CHAPTER 2
MULTIMEDIA INFORMATION SOURCES:
CHANGING CONCEPTS, SCOPE AND TRENDS
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2.1 A Peep into the Past:

From earliest times men have attempted to preserve thoughts for the future use. For more than 5000 years, people have made written records of their ideas, their relations with others, and the world around them. They have kept their record on variety of materials: stones, clay, metal, wax, wood, papyrus, silk, leather, parchment, paper, film, plastic and magnetic and optical media. When oral communication changed to written form, libraries came into existence. Then emerged printing in 15th century for the mass production of documents.

Until nineteenth century, text and drawings on paper were the only ways besides the human brain to store information. Both involved much hard labour. Still Photography (1839), Magnetic Recording (1898), and Moving pictures (1905), reduced the amount of hard labour, making it economically feasible to store images, sound, and moving pictures on permanent and widely distributable media. Photographs and sound recordings could replace descriptions of distant scenes, cultures and provide a much more complete and accurate representation of the reality.¹

The major information development in the nineteenth century is attributed to production and distribution of printed materials. Inventions of that period laid the groundwork for two trends in early twentieth century, information processing and wider use of nontextual information and facilitated information management. The Photography made the recording of images by mechanical process, the Phonograph and early experiments of magnetic sound recording led to the development of a whole new industry. The development of optical sound recording, when coupled with the development of motion pictures led to the “talkies” in 1927.

The term “Multimedia” first appeared in education during 1960 - 1970’s when it described new media supporting the learning process in classroom
instruction. The underlying force in the emergence of computerized research is the digital technology of information storage, retrieval and transmission. This technology first flowered in the USA, but has now rapidly spread to entire world. Digital media can store sound, picture and data in various combinations. The new medium is the compact disk or optical disk or laser disk. For a number of years now CD’s have been alternate formats to magnetic tape for at home presentation of movies. Compact disks containing digitally encoded music came into the market in 1983. The Library of Congress has also made a major commitment to CD-ROM as a medium for preserving and disseminating print materials. The Digital Audio Tape (DAT) and its players or recorders are being introduced now everywhere. A DAT cassette, measuring 2/3 inches, can hold information equivalent to 6,00,000 printed pages. The new Multimedia is an advanced technology in computer science and it gets the advantage of both CD-ROM and DAT for its application.

The use of multimedia in education, tourism, training, entertainment and business has attracted a tremendous amount of attention in recent times. With the proper skill and techniques, multimedia has the potential to revolutionize methods of disseminating and communicating knowledge.²

All the above technologies have been instrumental in recording information and contemporary knowledge since centuries, and also responsible for the generation of different media as time passed. Though the term “Multimedia” in the modern context is used exclusively for the ‘digitally stored’ information products, but in practice it meant to the possessions of Libraries from hand written to modern Optical Media. Hence in this study the term “multimedia” is employed more comprehensively than its restricted meaning of newer computer-based multimedia products.

It is well said, “we live in a multimedia world and have now become so accustomed to communication via media that we take for granted… We expect
the library also to reflect the resources and services to which we have become accustomed by making man’s knowledge readily available in all the formats in which it has been recorded. Libraries are attempting to satisfy the demands of modern society by expanding their activities to serve the new needs of a more varied clientele. The transition from the traditional library to multimedia library is not easy. The sheer bulk of available materials in every type of media pose new challenges of selection, materials control, utilization and professional skills.”

The invasion of electronic media into library system is now a well-known fact. But “libraries have never remained static throughout”, but have to plan for an incorporation of newer type of media into their collection and make efforts to transmit the information for use by the clientele. However all media, regardless of whether they have been around for centuries or are new, exotic and futuristic, must meet the attention of being the best means of serving its clientele.

The traditional meaning and inclusion of materials that comprises ‘multimedia’ varies from author to author. Different authors define the term multimedia differently; hence a consensus meaning in the context has to be arrived at this juncture. An attempt is therefore made to enumerate the materials that are included as multimedia by different authors then a consensus is arrived to regroup them for this study.

