizers; Biopesticides and crop management, Animal Biotechnology, Agriculture; Plant Biotechnology - Pant tissue culture bioprospecting and Molecular taxonomy, Biofuels, Medicinal and Aromatic plants; Medical Biotechnology – vaccines; Diagnostics, Drug Development; etc.

The Department publishes Annual Reports. DBT Newsletter; Applications & Proformal Biotechnology - A vision, Biotechnology - In pursuit of excellence and relevance for human kind.

(d) Department of Defence Research & Development (DDR & D)

The Ministry of Defence now consists of four Departments : namely, Department of Defence, Department of Defence Production, Department of Defence Research & Development and Department of Ex-Servicemen Welfare and also Finance Division. The Department of Defence Research and Development is dedicatedly working towards enhancing self-reliance in Defence Systems. The Department is working in various areas of military technology which include aeronautics, armaments, combat vehicles, electronics, instrumentation engineering systems, missiles, materials, naval systems, advanced computing, simulation and life sciences. The Department has the Defence Research & Development Organisation (DRDO) as the major component. The Department executes various research and development programmes/ projects through a network of 48 laboratories/ establishments. Aeronautical Development Agency (ADA), a society funded by the Department is engaged in the development of Light Combat Aircraft (LCA).

1. The Central information source is the Defence Scientific Information and Documentation Centre (DESIDOC). Formerly known as the Scientific Information Bureau (SIB) in R & D organisation of the Ministry of Defence,

it was formed in 1967 in Delhi to function as Scientific Information and Documentation Centre to cater to the information needs of R & D Headquarters and R & D establishments since 1970. The DESIDOC has been functioning in the DRDO of the Government of India as a central agency to collect scientific and technical information from various published and unpublished sources, process it in different usable forms and disseminate the same to about 48 DRDO laboratories and other establishments of the Ministry of Defence. The major activities of DESIDOC include : collection, processing and dissemination of information; literature searches; compilation of union catalogues of DRDO libraries; organisation of translation bank; training and consultancy; reprography and training.

DESIDOC is organising a military database covering statistical information on defence forces of many countries. It has set up an online access to international databases through DIALOG information services. It offers computer-based SDI service. It has a good range of reprography and audio-visual equipment and in-house printing facility. It organises frequently short-term training courses for DRDO information personnel.

The publications of DESIDOC include **Defence Science Journal** (Quarterly), **R & D Digest** (bi-monthly), **R & D Bulletin** (Quarterly), **Popular Science and Technology** (half-yearly), **Current Abstracts** (bi-monthly), and **DESIDOC Bulletin** (monthly).

2. Institute for Defence Studies & Analyses (IDSA)

Under the Ministry of Defence, this is an autonomous Institute. It has a good library consisting of books, periodicals and newspapers of various countries. It brings out **IDSA Journal** (Quarterly), **Strategic Digest** (Monthly), **Strategic Analysis** (Monthly) and **News Reviews** on various countries.

(e) Department of Electronics (DOE)

It has a library at its headquarters in New Delhi.
It operates a database on electronic industry.

(f) Department of Environment

The Department of Environment has been assigned the responsibility of improving the overall Environmental Quality of the country. It coordinates the Environmental Information System (ENVIS). The ENVIS is a decentralised system with its headquarters in New Delhi. Ten ENVIS Centres are located

at different places in the country. Ten ENVIS Centres are building up databases on different areas of environment such as energy and environment, occupational biodegradation of wastes, pollution control, toxic chemicals and so on.

The ENVIS focal point brings out Paryavaran Abstracts (Quarterly). The ENVIS centres are located in New Delhi (four centres), Lucknow, Visakhapatnam, Chennai, Bangalore, Bhopal and Ahmedabad.

(g) Ministry of Non-Conventional Energy Sources

Ministry of Non-conventional Energy Sources is renamed as Ministry of New and Renewable Energy as per Cabinet Secretariat notification.

"The importance of increasing use of renewable energy sources in the transition to a sustainable energy base was recognized in India in the early 1970s. During the past quarter century, a significant effort has gone into the development, trial and induction of a variety of renewable energy technologies for use in different sectors of the economy and sections of Society in India."

With a strong industrial base and successful commercialisation of technologies in wind, solar photovoltaics, solar thermal, small hydel, biogas and improved biomass stoves, India is in a position today to offer 'state-of-the-art' technology to other developing countries and is poised to play a leading role in the global movement towards sustainable energy development.

India has today among the world's largest programmes for renewable energy. Their activities cover all major renewable energy sources of interest to us, such as biogas, solar energy, wind energy, small hydro power and other emerging technologies. Several renewable energy systems and products are now not only commercially available, but are also economically viable in comparison to fossil fuels, particularly when the environmental costs of fossil fuels are taken into account.

The functions of the Ministry include - policy making & planning, programme formulation and implementation; R & D, technology development and commercialization; programmes; human resource development; intellectual property right protection; etc.

The Department has a library at New Delhi. An important source of information is the Tata Energy Research Centre which is a private organisation.

(h) Department of Ocean Development

India has a long maritime history. Appreciating the importance of the subject,

Government of India established Department of Ocean Development in 1981 with an aim of creating a deeper understanding of the oceanic regime of the northern and central Indian Ocean and also development of technology and technological aids for harnessing of resources and understanding of various physical, chemical and biological processes. The Ocean Policy was enunciated in 1982.

(i) Department of Science & Technology (DST)

Department of Science & Technology was established in May 1971 at Technology Bhavan, New Delhi with the objective of promoting Science & Technology and to play the role of a nodal department for organising, coordinating and promoting S & T activities. The DST has the major responsibilities for specific projects and programmes as listed below :

1. (i) Formulation of policy statements and guidelines;
   (ii) Coordination of areas of Science & Technology in which a number of Institutions and Departments have capabilities.
2. (i) Support to basic and applied research in National Institutions;
   (ii) Support minimum infrastructural facilities for Testing & Instrumentation.
3. Technology Development and Commercialization - Technology Development Board.
4. Autonomous Research Institutions
5. Fostering International Cooperation in S & T.
6. Socially oriented S & T interventions for rural & weaker sections.
7. Support Science & Technology entrepreneurship development.
8. Popularisation of Science & Technology.
9. Promotion and Development of S & T in States.
10. Scientific Surveys and services through **Survey of India** and **National Atlas and Thematic Mapping Organisation** (NATMO)
11. Providing meteorological services through **India Metalogical Department** (IMD) and **National Centre Range Weather Forecasting** (NCRWF)
12. Management of Information Systems for Science & Technology

The DST has a well-equipped library at Technology Bhavan. The Indian Meteorological Department is responsible for collecting and analysing meteorological and seismological data.

The Survey of India prepares topological and geographical maps of

India. It provides survey data to defence forces.

The NATMO prepares national atlases and thematic maps based on physical and socio-economic conditions of India.

The National Science & Technology Management Information System maintains data on the funding of S & T projects by various funding agencies, computerised S & T information systems functioning in the country and so on.

The following autonomous organisations maintain good collections in their libraries relating to their fields of activity:

(a) Bose Institute, Kolkata
(b) Indian Association for the Cultivation of Science, Kolkata.
(c) Indian Institute of Astrophysics, Bangalore.
(d) Raman Research Institute, Bangalore.
(e) Technology Information Forecasting & Assessment Council, New Delhi.

Geological Survey of India is the largest scientific organisation in the country dealing with earth sciences. Its library is well-equipped consisting of about 45,000 volumes, more than 1500 current serials and special materials such as maps, and unpublished reports. The unpublished reports have been digitized. It also provides abstracting, bibliographic, current awareness, reprographic and translation services to geologists.

The Ministry of Earth Sciences was created on 12th July, 2006 after merger of India Meteorological Department (IMD); National Centre for Medium Range Weather Forecasting; Indian Institute of Tropical Meteorology, Pune and Earth Risk Evaluation Centre (EREC) with the then Ministry of Ocean Development. The Ministry's mandate is to look after Atmospheric Sciences. Ocean Science & Technology and Seismology in an integrated manner. The expanded Ministry of Earth Sciences aims to create a framework for understanding the complex interactions among key elements of the Earth System, namely ocean, atmosphere and solid earth, by encompassing national programmes in Ocean Science, meteorology, climate, environment and seismology.

The Ministry of Earth Sciences provides the nation with best possible services in forecasting the monsoons and other weather/climate parameters, ocean state, earthquakes, Tsunamis and other phenomena related to earth systems through well-integrated programmes. In addition, the Ministry also deals with science and technology for exploration and exploitation of ocean

resources (living and non-living), and play a nodal role for Antarctic/Arctic and Southern Ocean research.

In order to generate ocean awareness and encourage research in the ocean related sectors, the Department is instituting an 'Ocean Science & Technology Development Award' for contribution in any of the three categories noted below :

Ocean Technology Development;
Ocean Science and Information Services;
Polar Science and Research.

By instituting the award scheme, the Department also intends to recognize outstanding Indian work in the field of Ocean Science and Technology, besides evoking interest in the field. The major information source of the Ocean Development is the National Ocean Information System. This system consists of several data, Marine data centres situated at various places all over the country. A few centres are noted below :

National Institute of Oceanography, Goa; Central Marine Fisheries Research Institute, Cochin; Central Salt & marine Chemicals Research Institute, Bhavnagar.

During the Xth plan period major programmes of the department are :

Continuing Schemes

Polar science, Polymetallic Nodules Programme, Ocean Observation and Information Services, Marine Research and Technology Development, National Institute of Ocean Technology (NIOT), Coastal Research Vessels, Delineation of Outer Limits of Continental Shelf.

New Schemes

Comprehensive Swath Bathymetric Survey, Gas Hydrate Exploration and Technology Development, Acquisition of New Research Vessel, Geophysical Study of Laxmi Basin.

(j) Department of Scientific & Industrial Research (DSIR)

From the perspective of information sources, the DSIR has two constituents : Council of Scientific & Industrial Research (CSIR) and National Information System for Science and Technology (NISSAT). We shall discuss them in details.

1. National Information System for Science and Technology (NISSAT)

programme implemented by Department of Scientific Industrial Research (DSIR), Government of India. NISSAT commenced its operations in 1977 with the objectives of organising information support facilities for people engaged in research and academics. The objectives of NISSAT are very vivid when it includes, the following optimum utilisation of existing information services and systems, provision of information services to meet the present and future need, promotion of national and international cooperation and liaison for exchange of information, support and active participation in research, development, and innovation in information science and communication, to enhance both efficiency of information services, and quality of information provided by these services and development of man power.

The NISSAT programme has the mandate to cover the entire spectrum of Science and Technology. As a proactive and progressive step, NISSAT has taken the onus on itself to strengthen the library movement in the country through the introduction of modern information technology, tools and techniques. As the boundaries between science and technology, Social Sciences, Arts and Humanities are fast disappearing, emphasis on activities on one are a cannot subsist without the support of the other. Therefore, in due course, NISSAT would need to adopt the non- S & T subjects also.

In tune with the changing global scenario and in pursuance of the national efforts in liberalisation and globalisation of the economy, NISSAT reoriented its programmed activities continually in order to be useful to a wider base of clientele in diverse subjects. Besides establishing the internal linkages between the information industry, its promoters and users, NISSAT has been making efforts to establish a bridge between information resource developers and users in Indian and other countries. The NISSAT has so far supported the establishment of subject-wise information centres previously called Sectoral Information Centres. For example, National Information Centre for Leather and Allied Industries (NICLAI) at Central Leather Research Institute (CLRI), Chennai; National Information Centre for Food Sciences and Technology (NICFOS), Mysore; National Information Centre for Machine Tools and Production Engineering (NICMAP) at Bangalore; National Information Centre for Drugs and Pharmaceuticals (NICDAP) at Lucknow; National Information Centre for Textiles & Allied Subjects (NICTAS) at Ahmedabad; National Information Centre for Chemistry and Chemical Technology (NICHEM) at Pune; National Centre for CD-ROM (NICDROM) at the National Aeronautical Laboratory, Bangalore; National Centre for

Bibliometry (NCB) at INSDOC (now NISCAIR), New Delhi; National Information Centre for Crystallography (NICRYS), at University of Madras, Chennai; National Information Centre for Advanced Ceramics (NICAC) at the Central Glass and Ceramic Research Institute, Kolkata.

Apart from these NISSAT sponsored Metropolitan Information/Library Networks.

Network	Host Site	Management
ADINET	INFLIBNET, Gujarat University Campus, Ahmedabad	Society drawing support from INFLIBNET
BONET	National Centre for Software Technology	
CALIBNET	Regional Computer Centre, Jadavpur University Campus, Kolkata	Society
DELNET	India International Centre, New Delhi	Society drawing support from IIC
MYLIBNET	CFTRI, Mysore	Institutional Project
PUNET	Bio-Informatic Centre, Pune Univ. C-DAC and NCL Pune	Institutional Project

NISSAT encourages the preparation of directories, factual databases, value-added products besides bibliographic ones.

A national system cannot function effectively without proper international linkages. This linkage ought to be both for the flow of information resources, as well as for the concepts, methodologies, techniques and tools. Realising this, India had close interaction with the Division of Communication, Information and Informatics (CII) of the UNESCO and the ASTINFO (The Regional Programme for the Exchange of Information Experiences in Asia and the Pacific). UNESCO had supported activities that strengthened the foundation and various building blocks of the system. NISSAT has been organising and sponsoring computer courses for librarians and information scientists. The activities of NISSAT are reported in the NISSAT **Newsletter** (Quarterly).

(k) Council of Scientific & Industrial Research (CSIR)

As noted earlier, CSIR is one of the constituents of DSIR with a large number of R&D laoratories supported by good libraries and information centres. We discuss below some of the libraries and information centres.

(l) Indian National Scientific Documentation Centre (INSDOC) INSDOC, on the strength of technical assistance from UNESCO, was established by the Government of India in 1952 with the objectives to develop collections

of relevant sources of information in the field of science and technology to complement and supplement the total national document resources, to render all appropriate and feasible information services in the field of science and technology, to develop appropriate linkages with the information systems and services organised in the country, to establish national repository for reports and scientific works of the nation (both published and unpublished) and be a channel through which this information made available within and outside the country, to contribute to advancement in information science and technology, including documentations and Library Science through research and other activities, to adopt and promote appropriate technologies and management practices to enhance capabilities and productivity of information networks and services in the country, and to participate effectively in international exchange of scientific matter.

INSDOC rendered several services to achieve these objectives, such as document copy supply, bibliography compilation, technical translation, reprography and micrography services, printing, CAS and SDI. Its publications include **Indian Science Abstracts** (Semi monthly), **National Index of Translations** (Monthly), **Annals of Library Science and Documentation** (Quarterly) and others like **National Union Catalogues of Scientific Serials in India**, a computer-based publication. INSDOC cooperated as an associated centre for ASTINFO in international level. It also assigned ISSN (International Standard Serial Number) for serials published in India.

National Institute of Science, Communication and Information Resources (NISCAIR)

NISCAIR has been formed on September 30, 2002 with the merger of National Institute of Science Communication (NISCOM) and INSDOC. The core activity of NISCAIR will be to collect/store, publish and disseminate S&T information through a mix of traditional and modern means which will benefit different segments of Society. Mandate of NISCAIR runs as follows :

To provide formal linkages of communication among the scientific community in the form of research journals in different areas of S & T;

To disseminate S & T information to general public, particularly school students, to inculcate interest in science among them;

To collect, collate and disseminate information on plant and mineral wealth and industrial infrastructure of the country; To harness information

technology application in information management with particular reference to science, communication and modernizing libraries;

To act as a facilitator in furthering the economic, social, industrial, scientific and commercial development by providing timely access to relevant and accurate information;

To develop human resource in the field of science, communication, library, documentation and information science, and S&T information management systems and services; To collaborate with international institutions and organisations having objectives and goals similar to those of NISCAIR;

Any other activity in consonance with the mission statement of NISCAIR.

Mission Statement

To become the prime custodian of all information resources on current and traditional knowledge stems in science and technology in the country, and to promote communication in science to diverse constituents at all levels, using the most appropriate technologies.

Dissemination of Information to Scientific Community

To provide communication links among members of the research community, NISCAIR publishes 19 research journals (including one in Hindi) and two abstracting journals of international repute, covering all the major disciplines of science and technology. Publication in all research journals is subject to peer reviewing, and the journals are covered by most of the major abstracting, indexing/current awareness services.

Popularization of Science

Popularization of science among the common masses is a major programme of NISCAIR. The Institute publishes three popular science magazines : **Science Reporter** (English, monthly), **Vigyan Pragati Magazine** and **Science Ki Duniya** (Urdu, Quarterly). NISCAIR has also published 60 popular science books in English under different series. NISCAIR also launched a new series of books on IT for kids.

Wealth of India and Monographs

NISCAIR publishes the encyclopaedia publication, **The Wealth of India** on Indian raw materials and monographs on specific topics. The Hindi version

of **The Wealth of India,** called **Bharat Ki Sampada** is also being published. Over thirty five scientific monographs in Botany, Industry, etc. have been brought out.

Consortium for Accessing e-Journals

NISCAIR is the nodal organisation for developing a consortium for CSIR Laboratories for accessing e-Journals. To begin with, an agreement has been signed with M/S Elsivier for a period of four years for all their e-Journals.

Information Services

NISCAIR offers a host of information services based on indigenbeus and international information resources. NISCAIR is the National Centre for ISSN International Centre for assigning ISSN to serials published in India.

NISCAIR provides S & T translation services from major foreign languages such as Japanese, German, French, China and Russian in English.

NISCAIR renders bibliographic services on specified subjects on customers choice for studying growth, development and spread of any area of research.

Consultancy Services

NISCAIR undertakes consultancy assignment in designing, editing and publication of journals, books, conference proceedings, etc. for other institutions and organisations. It undertakes projects for the reorganisation, automation and modernisation of libraries. It undertakes sponsored projects on design and development of databases for organisations on turnkey basis.

Human Resource Development (HRD)

NISCAIR organises HRD programmes to train and prepare library, information, documentation and science and Communication professionals in meeting the challenges of IT scenaries. It organises two-year advanced Master's degree level academic course in documentation and reprography (Associateship in Information Science). It also organises short-tern training courses, attachment training programmes and on-site training programmes.

Raw Materials Herbarium & Museum

NISCAIR has a Raw Materials Herbarium & Museum, which acts as a

repository of raw materials. The herbarium houses over 4000 species of economic and medicinal plants of India and the museum comprises over 2500 samples of crude drugs, animals and mineral specimens.

R&D Newsletters

NISCAIR brings out **CSIR News** (fortnightly) and its Hindi Version, **CSIR Samachar** (monthly)

Database Design and Development

NISCAIR has developed expertise in the design and development of database. Some databases include **Indian Science Abstracts Database, National Union Catalogue of Scientific Serials in India Database, Indian Patents Database** and **Aromatic Plants Abstracts Database.** All these databases are available online.

Traditional Knowledge Digital Library

NISCAIR and the Department of Indian Systems of Medicine and Homeopathy (ISM & H) have entered into an agreement for establishing a Traditional Knowledge Digital Library (TKDL) on Ayurveda. NISCAIR is the implementing agency for this project.

National Science Library (NSL)

The National Science Library was established in 1964 with the objective of building up a comprehensive collection of S & T publications in the country and offering services on a national scale. It subscribes to almost all Indian S & T periodicals and has over 1,80,000 bound volumes of books and periodicals. NSL has also an Electronic Library Division with a collection of more than 5000 foreign Journals, conference proceedings, etc. and a large number of databases including CA, CAB, SCI current contents.

(l) Department of Space (DOS)

Government of India set up Space Commission and the Department of Space (DOS) in June 1972. Indian Space Research Organisation (ISRO) under DOS executes Space programme through its establishments located in different places in India. The ISRO a few, R&D institutions which include the Vikram Sarabhai Space Centre (VSCC) at Tiruvananthapuram, SHAR Centre at Sriharikota, ISRO Satellite Applications Centre (ISAC) at Bangalore and Space

Application Centre (SAC) at Ahmedabad.

R & D activities cover avionics, aeronautic, materials and mechanical engineering, solid propulsion and composites, propellants, polymers and chemicals, stems reliability and computer and information. Ammonium Perchlorate Experimental Plant under VSSC functions at Aluva. Space Physics Laboratory carries out research in atmospheric and related Space Sciences. Achievements include development of sounding rockets, ISRO launch vehicles, SLV3, ASLV and PSLV, GSLV is under development.