At first some of the enumerations presented in different sources are given below:

According to James Cabeceiras⁵ the major categories of media are:

1. Art Prints
2. Books
3. Community Resources
4. Computers
5. Film Strips  
6. Kits  
7. Maps and Charts  
8. Microforms  
9. Motion Pictures  
10. Pamphlets  
11. Periodicals  
12. Pictures  
13. Programmed Instruction  
14. Real Things and Models  
15. Recordings (Audiotapes)  
16. Recordings (Audio-discs)  
17. Recordings (Videotapes)  
18. Simulations and games  
19. Slides (Photographic)  
20. Transparencies

According to Fothergill and Butchart\textsuperscript{6} the materials that included broadly under media are:

a) Paper-Based  
b) Film Based  
c) Magnetic Media  
d) Plastic  
e) Optical

For the purpose of this study a unified idea of multimedia comprising both Traditional and new media is considered. Thus it includes:

2.2 **Major Categories of Traditional (multi)media**

1) Audio Materials: Gramophone Records; Hard base and Vinyl.


V) Microforms: Microfilms of all types, Micro Card, Microprint, and Microfiche.

VI) Optical Media: CD-Audio, Videodisc, Multimedia discs, Information Sources on CD-Rom and So on.

Communication (mostly electronic) media with the following sources:

1) INTERNET

2) Teleconferencing / Videoconferencing, Videotext, Teletext.

3) Television and Radio.

4) Human Experts and Institutions as Sources of Information.

This list is not exhaustive but representative one. However a descriptive account given later in the chapter enlists all the varieties comprehensively with their genesis and characteristics.

A peep into the past forty years traces that the information used to be produced through the separate media, namely, publishing (hard copy form in paper-based print), broadcasting (radio and TV) and computing (magnetic form). During 1980’s and 1990’s all the three media stated gradually converging and getting utilized to form a single medium now known as 'Multimedia'.

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2.3 Information Sources and Communication Media: A Descriptive account

2.3.1 Of Ancient Times

In the early periods of human development as repeatedly stated men used signs, drum beats and semaphores for long distance communication. The earliest durable writing material was stone and the first pens were implements for scratching, engraving and painting on the surface and it was the first attempt by man, to discover newer avenues of expression other than speech. Writing on stone the oldest example of writing, which has survived the vagaries of nature through centuries. The metal plates were generally used as documents like land grants. Our ancestors created something, which is similar to the present day ‘book’. The Sumerians, the Babylonians, and the Assyrians used tablets made up of water-cleaned clay. While the clay was still soft, the writer used to inscribe his writing on it with the help of a stylus. After the writing was done, the clay tablet was either dried in the sun or for better durability, burnt in fire. The tablets, which looked like bricks, were of different shapes and dimension about five inches long. These burnt tablets were hard and almost indestructible.

The Papyrus roll is of equal antiquity as clay tablet; the Egyptians learned to make beautiful writing material from papyrus plant. Skin of certain animals known as parchment has been used as writing material centuries ago.

Wooden tablets, on which writing was done with a stylus upon wax-covered Bamboo and tree bark have at various times been used as writing materials, while in India and Ceylon palm and other leaves have been the most widely used writing materials before the invention of paper, papyrus, parchment and vellum.

Palm-trees grow abundantly in various parts of India, particularly in South India, Bihar, Orissa and Bengal. Its leaves have therefore, been more widely used as writing material than birch-bark. Palm-leaf manuscripts are pierced either in
the middle or in two places. Through the holes, threads (Sutra) are drawn to hold a collection of individual leaves together, between two thin wooden boards.

It is not exactly known when the use of birch-bark (bhurja) as writing material of India begin. But it has been recorded as the predominant writing material of India at the time of Alexander the Great. Birch-bark sheets consist of a number of layers, collected from the inner side of the bark.

2.3.2 Advent of Paper and Print Media:

Paper is often called "the handmaiden" of civilization. The paper media traditionally used for handwritten and print media. Little need be said about collection of papers. Paper as a medium for multimedia materials includes a wide range of forms—Charts, wall charts, posters, flipcharts, handouts, atlases and folders are commonplace, the size and quantities of paper being variable. It can be expected that these formats will continue to be popular, both for educational and domestic use.

A change in the structure of the textbook has occurred. Several books now published in loose-leaf format, the pages held in a ring or lace binder. All the pages can be removed individually and extra ones can be added. Novels and reference materials are also now printed and punched for insertion into the ubiquitous personal organizers that many people use.

A combination of books and loose-leaf pages inside a folder is also a format that is being used. Because most of the other media require the intervention of a machine in order to see the contents, they are usually accompanied by booklets and paper inserts. Some textbooks are also published with slides or Compact diskettes or floppy inserted into pockets within the covers. The standard book is not a static format, but one, which will evolve in combination with other arrangements and media.

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Diagrams and photographs, which are refereed, to frequently need be printed only once, and extracted for repeated study. Diagrams explain the message rather than represent. They are drawings used to explain, present numerical data in an understandable manner. It is known as diagrammatic presentation of factual information. They are visual media of description, which explain, meaning, language to convey message. They are being attractive, eye-catching and interesting.

Print media:

Print media, composed of several media, no doubt is more popular and common. The fact that written medium is a source of great instructions and directional medium in formal communication. The print medium is very powerful medium and is likely to remain as the core-medium of communication in the days to come in spite of the emergence of new technologies in communication.

After going through a print media profile since the birth of writing, it implies that, Libraries comprises variety of documents generated in different media. These are acquired, stored, organized and put into use for the clientele. Some of these are still existence, some are extinct, and some of them are in processes of being published out. However many varieties are still held by our Libraries, both Academic and public, hence meaning and a descriptive account of "multimedia" materials of traditional nature are described and presented here. This process of description follows the destiny made earlier on page number 23.

2.3.3 Audio Materials:

Often librarians are proceeding to acquire information either on a disc record or a cassette tape. One soon realizes that audio is truly a dynamic medium. Some academic libraries processes still 78rpm recordings. Open reel audio - tape (except for commercial use) and tape cartridge, and are the prize possessions of
many libraries. Even audiotape cassettes are beginning to pass their zenith as a prime medium for commercially available recordings.

Audio recordings are one of the first non-print media to be incorporated into the library's collections for specialized information services. Undoubtedly the growth of the audio recording industry has been paralleled by a similar growth in library record collection.

The history of audio recording appears to follow two distinct paths (a) Disc recording and (b) Audio tape recording. Generally the disc recording has always been considerably unalterable, meaning it cannot be erased or locally recorded, whereas the tape recording allows the end users to erase, modify and record onto the tape.

(a) Disc recording: Charles Cros, a French inventor is recognized as the maker of the first successful disc recording, in 1877. Thomas Alva Edison at about the same time developed a machine utilizing the basic concept for all groove disc recordings. He used a needle attached to a device resembling a megaphone and shouted into it the now famous "Mary had a little lamb". The result was a recording scratched on a foil covered cylinder. The dents produced on the foil, when played back reproduced the recorded sound. The information, statements, messages recorded is intended to be reproduced or made public. they are written down or recorded for future reference.

The major milestone in audio recording came in 1948, with the introduction of the Long Playing (LP) 45 and 33 1/3rpm records. LP records were more durable and reproduced sound better than the 78-rpm records. Just 10 years later in 1958, Stereophonic sound became available. This saw the advent of what is called sound systems-turntables, jewel stylus cartridges, amplifiers, and multiple speakers. In 1972, Denon, a Japanese electronics company, introduced a method to digitally record information onto a master disc. A Digital recording supposedly eliminates
any vagaries attributable to the electronics responsible for responsible for reproducing the audio signal. In the early 1980’s compact discs, utilizing laser technology, made their appearance on the home market.

The term ‘Gramophone discs’ is used to describe any disc format where an audio signal is recorded as a series of grooves, which are read using a stylus and amplification system. The basic arrangement of gramophone discs has not changed throughout their history. What has changed is the size of the discs, the speed at which they are played and the methods and materials used in their manufacture. There are various compositions of discs with; various materials have been used in the manufacture. These include (in chronological order):

- Wax (compounded with other materials)
- Shellac (compounded with other materials)
- Cellulose nitrate
- Cellulose acetate
- Polyvinyl chloride (PVC).