Experimental phase included Satellite Instructional Television Experiment (SITE), Telecommunication Experiment (STEP), Remote Sensing application Projects, Satellite Aryabhatta, Bhaskara, Rohini and APPLE and launch vehicles, SLV-3 and ASLV.

Present operational space systems include Indian National Satellite (INSAT) for communication, television broadcasting, meteorology and disaster warning and Remote Sensing Satellite (RSS) for resource monitoring and management.

Polar Satellite Launch Vehicle (PSLV) used for RSS Satellites and Geosynchronous Satellite Launch Vehicle (GSLV) intended for launching INSAT Satellites.

Four R & D institutions as noted above have organised libraries in the subject disciplines of Space Science and Technology. These libraries offer services for current awareness, reference and document supply.

(m) Department of Telecommunications (Door Sanchar Vibhag)

This Department comes under the Ministry of Communications & Information Technology. This Department is concerned with policy, licensing and coordination matters relating to telegraphs, telephonic data, fascimile and telematic services and other like forms of communication. It involves in international cooperation in matters connected with telecommunications, in matters relating to all international bodies dealing with telecommunication : International Telecommunication Union (ITU), its Radio Regulation Board, Telecommunication Standardization Sector, Development Sector (ITU-R), International Telecommunication Satellite (INTELSAT), International Mobile Satellite Organisation (INMARSAT), Asia Pacific Telecommunication (APT).

It deals with matters relating to Indian Telephone Industries Ltd., Bharat Sanchar Nigam Limited, Videsh Sanchar Nigam Limited and

Telecommunications Consultant, Centre for Development of Telematics (C-DOT), Centre for Development of Telematics and Indian Telephones Industries Limited have good libraries and offer different services to users.

(n) Research Design and Standards Organisation (RDSO), Lucknow

This Department was set up by the Ministry of Railways. The Railway Board established the Central Standards Office in 1930 to look into the preparation of standard designs and specifications for the Indian Railway Testing & Research Centre was formed in 1952. In 1957 the Central Standards Office and the Railway Testing & Research Centre were merged to set up the Research Design and Standards Organisation which has a good library and information centre.

The Library and Information Centre of RDSO has a good collection of books, current serials, microfilms and reports. It offers different information services which include abstracting, bibliographic and current awareness services.

The RSDO brings out Railway Technical Bulletin, Quarterly News Bulletin and other publications.

6.2.2 Information System/ Sources under other Organisations of Government of India

A good number of S & T organisations in other departments carry out R&D activities in a manner comparable to those discussed earlier. These departments organise activities which have become important information sources. Some of them are described below.

(a) Indian Council of Medical Research (ICMR)

The Indian Council of Medical Research, New Delhi, the apex body in India for the formulation, coordination and promotion of biomedical research, is one of the oldest medical research bodies in the world. As early as in 1911, the Government of India set up the Indian Research Fund Association (IRFA) with the specific objective of sponsoring and coordinating medical research in the country. After independence, several important changes were made in the organisation and activities of the IRFA. It was redesigned in 1949 as the Indian Council of Medical Research (ICMR) with considerably expanded scope of functions. The ICMR is funded by the Government of India through the Ministry of Health & Family Welfare.

The Council promotes biomedical research in the country through intramural as well as extramural research. Over the decades, the base of extramural research and also its strategies have been expanded by the Council. Intramural Research is carried out currently through the Council's (i) 21 Permanent Research Institutes/ Centres which are mission-oriented national institutes located in different parts of India and address themselves to research on specific areas such as tuberculosis, leprosy, cholera and diarrhoea diseases, viral diseases including AIDS, malaria, Kala-azar, vector control, nutrition, food & drug toxicology, reproduction, ontology, medical statistics, etc. and (ii) 6 Regional Medical Research Centres which address regional health problems, and also aims to strengthen or generate research capabilities in different geographic areas of the country.

ICMR has a few well organised libraries in some of its institutes and there is a Publication Division at the headquarters in New Delhi. This Division has a library and has organised some databases.

Extramural research is promoted by ICMR through (i) setting up centres for Advanced Research in different research areas around existing expertise and infrastructure in selected departments of Medical Colleges, Universities and other non-ICMR Research Institutes; (ii) Task force studies which emphasise a time-bound, goal-oriented approach with clearly defined targets, specific time frames, standardized and uniform methodologies and often a multicentric structure; (iii) Open-ended research on the basis of applications for grants-in-aid received from scientists in non-ICMR Research Institutes, Medical Colleges, Universities, etc. located in different parts of the country.

In addition to research activities, the ICMR encourages human resource development in biomedical research through (i) Research Fellowships, (ii) Short-Term visiting Fellowships, (iii) Short-Term Research Studentships, (iv) Various Training Programmes and workshops conducted by ICMR Institutes and Headquarters.

ICMR has collaborated with the National Informatics Centre in establishing on ICMR-NIC Centre for Biomedical Information in collaboration with the US National Library of Medicine.

For retried medical scientists and teachers, the Council offers the position of Emeritus Scientist to enable them to continue or take up research on specific biomedical topics. The Council also awards prizes to Indian Scientists, in recognition of significant contributions to biomedical research. At present,

the Council offers 38 awards, of which 11 are meant exclusively for young scientists (below 40 years).

(b) National Medical Library (NML), New Delhi

The Library was initially conceived as departmental library having a small collection of books for the use of officers of the erstwhile Directorate General of Indian Medical Services (DGIMS). The DGIMS was later merged with the Office of the Public Health Commissioner in India in 1947 to form the Directorate General of Health Services (DGHS) and the Library became DGHS Library. Realising the need for a Central Library to support academic, research and clinical work of biomedical professionals and the country, the DGHS Library was developed gradually and declared a Central Medical Library in 1961 and as the National Medical Library on 1st April, 1966.

Mission : The National Medical Library aims to provide wide and efficient library and information services to the health science professionals in India.

The Library is mainly a reference library in the field of Medical and allied Sciences. It is open for consultation to the entire Medical, Paramedical and allied Professions. It has 3.6 lakh volumes of books, reports, bound volume of Journals and other literature and adds about 3000 latest books and serials every year. It also subscribes to 2000 current periodicals. The Library has a good collection of 19th century literature. Book collection is divided into pre-1977 and 1977 onwards and is classified according to the Dewey Decimal Classification Scheme. Bound volumes of journals are divided into upto 1990 and post-1990.

NML is also the National Focal Point of HELLIS Network set up by WHO in Southeast Asia in 1982. HELLIS (Health Library & Literature Information Service) is a network of health science libraries of the seven countries of the World Health Organisation (WHO) in Southeast Asian Region. These are Bangladesh, Burma, India, Indonesia, Nepal, Sri Lanka and Thailand. In India, the HELLIS focal point is the National Medical Library with six regional coordinating centres in different parts of the country.

The four-storeyed building of the NML having a carpet area of about 70,000 sq.ft. is situated near All India Institute of Medical Sciences, Ansari Nagar, Ring Road, New Delhi-110029.

The library is organised into the following functional units : (a) Book Acquisition, (b) Periodical Subscription, (c) Technical Processing of

Documents, (d) Documentation and Reference Service; (e) MEDLARS Services (including CD-ROM and internet based services); (f) Photocopying Service, (g) Binding Section.

Non-member visitors are required to obtain entry-pass issued on application in the prescribed form from the Reception Counter of the Library.

Photocopying of available literature are provided for personal use. Borrowing of books is allowed to registered members only. All doctors and teachers working in Government Hospitals and Medical Colleges in Delhi can be become borrowing members. The library remains open on 359 days of the year and beyond normal office hours (0900-2000 hrs. during March-October and 0900-1900 hrs. during November – February). It provides free access to all HS professionals for reference and consultation. Library also receives a number of reference queries and provides quick reference service on telephone. It offers current awareness services. It brings out Library Bulletin (Bi-monthly), Chetna (Quarterly) Index to Indian Medical Periodicals (Half-yearly) and documentation on AIDS.

(c) National Informatics Centre (NIC)

NIC, under the Electronics Commission, Government of India, is responsible for the development of computerised information systems for the user government departments and ministries. To achieve this, at the initial stage, NIC built up an intercity computer network in New Delhi by connecting minicomputer terminals to the host cyber computer system, using leased telephone lines and radio (VHF) frequencies. The National Informatics Centre set up a network NICNET in November 1987. It is being evolved solely for Government use.

National Informatics Centre, now of the Department of Information Technology is providing network backbone and e-Governance support to central Government, State Governments, UT Administrations, Districts and other Government bodies. It offers a wide range of ICT services including Nationide Communication Network for decentralised planning, improvement in Government services and wider transparency of national and local Governments. NIC assists in implementing information technology projects, in close collaboration with central and state Governments, in the areas of (a) Centrally sponsored schemes and Central Sector Schemes, (b) State Sector and State sponsored projects, and (c) District Administration sponsored projects. NIC endeavours to ensure that the latest technology in all areas of

IT is available to its users. NICNET also endeavours to provide access to world medical bibliographic information through its collaborative project with ICMR, titled ICMR-NIC for Biomedical Information.

(d) Bioinformatics Centre

The mission of Bioinformatics Centre is to develop and implement methods for the management and interpretation of medical /genomic data, with an emphasis on biomedical informatics. By working closely with other groups at various ICMR research institutes, the BIC will play a key role in ensuring that the genome revolution improves the research capacity of ICMR institutes. The BIC will encourage interdisciplinary and inter-institutional cooperation by providing both facilities and intellectual stimulus.

Established in 1982 as Integrated Research Information System (IRIS), the Bioinformatics Centre in collaboration with ICMR is providing IT solutions and services to the ICMR. Maintaining databases of ICMR funded activities, profiles of ICMR Institutes and Scientists etc. are some of the routine activities of the Centre. Attempts are being made by the Centre to provide exposure of applications of Bioinformatics in Medical Science to the ICMR scientists and other medical professionals. A multi centric task force on 'Role of Bioinformatics in Medical Sciences' has been proposed. A database of free software for biomedical applications has been developed which can be accessed online. A powerful online discussion/ chat forum enabling researchers and Medical professionals to achieve scientific innovation through information exchange has been formed recently.

(e) National Centre for Science Information, (NCSI), Bangalore

The NCSI was established in June 1983 with the financial support of the UGC at Indian Institute of Science, Bangalore to provide computer-based information services to the research and academic community in the areas of Science & Technology. With the objective of providing large scale Current Awareness Services using bibliographic databases on magnetic tapes, NCSI has been gearing itself up to the developments in Information Technology for improving its services. Besides introducing services based on CD-ROM and online databases, the Centre has started network-based information services like an e-mail based bibliographic information services and e-mail discussion forum. NCSI also carries out sponsored R & D and consultancy projects. It proposes to conduct short-term training programmes.

(f) Information & Library Network (INFLIBNET)

The UGC, taking into consideration the twin phenomena of information explosion and price rise decided to take a quantum jump into the new era, by setting up an "Inter-Agency Working Group for Development of Information and Library Network", popularly known as INFLIBNET in April 1991 with headquarters at Ahmedabad. INFLIBNET is to be a computer-communication network for linking libraries and information centres in universities, deemed universities, institutions of national importance, UGC reformation centres, R & D institutions and colleges.

The main objectives of INFLIBNET are :

(a) to evolve a national network, interconnecting various libraries and information centres in the country and to improve capability in information handling and services;

(b) to provide reliable access to document collection of libraries by creating online catalogues of monographs, serials and non-book materials in various libraries in India;

(c) to provide better access to worthwhile bibliographic information sources, with citations and abstracts, such as periodicals, articles, conference papers, etc., through indigenously created databases of the Sectoral Information Centres of NISSAT and UGC information centres and such others and by establishing gateway for online accessing of international databases held by international information networks and centres;

(d) to provide document delivery services by establishing resource centres around libraries having a rich collection of documents;

(e) to optimise information resource utilisation through shared cataloging, inter-library loan service, catalogue production, collection development and avoiding duplication in acquisition to the extent possible;

(f) to implement computerisation of operations and services in libraries and information centres of the country, following a uniform standard;

(g) to facilitate scientific communication amongst scientists, engineers, researchers, social scientists, academics, faculties and students through e-mail, bulletin board, file transfer, computer/audio/video conferencing, etc.;

(h) to enable the users disbursed all over the country irrespective of location and distance, to have access to information regarding books, serials, etc. by locating the sources where from available a union catalogue of documents;

(i) to create database of projects, institutions and specialists for providing online information services;

(j) to encourage cooperation among libraries, documentation centres and information centres in the country;

(k) to develop suitable professional manpower of appropriate quality to establish, manage and sustain INFLIBNET and

(l) to evolve standards and uniform guidelines in techniques, methods, procedures, hardware and software, services and so on, and promote adoption in actual practice by all libraries in order to facilitate pooling, sharing and exchanging resources and facilities towards optimisation.

INFLIBNET will be a multiple function/ service network. It will provide the following services :

Catalogue Based Service, Database Services, Document Supply Services, Collection, Development and Communication Based Service. Software for University Libraries (SOUL) – the state of the art library management software designed and developed at INFLIBNET – has been well accepted by the academic community and has been installed at more than 100 libraries and many universities and institutions have placed orders for it to be installed soon.

Union databases have been developed to provide access to the Library holdings. The Union databases contain serials, theses, books, excepts, projects, etc. and is being updated constantly and is available online for access at www.inflibnet.ac.in. User-friendly search engines have been developed to provide access to such database content.

(g) The Central Water and Power Research Station (CWPRS), Pune

The CWPRS was established in 1916 by the then Bombay Presidency as a "Special Irrigation Cell" with a limited mandate to modify irrigation practice to meet agricultural requirements and alter the agricultural methods to meet irrigation limitations. Recognizing its role in the systematic study of various phase of water flow including floods, the Institution was taken over by the Government of India in 1936.

After independence and launching of planned development of the nation's water resources, CWPRS became the principal central agency to cater to the R&D needs of projects in the fields of water and energy resources development and water-borne transport.

Today, CWPRS, a part of the Union Ministry of Water Resources, is

increasingly called upon to advise on projects in fields as diverse as river training and flood control, design of stable channels, irrigation and hydroelectric structures, harbours, waterways and coastal protection, structural design, etc.

In keeping with the premier role of the Institution, CWPRS disseminates knowledge and expertise by way of holding technical events in the form of national conferences, workshops and seminars, participation in the technical bodies of other institutions, publication of technical memoranda, training of personnel from other institutions, etc. The Research Station has made significant contributions through bodies such as Bureau of Indian Standards (BIS), and International Standards Organization (ISO)

The scope and magnitude of the services offered in the different areas of activity by CWPRS caters to the R & D needs of the country.

It has helped to lead the country to self-reliance in hydraulic research. Water and Power Information System caters to collection, storage, analysis and retrieval of information in the broad areas of water and power;

Computer readable bibliographic information from 1,56,000 records relating to CWPRS holdings, journal, articles and reports;

Current Awareness and Selective Dissemination of Information Services (CAS & SDI);

Retrospective Searches;

Information services using CD-ROMs : International Civil Engineering Abstracts (ICEA) : references from Civil Engineering journals;

COMPENDEX PLUS : bibliographic references from technical reports;

Selected Water Resources Abstracts : references from journals on water resources management;

Online Access to International database : Access to over 1,000 International databases in various fields using EASYNET for current and retrospective and exhaustive information.

Library : Books and Reports :48,705
Bound volumes :15,867
Journals subscribed :317

Services : Reference, Referral, Lending, Current contents, Bibliographic.

Networking : Link to National Informatics NETwork (NICNET) having seven hundred nodes spread all over the country; Centralised electronic mail facility;

On-line connection to EASYNET through Indian NETwork (I-NET);

Participation in PUNENET - A network of technical libraries in Pune;

Centre for Indian Network on Research in Irrigation and Drainage (INRID) in collaboration with ICID and INCID;

Internet access.

In the years to come, CWPRS plans to develop expertise for application of remote sensing and Geographical Information System in the study of water resources, projects, assessment of environmental impact, evaluating prototype performances, collection of extensive field data on various hydraulic and engineering parameters, development of earthquake resistance, with resources, structures, design of flood forecasting systems and better management of command areas of irrigation projects.

(h) Patent Information System (PIS)

Government of India, Ministry of Commerce and Industry, Department of Industrial Promotion established Patent Information System, in the year 1980 with the following objectives.

a. To obtain and maintain a comprehensive collection of patent specification related literature on a worldwide basis to meet the needs for technological information by various users in R&D establishments, Government Organisations, Private Industries Investors and other users;

b. To provide technological information contained in patents or patent related documents through publication services, search services and patent copy supply service; and

c. To meet statuary obligation regarding novelty search under the Patents Act, amended in 1999.

Intellectual Property Training Institute has been established in PIS, Nagpur under the modernization project of Patent Offices in India.

The PIS caters to user needs on the basis of patent documentation, retrieval and dissemination of patent information.

The system has been modelled in relation to the user requirements ascertained from the results of the user survey conducted by PIS.

The Search service may be availed by sending the search request in the standard search request. List of services : State of Art Search, Bibliographic Search, English Equivalent Patent Search, Equivalent Family Patent Search, Assisted Search, and standard from for sending search request.

(i) Small Enterprises National Documentation Centre (SENDOC)

SENDOC was established in 1971. This is a part of the Small Industries Extension Training (SIET) Institute at Hyderabad. It provides small scale industries with technological and managerial information. SENDOC has a good library with a large collection of books, monographs, technical reports, standards, specifications, industrial profiles and over 1000 current periodicals. The Centre publishes a number of bulletins viz SENDOC Bulletin (Monthly), Appropriate Technology Documents Bulletin (Quarterly). The Centre brings out Union Catalogue of product profiles for small industry, Director of training courses offered by different institutions in different industries/ trade. In additions a number of ad hoc publications of interest to small industry are also being brought out.

(g) Indian Petrochemical Corporation Limited (IPCL)

IPCL is the pioneering Petrochemical Company Limited in India. It was established on March 22, 1969. Its business comprises polymers, synthetic fibre, fibre intermediaries, solvents, surfactants, industrial chemicals, catalysts and absorbents. Backed by strong Research Centre, Product Application Centres, Technology Management Centers and Customer Relations Centres, the Company is continuously innovative in its processes and products. The Company owns and operates three petrochemical complexes, a naptha based complex at Vadodara and gas based complex at Nagothane near Mumbai and at Dahej on Narmada estuary in Bay of Khambhat. Its Information Centre at Vadodara has a library with a good collection in the disciplines as noted above.

(k) Steel Authority of India Limited (SAIL)

SAIL is the largest steel maker in India. It is a public sector undertaking wholly owned by Government of India and acts like an operating company. Major plants owned by SAIL are located at Bhilai, Bokaro, Durgapur, Rourkela, Burnpur and Salem. With technical and managerial expertise and know-how in steel making gained over four decades, SAIL's Consultancy Division (SAILCON) at New Delhi offers services and consultancy to clients world-wide.

SAIL has a well-equipped Research and Development Centre for Iron and Steel (RDCIS) at Ranchi which helps to produce quality steel and develop new technologies fpr the steel industry. Besides, SAIL has its own in-house

centre for Engineering and Technology (CET), Management Training Institute (MTI), Safety Organisation and the Library and Information Centre at Ranchi. The Information Centre has a good collection of books, serials, reports and standards. The Information unit offers reprographic, SDI, translation services, etc. The Captive Mines are under the control of the Raw Materials Division in Kolkata. The Environment Management Division and Growth Division of SAIL operate from the headquarters in Kolkata.

6.3 S & T Information System/ Sources under the State Government

Almost every state in India has a Council for Science & Technology. Each Council, with the purpose of infusing scientific attitude in the public minds, has laid emphasis to disburse knowledge through various means of display and publications, about the nature of life and its physical surroundings, while signifying the usable aspects of available technologies. The Council's activities are towards :

- Popularisation of Science;
- Conservation of environment;
- Consultancy to industries for enduring development;
- Biotechological interventions;
- Patent information;

The Council prefers to catalyse, rather than executing new plans, without causing dramatic coup or bringing about sudden illumination of landscape. It continues alluring men and material in industry and agriculture; and on the basis of reciprocity, it is developing links with other institutes, such as UNESCO, UNDP, World Bank, various universities and central and state departments at national and international levels. Without mellowing down its effectiveness for achievement, the Council prefers to act extremely gently so as not to create ripples in the pool of prevailing circumstances; and it is indeed extraordinary that it has managed to produce omlette without shattering the eggshells.

6.4 S & T Information Sources in the Private Sector

We have seen that the S&T activities in the public sector is on a larger scale than the private sector. However, there are a few private institutions which

have well organised libraries/ Information Centres. In this context at least four may be worthy of note.