Another type of disc is the ‘instantaneous recording’ disc which consists of a metal substrate, usually aluminum, with a layer of cellulose acetate or cellulose nitrate overlaid on one or both sides. Gramophone discs have recently been all but superseded by the new technology of the compact disc.

(b) Audiotape: Audiotapes are packed in cassettes and these require listening equipment. Audiocassettes operate at a standard speed of 1 7/8 ips (inches per second); cassettes operating at other speeds are for special applications. Recording can be monaural, stereophonic, or quadraphonic. The major types of information found on recording are music, storytelling, readings, speeches, recitals, and sound effects. Audiocassettes are used throughout the world as tools of self-learning, as means for executive training, and as an aid for continuing education.
Audiocassettes are also used in recent years as the most useful teaching medium. These enable the learner to have control over the learning materials. The learner can listen to the cassettes according to his own convenience. It can be stopped at any time.

An obvious advantage of the audiocassette over the radio programmes is that they are under the control of the user. Students can stop the player to take test. Make notes or can replay a difficult section. Different purposes the audiocassettes are to:

a) provide orientation of the course;
b) clarify certain complex ideas;
c) given feedback to the student's activities and assignments;
d) summaries major idea of each unit; and present the views of external experts.

Generally the library's tape collection will be in cassette format. Open reel tapes are still being used but usually they are neglected to use by audiophiles with expensive sound systems. Audiotapes are made of plastic and coated with a layer of iron oxide or chromium dioxide.

2.3.4 Visual Materials (Paper-based):

A visual aid is any visible device that assists an instructor to transmit to learner facts, skills, understanding, knowledge and appreciation. The visual method is actually an aid to use with other methods of instruction rather than a method in itself. It is particularly useful with the dramatization and lecture method. In the visual method, instruction is carried on through such devices as filmstrips, movies, photographs, charts, posters, cartoons, models and actual objects. It is used as far as possible, in a visual sense; it is measured as effective as an avenue of learning. The visual-sense can be increased to a great extent by visual aids. Quick and fast presentation can be achieved, which show a relationship among ideas, facts and
can serve as a review device. The aids are clear, simple, legible, interesting to have positive effect. It is practically possible to use visual media in combination with other media.

In corporate organization, the executives can substantiate the policies and the goals of the corporation with reference to data properly presented by the pictures. Like other electronic media, visual medium also plays a significant role in bridging up the communication gap. Here, one should remember the popular technology, namely audio-visual, technique, in which visual technology is the key factor as a tool to give effect to audio-visual communication.

A number of factors are responsible to be receptive to visual aids. Some of the visual media are briefly described into the forthcoming sections.

(a) Charts, Posters and others:

(i) Charts:

The term "chart" denotes a map showing some information. It may be a table or diagram giving information, situation, possessions etc. Generally, charts are used to depict non-numerical information. They show the relationship of non-numerical nature systems and activities etc. The organizational chart is the best example to illustrate a chart.

A chart is a pictorial presentation of a table or a diagram of information about a particular subject. A chart depicts numerical relationship and a graph depicts quantitative relationship. Information may be presented by charts, graphs etc. They are the most popularly used visual aids may be painted, printed or drawn.

The various forms of charts and wall charts have always been popular in all sectors of education and training because of their versatility and ease of use,
and, even with the spread of more sophisticated visual aids such as slides and videos, are still capable of playing an important role in such work. The former term is generally taken to refer to displays on large sheets of papers or cloth that are designed to be shown to a class in the course of a lesson. The latter term is used to describe similar displays that are pinned to a wall or bulletin board and are intended for casual study in the context of a formal lesson. The materials on charts is usually larger and easier to see or headed than that on wall charts, since the former has to be clearly distinguishable legible at a distance whereas the later can be studied at close quarters.

Larger number of professionally – produced charts and wall charts covering a wide range of topics and often incorporating eye-catching features such as photographs, maps, diagrams, graphs and cartoons, are generally available for the educational and training community. There are various types of charts such as lines, bars, mathematical graphs, cartograms, diagrams, area graphs, para graphs, grouped bar, subdivided bar, range bar, stop bar, twin bar, paired bar, deviation bar, sliding bar, column bar, histogram, curve graph, slice graph, matrices graph, multi-scale graph, cumulative graph, cumulative frequency graph or give index graph, chart, frequency polygon, semi-log graph, band graph, etc. Change in poster production, from offset printing to digital technology has been the modern innovation.