(a) Shriram Institute for Industrial Research (SRI), Delhi

SRI is an independent, non-profit, self supporting research organisation with a board of Governors including leading scientists, eminent academicians, professionals, civil servants and other distinguished persons. The thrust areas are : Material Science, Analytical Services, Calibration Services, Environment Protection, Toxicology, Radiation, Sterilization & other Irradiation Services The Institute has well-equipped library containing 20,000 books, 2,00,000 microdocuments and 160 current periodicals.

(b) Tata Iron & Steel Company (TISCO) Ltd, Jamshedpur

Tata Steel is India's largest integrated private sector steel company. Established in 1907, its steel plant at Jamshedpur produces four million tonnes of hot and cold rolled flat and long products. It has a well-equipped library comprising about 1 lac books and 150 current serials.

(c) Sarabhai Research Centre, Baroda

In 1960, Dr. Vikram A. Sarabhai set up the Sarabhai Research Centre at Baroda, for investigation of natural and synthetic and decimal products. It has a good library subscribing about 900 current periodicals.

(d) The Energy and Resources Institute

It was Mr. Darbari Seth of Tata Chemicals, whose appreciation of the importance of energy as a resource, who thought of an Institute to tackle and deal with the immense and acute problems that mankind is likely to be faced within the years ahead (a) on account of the gradual depletion of the earth's finite energy resources which are largely non-renewable and (b) on account of the existing methods of their use which are polluting. The idea instantly appealed to Mr. J. R. D. Tata, Chairman of the Tata Group, a great visionary himself and a staunch supporter of scientific research – Tata Energy Research Institute (TERI) was duly registered in Delhi in 1974. In 2003, as the scope of activities widened over time, the Institute was renamed as **The Energy and Resources Institute.**

TERI began operations in Mumbai in Bombay House, headquarters of

the house of Tatas, India's most respected industrial house. In the first decade, the approach was to fund deserving research projects on renewable energy. TERI also set up a documentation and information centre, which began publishing **Indian Energy Abstracts** (Quarterly) and a small field station in Pondicherry to undertake research on renewable energy. However, in 1984, it moved to Delhi and began its own research. The first externally funded project was to develop an energy model for India. For a decade after that, TERI operated out of rented premises, in keeping with the Institute's conscious policy that activities must precede brick and mortar, before moving into the Darbari Seth Block, within the India Habitat Centre Complex off Lodhi Road.

TERI works closely with several multilateral organisations, national governments, NGOs and academics around the world. As of now, it has over 900 organisations as sponsors and around 200 organisations as partners from 43 countries.

In all its activities dedicated to technology innovation, TERI consciously builds in comprehensive dimensions that are environment-friendly, natural resource conserving and people-oriented.

It is with such vision, perseverance, and ingenuity that TERI's team has developed a range of technologies in different disciplines and areas of scientific endeavour. From sophisticated research in microbial biotechnology for remediation of oil spills, to the effective use of mechanical and chemical engineering techniques in developing biomass gasifiers for various applications, or customization of photovoltaic technology for applications that suit the needs of the poorest of the poor-TERI has, quite unobtrusively, over two decades, developed a bank of technologies that carry immense potential to reduce the ecological footprint of development on the country's natural wealth while also generate opportunities for the underprivileged. The talent of diverse groups of TERI was pooled to create workable and viable solutions that are, most importantly, sustainable.

6.5 Summary

In this unit we have noted most of S&T information systems organised in India. These systems serve as sources of information as and when required. Since most of the systems are functioning under the Central Government Departments and their autonomous bodies, these Departments are represented subject-wise. The subject-wise departments can be consulted for any sort of

reference and referral services. In the private sector there are well-organised S&T information sources which are useful to librarians and information officers. We have discussed four such prominent institutions. So far as S & T information systems are concerned these are better organised in terms of infrastructural facilities.

6.6 Exercise

1. Which is the most prominent information system in private sector in the field of renewable sources of power? Describe the system briefly.
2. Discuss information sources related to industrial production technologies.
3. Why do we generally find that S & T information systems in India are better placed in terms of infrastructural facilities and information sources? Discuss.
4. Discuss the activities of NISCAIR.
5. What are the major services catered by an information system? Give a brief account of National Information System in Science and Technology.
6. Which is the central information source in the defence science? Discuss the centre briefly along with its publications.
7. Note the major responsibilities of the DST.
8. Show your acquaintance with the Ministry of Earth Sciences.
9. Write a short note on RDSO.
10. Discuss the activities of ICMR.
11. Show your acquaintance with the HELLIS Network.
12. Discuss the main objectives of INFLIBNET.
13. Write what you know about CWPRS.

6.7 References and Further Reading

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Unit 7 ❑ International Organisations

Structure

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7.0 Objectives

In this unit we present important international organisations, global information systems and some special organisations of international learnings. We describe their roles, objectives, present activities and some future programmes. After reading this unit, you will understand their efforts in the development of library and information services. You will identify their activities and programmes in the promotion, coordination and development of library and information services.

7.1 Introduction

The librarians' most important technological goal is to give all citizens access to information regardless of format and provision of the information. The secondary goal is to make access available from anywhere an authenticated user is situated. But over the last three decades, the librarians and information professionals have been facing many problems, for which information services were often found to be inadequate. Many international and national organisations have come into being to coordinate, promote and develop library and information services. Networking is an essential process in this exercise as it facilitates access to vast information services. Networks have potential to improve library services in several ways. The continuous improvement in the networking technology helps libraries to reduce the cost of information provision, thus creating new opportunities for the libraries in providing information to its end user.

Here we shall discuss some well established international organisations, global information systems, professional organisations with international pursuit and a few national systems with international standing.

7.2 International Organisations

International organisations come forward to maintain good relations among countries for exchanging information. United Nations provides a forum to maintain cooperation among developing countries by facilitating distribution of technological information and promotion of technical cooperation. Here we shall highlight the activities of some of them.

7.2.1 United Nations Educational, Scientific and Cultural Organisation (UNESCO)

UNESCO, belonging to United Nations, was established by the representatives of twenty countries in London on November 16, 1946. Its present headquarters are in Paris. The very Constitution of UNESCO defines its objectives : to encourage international intellectual cooperation, speed up development through operational assistance to member states, promote peace, human rights and international understanding. UNESCO is also active in promotion, coordination and development of library activities, documentation and information services. It also holds seminars and meetings, provides experts,

equipment and fellowships, prepares standards and guidelines, publisher's manuals and performs similar other activities.

UNESCO has taken concrete steps in the development of public libraries, in the elevation of national libraries and in the improvement of university libraries in many of its member states. The UNESCO Public Library Manifesto provided a new impetus, image and wide scope to public libraries. The founding of the public library at New Delhi (India), Enugu (Nigeria), and Medellin (Columbia) is worthy of note in this context. With regard to university and special libraries UNESCO has carried out a continuous series of activities which include holding seminars, offering technical assistance and grants. As regards national libraries, UNESCO's Symposium on National Libraries in Vienna, Austria, in 1958 and Regional Seminar on the Development of National Libraries in Asia, UNESCO has been striving to benefit developing countries through numerous programme, projects and activities.

7.2.1.1 World Science Information System (UNISIST)

UNESCO has been concerned with the information matters since its founding in 1946. At the Pugwash Conference on Science and World Affairs in Karlovy Vary in 1964, it was noted that indexing and abstracting services were developing independently, so that information stored by one of them was not freely exchangeable with information stored by others. In 1967, UNESCO joined forces with the International Council of Scientific Unions (ICSU) to carry out feasibility study on the establishment of a World Science Information System, UNISIST. The feasibility report was prepared by Jean Claude Gardin. This report and a synoptic version became the working documents of the UNISIST Intergovernmental Conference held in Paris in October 1971 to advise UNESCO on the implementation of the feasibility study. It may be noted in passing that the word UNISIST was never meant to be an acronym, but rather to connote phonetically the part that UN agencies particularly UNESCO, should play in the promotion of an international system for information, covering science and technology. "UNISIST" stood for the study, for the conference and for the programme launched thereafter.

A second conference, the Intergovernmental Conference on Scientific and Technological Information for Development - UNISIST II - was held in Paris in 1979 to review developments since UNISIST Conference of 1971 and to made recommendations for the future. The UNISIST II make recommendations for the future. The UNISIST II recommendations emphasised

the application of information – particularly scientific and technological information – in the service of development, the importance of developing user-oriented information systems, the need for national information policies and planning, and the importance of education and training.

7.2.1.2 General Information Programme (PGI)

The Division of the General Information Programme, often called PGI, the initials of its French name (Programme general d'information) was set up by the decision of the General Conference of UNESCO at its 19th Session in 1976. At the same session, the General Conference also approved UNESCO's Medium Term Plan for 1977-1982, which covered all aspects of the Organisation's work. PGI is committed to promote the dissemination of specialised information of use to economic and social development, especially in the third world.

The major thrust in PGI's current work is on promoting computer applications to library and information activities in developing countries, and use of information technologies in network development and online facilities for sharing and exchanging information from local area to international level. Financial support is provided to representatives from the developing countries to attend relevant seminars, workshops and conferences.

Three micro-computer based software packages have been provided free of charge to non-profit organisations in the developing world. One of the packages is the mini-micro version of Computerised Documentation/ Integrated Set of Information System (CDS/ISIS) software.

At the regional level, programmes are launched for cooperation in information exchange and development of information systems, often with the help of funding agencies such as UNDP. For example, a Regional Network for the Exchanges of Information and Experience in Science and Technology in Asia and the Pacific (ASTINFO) was established in 1984; Asia Pacific Information Network in Social Sciences (APINESS) was launched in 1986; and the Asia Pacific Information Network on Medicinal and Aromatic Plants (APINMAP) is in the process.

In the field of archives UNESCO collaborates with International Council of Archives. In the field of libraries, Unesco collaborates with IFLA. PGI, of course, has responsibilities in the information field that extend beyond its support for UNISIST. PGI's current programme reflects a sensitivity to the value of archival holdings and services; and a significant number of projects

involve the development of Records and Archives Management programme RAMP) guidelines that are needed on a priority basis.

In the library field, UNESCO's PGI has produced guidelines for the National Bibliographic Agency and the National Bibliography, 1979 and Guidelines for the Planning and Organisation of the School Library Media Centres, 1979.

7.2.2 International Federation for Information and Documentation (FID)

Two Belgian bibliographers, Paul Otlet and Henri La Fontaine were regareded as the founding farthers of FID. In September 1895, FID was founded as the Institute International ede Bibliographic (IIB) at Brussels. This was in 1895 when two Belgian bibliographers were working on Universal Bibliographic Repertory, a comprehensive classified index to all published information. At the same time the main objective of IIB was the compilation of repertory of knowledge and the development of the Universal Decimal Classification (UDC) from the Dewey Decimal Classification for providing order and access to the bibliographical entries in the repertory. While the project had failed, the development of UDC continued.

In 1931, the IIB became IID (Institute International ede Documentation). In 1938 it became the Federation International ede Documentation (FID) with its Headquarters at the Hague in Netherlands. In 1986 the word information was added to the name but the acronym is retained. Upto the end of the year 1991 it was the duty of the FID to update the UDC. Then this responsibility was transferred to a new organisation, UDC Consortium (UDCC)

FID had to face crucial financial hardship and the situation compelled the organisation to stop functioning during the year 2002. It could not repay the loans and even the payment of salary to the staff. The tenure of the then Council expired at the end of the year 2001. There was held no election. Practically, FID became a non-functioning body. The Headquarter at the Hague is now under the control of Royal Library, whose responsibility has been conferred upon the UDC Consortium.

7.2.3 International Federation of Library Associations and Institutions (IFLA)

IFLA is the leading international body representing the interests of library and information services and their users. It is the global voice of the library and information profession. Founded in Edinburgh, Scotland, in 1927 at an

international conference, it celebrated its 75th birthday at a conference in Glasgow, Scotland in 2002. IFLA has over 1700 members in 155 countries around the world. The Royal Library, the National Library of the Netherlands, in the Hague, generously provides the facilities for its headquarters. IFLA was registered in the Netherlands in 1971. Since 1976, IFLA has two main categories of members, Association and Institution.

AIMS

IFLA is an independent, international, non-Governmental, not-for-profit organisation. Its aims are to :

Promote high standards of provision and delivery of library and information services;

Encourage widespread understanding of the value of good library & information services;

Represent the interests of its members throughout the world.

Core Values

In pursuing these aims IFLA embraces the following core values :

1. the endorsement of the principles of freedom of access to information, ideas and works of imagination and freedom of expression embodied in Article 19 of the Universal Declaration of Human Rights;
2. the belief that people, communities and organisations need universal and equitable access to information, ideas and works of imagination for their social, educational, cultural, democratic and economic well-being;
3. the conviction that delivery of high quality library and information services helps guarantee that access;
4. the commitment to enable all Members of the Federation to engage in, and benefit from, its activities without regard to citizenship, disability, ethnic origin, gender, geographical location, language, political philosophy, race or religion.

Relations with other bodies

IFLA has established good working relations with a variety of other bodies with similar interests, providing an opportunity for a regular exchange of information and views on issues of mutual concern. It has Formal Associate Relations with UNESCO, observer status with the United Nations, associate status with the International Council of Scientific Unions (ICSU) and observer

status with the World Intellectual Property Organisation (WIPO) and the International Organisation for Standardization (ISO). In 1999, IFLA established observer status with the World Trade Organisation (WTO). IFLA is a member, along with the International Council on Archives (ICA), International Council of Museums (ICOM) and the International Council on Monuments and Sites (ICOMOS), of the International Committee of the Blue Shield (ICBS). The mission of ICBS is to collect and disseminate information and to coordinate action in situations when cultural properly is at risk.

Core Activities

Issues common to library and information services around the world are the concern of the IFLA core activities. Many of the IFLA's activities are organised within the framework of one or other of its core programme, which include those concerned with Universal Bibliographic Control (UBC), International MARC Programme (IMP), Universal Availability of Publication (UAP), Transborder Data Flow (TDF), Preservation and Conservation Core Programme (PAC) and the Advancement of Librarianship in the third world (ALP).

ALP (Action for Development through Libraries Programme) has very wide scope, concentrating on the broad range of concerns specific to the developing world. IFLA's office for Free Access to Information and Freedom of Expression (FAIFE) was established in Copenhagen in 1998.

Publications

IFLA Journal is Published four times a year. The biennial Council Report records IFLA's achievements in five key areas : access to information, the electronic environment, preservation and conservation, services and standards and professional development. **IFLA Annual** and *IFLA Directory* (biennial) are also brought out. The IFLA publications series, published by IFLA's publisher, K.G. Saur Verlag in Munich, Germany includes such titles as **Intelligent library buildings**, and **Adapting marketing to libraries in a changing worldwide environment.** The IFLA Professional Reports Series feature reports of professional meetings and guidelines to best practice. Recent reports include **Proceedings of the IFLA/UNESCO pre-conference seminar on public libraries and Guidelines for easy-to-read materials.**

INFLANET

INFLANET has rapidly become a prime source of information not only about IFLA, but also on a broad spectrum of library and information issues. It is hosted by the Institute de l' Information Scientifique et Technique (INIST), France.

7.2.4 International Council of Scientific Unions (ICSU)

Established in 1931, ICSU is a Non-Governmental Organisation representing a global membership that includes both national scientific bodies (103 members) and international scientific unions (27 members).

Through this extensive international network, ICSU provides a forum for discussion of issues relevant to policy for international science and the importance of international science for policy issues and undertakes the following core activities :

Planning and coordinating interdisciplinary research to address major issues of relevance in both science and society;

Actively advocating for freedom in the conduct of science, promoting equitable access to scientific data and information, and facilitating science education and capacity building;

Acting as a focus for the exchange of ideas, the communication of scientific information and development of scientific standards;

Supporting in excess of 600 scientific conferences, Congresses and symposia per year all around the world as well as the production of a wide range of newsletters, handbooks, learned journals and proceedings.

ICSU also helps create international and regional networks of scientists with similar interests and maintains close working relationships with a number of intergovernmental and non-governmental organisations, especially the United Nations Educational, Scientific and Cultural Organisation (UNESCO) and the Third World Academy of Sciences (TWAS).

Because of the broad and diverse membership, the Council is increasingly called upon to speak on behalf of the global scientific community. ICSU-AB (ICSU - Abstracting Board) and the Committee on Data for Science and Technology (CODATA) within ICSU were set up in 1952 and 1966 respectively and have engaged themselves with scientific information.

7.2.5 Committee on Data for Science and Technology (CODATA)

CODATA is an interdisciplinary scientific committee of the International Council for Scientific Union (ICSU) and was established in 1966 and its Secretariat is situated in Paris. CODATA works to improve the quality, reliability, management and accessibility of data of importance to all fields of science and technology. CODATA is a resource that provides scientists and engineers with access to international data activities for increased awareness, direct cooperation and new knowledge. Today 23 countries are members, and 14 International Scientific Unions have assigned liaison delegages.

CODATA is concerned with all types of data resulting from experimental measurements, observations and calculations in every field of science and technology, including the physical sciences, biology, geology, astronomy, engineering, environmental science, ecology and others. Particular emphasis is given to data management problems common to different disciplines and to data used outside the field in which they were generated.

Objectives

The improvement of the quality and accessibility of data, as well as the methods by which data are acquired, managed, analysed and evaluated, with a particular emphasis on developing countries;

The facilitation of international cooperation among those collecting, organising and using data;

The promotion of an increased awareness in the scientific and technical community of the importance of these activities;

The consideration of data access and intellectual property issues;

In short, the reason for CODATA is to help foster and advance science and technology through developing and sharing knowledge about data and the activities that work with data.

CODATA uses many mechanisms in its ongoing effort to reach these objectives. These are :

Task Groups, Working Groups, National Member Activities, Conferences, Workshops, Publications, and cooperation with other organisations of common interests.

Activities

CODATA has four primary activities, all in support of its fundamental aim of fostering worldwide cooperation in scientific and technical data :

Sponsorship of a Biennial CODATA International Conference on Data, which attracts approximately 300 data specialists from around the world;

Specialist meetings of scientific data experts, which address issues specific to one discipline or topic; Publications on data handling, data compilation, surveys of data activities and conference proceedings; Sponsorship of Task Groups, Working Groups, Commissions and other groups addressing specific data issues, such as :

- Coordination of multinational data project;
- Establishment of formal standards to promote data exchange, sharing and compatibility;
- Guidelines to presentation of data in the primary literature or archival data banks;
- Supplying information on sources of reliable data;
- Education and training;
- Preparation of key data sets for which consistent international use is desirable;
- Organisation of conferences and workshops

The national committees of CODATA often organise data activities on a national level. Much of the most important work of CODATA, however, lies outside its formal activities in its providing a milieu in which data experts from different countries can interact, cooperate directly, develop bilateral collaborations outside of CODATA, and exchange ideas and knowledge.

A major driving force in the establishment of CODATA was the fact that the management of scientific data could no longer be left to the ad hoc efforts of a few dedicated individuals. The rapid expansion of scientific research which had occurred continuously since the end of World War II, brought with it a corresponding expansion in the amount of data generated. If this investment in research is to be fully utilized, better mechanisms are needed to evaluate, store, retrieve and disseminate the data. While national organisations carry out some of these functions, CODATA is the international umbrella organisation which encourages, coordinates, and tries to avoid duplication of such efforts.

CODATA is open to new projects, especially in this time of increasing importance of data because of computer-based modeling and the internet. Today more and more data sources of unknown quality and origin are becoming easily available, via the World Wide Web. CODATA provides a

home for international data experts needing to address data quality and data access issues to turn the Information Revolution into the positive force for the future. Today's data become the products and processes of tomorrow. CODATA is ready to help science and technology achieve a better tomorrow through better data today.

7.3 Gobal Information Systems

7.3.1 International Nuclear Information System (INIS)

INIS, the International Nuclear Information System is the world's leading information system on the peaceful uses of nuclear science and technology. INIS is operated by the International Atomic Energy Agency (IAEA) in collaboration with its member states and co-operating international organisations. The IAEA, based in Vienna, Austria, is an autonomous organisation within the United Nations system.

INIS was established in 1970 in response to the IAEA's mandate "....to foster the exchange of scientific and technical information on peaceful uses of atomic energy" For 36 years, INIS has been successfully fulfilling its mission to:

- Create a reservoir of nuclear information for current and future generations;
- provide quality nuclear information services to member states, and
- assist with the development of a culture of information and knowledge sharing.

INIS possess most of the world's scientific and technical literature on a wide range of subjects from nuclear engineering, safeguards and non-proliferation to applications in agriculture and health.

INIS Products

There are three major INIS products :

The INIS Database, which now contains 2.7 million bibliographic records; it is accessible by subscription only and has currently 1.3 million authorized users.

A unique collection of about 700,000 full-text documents (Non-Conventional "grey" Literature - NCL) in 63 languages, including many documents that cannot easily be found anywhere else.

The INIS Multilingual Thesaurus - a major tool for describing nuclear

information and knowledge in a structured form, which assists in multilingual and semantic searches.

International Cooperation

INIS is operated by the IAEA in collaboration with, at present, 116 Member States and 22 International Organisations. Active Partnerships with other organisations in Member States are also developed.

INIS' strength is based on this international cooperation. Representation in the system is at Governmental level. National INIS Centres are reponsible for all related activities in a country.

Decentralization

Decentralisation is an important element of INIS' sources. Collecting relevant literature and disseminating INIS output products to end-users is decentralised to National INIS Centres in Member States.

This trusted international mechanism allows INIS to achieve widest coverage of national nuclear-related literature, overcome cultural and language barriers, and give every INIS Member the right to access nuclear information of all other INIS Members.

What INIS does?

INIS provides a comprehensive information reference service for literature on the peaceful applications of nuclear science and technology. To do this, INIS processes most of the world's scientific and technical literature that falls within its subject scope and maintains a database which currently contains over 2.5 million bibliographic references, making it the world's most comprehensive information source on the peaceful applications of nuclear science and technology.

The INIS Database is a bibliographic database compiled from the data submitted by INIS Members. All the bibliographic references found in INIS Database have been selected, abstracted and indexed in English by INIS Members according to agreed rules and standards.

The subject scope of the INIS Database was developed to respond to the information needs of the international community in the areas of the IAEA's interests and activities covering the peaceful uses of nuclear science and technology. There are central areas to the scope such as nuclear reactors, reactor safety, nuclear fusion, applications of radiation, and radioisotopes in

medicine, agriculture, industry and pest control as well as related fields such as nuclear chemistry, nuclear physics, and material science.

From 1992, the economic and environmental aspects of all non-nuclear energy sources are included in the scope.

Additionally, INIS also maintains a unique collection of full text non-conventional (grey) literature that would be difficult to obtain elsewhere.

INIS publishes INIS Atom Index – a semimonthly journal. BARC serves as the input centre for INIS.

7.3.2 International Information System for the Agricultural Sciences and Technology (AGRIS)

AGRIS was created by the Food and Agriculture Organisation of the United Nations and became operational in 1975. The centralized processing centre is located in Rome. It is modelled on INIS. AGRIS offers an international perspective on crucial agricultural reserch. The many aspects of agriculture including forestry, animal husbandry, aquatic sciences and fisheries, and human nutrition from over 135 participating countries are covered.

Literature includes unique material such as unpublished scientific and technical reports, theses, conference papers, government publications and more. Approximately 130,000 records are added each year with key words in English, French, and Spanish. The archival discs now cover 1975 through 1990. The current disc covers from 1991 to the present.

Products

Agricola Full Set ; Arch. Set + 12 Mo Subs W/Quarterly updates

CAB Abstracts 1990 – Present

FSTA Monthly Updates 1990 +

CAB Abstracts Lease 1973 – Present W/ Monthly Updates

Silver Linker Database W/ Weekly Updates Via Quikdata or Internet

Agricola 12 Month Subscription with Quarterly updates or Internet Medline (1966 – Date)

Biotechnology Abstracts 12 Mo Subscription W/Quarterly updates Agricola (1979 – Date)

TROPAG & RURAL 12 Month Subscription W/Semi – Annual Updates 1975 –

In July 1974, India formally decided to participate in AGRIS Programme on a national basis through Agricultural Research Information Centre of Indian

Council of Agricultural Research (ICAR). After an initial experiment carried out in November 1974, the Agricultural Research Centre of ICAR has been participating in the AGRIS programme since May 1975.

7.3.3 United National Environment Programme (UNEP) INFOTERRA

UNEP - Infoterra is an international environmental referral and research network made up of 177 countries coordinated by the United Nations Environment Programme (UNEP) in Nairobi, Kenya. The US National Focal Point for UNEP - Infoterra is located at the EPA Headquarters Library and is managed by the Office of Environmental Information.

The Services offered by UNEP - Infoterra/USA include responding to requests from the international community for environmental information through document delivery, database searching, bibliographic products, purchasing information and referrals to experts. Additionally, UNEP - Infoterra / USA will assist U.S. residents in identifying sources of international environmental information.

Publications

Earthlink is a bi-monthly current awareness newsletter produced by UNEP - Infoterra/USA. **Earthlink** provides information on international environmental activities, publications and news of interest ot EPA staff and other environmental professionals.

Caribbean Currents is a newsletter edited by UNEP - Infoterra/ USA in its capacity as the Regional Service Centre (RSC) for UNEP - Infoterra National Focal Points (NEPs) in the English and French speaking Caribbean.

7.4 Other Organisations

There are some nationally controlled services and systems which cater their services and products internationally. Some of them are controlled by commercial organisations and their services have become popular to users internationally. Let us discuss these organisations and services.

7.4.1 Institute of Scientific Information (ISI)

The ISI was founded by Eugene Garfield in 1960. It was acquired by Thomson Scientific and Healthcare in 1992 and was known as Thomson ISI and now

merely Thomson Scientific. ISI offers bibliograpohic database services. Its speciality is citation indexing and analysis, a field pioneered by Garfield. It maintains a citation database covering thousands of academic journals, (a continuation of its longtime print based indexing services) the Science Citation Index (SCI), the Social Science Citation Index (SSCI) and the Arts and Humanities Citation Index (AHCI), all of which are available via ISI's web of knowledge database service. This database allows a researcher to identify which articles have been cited most frequently and who cited them. ISI also publishes an annual Journal Citation Report which lists an impact factor for each of the journals that it tracks. Within the scientific community, journal impact factors, play a huge but controversial role in determining the kudos attached to a scientist's published research record.

The impact factor, abbreviated as IF is a measure of the citations to science and social science journals. It is frequently used as a proxy for the importance of a journal in its field. It was devised by Eugene Garfield, the founder of the Institute for Scientific Information. Impact factors are calculated each year by the ISI for those journals which it indexes, and the factors and indices are published in Journal Citation Reports (JCR). Some related values, also calculated and published by the same organisation are the Immediacy Index - the average Citation Number of an article in that year; the journal cited half-life-the median age of the article that was cited in J.C.R. each year. For example, if the journal's half life in 2005 in 5, that means the citations from 2001-2005 are 50% of all the citations from that journal in 2005. The aggregate impact factor for a subject category - it is calculated taking into account the number of citations, to all journals in the subject category and the number of articles from all the journals in the subject category.

An early offshoot of SCI in 1965 was the launch of the first commercial system of SDI, periodic updates of literature searches based on user profiles called Automatic Subject Citation Alert. This continues in electronic form Oas the ISI Personal Alert, and this feature is now almost universally available in any bibliometric database and for most electronic journals.

Mission

ISI's basic mission as a database publishing company is to provide comprehensive coverage of the world's most important and influential research conducted throughout the world.

7.4.2 Chemical Abstracts Service (CAS)

CAS was established in 1907 and is located in Columbas, Ohio and is a division of the American Chemical Society. CAS is a team of scientists, creating and delivering the most effective digital information environment for scientific research and discovery. CAS provides pathways to published research in the world's journal and patent literature – virtually everything relevant to chemistry plus a wealth of information in the life sciences and a wide range of other scientific disciplines – back to the beginning of the twentieth century.

Since 1907, CAS has indexed and summarised chemistry related articles from more than 40,000 scientific journals in addition to patents, conference proceedings and other documents pertinent to chemistry, life sciences and many other fields. In total, abstracts for more than 24 million documents are accessible online through CAS.

Through the CA (Chemical Abstracts), CA on CD, STN, the CAS files distributed through licensed vendors, the SciFinder and SciFinder Scholar desktop research tools, and the STN Easy or STN on the Web services, data produced by CAS is accessible to virtually any scientific researcher worldwide in industry, governmental research institutions, and academics.

Substance identification is a special strength of CAS. It is widely known as the CAS Registry, the largest substance identification system in existence. When a Chemical substance, newly encountered in the literature, is processed by CAS, its molecular structure diagram, systematic chemical name, molecular formula, and other identifying information are added to the Registry and it is assigned a unique CAS Registry Number. Registry now contains records for more than 26 million organic and inorganic substances and more than 56 million sequences. CAS Registry Numbers are used in reference works, databases, and regulatory compliance documents by many organisations around the world to identify substances without the ambiguity of chemical nomenclature.

CAS brings out every two weeks CA SELECTS, CAS Biotech, and Chemical Titles.

7.4.3 Medical Literature Analysis and Retrieval System (MEDLARS)

The US National Library of Medicine (NLM) has been operating this project since 1964 by way of storing citations in its computer for use in MEDLARS which generated a number of major indices like Index Medicus, a monthly

index to articles in 3,000 journals. MEDLARS is thus a computer-based system of the US National Library of Medicine, the rapid access to NLM's store of biomedical information. Today, through the Internet and Web, MEDLARS search services are available around the world without charge.

MEDLINE® is the best known of NLM's databases. Essentially Index Medicus of MEDLINE enables anyone to query the NLM Computer's store of journal article on specific topics. It currently contains 9 million references going back to the mid-19 databases, provides information cataloguing and serials, toxicological and environmental health data, AIDS and other specialised areas. Through the World Wide Web, MEDLINE searches a day are done by health professionals, scientists, librarians and public. A new Web Service, called MEDLINE Plus, links users to many sources of health information.

The NLM is the largest medical library in the world. It is part of the National Institute of Health (NIH) in Bethesda, Maryland. It collects materials in all areas of biomedicinal health care, as well as works on biomedical aspects of technology, the humanities, physical, life and social sciences. NLM is the key resource for health science libraries. It is to this extraordinary resource that MEDLARS gives access.

7.5 Summary

To provide access to relevant information the librarians and information specialists have been facing perennial problems since World War II. International organisations like UNESCO, IFLA, ICSU, ICSU-AB, CODATA have been playing a key role in coordinating, promoting and developing information services all over the globe. Similarly global information systems like INIS, AGRIS work on the principle of the decentralised input, centralised processing and decentralised act for disseminating information. Some of the commercial organisations like ISI, CAS, MEDLARS are also operating in the right direction to cater to the needs of users in their respective fields. All these information sources and systems are international in scope. Their programmes and activities very much relate to developing countries.

7.6 Exercise

1. Discuss the programmes and activities with reference to developing countries.

2. Indicate the features of UNESCO's PGI.
3. Discuss the core programmes of IFLA.
4. What are the salient features of CODATA ?
5. Write a note on (UNEP) INFOTERRA
6. State the database services of ISI.
7. What is CAS? How does it provide pathways to published research in the world's journal and patent literature?
8. How do MEDLARS search services operate?

7.7 References and Further Reading

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Unit 8 ❐ Content Analysis and its Correlation to Users

Structure

8.0 Objectives
8.1 Introduction
8.2 Definition
8.3 Data
8.4 Data : Unitizing
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8.1.2 References and Further Reading

8.0 Objectives

After reading this unit you will have :

a clear understanding of the meaning and uses of content analysis;

an overview of conceptual analysis and its associated methodology;

an idea about the use of content analysis in different branches of Library nd Information studies.

8.1 Introduction

Content analysis is a research tool used to determine the presence of certain words or concepts within texts or sets of texts. Researches quantify and analyse the presence, meanings and relationships of such words and concepts, then make inferences about the messages written, the texts, the writer (s), the audience and even the culture and time of which these are a part. Texts can be defined broadly as books, book chapters, essays, interviews, discussions, newspaper headlines, and articles, historical documents, speeches, conversations, advertising, theatre, informal conversation or really any occurrence of communicative language. To conduct a content analysis on any such text, the text is coded or broken down, into manageable categories on a variety of levels – word, word sense, phrase, sentence, or theme and then examined using one of content analysis' basic methods; conceptual analysis or relational analysis.

As a research methodology, content analysis has its roots in the study of mass communications in the 1950s. Based on a basic communications model of sender/message/ receiver, initially researchers emphasized making inferences based on quantified analysis of recording, easily identifiable aspects of text content, sometimes rererred to as manifest content. Since then, researchers in many fields, including anthropology, library and information studies (LIS), management, sociology, have used content analysis. In the process, they have adapted content analysis to suit the unique needs of their research questions and strategies and have developed a cluster of techniques and approaches for analysing text grouped under the broad term of textual analysis. A significant change has been a broadening of text aspects to include syntactic, syntagmatic and pragmatic aspects of text, although not always within the same study.

In the compilation of dictionaries, glossaries, language thesauri, the technique of content analysis is applied implicitly.

In dictionaries, monolingual, bilingual and multilingual we collect words from written sources and spoken practices, examine their usages in different contexts and organise them in a manner most acceptable to the users and bring them out as reference tools.

8.2 Definition

Content analysis is "a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use" (Krippendorff, 2004, p. 18). The notion of inference is especially important in content analysis. The researcher uses analytical constructs, or rules of inference, to move from the text to the answers to the research questions. The two domains, the texts and the context, are logically independent, and the researcher draws conclusions from one independent domain (the texts) to the other (the context).

In LIS studies the analytical constructs which are not always explicit.

The analytical constructs may be derived from (1) existing theories or practices; (2) the experience and knowledge of experts; and (3) previous research. (Krippendorff, 2004, p. 173). P. Marying, the author of a standard German-language text on qualitative content analysis, suggests using a model of communication to determine the focal point for the inferences. Conclusions can be drawn about the communicator, the message or text, the situation surrounding its creation-including the socio-cultural background of the communication - and /or the effect of the message. For example, D.A. Niteki (1993) focuses on characterizing the communicator. She draws inferences about academicians' conceptual models of libraries based on analysing the metaphors they used when they referred to libraries in published letters to the editor and opinion articles.

Content analysis involves spicialized procedures that, at least in quantifative content analysis, allow for replication. The findings of a good study using quantitafive content analysis, therefore, do not rely solely on the authority of the researchers doing the content analysis for their acceptability. They can be subjected to independent tests and techniques for judging their validity and reliability. Indeed, the extent to which validity and reliability can be judged are significant issues in evaluating a research methodology.

8.3 Data

The data provide useful evidence for testing hypotheses or answering research questions. Another key factor is that the data communicate; they convey message from a sender to a receiver. Pictures on a web site, for example, are used to convey one or more meanings, often in combination with text and as

such, can be subjected to content analysis either by themselves or by looking at the relationships between images and text.

R. D. Beaugrande and W. U. Dressier (1981) suggest seven criteria for defining a text, which is the more common form of data for content analysis : cohesion, coherence, intentionality, acceptibility, infermativity, situationality and intertextuality. In other words, text appropriate for content analysis is composed of linguistic elements arranged in a linear sequence that follows rules of grammar and dependencies and uses devices such as recurrence, anaphora and cataphora, ellipses, and conjunctions to cause the elements to "hang together" to create a message (cohesion). The text has meaning, often established through relationships or implicature that may not be linguistically evident, and draws on frameworks within the recipient for understanding (coherence). The writer or speaker of the text intends for it to convey meaning related to his attitude and purpose (intentionality), conversely recipients of the message understand the text as a message, they expect it to be useful or relevant (acceptability). The text may contain new or expected information, allowing for judgements about the quality of informing (informativity). The situation surrounding the text affects its production and determines what is appropriate for the situation and the culture (situationality) or is related to other similar texts, for example others within a genre, such as transcripts of chat sessions (another meaning of intertexuality).

The objective of content analysis is usually to identify that person's perspective on the topic. Reference interviews are a form of dyadic, interpersonal communication. Messages on electronic lists offer an example of group messaging, the person sends the message to the group, any member of which can reply. The objective in this case, is to characterise the communications of the group. Job advertisements in LIS Journals are examples of mass messaging.

8.4 Data : Unitizing

At an early point in a content analysis study, the data need to be "chunked", that is, broken into units for sampling, collecting and analysis and reporting. Sampling units serve to identify the population and establish the basis for sampling. Data collection units are the units for measuring variables. Units of analysis are the basis for reporting analysis.

8.5 Procedures : Quantitative Content Analysis

Before discussing distinctions between qualitative and quantitative content analysis, it is useful to identify and explain the steps involved in content analysis. The focus initially is on the steps for a study using quantitative content analysis. The steps are as follows :

1. Establish hypothesis or hypotheses;
2. Indentify appropriate data (text or other communicative meterial);
3. Determine sampling method and sampling unit;
4. Draw sample;
5. Establish coding scheme that allows for testing hypothesis;
7. Code data;
8. Check for reliability of coding and adjust coding process, if necessary;
9. Analyse coded data, applying statistical test(s);
10. Write up results.

8.5.1 Generating Hypothesis

Quantitative content analysis flows from a positivist research tradition and is deductive. Its objective is to test hypotheses. Drawing on related research and existing relevant theory, a researcher first establishes one or more hypotheses that can be tested using context analysis. These hypotheses flow from what is already known about the problem and the extant research questions.

8.5.2 Determining Data for Analysis

The hypotheses, in turn, serve to guide subsequent decisions in the methodology. For example, they determine the nature of the data that would be required to test the hypotheses. To test hypothesis, we need to collect reference interviews under different situations : from librarians with training (1) before and (2) after the training and (3) from librarians with no direct training.

8.5.3 Sampling

A major objective of social science research is generalizability, that is, the ability to generalize from the specific to the general - for example, to study the sample but infer from the sample's findings something about the

population from which the sample is drawn. With a relatively non-stratified population, the ideal is random sampling, that is, sampling in which the probability of any unit within the population being selected is the same. To do this effectively, it is essential to know all units that exist in the population, such as all research articles published during a particular time period within a set of journals.

8.5.4 Coding

In quantitative content analysis the coding scheme is determined a priori, that is, before coding begins. Several coding schemes developed by LIS researchers have potentially broad use in LIS. A good coding scheme has categories or levels that are exhaustive, that is, all relevant aspects of the construct are represented, are mutually exclusive and are measured at the highest possible scale of measurement based on the four scales of measurement (nominal, ordinal, interval and ratio).

8.5.5 Analyzing the Coding Data

After coding, which in itself is analytical, the researcher undertakes serveral additional steps. First, he summarizes the findings identified during the coding, formulating and relating them so that they can be understood easily and are applicable to his hypotheses or research questions. Second, he identifies and articulates the patterns and relationships among the findings so that he can test hypotheses or answer the research questions. Finally, he relates these more involved findings to those in other situations or other studies. The last step allows him to put his findings into perspective.

8.6 Procodures : Qualitative Analysis

Proponents of qualitative and quantitative content analysis often emphasise their differences, yet many similarities exist. Noting four common elements, Krippendorff points out "The proponents of both approaches : (1) Sample text, in the sense of selecting what is relevant; (2) Unitize test, in the sense of distinguishing words or propositions and using quotes or examples; (3) Contextualize what they are reading in light of what they know about the circumstances surrounding the text; and (4) Have specific research questions in mind."

8.6.1 Formulating Research Questions

Qualitative content analysis flows from a humanistic, not a positivistic, tradition. It is inductive. Qualitative content analysis may yield testable hypotheses but that is not its immediate purpose. Replacing hypotheses are foreshadowing questions, that is, open questions that guide the research and influence the data that are gathered. Here the text plays a slightly different role in that, as the researcher reads through the data and scrutinizes them closely to identify concepts and patterns, some patterns and concepts may emerge that were not foreshadowed but that are, nevertheless, important aspects to consider. In that case, the researcher questions to pursue these need patterns.

8.6.2 Sampling

Both qualitative and quantitative context analysis researchers sample text and choose text that is relevant for their purpose. But qualitative researchers focus on the uniqueness of the text and are consciously aware of the multiple interpretations than can arise from a close perusal of it.

8.6.3 Coding

For qualitative coding, the researcher's initial foci are not a priori codes but the initial foreshadowing questions he aims to answer through his research. The questions guide his initial approach to the data, but the proces is inductive, not deductive. The evidence plays almost as significant a role in shaping the analysis as the initial questions. It is not unusual to have a person doing qualitative content analysis read through the data initially with the intent of trying to see the big picture.

wualitative content analysis has developed approaches similar to validity and reliability for assessing the rigour of the coding and analysis process. Qualitative content analysis focuses on creating a picture of a given phenomenon that is always embedded within a particular context, not on describing reality objectively.