In many cases, such charts and wall charts are available free of charge from commercial organizations as in “goodwill gestures”, while others can be purchased at relatively low cost. In an educational or training situation, charts and wall charts can play a variety of different roles. They can, for example be used:

> to stimulate interest and provide motivation;

> to act as a source of idea or topics for discussion;
to be referred at random in order to produce gradual familiarization with their content;

to act as an information stored and memory substitute.

ii) **Flip charts**: These constitute a simple, and, when used in an appropriate context, highly effective method of displaying information to class or small group. Such charts consist of a number of larger sheets of paper, fixed to a support bar, easel or display board by clamping or pinning them along their edges so that they can be flipped backwards or forwards as required. Such charts can be used in two basic ways. First, they can be used to display a succession of pre-prepared sheets, which can be shown in the required order either by flipping them into view from the back of the suspension system one by one or by revealing each successive sheet by flipping the previous one over the back of suspension system out of the way. Second, they can be used to provide an instantly renewable series of blank surfaces on which material can be jotted down on an important basis in the course of a lesson, group discussion or other activity. They can, for example, be used to list replies from class members to questions or ideas generated by buzz groups. 'Electronic flipchart's are now coming in to use in educational and training institutions. These provide a reduced - size- out of what has been written on the 'chart', which can be photocopied and distributed to the class.

iii) **Posters**: These are similar in many ways to charts but are usually smaller, simpler and bolder in content and style. A poster is a large notice or advertisement for sticking on a wall. A written document, a placard pasted or displayed in public places as an announcement or advertisement. It may include pictorial or picture poster, a placard consisting mainly a picture of illustration. A poster gives an opportunity to the by-passer to see and read. This form of written communication offer many advantages to the organization because it draws the attention of many people. A poster is prepared based on planned specialization;
and all the activities relating to the poster exhibition are effectively supervised and controlled. A poster in a prominent place attracts a great variety of cross sections of the people. Posters are generally used for product advertisement. The posters are called "Billboards". Their main use in the classroom as a means of providing decoration, atmosphere and motivation, all through they could also be used to make or remind learners of key points. As with charts and wall charts, ready-made posters are available from a large number of sources – very often free of charge. The job of the poster is to stop the hurriedly passing person, thrust the message upon him quickly and lead him to action immediately or eventually. The best example of posters in library and information science are DDC - 21 poster available on Dewey Web Site, and the Poster prepared by Indian Library Association during Dr. S.R Ranganathan's Birth centenary year.

In the context of International conferences the "Poster sessions" are displayed to make clear the idea or exact facet of the presented paper, hence the posters are having an immense value in communicating nascent thought to the audiences.

iv) Photograph: As a means of visual communication and expression, photography has marked aesthetic capabilities. As technological advances have improved photographic equipment, materials, and techniques, the scope of photography has expanded enormously. Photography pervades every sphere of activity in modern civilization. Photography disseminates information about humanity and nature, records the visible world, and extends human knowledge into areas the eye cannot penetrate.

Colour photography has become increasingly popular within the ranks of the amateur. Although many professionals have explored the artistic possibilities of colour, which can add intensity and realism to the picture and increase interest in the subject.
The Photography made it possible for a new kind of record, for the collections of photographs as popular visuals in particularly in academic and public libraries with an interest in local history. Specialized photo libraries, such as the BBC Hulton Picture Library, London are regularly used to provide illustrative material for film and television programs. For the general use of libraries, however, microphotography has played a much more important role. Many leading newspapers and periodicals have reproduced their entire sets of back issues on roll film, which offer a considerable saving of space and make it feasible for even a small library to house an entire set. These will be further discussed under microforms.

(v) **Mobiles:** A ‘mobile’ is, in essence, a three - dimensional wall chart in which the individual components can move about. Mobiles can be used in virtually any situation where learners have to acquire and consolidate a set of related facts and where a wall charts would normally be used to reinforce this material.