8.6.4 Method of Analysis

Analysis is integrated into coding much more in qualitative content analysis than in quantitative content analysis. The emphasis is always on answering the research questions but considering as well only transformations that the

initial foreshadowing questions may have undergone during the coding or any new questions or themes that emerge during the coding. Often the result of qualitative analysis is a composite picture of the phenomenon being studied. The picture carefully incorporates the context, including the population, the situation(s) and the theoretical construct. The goal is to depict the "big picture" of a given subject, displaying conceptual depth through thoughtful arrangement of a wealth of detailed observations.

8.7 Application of Content Analysis in LIS

Content analysis can be applied to the following broad groups in Library and Information Science :

Information Storage and Retrieval;
Indexing Language;
User Studies;
Management.

(a) Information Storage and Retrieval

We organise libraries by arranging collections using certain standared systems of classification. Classification refers both to the arrangement in some logical order of the field of knowledge and to the art of arranging books or other documents in conformity with such a scheme. The library catalogue informs to the clientele whether the required item is available in the library. In both cases contents of documents are analysed to provide access through author, title and subject. With the exponential growth of publications and increasing trends in interdisciplinary and multidisciplinary features of subjects, various indexing techniques have been introduced in order to provide access to the documents. Here also content analysis is required.

For indexing we are to examine documents for ascertaining their subject content; we need to identify the principal concepts present in the subject of the documents; we need to transform these concepts in terms of indexing language. Obviously all these activities conform to the purpose of content analysis. The records in retrieval systems may be of various kinds, for example, quantitative and qualitative data about variables of interest of clientiles; texts drawings, graphs, charts, etc; locations of people, institutions, manufactures; and others.

Computer-based indexing systems use content analysis to set the right keywords to represent the thought content of a document.

(b) Indexing Language

Indexing language comprising classification schemes, alphabetical subject, heading lists and thesauri is designed for a special purpose. Other than subject description indexing language is used in organising a searcheable file to be used by the information seekers. A match between the description of document done by the indexer and description of request made by the user only yields a positive result. This match is possible if the file is organised in a predetermined order and the users are aware of it. In successful organisation of this file and subsequent matching of document and request, semantic and syntax of indexing language have very important role to play.

The matching of document and request depends on well constructed indexing terms. The indexer has to determine the subject matter of documents by analysing their contents; selecting terms which summarise the subject, and indicating relationships between the concepts represented by these terms. The indexing language is indispensable both at the time of storage, that is, input stage and later at the time of matching, that is, output stage. In the construction of classification schemes, subject heading lists and thesauri the techniques of content analysis are used.

(c) Library Services

Library records of various types have been used by librarians for a long time to elicit useful information. Records of reference questions and literature searches can give librarians insight into the operation of a library, use of various types of documents, number of documents used per question, number of facets per question, etc. All these can be utilised in the design and improvement of library services.

Similarly circulation records can be analysed to determine the activity of a library as well as to determine reading habits of library users. A closely related method is the analysis of the personal indices used by the researchers. All these efforts require content analysis.

(d) Information Services and Products

The information system or an information centre exists to provide services. It may be realised that the information that is announced as new will have

to be absorbed and integrated into the already existing reservoir or store of information after some time. This process of accretion is a normal function of any information system. But what is most important from the point of view of a user is the availability of a separate mechanism or device by which easy access to any aspect of the entire store is assured. This is usually done through a number of services generally in the form of abstracts, indices, digests, guides, keys, etc. In repackaging services, the literature on a particular topic is reshaped and rewritten to suit the requirements of users. All these services and products are based on proper content analysis techniques.

8.8 Advantages of Content Analysis

Content analysis offers several advantages to researchers who consider using it. In particular, content analysis :

a. looks directly at communication via texts or transcripts, and hence gets at the central aspect of social interaction;

b. can allow for both quantitative and qualitative operations;

c. can provide valuable historical/ cultural insights over time through analysis of texts;

d. provides insight into complex models of human thought and language use;

e. allows closeness to text which can alternate between specific categories and relationships and also statistically analyse the coded form of the text;

f. is an unobtrusive means of analysing interactions.

8.9 Disadvantages of Content Analysis

Content analysis suffers from several disadvantages, both theoretical and procedural. In particular, content analysis :

a. can be extremely time consuming;

b. is subject to increased error, particularly when relational analysis is used to attain a higher level of interpretation;

c. is often devoid of theoretical base, or attempts too liberally to draw meaningful inferences about the relationships and impacts implied in a study;

d. is inherently reductive, particularly when dealing with complex texts;

e. tends too often to simply consist of word counts;

f. can be difficult to automate or computerize.

8.10 Summary

Many subject fields have adapted content analysis to suit the unique needs of their research questions. Content analysis involves specialized procedures that allow for replication. We have explained the steps involved in content analysis. In quantitative content analysis the coding scheme is determined before coding begins. We have explained procedures both for quantitative and qualitative content analyses. We have discussed the applications of content analysis in LIS. Here, the four broad groups viz. information storage and retrieval, indexing language, user studies and management, have been explained. Finally, we have noted the advantages and disadvantages of content analysis.

8.11 Exercise

1. What is content analysis? Discuss its purpose.
2. Examine the applications ot content analysis in various activities of a library or an information centre.
3. Illustrate the use of content analysis as a reasearch methodology in library and information services.
4. Bring out the similarities between qualitative and quantitative content analysis.
5. What is the objective of content analysis? Illustrate.

8.12 References and Further Reading

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Unit 9 ❑ Customised Organisation of Information Sources

Structure

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9.2 Information sources and their varieties
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9.0 Objectives

After reading this unit you will be able;

1) to know convenient categories of information sources;
2) to understand the customised organisation of sources;
3) to know about the nature of information need;
4) to realise that information need is a composite concept of different types of requirements and approaches to information.

9.1 Introduction

Information is among the major resources of a country such as its raw materials, finances, manpower, etc, that needs to be mobilised, organised and utilized for the progress and well being of the people. There is no field of human activity wherein information is not a component. Whether it is research and development, business and industry, government affairs, education and training, information has to be acquired, stored, processed, retrieved, and disseminated for communication. Indeed the effectiveness of performance in all these spheres of activity, depends very largely on the availability of information at the right time in adequate quality and quality.

All human activities result in the creation of information which are mostly recorded and communicated through various media. This information transfer process throws up incessantly a great volume of information sources embodied in a variety of forms, languages and quality. It is absolutely necessary for an information system to respond to this environmental stimuli by acquiring these documents to meet the requirements of user interests, both presently expressed, as well as possible future interests. This, in fact, is the very first step in the organisation of any information system.

A document in any form can be a source of information. For quite some time now the printed page has been the most useful and reliable source of information. The printed page in the form of book, periodicals, reports, etc is to be witnessed everywhere. Along with printed page, some other forms of documents have also appeared on the scene demanding more and more attention. The development of information technology and varieties of dissemination media have made the customisation of sources difficult.

9.2 Information sources and their varieties

Any work undertaken, invariably begins with a search for information already generated and recorded in that area. Due to complex nature of the numerous information sources, it is always a problem to select the information of value. As the saying goes 'A thing well begun is half done', the choice of the most appropriate source may make the difference between minutes on a task and spending hours or days, sometimes even between success and failure. Information work, therefore necessitates, knowledge of varieties of information soruces, their scope and limitations, reference characteristics, and ease of use.

9.2.1 Document Sources

Scientific and technical literature has a definite structure in that they do not merely comprise a miscellaneous collection of papers, reports, books, etc, but can be divided into quite basic and fundamental categories. These categories have come into being largely as a result of the information requirements of the scientists themselves. Of course, the non-scientists approach for information to the literature does differ from that of the scientis or technologist. Only rarely would he attempt to master the primary literature, though he is most often conversant with their contents, varieties and characteristics. His stock-in-trade, in fact, is the secondary and tertiary literature. His particular armoury lies in, his grasp through systematic study of the underlying pattern discernible in the literature, and his familiarity with the variety in which it manifests itself, combined with an understanding of the relationships of their forms with one another, their comparative reliability and their varying uses.

9.2.1.1 Primary Sources

Among the primary sources, the periodical is said to have assumed the most important place. Results of research are usually first reported in periodicals. A periodical contains mostly original contributions. Next to periodicals, the research report is considered an important primary source. It is difficult to say what exactly is the unique information characteristic of a research report. It appears there is a wide variety. In some cases a report may be just like a preliminary communication of a work presented in a rough and ready manner. There are, at the same time reports which provide detailed and most authoritative account of work and results obtained may not be available in any other source. Another view is that all useful information contained in research reports are eventually reported in periodicals.

Conferences, conventions, symposia, etc. have been used by the scientific community as useful channels for communication. Patents and standards are entirely different forms of primary sources of information. Each patent presents a detailed account of a new manufacturing process or improvement of existing process, a new product, etc. which may not be available in this form in other sources. Standard is a unique source of information. The importance of standards in any industrial community is well known.

Trade literature produced by manufactures for imparting useful information about their products come in various forms and formats. They

include various types of catalogues, manuals, guides, house journals, etc. The complete description, principles and working of a newly developed highly sophisticated instrument may be available only in the manufacturers' trade literature.

Theses and dissertations are by their very nature meant to report some original work in a specified field. They may be result of purely academic pursuit.

9.2.1.2 Secondary Sources

Secondary documents are based on primary documents. Secondary sources deal with results of the analytical processing of information contained in the primary sources. By their very nature, they are more often widely available than the primary literature. By their repackaging and reprocessing information from the primary literature, the secondary sources are not only repositories of digested data but also signposts or bibliographical keys to the primary soruces.

Secondary documents can be considered in four types : 1) Access Sources, 2) Review Sources, 3. Reference Sources and 4. Textbooks.

Access sources index primary literature selectively or comprehensively with/without annotations/abstracts, providing information about primary literature. In addition these give an idea of the literature in a subject field, generally or specifically, currently or retrospectively. These take the form of closed bibliographies or indexing or abstracting periodicals. An abstracting periodical, essentially provides, a scientific worker a bird's eye view of the progress of the subject.

Review sources survey subject fields highlighting the significant literature of the field, giving a state-of-the-art report of the subject, or annual progress/advances. Sometimes they take the from of a comprehensive and definitive treatment to a specific subject during a certain period. This type is manifested in publications like annual reviews, advances, state-of-the-art reports, treatises, monographs, etc.

Reference sources are conventional referencebooks and there are a variety of them. Examples of these type are the encyclopaedias, dictionaries, handbooks, etc. each having a characteristic feature.

Textbooks are secondary sources in that they are assimilated information written for a particular level of audience, the information having been drawn

from primary sources. The treatment is concise or comprehensive depending on the audience to whom it is meant for.

9.2.1.3 Tertiary Sources

These are usually compilations drawn from primary or secondary sources, organised and arranged according to a definite plan. Essentially these are to aid researchers in using the primary and secondary sources. A characteristic feature of these sources are that they do not carry any subject information at all. Examples of this category are bibliography of bibliographies, directories of persons, organisations, products, etc., guides to literature, lists of books, etc.

9.3 Customised Organisation of Sources : Need and Meaning

No less than other kinds of information, information resulting from science is a vital resource. Throughout the modern society the need for scientific information is increasingly evident. In basic research, the research worker needs to know the results of research; in manufacturing industry, applied research is the starting point of development. In industry the main reason to use scientific information is the need or desire to innovate.

As in innovation in industry, the responsible bodies may or may not employ research scientists; which is essential in that they should have access to up-to-date and reliable information often at very short notice, and they should be able to interpret it and perceive its value so as to ensure its effective use.

Scientific information thus needs to be communicated in suitable form, to several kinds of uses. The passage of scientific information to all these types of uses creates major problems of presentation and handling—with changes in emphasis, grouping and level of treatment to suit different requirements. The problem of scientific information, thus is essentially to organise available resources in the best way to satisfy the broad range of needs as it also, perhaps, involves exploration and, where possible, use all available media, whether 'mass' or selective.

Scattering of information is also hindrance experienced by the users. This necessitates the organisation of information sources in a proper way that facilitates easy access to the users. All these factors necessitate customised organisation of information sources. Customised organisation means to make

it in such a way as to suit specified individual requirements. If the information sources are organised without keeping in view the requirements of users, these may lead to wastage of efforts. Herein lies the importance of customised organisation of information sources.

9.4 Users : Their nature of need

The nature of need can be ascertained by the user studies. It has now been realised that information need is a composite concept of different types of requirements and approaches to information. There have been a large number of studies to understand the pattern of information need. Melvin Voigt made a remarkable analysis of the composite nature of requirements and approaches to information.

His study disclosed that the same person could interact with the information system in different ways at different times depending on his purpose in relation to his work, stage of his work, general interest, amount of information at his disposal and so on. Voigt identified three types of information requirements. Later on, a fourth type was introduced by others in the field. The requirements or approaches are :

1. Current Approach;
2. Everyday Approach;
3. Exhaustive Approach;
4. Catching-up or Brushing-up Approach.

9.4.1 Current Approach

The users want to keep themselves abreast of current developments, up to a fair degree not only in their own respective fields but also in the broader field or fields of interest or areas, whose developments can substantially change the course of their present work. Here, the worker interacts with the information system in a general way—browsing through his favourite periodicals, going through the abstract journals, etc—but all these without keeping in view any specific search for information. This need arises in those fields where the rate of development of the subject is very fast.

9.4.2 Everyday Approach

This need arises when there are certain types of information which are required by the research worker in the course of his investigation for specific piece of

information, such as data, for example, boiling point of a substance, a formula, etc. Such answers are furnished by consulting specific types of reference tools. Librarians are used to calling more or less a similar approach as short range reference queries

9.4.3 Exhaustive Approach

Here the dependence on documents is very much necessary. In this approach the users want to obtain information on a field as exhaustively as possible. When a worker or a team of workers wants to take up a new area of investigation, such an approach to information is necessary. Information sources for this approach furnish the total picture of that particular field asked for.

9.4.4 Catching-up Approach

This approach is occasional. This is likely to be an area where a worker may at times need to have a brief but a complete picture of recent developments. This is likely to be an area in which he is not an expert. As a result, he may not be current with the subject. The characteristic feature of the need is that the worker is not interested in that particular area. Hence in such a situation, he expects to have in the communication system a device which will help him in quickly catching-up with the progress in the field. These findings derived from user studies about information need have helped to modify, realign and redesign some of the tools and thus improve the communication system.

9.5. Customised Organisation of Sources in respect of various needs

We have discussed the nature of information sources and information needs of users. In the context of current and exhaustive information needs, we do not supply the actual information. But in the everyday and catching-up information needs, the sources should provide the users the exact information. It is clear that the announcement mechanism is necessary but can it satisfy the current approach of most of the users? Can the same mechanisms meet simultaneously the other two approaches also?

9.5.1 Source in respect of current information need

The usual channels available to a user to know the current developments are : information obtained orally from colleagues, gatekeeper, scientists and others, notice of meetings and private communication, attending meetings and conferences and getting information in both formal and informal ways, regular scanning of current issues of periodicals, and regular perusal of abstracting and indexing periodicals in one's subject field. In some cases, reviews and monographs are also used.

The current information need presupposes that the availability of information should be brought to the notice of the users as early as possible. In the context of a library the time limit should be after the receipt of the publication but well before the receipt of secondary publications containing them. Current awareness lists are being published at different levels, obviously addressed to different audience. There are lists being compiled and published by international agencies, professional organisations and others who are far away from the potential users. On the other hand, there are lists which are published by research institutions in the immediate context of their users keeping in view of their requirements, often called local documentation lists. If we consider general lists such as *Current Contents* of the Institute for Scientific Information, Philadelphia, *Chemical Titles* of the Chemical Abstracts Services, *Current Chemical Papers* of the Chemical Society and other similar lists, we find that in each case the field of coverage is a braod subject, the type of document included predominantly is current periodical literature and arrangement and presentation are of a very simple type. This is the simplest way to sustain the interests of the majority graph.

A local current awareness list has the advantage of tailoring the selection policy to the actual requirements of its users. In fact, a well produced local list can be the most effective instrument in exposing the active workers to the type of literature most needed for exploratory research and keep them current.

9.5.2 Sources in respect of everyday approach

The everyday approach stems from the research worker's frequent need for specific piece of information or data. He expects the information itself, not the literature. The most well-known example is the *International Critical Tables of Numerical Data of Physics, Chemistry and Technology* (7 vols. McGraw-Hill,

1926-1930). A number of handbooks have also been meeting the requirements in this field. A few such handbooks are : Chemical Rubber Company's *Handbook of Chemistry and Physics*, Perry's *Chemical Engineering Handbook*, etc. The concept of databand has brought with it a new concept in information service. Some efforts in this direction culminated in the formation of the Committee on Data for Science and Technology (CODATA) in 1966. Every documentation or information centre will have to be suitably linked with national specialised data banks and through them to the International banks.

9.5.3 Sources in respect of exhaustive approach

It has already been pointed out that exhaustive approach to information is in response to a well recognised need, namely, to find out all relevant literature or as much as possible on a subject. This need for a user, arises only occasionally, usually and when he takes up a new project or when he has come to the report writing stage relating to a project in hand. For exhaustive approach detailed indices, providing maximum case of approach, are very much necessary. Some of the earliest bibliographical tools such as the subject bibliography, abstracting and indexing periodicals are more adapted to meet this approach. The usual channels and methods for this approach are —abstracting and indexing services; subject bibliographies; references in monographs, treatises, journal articles, etc., information from textbooks, reviews, monographs, treatises of all these channels, the abstracting and indexing periodicals are the most suitable.

The indexing periodical is the most effective mechanism to provide the appropriate access for exhaustive approach. In exhaustive approach, the ultimate idea is to get the original document, the primary source. The full cycle of getting to the primary source may be through stages. For example, from an index or a combination of indices, one may go to the citation and abstract of a document. In case he wants move, the next more would be to get the document. If the required document happens to be in a language unknown to the user then the next stage would be to go through another set of tools like the indices of translation, lists of cover-to-cover translation, directories of translation polls and translators.

9.5.4. Sources in respect of catching-up approach

To meet the specific requirements of catching-up approach the reviews (subject reviews) and review publications are helpful. In a review publication, an

integrated picture of development can be presented. The size of the available literature in the field is considerably slimmed by taking into account only the significant contributions. Information analysis, consolidation and repackaging are methods followed in creating such sources which can satisfy this approach. Various kinds of state-of-the-art reports, advances and the like are suitable for this catching-up approach.

9.6. Conclusion

We have discussed the general type of user's need and related customised information sources. The need may be more varied and specific and according to the sources, should be designed to fulfil the need of the users. It may be mentioned in passing that case of use is very important from the perspective of the user. For illiterate masses, it will be worthwhile to present the information by audio-visual media. In the wake of the development of information technology, varieties of disseminating media have been evolved. We need to consider the customisation of sources in different ways.

9.7 Summary

Scientific and technical literature has a definite structure. We have discussed primary, secondary and tertiary sources. Scientific information needs to be communicated in a suitable form to the different kinds of users with different requirements. We have explained different types of requirements and approaches of users. The sources in respect of different approaches of users have been noted. The present day information centres should appreciate the varied needs and approaches of users and offer better quality information services than they are doing at present.

9.8 Exercise

1. What do you mean by 'customised organisation' of information sources? Illustrate
2. Indicate various categories of information sources.
3. Discuss the various types of sources which the users need at different points of time.
4. Describe the ways for customised organisation of information sources

5. When a brief but total picture of a particular field is to be represented to the user?

9.9. References and Further Study

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Unit 10 ❑ Citation Analysis and Cito-Analytical Products

Structure

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10.6 Summary
10.7 Exercise
10.8 References and Further Reading

10.0 Objectives

After reading this unit you will
(a) know what is citation;
(b) know what is citation analysis;
(c) understand Cito-Analytical products and their uses.

10.1 Introduction

Garfield's credit lies in putting a soul in the evolutionary life of the concept of citation and in integrating its various processes and activities. We cannot alter the past, but we can record it, and within reason we can use these records to anticipate the future. It has argued that the use of citation data for historical and sociological studies will increase in future. This is quite likely

as by this time citation data have proved their potentiality for these types of studies.

Citations are integral parts of scientific papers. Naturally, future of citations and citation data depends much on the scientific papers. Citation analysis has become an indispensable tool to objectively evaluate a research journal; put forward a guideline to use documents in a library; and select important periodicals in various fields of knowledge. Citation analysis helps to develop a balanced collection in the library. Citation analysis evaluates the impact a scientist or a research institution has made in the world.

10.2 Citation

The beauty way of achieving truth is the intuitive way. The intuitive attitude of mind has no exclusions; it comprehends every sort of experience, denying truth to none. But the rational mode of achieving knowledge is cumulative. New ideas in varied spheres of living are being constantly added or being opposed to another and old ideas cancelled or modified. Starting with a segment of the total circle of existences, inner and outer, the seeker can go on enlarging the segment till it is one with the circle itself. The revealed world of seekers with its profundity transcends the bounds of time and place and elevates the posterity. In the sphere of science this elevation is reflected in the sentiment of Newton when he candidly expressed—'If I have seen anything further that is standing on the shoulders of giants'. This indebtedness of researchers, whether in the field of science or social sciences, has found expression in citations or bibliographical references, accompanying research communications. Ethics of communication claims that previous concepts, methods, apparatus, etc. used in the current document should be duly recorded with the help of citations. Citations are used not only to pay homage to pioneers and give credit for related work but also to criticise, correct and dispute previous contributions. Whatever may be the reasons of their occurrences, citations seek to identify much of the earlier works that are pertinent to the subject of the citing document and thus provide further reading lists for users. For a long time, citations have been used for this purpose.

During recent years citations are being used, in addition to the previous purpose, for analysis and various studies to determine useful life of documents, to trace roots of subjects, to obtain ranked list of periodicals, etc. Crowning

all creation of citations, index based on bibliographical references has provided a special significance for citations. Rightly it has been viewed that these trivialities are vital facets of the scientific process. Rightly it has been observed that these lowly footnotes have attained a lofty height through these significant roles. In fact, citations are frozen footprints in the landscape of scholarly achievement; footprints which bear witness to the passage of ideas. Citations also give substantive expression to the process of innovation, and if properly organised, can provide the researcher with versatility.

10.3 Citation Analysis

Information scientists analyse and evaluate the systems that allow people to find answers or satisfy interests in large bodies of writings, such as library collections, scholarly literatures, and sectors of the World Wide Web. Such systems connect users with relevant writings through a variety of indices, including the citation indices of the Institute for Scientific Information (ISI), which are currently found online in libraries as the Web of Science. Citations link intellectual linkages in academic and professional disciplines and support document retrieval in ways complementary to standard subject indexing. Hence, information scientists have made citation patterns a major topic of research since the 1960s.

The subfield of information science to which citation analysis belongs is most often called bibliometrics (some now prefer scientometrics or informetrics)—the quantitative study of writings in the aggregate.

H. Small distinguishes two ways of analysing citations on the basis of the text immediately around them. Both have produced teams of research. The first is to classify abstract features of the relationship between citing and cited work, such as whether the cited work seems essential or inessential to the argument of the citing work and whether the citer's attitude seems positive or negative. The second is to read citations as indicators of concrete topics, as if they stood for subject headings.

Generally, the first requires the analyst to judge and code some aspect of the citation that is only implicit in the context, while in the second, the analyst makes use of explicit words of phrases connected with citation. The first thus depends relatively heavily on the analyst's expertise; the second, on the text in which the citation occurs. Both are forms of citation context analysis, but the second is sometimes called citation *content* analysis.

10.4 Cito-Analytical Products and their uses

The outcome of citation analysis gives rise to cito-analytical products. The products are many and serve different purposes. Ranked list of journals is one such product.

10.4.1 Journal Citation Reports

Journal Citation Report provides a systematic, objective means to evaluate the world's leading research journals. It offers a unique perspective for journal evaluation and comparison by accumulating and tabulating citation and article counts from virtually all specialities in the sciences, social sciences, and technology fields. To help anyone compare and discover which are the most significant, Journal Citation Reports can show :

Most frequently cited journals in a field;
Hottest journals in a field;
Highest impact journals in a field;
Most published articles in a field;
Subject category data for benchmarking.

JCR citation data comes from over 7,600 journals, representing more than 3,300 publishers worldwide in over 220 disciplines. Each annual edition contains the previous year's publication data and shows relationship between citing and cited journals in a clear, easy-to-use framework.

JCR Science Edition : Contains data from over 5,900 journals in 171 subject categories

JCR Social Sciences Edition : Over 1,700 journals in the 55 subject categories

10.4.2 Ranked List of Journals

What the authors read or use are usually reflected in their writings through citations. So a sample of citations reveals the general picture of the reading pattern of a community. The compilation of lists of most frequently cited periodicals has become a frequent exercise in different subject fields. Cross and Cross published in the *Science* in 1927 one of the earliest of such lists. This study presented a ranked list of periodicals in Chemistry as cited in the *Journal of the American Society*. Since then, large number of studies have been made. These ranked lists can provide the most objective and unbiased data regarding the selection of periodicals in libraries.

10.4.3 Ranked List of Journals by Impact Factor

Impact factor of a journal is indicative of its rank and to a certain extent its quality in the world. It is a measure of frequency with which an average article in a journal has been cited in a particular year. Higher the impact factor, higher is the prestige of the journal and the paper. Getting a paper published in such a journal is prestigious.

For example, Journal of Verbal Learning and Verbal Behaviour has the highest impact factor 2,260 among the 29 journals in the rank list.

Bibliometric indicators currently used to examine and evaluate the published knowledge production are primarily based on impact factors covered by *Science Citation Index* and published annually since 1975 in the *Journal Citation Reports*.This concept has been introduced by Garfield as a measure of the average citation frequency for a specific citable item (article, review, letter, discovery account, note, abstract) in a specific journal during a specific year or period. Commonly, the impact factor of a journal is defined as the ratio between citations and recent (previous two years) citable items published, or, in other words, as the average number of citations in a given year of articles published in that journal in the preceding two years. Thus, for instance, the impact factor for 1990 of *Physical Review Letters* (PRL) has been calculated as the accumulated number of 22,007 citations received in 1990 for articles published in the considered journal in 1988 (11,497 citations) and 1989 (10,510 citations) divided by the cumulated number 2901 (in 1988+1989)= 1430 (in 1988) + 1471 (in 1989) of citable articles published in that journal during the same two-year period; the impact factor of PRL in the year 1990 results then from the ratio 22,007 citations /2901 papers = 7.586 citations per paper and has the meaning of number of citations received by the "average PRL article" during the considered two-year period. Obviously, the definition can be extended over longer time spans.

Developed originally from the need to compare the journal influence or performance, the impact factor nowadays is the main quantitative tool for ranking, evaluating, categorising, comparing journals. Thus it provides librarians with a tool for the management of journal collections and publishers a quantitative evidence in evaluating the position of their journals.

The Journal Citation Report (JCR) division of Thomson Scientific, formerly known as the Institute for Scientific Information (ISI) has an extensive bibliographic database from which it generates indices of journal article

citations. They release yearly update figures, the most widely known being the Impact Factor, which is a measure of importance of scientific journals.

The Impact Factor is calculated based on a 3-year period. For example, the 2004 Impact Factor for a journal would be calculated as follows :

A. No. of times articles published in 200-2002 were cited in tracked journals during 2003,

B. No. the articles published in 2001-2002.

Impact Factor = A/B

10.4.4 Ranked List of Journals by Immediacy Index

An immediacy index is a measure of how topical and urgent work is published in a scientific journal. Along with the better known impact factor measure, it is calculated each year by the Institute for Scientific Information for those journals which it indexes; both impact factors and immediacy indices are published annually in the JCR.

The index is calculated based on the papers published in a journal in a single calender year. For example, the 2005 immediacy index for a journal would be calculated as follows :

A = the number of times articles published in 2005 were cited in indexed journals during 2005.

B= the number of articles, reviews, proceedings of notes published in 2005.

2005 immediacy index = A/B

The journal cell contained 450 articles in 1994. These articles were quoted in the same year 3,037 times, that is, each article was quoted on average 6.75 times (= Immediacy Index)

10.4.5 Cited Half-Life

The cited half-life benchmarks the age of cited articles by schowing the number of years back from the current year that account for 50% of the total number of citations to a journal in the current year. This number is useful in making collection management and archiving decisions. A publisher may use this number to adjust editorial policies to compete in different segments.

Example : The Journal Cell is given the figure 4.4 that is, half of all the quotations from the Journal Cell in the year 1994 referred to articles published

in the last 4.4 years. The remaining half, then, concerns articles older than 4.4 years.

10.4.6 Citing Half-Life

The citing half-life identifies the number of years from the current year that accounts for 50% of the cited references from articles published by a journal in the current year. Used together with Cited Half-Life, this number aids the evaluation of editorial policies

10.4.7 Citation Profile of a Scientist

Various yardisticks can be created from the citation analysis of the works of an individual scientist. These indicators comprise (a) the total number of citations the works have generated in a fixed period of time; (b) the number of citations for each paper; (c) percentage of self-citation; (d) percentage of cited papers, etc. In this way we can evolve citation profile of a scientist. If the scientist has original work, it will be cited in later works. Thus we can depict the citation profile of a scientist from citation analysis.

10.4.8 Citation Profile of a Research Institution

An analysis of 16891 publications published by Indian scientists during 1993-2002 and indexed by Science Citation Index Expanded, indicates that the publication output in the agricultural sciences is on the decline since 1998 onwards. "Dairy and animal sciences" followed by "veterinary sciences" constitute the largest component of the Indian agricultural research output. On the basis of citations generated by the works of a research institution, we can depict the citation profile of an institution. By comparing the profiles of different research institutions, we can depict the citation profile of an institution. By comparing the profiles of different research institutions we can evaluate the trend of the performance of an individual institution. Most of the prolific authors are from the highly productive institutions. However, only a few highly cited authors are from highly productive institutions.

10.5 Limitations of Citation Analysis

Controversial papers are likely to be cited more than other types. This fact may pose some wrong impressions. Likewise, self citation may provide wrong

indications. Review papers may be cited more than the research papers. Hence, this phenomenon can mislead the comparative study of the performance of scientist one with others in his field.

10.6 Summary

Here we have discussed citation, citation analysis and cito-analytical products and their uses in detail. We have described ranked list of journals from different angles. We have noted the citation profile of a scientist and research institution. We have outlines the salient features of Journal Citation Report. Finally we have mentioned the limitations of citation analysis.

10.7. Exercise

1. Discuss the different ways of ranking journals. Describe the uses of ranked list of journals.
2. Explain the citation profiles of a scientist and research institutions.
3. What is impact factor? Explain how impact factor of a journal is determined.
4. Explain cited half-life and citing half-life
5. What are the limitations of citation analysis?
6. Write a short note on Journal Citation Report.

10.8 Reference and Further Reading

1. Chakraborty, A.R. and Chakraborti, B, Indexing : principles, processes and products, World Press, 1984
2. Cross, P.L.K and Cross, E.M. 'college libraries and chemical education'. *Science*, 1927, 66, pp. 385-89
3. Garfield, Eugene 'Science Citation Index, a new dimension in indexing'. *Science*, 1964, 144, pp. 649-54
4. Guha, B, Documentation and Information : Services, Techniques and Systems, 2nd ed, World Press, 1983
5. Small, H.G., 'Cited documents as concept symbols', *Social Studies of Science*, 1978. 8. 327-40.

Unit 11 ❑ Aids to Information Sources

Structure

11.0 Objectives
11.1 Introduction
11.2 Aids to Information Sources
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11.2.2 Indexes in Secondary Periodicals
11.2.2.1 Chemical Abstracts
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11.0 Objectives

After reading this unit you will be in a position;

1) to search out information from various sources;
2) to improve your capability to provide better information service;
3) to be better acquainted with the contents of an information;

11.1 Introduction

We have discussed various types of information sources. With the knowledge of information sources it is not possible to render satisfactory information service. In-depth knowledge of an information source is definitely useful, but knowledge of source aids is also equally indispensable. Here we shall discuss broadly some aids to information sources.

Documentary information sources generally are equipped with table of contents. Indices to documentary sources pinpoint a particular concept within

these. Sometimes explanatory notes are helpful to understand the information contained in them. Secondary periodicals are significant tools for information handling and dissemination. The secondary information sources such as abstracting and indexing periodicals act as a key of primary sources. Finally, reference librarians are born with keen mind, quick insight, and flexible reasoning, made from long experience, probing questions and co-axing simple tools to yield complex answers or vise-versa, forcing complex tools to give simple facts.

11.2 Aids to Information Sources

We have already discussed that information sources can be both documentary and non-documentary. But here we are concerned with documentary sources. Anything or any person that helps in locating the required information can be termed as an aid to information sources. Anything may be a document or a part of a document and any person may be reference librarian. These aids that help to locate information may be table of contents, indices, list of illustrations or list of tables.

11.2.1 Table of Contents

The table of contents acts as the key to the contents of a document, specifically in dictionaries, conference documents, technical reports, etc. which do not contain any index. In many abstracting periodicals the table of contents complements the role played by an index. In majority of the cases, the table of contents unfolds a huge vista of information contained in the documents.

11.2.2 Indexes in Secondary Periodicals

A basic requisite for exploitation of secondary periodicals is the clear understanding of the indexing techniques used and their roles in information dissemination. Occasionally a secondary periodical may have a number of indices with distinct role for each one. It is necessary before search to have a clear idea about the coverage, limitation and target of each index to get the optimum result out of it. Sometimes some of the indices are modified or dropped and some new ones are introduced.

11.2.2.1 Chemical Abstracts (CA)

CA with the widest coverage in the field of chemistry is published in parts in alternate weeks. Sixty percent of CA budget is spent on indices. Indices are provided for each issue, each volume and cumulated period. This reflects the importance given to the indices by the publisher of CA. In unison with this line of thinking, indices are provided for each issue, each volume and cumulated volume. While a few of them have current awareness function, the rest are designed primarily for retrospective searches.

Issue Index

Each weekly issue of CA carries four different indices : indices to meet the current approach are – Author Index, Keywork Index, Numerical Patent Index and Patent Concordance. The chronological development of these indices is shown below :

1907 - 1947	...	No Index
1948 - 1957	...	Author Index
1958 - 1962	...	Author Index and Numerical Patent Index
1963 -	...	Author Index, Keyword Index, Numerical Patent Index and Patent Concordance

Volume Index

Since its inception CA carried Author and Subject indices in each volume. Later in successive years, different indices were introduced to provide additional strength for the publication. These include Ring Index, Formula Index, Numerical Patent Index, Patent Concordance, HAIC Index, General Subject Index and Chemical Substance Index.

Cumulated index

Initially cumulated indices for CA were issued covering 10 years. Accordingly, five 10 year cumulated indices were published covering the periods 1907-1916, 1917-1926, 1927-1936, 1937-1946 and 1947-1956. From 1957 onwards cumulated indices are being published covering the period of 5 years. Accordingly indices for the periods 1957-1961, 1962-1966, 1967-1971 and so on have been brought out. Cumulated index volumes include only those types of indices covered by the volumes. Other than these, a Numerical Patent Index (1907-1936) and a Formula Index (1920-1946) have also been published.

Author Index

This index takes care of both personal and corporate authors and arranged in a single alphabetical order referring to the abstract number, e.g.

Hindusthan Level Ltd.	43617 s
.....	
.....	
Paul V	43617 s

Keyword Index

Keywords extracted from titles and abstracts are arranged in alphabetical order and refer to the abstract numbers as the followings :

Leukemia	methotrexate	38538 j
... ...		
... ...		
Methotrexate	leukemia	38538 j

Formula Index

Chemical formula is a peculiarity of chemical literature and it provides a special access point to information for the community of chemists. Universality of chemical formula has been utilised in CA in the construction of Formula Index. Entries in this index are arranged according to Hill system. The symbols in the formula are arranged alphabetically.

Compounds containing carbon are exceptions to this rule. In such compounds, C (carbon) comes first, followed immediately by H (Hydrogen), if it is present and then by the remaining elements, alphabetically by symbols. A sample entry is given below :

$C_{16}H_6F_6N_2O_8$

Ethanedioic acid

bis [4 – nitro – 2 (trifluoromethyl) phenyl]

ester [19125 – 94 –1], P1788 r

Ring index

Index of Ring Systems is another variety of formula index available in CA. Arrangement of index items in this index is based on the number of rings involved. Within each number category, arrangement is further made according to ring size. The index does not provide any direct access to abstracts but can be used in consultation with Formula and Subject index. A

sample entry is given below :

2- Ring systems

CaN_2 - C_4O

1H - Furo [2, 3- d] imidazole

1H - Furo [3, 4 - e] pyrazole

HAIC Index

HAIC is contracted form of Hetero Atom In Context. This special type of formula index was initiated in 1967 to focus hetero (other than carbon and hydrogen) elements. This purpose was served by placing the hetero atom in a central column with the rest of the symbols of formula separated from it to the left and right. HAIC index differed from the Formula index on another point. Molecular formula of a compound appeared as many times as there were different hetero atoms in the former, while it appears only once in the latter. Thus the compound C_5H_4FN will be listed only once in the Formula index, while it will get two separate entries (for two hetero atoms) according to HAIC system as follows :

C_5H_4 ... ... F ... N

C_5H_4 F ... ...N...

This index was proved to be of little value as no further information, such as name, citations, etc. could be provided with the entries and thus was discontinued.

Subject Index

Subject index for CA was introduced for complete volumes since its inception in 1907. From 1972, this index has been divided into two sections - General Subject Index (GSI) and Chemical Substance Index (CSI) to provide specific approach. While the former generally deals with classes of chemical substances, the latter is concerned with specific ones.

GSI :

Amines, polymers
of aromatic di -, Prepn of
mechanism of, 20073a

CSI : Benzoic acid, esters
methyl ester [93 - 58 - 3]
dichroism of, 26934y

11.2.2.2 Patent Indexes

Patents are profusely present in chemical literature. Access to these types of information is provided in CA with the help of two different indices - Numerical Patent Index and Patent Concordance.

Numerical Patent Index : Patents are uniquly identified by the patent number and the name of the country issuing it. Entries are arranged first by the names of the countries in alphabetical order and then by the patent number in chronological order.

Indian
13452 43617 s

Patent Concordance

Original patents are abstracted in CA. Equivalent patents issued latter from a different country are not abstracted but are referred to the orginal index in this index.This index is presented in three columns. Patent numbers with the names of issuing countries are listed in the first column. Patents covering the same basic invention are listed in the second column. Column three provides the CA volume and abstract number of the patent listed in the first column. A same entry is given below :

United States
3433781 Brit 1181594 70, 111177C

A very important tool to be consulted for successful search is the "Index guide". The guide incorporates indexing policy followed in CA for a period of five years. It also lists names of chemical substances, CA preferred index names and necessary cross references.

11.2.2.3 Biological Abstracts (BA)

BA was initiated in 1927 and has become the most comprehensive service for biological literature published throughout the world. Other than this quality of coverage BA deserves special attention for the variety and peculiarity of indices, characterised by computer application.

Entries in BA are displayed under more than 600 headings and subheadings. Cross references are provided under headings and subheadings guiding users to required information. A subject guide listing different headings used, accompanies each issue.

Each individual issue of BA is accompanied with Author, Bio-systematic,

Generic, Concept and Subject index. Indices are cumulated to facilitate retrospective search.

Author Index

Author index in BA is a simple one, which incorporates names of personal and corporate authors and guides the user to the abstract numbers. A sample entry is furnished below :

Ranganathan, S 14979

Biosystematic Index

The biologists have a special approach to their literature through taxonomical indices. This approach is satisfied with the help of Biosystematic and Genetic index. The entries in this index are composed of taxonomic categories, covered in the documents abstracted. Taxonomic categories represent Phylum, Class, Order, Family, etc. A peculiarity of this index is its arrengement in systematic order and not in alphabectical order. Of course, major concepts are alphabetically arranged within each taxonomic groupings. Reference numbers are displayed under the headings from left to right in numeric sequence. An asterisk adjacent to the reference number indicates a new taxon described in the document. To initiate the search, taxonomic categories listed separately should be consulted for searching appropriate categories. Sample entries from this index is given below :

ORGANISMS
- Anatomy, Comparative
35574
Anthropoda, General, Systematic
81230
Behaviuor, Animal
7301 71175

Generic Index

This index is used to find items referring to a genus, species, community or hybrid form. This is generated from names of genus and/or species mentioned in the title or selected from the text. Genera and species of both living and fossil variety are taken care of in the index. Subgenera and sections are listed only when they represent new taxa. All genus species names are

provided together by intermediate hyphens. A question mark(?) following a name indicates uncertain identification. Different tags, as following, are used to indicate new findings in this index :

* A New status
* B New subspecies
* C New combination
* F New form
* G New genus
* H New subgenus
* K New section
* N New name
* R New record
* S New species
* T New serotype, etc.