(vi) **Handouts:** Pre-prepared notes, diagrams and tables can be given to students in the form of handouts. This can save the student from tedious and perhaps inefficient note taking, thus allowing him or her to concentrate better on what is being said. Thus, the student has some involvement in the process, and interacts better with the handout.

(vii) **Overhead transparencies:**

The ‘fuel’ for the Over Head Projector is the overhead transparency. This is a piece of transparent film available in various thicknesses, commonly ranging from 0.05mm to 0.025mm, either as single flat sheet or as a roll. Different manufactures supply slight variations in their dimensions. Although a transparency is of sufficient size and that it is possible to prepare a visual direct on the material, a copying process is usually included as part of the preparation.
Colour can be added to overhead transparencies in several ways, the best options are using the laser printers, or using standard photographic methods. For those in a hurry, Polaroid makes an instant OHP transparency film.

Only specialized libraries dealing with education and training are likely to have these materials to store. Because only instructors normally use them, it is usually to keep them in any kits to which they refer or to store them as a separate collection rather than to make an attempt to intersheling them.

Overhead transparencies are also extremely compact, and therefore easy to store in suitable boxes, large envelopes, folders or files. Compared with other projected aids, the OHP also has the great advantage that it does not take notes: indeed it can be used in day light situation. The OHP is also clean, quite and 'user friendly', requiring no technical skill or knowledge on the part of the operator.

There are some media forms in the library that cannot be conveniently categorized as purely audio, visual, or audiovisual. These media forms, because of their size, shape and presentation of information content, are included here. Such forms are models, realia, and games and simulations.

(viii) Models: Models tend to closely represent objects in the real world and are acquired by library whenever it is not feasible to include the actual object in the library collection. These are often used in cases where movement has to be illustrated for example, the motion of the planets rounds the sun, wave motion etc, or when a three-dimensional representation is necessary (e.g. crystal structures, animal skeletons etc). However it is usually worthwhile getting the learners to gather round the model when its salient features are being demonstrated.

A model can show with little or no verbal description what an object looks like or does. A model is a replica or representation of a real object. Perhaps models are able to satisfy people’s inquisitiveness about the world around them.
Models on display in libraries always seem to draw attention, and they do not only fascinate patrons, but they seem to learn from them as well. When selecting models the librarian needs to be critically aware of their characteristics and attributes. The intended use of the model will determine the degree of accuracy required. Models are made because it is difficult or even possible to view the real objects. Various types of models are available, and the librarian should be familiar with such terms as exact model, simplified model, cross section, and diorama, and transparent model. If the library has an extensive collection of models, it may be practical to store them on shelves.

Mocks are not real substitute model for training or practice. Models and mock-ups are used for transmitting information, particularly more suitable for the starting point of discussion.

(ix) **Realia:** The supreme instructional 'model' is, in some cases, the article itself, since there are often of considerable advantages to be gained from letting learners see or handle the 'real thing'. and there comes the use of realia. When teaching geology, for example, there is simply no satisfactory substitute for getting the class to handle and examine real rock specimens, while the same is true in many aspects of the study of biology, physiology and similar subjects. Realia have a natural, built in, intrinsic interest.

In utilizing realia through a systems approach, the librarian should strongly consider the acquisition or local production of realia kits. A realia kit is a collection of real thing, near real things (models, and other supporting media like film, videotapes, art print's, charts, audiotapes, etc.) The realia kit contains all the materials for constructing a display or exhibit. When dealing with realia, the librarian can also consider a realia exhibit, which is essentially a collection of related materials.
To avoid a proliferation of realia beyond the needs of the library, the librarian should, first, classify areas of realia and, then, determine what types are essential to the library program. Once realia are classified, it becomes apparent which type from each classification would be beneficial to the library and should be considered as bonafide information realia.

(x) **Flannel Board**: The ordinary meaning of the word implies a piece of material made of cotton or wool. Cotton (Khadi) clothe made in the imitation of flannel. Flannel boards consist of a board covered with felt. Sticky-backed visuals are placed on the surface.