Entries in this index are displayed in three columns, represented by genus-species, major concept and reference number. Sample entries are given below :

Genus-species	Mayor Concept	Reference Number
BACILUS-BREYIS	BAC PHYSL	69231
	FD MICR FOOD	30742
	GENET BAC VI	591 42

Concept Index

Concept index is the new name of the CROSS (Computer Rearrangement of Subject Specialities) index provided earlier. It lists more than 600 section headings and subheadings of biological and biomedical interest. This computer-produced index is a very important example of post-coordinate index in a printed format. Hence this index operates with the help of coordination of concepts. If a given abstract is related to different concepts, the corresponding abstract number appears in this index under different headings, required to index the abstract properly. Headings and their respective subheadings are alphabetically arranged with relevant number displayed under them in ascending sequence.

In order to use this index, terms or headings describing the query are selected at the first instance. This selection may be made by scanning the alphabetical listing of headings provided separately. Numbers displayed

under these headings are matched to identify common ones, representing coordinated concepts. An example is given below :

AGRONOMY

AGRONOMY - FORAGE CROPS, FODDER

8	9	10	11	12	13	14	15	16	17
18	19	20	21	22	23	24	25	26	27
28	32	34	37	195	201	202	207	805	1419

Subject Index

This computer produced keyword index also known previously as BASIC, is compiled from signifact words from the author's title and editorial insertions of pertinent keywords. Like other keyword indices, keywords are permuted and arranged alphabetically in the window of the index with rest of the title wrapped around these keywords. Occasionally, titles are truncated at the end of the line as length of the title entry is limited to fixed characters. Modifying words, appearing on both sides of keywords, help to locate pertinent references on the desired topic. The title, "Metabolism of Chromosomal RNA in Guineapig Salivary Glands and its Relation to DNA Synthesis" would be indexed under the keywords : Metabolism, Chromosomal, RNA, Guineapig, Salivary, Glands, DNA, Synthesis. The index entry with 'Salivary' as keyword and modifying words on either side of the window will be as follwoing :

CHROMOSOMAL RNA IN Guineapig SALIVERY GLANDS AND ITS RELATION TO 10036

11.2.3 List of Tables

A list of tables contains numerical data provided in the book. This list enables readers to identify the table which contains the information required by the users and saves their time.

11.2.4 Explanatory Notes

Explanatory notes given by many sources help the users to know signs, symbols and explanations provided in a document. Explanatory notes make every item of information included in the document easily comprehensible to the users.

11.2.5 Propaedia

The One volume Propaedia is the first of three parts of the 15th edition of the New Encyclopaedia Britannica. It is intended as a topical organisation of the encyclopaedia's contents, complementary to the alphabetical organisation of the other two parts. The core of the Propaedia is its Outline of Knowledge, but the volume has several appendices that list the various staff members, advisors and contributors to all three parts of the Britannica. The Propaedia has three types of goals : epistemological, educational and organisational.

The propaedia serves as an expanded Table of Conteats (or index) for the Micropaedia and Macropaedia. In the epistemological arena, it seeks to provide a systematic, hierarchical categorisation of all possible human knowledge, a 20th century analogue of the Great Chain of Being and Francis Bacon's Outline of Novum.

In the educatonal arena, the Propaedia lays out a course of study for each major discipline, a "roadmap" for a student who wishes to learn a field in its entirety. The Propaedia has ten parts :

Part 1	-	Matter & Energy
Part 2	-	The Earth
Part 3	-	Life on Earth
Part 4	-	Human Life
Part 5	-	Human Society
Part 6	-	Art
Part 7	-	Technology
Part 8	-	Religion
Part 9	-	The History of Mankind
Part 10	-	The Branches of Knowledge

The Propaedia acts as a non-alphabetical guide to information contained in Macropaedia.

11.3 Guide to Information Sources

The very first work of a student should attempt to locate when communicating his study of a particular literature of a particular subject is a guide to the literature, if one exists. Fortunately, over the last few decades, these have increased in number and there are few major disciplines in science and technology that still lack such guide. One classic example is M.G. Mellon *Chemical Publications : Their Nature and Use* (MCGraw-Hill, 4th ed, 1965). The

majority of guides are aimed at a wide public-students, teachers, research workers, practising scientists and technologists, as well as librarians, such as H. R. Malinowsky and J. M. Richardson, *Science and Engineering Literature : A Guide (Littleton, Colo, Libraries Unlimited, 3rd ed., 1980).* R. T. Bottle, *The Use of Chemical Literature* (Butterworths, 3rd ed, 1979) started life as an edited version of actual lectures delivered at Liverpool College of Technology.

There are two types of guide : The 'textbook' type and the 'reference book' type. In the 'textbook type' the emphasis is on exposition, with the stress laid on types of material rather than individual titles. The preface to H.M. Woodburn, *Using the Chemical Literature : A Practical Guide* (New York, Dekker, 1974) makes clear that it is intended for instruction and is not a 'bibliography of sources'.

The 'reference book' type is designed as a working tool, this kind aims at comprehensiveness : The Introduction to the Yescombe Guide to Rubber and Plastics claims that every effort has been made to include all sources.

All these guides are more comprehensive than Walford's or Sheehy's guide and more effective for searching literature in a narrow field area.

Reference Librarian

The reference librarian has been described variously, as the pivot, the chief supporting pillar of the structure of reference service. He is one of the most important aids for retrieving information from various sources, the active agent who makes the library's collection fruitful to users of a library. The principal focus of the reference librarians is the access to information. The principal problems of the users, however, is too much information. Information is expanding faster than any one can predict. The sheer volume of information threatens to overwhelm whatever might be useful. The reference librarian by virtue of his in-depth knowledge of varied reference sources and information tools provide users the required information with confidence. The reference librarian provides the overview by mapping the changing world of information and navigational tools that enable a researcher to identify, evaluate and colocate information for a particular purpose.

Librarians have done a commendable job in seizing new technologies, but they will need to become much more aggressive in the future as they face increased competition from a variety of groups who think they can do a better job in providing information to the user.

By examining the past and present with a critical eye and learning from

both successes and failures, reference librarians have the glare and gallantness to control their future. After all, the prestige of the library depends more on the reference librarian than any other.

11.5 Summary

In this, we have presented both documentary and non-documentary sources. Under documentary sources we have pointed out table of contents, list of tables, explanatory notes and Propaedia as aids to information sources. We have discussed the varieties of indices in Chemical Abstracts and Biological Abstracts. We have noted various guides to information sources. Finally, we have highlighted the role played by the reference librarian for handling diverse enquiries of multitude of users.

11.6 Exercise

1. What is understood by aids to information sources?
2. Describe the various types of indexes in Chemical Abstracts.
3. Highlight the different types of indexes in Biological Abstracts.
4. What role does the list of tables play?
5. What is the purpose of explanatory notes in reference books?

11.7 References and Further Reading

1. Chakraborty, A. R. and Chakrabarti, B, Indexing : principles, processes and Products, World Press, 1984.
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Unit 12 ❑ Library and Information Personnel

Structure

12.0 Objectives
12.1 Introduction
12.2 Library Personnel
12.2.1 Categories of Library Personnel
12.3 Information Personnel
12.3.1 Categories of Information Personnel
12.4 Summary
12.5 Exercise
12.6 References and Further Reading

12.0 Objectives

1. We shall enumerate different categories of library and information personnel ;
2. We shall discuss the various types of information that these people generate, gather, record, process, and disseminate for the awareness of users.

12.1 Introduction

Traditionally, and still in popular consciousness, the curators of collections of books and other information materials, administer conditional user access to these collections. In current practice, the librarian and the mediator of access to information for user groups of various descriptions, still serve virtually through the collection of materials under their immediate administration, but also through the global range of available sources.

The term will be found applied to a Chief Librarian, often called simply the Librarian; to Professional Librarians of different grades, distinguished by the possession of a recognised academic or professional qualifications and holding of a post with higher level tasks and responsibilities or acting as a personnel in library work—usually more correctly referred to by some terms such as paraprofessional library assistant, library clerk or library messenger.

Assistant librarian (as distinct from library assistant) usually refers to a professional librarian.

In the strict sense of the term, a 'library' is a 'collection' of materials organised for use'. The momentous advances in information technology have not made the term redundant. 'Library' in information technology is used as a generic term for an ordered set of related items. Library and information personnel occupy a broad field. We may be confused with the term 'information personnel'. However the title of this unit shows that it is going to deal with non-documentary sources. We shall depict the roles these personnel play as sources of information.

12.2 Library Personnel

There is good reason to believe that the root concept of 'library' is deeply embedded in our ways of thinking about the world and coping with its problems. In its primary role as guardian of the social memory, there are many parallels with the ways in which the human memory orders, stores, and retrieves information necessary for survival. Library personnel are involved in the process of acquisition, processing, organising and providing various types of information services based on the collections.

12.2.1 Categories of Library Personnel

A library derives its individuality from the types of materials it is designed to collect. Thus we have art libraries, audiovisual libraries, map libraries, picture libraries. Advances in communication technology have frequently meant changes in the physical media of communication stored by libraries.

The operations of collecting and organising may be analysed further into the professional techniques of selection, classification, cataloguing, information management and information retrieval. In this context, library personnel may be categorised as administrators, classifiers, cataloguers, reference librarians, bibliographers, and so on.

Just as in human communication we design our messages according to our image of receiver, so also the library adjusts its purpose, content and design to the image of the user. A library intended to serve pre-school children will differ in its user approach from one designed for cosmic physicists. Academic libraries reflect the philosophy of the institution of which they are

a part; they design their collections and services to meet the educational aims and instructional objectives of the institutions they serve.

When we move onwards from the specific types of library to the wider social setting, we can see how the content and purpose of the library are shaped and directed by a diversity of social concepts.

12.3 Information Personnel

An information retrieval system comprises the people activities and equipment concerned with the acquisition, organisation and retrieval of information. Information personnel are those who generate, gather, record, process, organise and disseminate information. Various information services are based on information.

12.3.1 Categories of Information Personnel

Those who are responsible for the generation of new ideas are termed as information generators. Researchers, innovators, thinkers, authors, policy makers are *information generators*. New findings or new ideas are gathered by some people, for example, reporters for onward transmission. These personnel are known as *information gathers*. Information gatherers transmit the gathered information to editorial process. Editors place this information in proper perspective. They are called *information processors*. After processing, information is to be recorded. The author and reporter first record the information and they are termed as *information recorders*. After recording, information requires to be printed. In case of books, publishers are the *disseminators of information*.

In responding to queries, Information Retrieval Systems must achieve a balance between speed, accuracy, cost and retrieval effectiveness in revealing the existence of information items and displaying surrogates (representation) or the original items. In order to make the retrieval process easy, another category of personnel has come into being. They are called *information retrievers*. They include reference librarians and database searchers.

12.4 Summary

We have identified different categories of library and information personnel. They become sources of information. We have discussed the different

categories of information professionals such as information generators, gatherers, processors, recorders, disseminators and retrievers. In the process of their activities they also become the sources of information.

12.5 Exercise

1. Enumerate the different categories of library personnel. For what type of information would you approach each of them?
2. Discuss the different categories of information personnel.
3. Describe the activities of information disseminators and information retrievers.

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Unit 13 ❑ Science and Technology Information Intermediaries

Structure

13.0 Objectives
13.1 Introduction
13.2 Who are Information Intermediaries?
13.2.1 Characteristics
13.2.2 Functions
13.3 Information Intermediaries in Science and Technology
13.4 Types of Information Intermediaries
13.4.1 Invisible Colleges
13.4.2 Technological Gatekeepers
13.4.3 Information Brokers
13.4.4 Information Consultants
13.4.5 Online Vendors
13.4.6 Expert Systems
13.4.7 Information Filters
13.4.8 Extension Workers, Block Development Officers, etc.
13.5 Conclusion
13.6 Summary
13.7 Exercise
13.8 References and Further Reading

13.0 Objectives

Here you will be able to :

know who are the information intermediaries;

have an idea about the characteristics and functions of intermediaries;

understand the different types of information intermediaries in the field of science and technology;

13.1 Introduction

As information becomes even more pervasive and important, people increase on a variety of information streams to meet their information needs. Rather

stream replacing another in this economy of information, each stream has its own niche. Thus, newspapers did not disappear when radio was developed, it remains after the advent of television and the telephone did not obviate the postal mail. More recently, e-mail, news groups, chat rooms, cellular phones, personal digital assistants and the World Wide Web have greatly expanded the set of information streams to which we all have. Importantly, being connected to many streams is very nearly a necessity of the world.

An information steam conveys data from an information provider to an information consumer. For instance, on the WWW, servers generally provide information, browsers generally consume information.

The 2004 APEC (Asia Pacific Electronic Communication) Forum on the Development of S & T Intermediary Institutions began on February 9; 2003. The Forum attracted the participation of more than 100 experts, scholars and government officials from 14 members of APEC. Participants discussed issues concerning the vigorous development of S & T intermediary agencies and the promotion of S & T in the Asia and Pacific regions. Mr. Li Xueyong, Chinese Vice Minister of Science and Technology said that since the adoption of reform and opening policies, the S & T intermediary agencies have enjoyed rapid development in the country. These intermediary agencies usually work as productivity promotion centres, S & T industrial incubators, S & T consultation and evaluation firms, technology exchanges, and venture capital firms. Mr Li also stressed that the development priorities of S & T intermediary agencies in the foreseeable future will focus on nurturing new growth points of high tech industries, supporting technical innovations of small and medium business, promoting the marriage between S & T developments and banking, providing better service for economic and social development in the rural areas, increasing farmers' income and changing governmental functions.

13.2.1 Characteristics of Information Intermediaries

Active, interative and inclusive communication between experts and decision makers proves crucial to systems that mobilize knowledge that is seen as salient, credible and legitimate in the world of action. Intermediaries working between the primary user and information source help the user to reach an information state. They perform the following tasks :

They satisfy the requirements of the generators and consumers of knowledge;

They transfer the products from the generators to users of information;

Intermediaries, therefore must have thorough knowledge of the sources of information and must be able to extract information from the sources;

Intermediaries should be aware of the technical aspects of the information transfer. They should know the characteristics of users and should have knowledge of the subject concerned.

13.2.2 Functions of Information Intermediaries

The effectiveness suffers when communication is largely one way, whether the involved experts assuming that they know what questions decision makers would see as salient or decision makers assuming that questions relevant to them are one, experts can credibly answer. The basic function of intermediaries is to provide adequate information to the users at the earliest possible time. The principal functions should be :

i) to search data and information;
ii) to analyse data and information,
iii) to disseminate information in required form;

Linking knowledge to action requires open channels of communication between experts and decision makers but also requires that participants in resulting conversation understand each other.

13.3 Information Intermediaries in Science & Technology

In the great period of expansion stretching from the Second World War to today, the scientific literature has been doubling in bulk every fifteen years. Thus S & T information has been growing at a tremendous rate. Whether ignorance, or deliberate preference for other channels of communication or fear of being overwhelmed or simple disinclination, there is clearly a role here for an intermediary. In some cases, libraries try to cope with the situation. Information intermediaries in S & T are usually experts in the subject field. Like libraries they do not maintain or organise document collections. But their indepth knowledge helps them to perform the functions more effectively. Most of the intermediaries operate on a commercial basis, there are others like Technological Gatekeepers and Invisible Colleges who are engaged in informal communication.

Information Intermediaries in S & T comprise Information Brokers,

Online Vendors, Technological Gatekeepers, Invisible Colleges, Information Filters, Expert Systems, etc. All these are types of intermediaries.

13.4 Types of Information Intermediaries

Among the two types : profit making and non-profit making intermediaries, let us discuss the latter type first : Invisible College and Technological Gatekeeper

13.4.1 Invisible Colleges

While informal communication among those engaged in scientific researches is old as science itself, it is only within the last fifty or sixty years these communication processes have been subjected to close scrutiny. Price shows that the 'invisible college' phenomenon can be traced back to the middle of the seventeenth century. The term appears first to have been applied to that group of scientists which began meeting informally as a club and which eventually formed itself into the Royal Society. An invisible college is now recognised to be an informal communication network composed of a scientific elite in some specialised research area.

Echo chambers are the direct descendants of the Invisible College concept. What makes them different comes from their visibility and open access rather than exclusivity. What makes them valuable today is that visibility, because that way leads fresh thinking, and that way leads balanced thinking.

The term was probably first used by Robert Boyle C. 1644. When his father died, Boyle inherited a bundle of land in Ireland and an estate in Dorset and he was consequently sufficiently well-off to give up his study and scientific research. He "soon took a prominent place in the band of inquirers, known as the "Invisible College", who devoted themselves to the cultivation of the "new philosophy". They met frequently in London, often at Gresham College; some of the members also had meetings at Oxford, and in that city Boyle went to reside in 1564 ... In 1663 the "Invisible College" became 'Royal Society' of London for improving natural knowledge" [Wikipedia]

In the 1960's, Derek de solla Price reintroduced the term in his work on scholarly communication. He hits on two issues which are critical to Echo Chambers – information overload and new fields.

"It used to be that scientists learned about what their colleagues did by reading journals. Actually they used to read books, then things moved so fast

they read only papers, then even faster so they read only letters to the editor in their rapid publication journals. Now they are moving so fast that they do not read but telephone each other, and meet at society meeting and conferences, preferably in beautiful hotels in elegant towns around the world. They get by in what are now called "invisible colleges" of little groups of peers.Then a few years later, along came the sociologist, Diana Crane. She analysed the ways in which social structures influence the development of ideas. According to Crane, participation in Invisible College bolsters morale, inspires a sense of purpose, provides criticism, maintains solidarity, and focuses interest on particular issues. Perhaps, most importantly, members of an invisible college see themselves as part of a complex network, not members of a speical interest group.

It seems there are some clear parallels here between Invisible Colleges and Echo Chambers. The main difference of course, is that little thing called the internet. It's turned Invisible Colleges into visible, and sometimes loud, Echo Chambers.

13.4.2 Technological Gatekeepers

Technological Gatekeeper is also known as "information gatekeeper". They act as a link between the internal users of a company, organisation or institution and the external sources of information. According to Kent Allen and others, the gatekeeper is an engineer or scientist in an industrial organisation to whom others in the organisation approach when the need for information arises. Although this may not be an officially designated function within the company, the information gatekeeper plays a key role in industrial progress by bringing information into the organisation through both formal and informal channels. In some countries international technological gatekeepers have been identified. They are scientists or other professioinals who stay current with new scientific or technological developments abroad through literature and professional contacts. Such individuals would play a particularly valuable role in importing into developing country the technology of the more industrially advanced nations.

Now let us discuss the profit making type of information intermediaries.

Information Brokers

'Information broker' is the generic term for a person providing information

services for a fee. There are several terms in use in this field :

- information broker
- information consultant
- information specialist
- information retailer
- infomediary

One of the best definitions for an information broker is ;

'an individual or organisation who—on demand— seeks to answer questions using all sources available and who is in business for a profit'

The definition points out the key characteristics of information brokers. That is, they provide services 'on demand' and are willing to undertake work on an occasional basis. They answer question by research in the published literature or in some cases by telephone or personal interviewing of informed parties. 'Using all resources available' indicates that they are not confined to the sources of a particular library or information collection. And finally, they are 'in business for a profit' which was a far more revolutionary idea in the 1960's than it sounds now.

A pattern has emerged as the field has grown and regardless of the title used, information brokers normally fall into one of the following categories :

1. Independent information broker (either as a sole proprietor or small business) whose main source of income is gained by selling information services. Many information consultants can be included in this group.

2. Fee-based services attached to an organisation or institution.

Their primary loyalty is to the parent organisation and in many cases their services are subsidized by that organisation. Many of these fee-based services are in the public sector or in non-profit making institutions and some of the services they provide are free and charges are made for only some services such as online searching, document delivery, or photocopying at subsidized rates. For example, NISCAIR's various information services fall under this category.

A great impetus for the growth of information brokers has come from the recognition that knowledge is a business and information is a commodity. Information creates wealth.

13.4.3 Information Consultants

Information brokers are new but because some of their services overlap with those provided by information consultants, the dividing lines between brokers and consultants are not always sharply drawn. Information consultants have been in existence for many years, long before the term (information broker) was coined. In some quarters there was resentment on the part of these consultants who felt that information brokers were giving the whole field a bad name by stressing the commercial side of the information business.

Generally speaking, consultants do not provide clients with existing, published information; rather, they advise on solutions to problems.