(xi) **Adhesive Boards**: As the name indicates, it is a substance, which is used to make things stick to a board. Most of the problems of the organization often lend themselves to the type of sticking information on a board. Adhesive boards can be used to display information of any problem.

(xii) **Magnetic Boards**: Magnets permit the use of behavior three-dimensional visuals. Magnetic boards are similar to the flannel boards. The only special feature with magnetic boards is the magnets permit the use of heavier three-dimensional visuals.

(xiii) **Electro-writers**: Writing is caused by electricity.

(xiv) **Telelectures**: Telelecture is visual aid; it is a common tool for making an audio-visual presentation at a distance.

(xv) **Signs and Symbols**: Symbolic form of expression includes the use of words, numbers, signs etc. Communication in symbolic form includes a collection of signs and symbols that may be put together in an infinite number of ways and the impression created at these symbols is the image. A sign is a group of letters, sounds, pictures or other communication elements that stand for something. It may stand for an abstract idea or stand for a product. An advertisement, for
instance, is a collection of signs, verbal or nonverbal. These signs usually operate at a subconscious level and are not consciously associated with past and present impressions.

(xvi) Displays: “Display” means things set out for show. Book Fairs, festivals, exhibitions, carnivals etc, would give an opportunity for installing or arranging displays. They are prepared and presented powerfully to attract the attention of the public and create desires and interests on the things displayed at important places like fairs and exhibitions. There are various methods of display, namely: Open display; Closed display; Architectural display; Platform display; Ledger and Wall display and Interior display. On the other hand, display may be interior, which follows certain factors of layout, decoration and product display at counters.

The libraries do not normally possess some of the supplementary visual aids. Such as Drawings, Hoardings, Cartoons etc.

2.3.5 Audio-Visual Materials

The first confusion that one must be faced is the distinction between ‘Audiovisuals’ and ‘visual aids’ Generally they are used together and often use the same equipment. For the purpose of definition audiovisual is taken to mean a medium using recorded sound, whereas visual aids accompany a live presenter.

Audiovisuals have come to mean many different things to different people. To some the use of a single slide is audiovisual, to others only a program using the latest video technology qualifies for the epithet. Individuals, groups and organizations can use audiovisual media. Unfortunately, many good academic libraries are not realized in full the potential characteristics and utilities of audiovisuals materials. Audio-visual aids have made a valuable contribution in education, training, art, culture, commerce, industry, and government. A Chinese proverb says, “One picture is worth a thousand words”. There are varieties of
audio-visual or sensory-aids. It may be noted that audio-visals and other sensory-aids are of little value or significance if they are not supported by a talk. Speakers and instructors or training teachers use them to illustrate in order to make them more comprehensible. In other words, the image and spoken words both are necessary to make the discussion or session lively, effective and more interesting. In number of cases, spoken words are necessary in support of visual aids to clarify its meaning. The most promising Audiovisual media are described in short below.

(a) Filmstrips and slides:

Filmstrips and slides have been a main stay in the library. Basically, filmstrips and slides are identified as being either silent or sound, with the sound being either as a disc recording or audiotapes. There has been a gradual changing trend away from silent filmstrips and slides toward the sound filmstrip. Computer and video technology are finding their way into the filmstrip and slide medium, making them easier to select and retrieve information in the said medium. This gives the librarian still another option to provide filmstrips and slide information to users. The librarian, by judicious selection can build a filmstrip or slide collection or both, that provides information in a format that is most convenient for the patron. As photographic techniques improved 35-mm film became, and still is, the standard for all-photographic filmstrips and slides. Attempts were made in the 1970's to introduce 16-mm filmstrips and a similar small format for slides.

Slides are a set of pictures and they are identified in sets. They are produced in two categories: (1) Vertical form; (2) Horizontal form, accordingly, projections are designed to show both types. Similarly, they are produced in two colour forms (a) Black and White; (b) Colour, and the two forms are: (1) Without Sound Track; (2) With Sound Track.
The advent of the sound filmstrip and sound slide opened a new capability for them. Now viewers could see projected still visuals and have them accompanied by appropriate audio commentary.