And of course, the converse is true : information brokers do provide clients with existing published information and generally speaking, are not in the business of providing advice or opinions but facts. However, there is no clearcut distinction between brokers and consultants. Most brokers offer a whole range of information services, from providing a copy of a single document to organising a whole collection.

Consultants normally work for a few clients on projects which may require months or years to complete, while information brokers concentrate on short-term tasks which can be measured in hours rather than weeks or months. They may well have hundreds of clients for whom they provide services on demand. Information brokers are usually more open about the costs of their services, publishing fee scales. Consultants will normally be more reticent about discussing fees because a great deal of effort and analysis is required to provide an estimate for a project.

13.4.5 Online Vendors

The emergence of another category of intermediary in the shape of the broker (or service intermediary), whose role is to provide or sell on-line search services on demand to those who do not have access to computer terminal. The student should note that unlike service suppliers, such brokers do not necessarily require their own computer facilities or data base tapes : all they need is a terminal providing online acces to distant computerized databases, together with some experience in searching them.

The major commercial services often called the hosts and vendors are accessible online throtugh telecommunication networks. Some of the well-known vendors are DIALOG, SDC and BRS in USA, BLAISE in UK. The

service suppliers exert great efforts to make online systems easier to use. One tool that has been devised is the 'database selector' such as DIALINDEX from DIALOG or DBI (Database index) from SDC. The aim of such aids, which the searcher actually consults online is to indicate which of the many databases on offer are the most appropriate for a particular search topic.

13.4.6 Expert Systems

An expert system, also known as a knowledge based system, is a computer programme that contains some of the subject-specific knowledge of one or more human experts. This class of programme was first developed by researchers in artificial intelligence during 1960s and 1970s and applied commercially thoughout the 1980s. The most common form of expert systems is a programme made up of a set of rules that analyse information (usually supplied by the user of the System) about a specific class of problems, as well as providing mathematical analysis of the problem(s) and depending upon their design, recommend a course of user action in order to implement corrections.

Expert systems are most valuable to organisations that have a high-level of know-how experience and expertise that cannot be easily transferred to other members. They are designed to carry the intelligence and information found in the intellect of experts and provide this knowledge to other members of the organisation for problem-solving purposes.

Typically, the problems to be solved are of the sort that would normally be tackled by a medical or other professional. Real experts in the problem domain (which will typically be very narrow, for instance, "diagnosing skin in human teenagers") are asked to provide" rules of thumb" on how they evaluate the problems, either explicitly with the aid of experienced systems developers or sometimes implicitly, by getting such experts to evaluate test cases using computer programmes to examine the test data and derive rules from that.

There are generally three individuals having an interaction with expert systems. Primary among these is the end-user; the individual who uses the system for its problem solving assistance. In the building and maintenance of the system there are two other roles : the problem domain expert, who builds and supplies the knowledge base providing the domain expertise, and a knowledge engineer, who assists the experts in determining the representation of their knowledge, enters this knowledge into an explanation

module and who defines the inference technique required to obtain useful problem solving activity.

13.4.7 Information Filters

Relevant information is required by researchers and other individuals. In this age of information explosion, a sort of filtering is necessary to help the users get the right type. Thus information filters are the mechanisms to derive the relevant information for the users. These are the mediators between informations sources and their users. Research institutions are generating a huge amount of information in various forms. These require filtering to make these useful. So information filters can work in both ways. From the point of view of users, the information filters can help them to overcome the 'information flood'. From the point of view of sources, they can direct the information to the potentially interested users.

Thus information filters serve the role of intermediaries. Filtering can be done both manually and electronically. In Selective Dissemination Information services, filtering is done electronically.

The task of information filtering is to classify documents from a stream into either relevant or irrelevant according to a particular user interest with the objective to reduce information load. When using an information filter in an environment that is changing as time proceeds, methods for adapting the filter should be considered in order to retain the desired accuracy in classification.

13.4.8 Extension Workers, Block Development Officers, etc.

Extension workers, Block Development Officers and the like have to be all things to all men. They must realise that they are the only source of information to farmers. However, they are expected to perform the following functions :

To help farmers improve their living standards;

Help farmers achieve their long and short term objectives;

Make practical suggestions which will enable farmers to attain their goals;

Act as link between farmers, researchers and planners;

Help farmers to devise methods of overcoming their problems. This is an innovative function and is also problem-oriented;

Assist with the implementation of national policies;

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Act as link between farmers, researchers and planners;

Help farmers to devise methods of overcoming their problems. This is an innovative function and is also problem-oriented;

Assist with the implementation of national policies;

popular. Their impact has been felt by different scientific and industrial organisations in our country.

13.7 Exercise

1. Discuss the characteristics and functions of Information Intermediaries.
2. When and how the concept of Invisible College came into being?
3. Define 'information broker'. What led to the development of information broker?
4. Discuss the functions of extension workers.
5. What is an Expert system? How do information filters serve the role of intermediary?

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Unit 14 ❑ Media Persons as Sources of Information

Structure

14.0 Objectives
14.1 Introduction
14.2 Multimedia
14.2.1 What is multimedia?
14.2.2 Elements of a Multimedia Programme
14.2.3 Multimedia Tools and Applications
14.2.3.1 Multimedia Tools
14.2.3.2 Multimedia Applications
14.2.4 Multimedia Messaging System (MMS)
14.3 Mass Media
14.3.1 Purposes
14.3.2 Journalism
14.3.3 Public Relation
14.3.4 Forms
14.3.5 Audio Recording and Reproduction
14.3.6 Film
14.3.7 Internet
14.3.8 Publishing
14.3.9 Book
14.3.10 Magazine
14.3.11 Newspaper
14.3.12 Radio Broadcasting
14.3.13 Television
14.4 Reference and Referral Tools
14.5 Summary
14.6 Exercise
14.7 References and Further Reading

14.0 Objectives

In this unit you will get :

1. a clear picture of multimedia and its applications ,
2. an idea about different categories of experts involved in mass communication to act as sources of information

acquainted with appropriate reference and referral tools to provide access to media persons.

14.1 Introduction

Media stand for physical modes of communication through which information get transmitted. Channels indicate the carriers of information such as books, magazines, newspapers,radios, televisions and so on. Today computer system designed to capture, store, process, retrieve, display and play back multiple types of information : text, picture, sound, animation and or video. At least two of the components must be present to qualify it as a multimedia product.

Multimedia itself is not a new term. It has been used in the arts to describe works of art that are composed of different media. In librarianship, multimedia has been used to describe collections of materials that include Kits, artfacts, audio, video and or computer-readable materials in in addition to the traditional print materials. Multimedia technology and its applications are contributing to every aspect of communication. Here we are concerned with its applications in mass communication.

Mass communication now includes conventional print media and a wide variety of audio-visual and electronic media. There are good number of individuals involved in creation, reproduction and dissemination of information. Here we shall explore the possibilities to identify these individuals for providing access to information.

14.2 Multimedia

Multimedia (Lat Multum + Medium) is media that uses multiple forms of information content and information processing (for example, text, audio, graphic, animation, video,interactivity) to inform or entertain the (user) audience. Multimedia also refers to the use of (but not limited to) electronic media to store and experince multimedia content. Multimedia is similar to traditional mixed media in fine art, but with a broader scope. The term 'rich media" is synonpymous for interactive multimedia.

14.2.1 What is Multimedia?

The word "Multimedia" simply means being able to communicate in more than one way. This means that, whether you are aware of it or not, you

already give multimedia presentations. For example, if you rub your temples while telling someone you have a headache or when point to a diagram on a board whilst speaking to a class of students, you are using multimedia to get your point across. In this instance you are using movement in conjuction with sound. So multimedia is all about communicating in several ways.

Originally the term 'multimedia' was used by institutions who run distance learning courses in which they deliver content via a combination of text, TV, telephone, audio cassette and the radio. So the idea of using multimedia for education is not new. What is new is the way in which we now use computers to bring these things together. The advent of high resolution screens and sound and video playback facilities for computers has resulted in the increased use of multimedia application for education is characterised by the following features :

- the different media it possesses and makes use of ; A typical
- Multimedia application
- the use of digital technology;
- the interaction it demands of the users;
- and integration of sound, images, text and data into seamless application.

14.2.2 Elements of a Multimedia Programme

There are six main elements which make up a typical multimedia programme :

Text : This is the base to most appications, the on-screen display of words. The use of different styles, fonts and colours can be used to emphasise specific points.

Images : Seeing a picture of an object has more impact than merely reading about it. Samples include conventional artwork, computer-generated artwork, photographs or captured video frames.

Movies : You can present information which is normally outside the scope of the oridinary classroom , such as medical operations or archaeological excavations.

Animation : Animations can render a procedure more accurately than that of a movie . For instance, objects which appear blurred within a movie can be represented more clearly.

Sound : Sound can be used in strategic parts of the programme or during a movie to emphasise certain points of the application and thus

prevent boredom : On-screen options should exist for them to visit areas of the programme.

14.2.3 Multimedia Tools and Applications

14.2.3.1 Multimedia Tools

- Multimedia application enabling software
- Hypermedia
- Multimedia Authoring Tools
- Multimedia databases and retreival
- System software support for multimedia
- System hardware supoort for multimedia
- Performance measurement tools for multimedia

14.2.3.2 Multimedia Applications

Prototype Multimedia Systems and Platforms Education and Training

- Computer aided instruction
- Distance and interactive training
- Multimedia Encyclopaedia
- Command and control
- Process control
- CAD/CAM
- Air traffic control
- On-line monitoring
- Multimedia securify systems.

Public

- Digital libraries
- Electronic museum
- Network Kiosk systems (medical, legal, banking,shopping, tourist)

Home

- Video on demand
- Interactive TV
- Home shopping
- Remote home care

- Electronic album
- Personalized electronic journals.

Business/Office

- Executive information systems
- Remote consulting systems
- Video conferencing
- Multimedia mail
- Multimedia documents
- Advertising
- Collaborative work
- Electronic publishing

Multimedia finds its application in various areas including, but not limited to, art, education, entertainment, engineering, medicine, mathematics, business, scientific research and spatial temporal applications.

Creative industries use multimedia for a variety of purposes ranging from fine arts, to entertainment, to commerical art, to journalism, to media and software services provided for any of the industries .

Multimedia is heavily used in the entertainment industry, especially to develop special effects in movies and animations. Multimedia games are a popular pastime and are software programmes available either a CD-ROMS or online. Some video games also use multimedia features.

In Education, multimedia is used to produce Computer Based Training courses (called CBTS) and reference books, encylopaedia and almanacs.

In Engineering, espcially in Mechanical and Automotive design, multimedia is primarily used for designing a machine or an automobile. This is known as Computer Aided ZDesigned (CAD) or Computer-Aided Engineering (CAE).

In Medicine, doctors can get trained by looking at a virtual surgery or they simulate how the human body is affected by diseases spread by viruses and bacteria and then develop techniques to prevent it.

14.2.4 Multimedia Messaging System (MMS)

MMS is an application that allows one to send and receive messages containing multimedia-related content MMS is a common feature of most cell phones. An electronic multimedia encyclopaedia can present

informationin better ways than traditional encyclopedia, so the user has more fun and learns more quickly. For instance, an article on World War II can include hyperlink, they are redirected to detailed articles on countries involved in the war. When users click on hyperlink, they are redirected to a detailed article about the country. In addition, it can include a video on the Pacific Campaign. It can also present maps pertinent to to World War II

Hyperlinks let a user access information in a non-linear fashion as opposed to print materials which are essentially linear.

14.3 Mass Media

Mass media is a term used to denote, as a class, that section of the media specially conceived and designed to reach a very large audience (typically at least as large as the whole population of a nation state). It was coined in the 1920s and (with the advent of nationwide radionetworks, mass-circulation newspapers and magazines), although mass media was present centuries before the term became common. The term *public media* has a similar meaning. It is the sum of the public mass distributors of news and entertainment and other information the newspaper, television and radio broadcasting, book publishers and suchlike. To this have been added more recently the internet, podcasting, blogging and suchlike. All of the public media sources have better informed the general public of what is going on in the world today. These methods of communication reach a greater number of people faster than traditional oral communication. Such things as podcasting and blogging give people an opportunity to express themselves in ways that can only be done with such technology.

14.3.1 Purposes

Mass media can be used for various purposes:

Advocacy, both for business and social concerns. This includes advertising, marketing, propaganda, public realtions, and political communication. Enrichment and education , such as literature.

Entertainment, traditionally through performances of acting, music, and sports, along with light reading, since the late 20th century also through video and computer games.

14.3.2 Journalism

Journalism is a discipline of collecting, analysing, verifying and presenting information regarding current events, trends, issues and people. Those who pratise journalism are known as journalists. Many news organisations claim proud traditions of holding goverment officials accountable to the public, while media critics have raised questions about holding the press itself accountable.

14.3.3 Public Relations

Public realtions is the art and science of managing communication between an organisation and its key public to build, manage and sustain its positive image. Examples : Corporations use Marketing Public Realtions (MPR) to convey informatioin about the products they manufacture of services they provide to potential customers to support this direct sales efforts. Typically, they support sales in the short and long term, establishing and furnishing the corporation's branding for a strong, ongoing market.

Corporations also use public relations as a vehicle to reach legislators and other politicians, seeking favourable tax, regulatory, and other treatment, and they may use public relations to portray themselves as enlightened employers, in support of human-resources recruiting programmes.

Non-profit organisations, including schools, colleges and universities, hospitals and human and social service agencies, use public relations in support of awareness programmes, fund raising programmes, staff recruiting and to increase patronage of their services.

14.3.4 Forms

Electronic media and print media include:
Broadcasting, in the narrow sense, for radio and television.
Various types of discs or tape. In the 20th century, these were mainly used for music, video and computer uses followed.

- Film, most often used for entertaiment, but also for documentaries.
- Internet which has many uses and presents both opportunities and challenges. Blogs and podcasts, such as news, music,prerecorded speech and video.
- Publishing, in the narrow sense, meaning on paper, mainly via books, magazines and newspapers.

- Computer games, which have developed into a mass form of media since devices such as the Play Station2,xbox,and the Game Cube broadened their use.

14.3.5 Audio recording and reproduction

Sound recording and reproduction is the electrical or mechanical re-creation and/or amplification of sound, often as music. This involves the use of audio equipment such microphones, recording devices and loudspeakers. From early beginnings with the invention of the phonograph using purely mechanical techniques, the field has advanced with the invention of electrical recording, the mass production of the 78 record, the magnetic wire recorder, followed by the tape recorder, the Vinyl L P record. The invention of the compact cassette in the 1960's, followed by Sony's Walkman, gave a major boost to the mass distribution of music recordings, and the invention of digital recording and compact disc in 1983 brought massive improvements in ruggedness and quality.The most recent developments have been in digital audio players like the Apple i Pod Boardcasting.

Broadcasting forms a very large segment of the mass media. Broadcasting to a very narrow range of audience is called narrowcasting.

14.3.6 Film

Film is a term that encompases motion pictures as individual projects, as well as field in general. The origin of the name comes from the fact that photographic film(also called filmstock) has historically been the primary medium for recording and displaying motion pictures. Film is considered by many to be an important art form; films entertain, educate, enlighten and inspire audiences. The visual elements of cinema need no translation, giving the motion picture a universal power of communication.Any film can become a worldwide attraction, espcially with addition of dubbing or subtitles that translate the dialogue.

14.3.7 Internet

The Internet (also known as "the Net") can be briefly understood as "a network of networks". Specially, it is the worldwide, publicly accessible network of interconnected computers that transmit data by packet switching using the standard Internet Protocol (IP). It consists of millions of smaller domestic,

academic, business and governmental networks, which together carry various information and services, such as electronic mail, online chat, file transfer and the interlinked Web pages and other documents of the World Wide Web.

Contrary to some common usage, the Internet and the World Wide Web are not synonymous: the Internet is a collection of interconnected computer networks, linked by copper wires, fibre-optic cables, wireless connections, etc ; the Web is a collection of interconnected documents, linked by hyperlinks and URLs. The WWW is accessible via the Internet, along with many other services including e-mail, file sharing and others. Towards the end of the 20th century, the advent of the WWW marked the first era in which any individual could have a means of exposure on a scale comparable to that of mass media

14.3.8 Publishing

Publishing is the industry concerned with the production of literature or information-the activity of making information available for public view. Traditionally, the term refers to the distribution of printed works such as books and newspaper. With the advent of digital information systems and the Internet, the scope of publishing has expanded to include websites, blogs and the like. As a business, publishing includes the development, marketing, production, and distribution of newspapers, magazines, books, literary works, musical works, software, other works dealing with information. Publication is also important as a legal concept : 1 as the process of giving formal notice to the world of a significant intention, for example, to marry or enter bankruptcy , and 2.as the essential precondition of being able to claim defamation; that is, the allged libel must have been published.

14.3.9 Book

In library and information science, a book is called a monograph to distinguish it from serial publication such as magazines, journals or newspapers. A book may be studied by students, in the form of a book report. It may also be covered by a professional writer as a book review to introduce a new book.

14.3.10 Magazine

A magazine is a periodical publication containing a variety of articles, generally financed by advertising and/or purchased by readers. Magazine is

typically published weekly, biweekly, monthly, bimonthly or quarterly, with a date on the cover that is in advance of the date it is actually published. Magazines can be classified as

1. General interest magazines (e.g. India Today, The Week, etc)
2. Special interest magazines (e.g. Sports, Business,etc).

14.3.11 Newspaper

A newspaper is a publication containing news and information and advertising, usually printed on low-cost paper called newsprint. It may be of general or special interest, most often published in 1605, and the form has thrived even in the face of competition from technologies such as radio and television. The operation of newspaper is generally divided into three major parts-news and editorials, business and production. Recent development on the Internet are posing major threats to its business model. However, paid circulation is declining in most countries, and advertising revenue, which makes up the bulk of newspaper's income , is shifting from print to online. Some commentaters,nevertheless, point out that historically new media such as radio and television did not entirely supplant existing media.

14.3.12 Radio Broadcasting

As printed newspapers do, the radio also has an impact on masses regarding fashions, tastes and entertainment. The uses of satellites, automated broadcast technology and computers have improved the radio. Programming of music, news , talks, and commerce is the key to success for modern radio stations.

14.3.13 Television

It is the modern mass medium and occupies a dominant position in the modern society. It combines both visuals and audio and attracts both young and old. In our country, the Doodarshan controls various functions of television industry.

From the aforesaid accounts of different mass communication, the usefulness of media persons as sources of information is evident and you will understand, impact of media persons on society. In order to understand the impact of mass media let us put it against non-mass media. Non-mass media or "personal" media (point-to-point and person-to-person communication) include :

- Speech
- Gestures
- Telephony
- Postal Mail
- Some uses of the Internet
- Some interactive media

Arguably, blogs and other first-person, web-based communication are non-mass media.

14.4 Reference and Referral Tools

The mass media persons are widely scattered and it is difficult to identify reference and referral tools for them. However, we note some Indian sources. Press in India (Formerly Annual Report of the Registrar of Newspapers for India) vol 1&2, New Delhi, Ministry of Information and Broadcasting, 1965-yearly. India News Index : A quarterly subject guide to Amrita Bazar Patrika, the press journal, Hindusthan Times, Indian Express, the Statesman, Times of India, Tribune, 1965- Ludhiana, Punjab University Extension Library, 1965-.

Indian Press Index (With Book Review Supplement)1986-Delhi ,Indian Library Association, 1968-Monthly. Who's Who of Indian Writers, Primary, Secondary and Tertiary periodical on mass media are given below :

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A Classified Guide to Current Periodicals, Foreign and Domestic, First edition, New York ,Bowker, 1932, 33rd edition was published in five volumes,1998. For current periodicals : 'Ulrich's Quarterly', Moreover, *Asian Recorder, Keesings Co-temporary Archives, Facts on File* are also sources to identify media persons. Media persons are envolved in a number of places in mass communication. In cases of inadequate reference tools, media persons appear to be the only source of information.

14.5 Summary

We have discussed here mass media gaining more and more importance in the field of communication and the advent of multimedia and its applications in mass communication. We have highlighted the varied applications of multimedia in education, video conferencing, publishing and library and information services. We have shown the different components of mass communication viz. print media, radio, television, public relations, and others.

All media persons are dealing with information. Reference and referral tools dealing with media persons are meagre. Some useful tools have been noted to identify these media persons.

14.6 Exercise

1. Indicate some tools to identify media persons.
2. Show how media persons can be a source of information.
3. Dicuss the functions of mass communication.
4. Highlight the important components of mass communication.
5. Discuss the application of multimedia in some fields of communication.

14.7 References and Further Reading

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