The slide or filmstrip, an individual using a slide or filmstrip viewer can see it, and also can be projected on a large screen. Still another consideration for using filmstrips and slides is that if the information to be viewed does not require motion, it is far less expensive than a motion picture film. Used by a competent librarian for group presentation, filmstrips and slides can compel attention, generate discussion, and involve follow-up activity, such as reading books for further information. When the librarian provides filmstrips and slides to students the results can be most gratifying. They tend to stimulate an interest in the library. A librarian should spend some time perusing filmstrip and slide selection aids to get an idea of the extremely wide range of information available.

The filmstrip is usually 35-mm, and silent filmstrips often have printed captions beneath the frame to explain the picture, even through filmstrips are usually accompanied by notes. Sound film strips are produced by the amalgamation of the strip with records or tapes, often synchronized by a 'beep', signaling that the film strip should turned on to the next frame. The filmstrip is invaluable as on the media of a multimedia programme and is generally a feasible material for inclusion in the library collection.

'Captioned filmstrips', a variety of filmstrip are best viewed independently. Most utilization of filmstrips and slides in the library will by individual patrons using a small filmstrip or slide viewer. The librarian should also seriously consider acquiring equipment that automatically advances visuals. The librarian needs to be cognizant of the qualities of the sound filmstrip and sound slide, whether it is on actual film or store on a Video laser disc.
(b) **Motion films:** Motion films that are in video formats are an important part of the library collection. Library film collection has been changing with regard to the film formats being acquired. In the year 1990, 16-mm motion picture films entered as new technology, High Definition Television (HDTV) which produced large projection screen quality, superior 16-mm film. At present, motion picture films are predominantly available in 16-mm and 35-mm formats.

16-mm film serves as a catalyst for small group identification, discussion, persuasion, and reaction. Of all the sound-visual-motion formats, the 16-mm film has the greatest number of titles commercially available to the librarian. Motion films remove the barriers of time, distance, size, and visibility. Nothing is invisible to the motion picture film. Motion film has the unique advantage of providing a bird’s eye view of the events being depicted.

Although the motion film is mostly used in-group situations, the librarian should encourage individual use as well. Preparing a film catalog, which quite frequently in a book or as a separate computer listing, is an essential tool for the multimedia center staff and the user. Preparing film programs to coincide with special events, holidays, and cultural affairs that affect the community served by the library. Although some users will want to see a film on the library premises, and many use it in-group situations and want to reserve a film so that it will be available when the group convenes.

(c) **Documentary Films**

There are many ways to categorize films in the library collection, but it is recommended that they be assigned to three major categories: the feature film, the educational film and the art film, which are called as "Documentaries". The film collection is generally devoted to entertainment, information, and cultural enrichment. The educational film should contain a learning objective; it will supplement, or be supplemented by, other forms of information media. Of the
three types of films, the art film usually the shortest, ranging from about 5 to 20 minutes of playing time. Art films are extremely popular in public libraries; they provide users with films that are unavailable from any other source.

Subsumed under the categories of feature, educational, and art films are a host of film tapes; history films, science films, cartoons, mystery films, horror films, comedy films, biographical films, and so on. Once the decision is made to acquire a film or a particular type of film for the library collection, the next task is to find what films are available in any given category. The task of selecting a film is a demanding one, but in terms of both the film's relatively high cost and the number of film titles available for selection, it is a worthwhile endeavor.

(d) Videotape: It is used to record programmes in pictures and sound using videotape. Videotapes have literally taken over the entertainment world from the Cinema. Videotape store magnetic signals for simultaneous subsequent retrieval of the visual and the audio information components. Lectures by experts, demonstration of processes techniques and field trips of inaccessible/remote regions could be recorded on videotapes for subsequent use. Videotape is a very useful innovation, which removes the constraint of viewing programmes at a fixed time.

These tapes are like films and have the same impact as the film. The audience for a film is larger than videotapes, and the tapes are seen on a television screen. Films are costly to make while videotapes are cheaper to make. More extensive use of videotapes is discussed under Communication Media.

2.3.6 Illustrated Materials (Paper-based Print):

(a) Maps: The way maps present information and by their physical characteristics, must be categorized as an illustrative type of media. The content of maps can range anywhere from single community maps to celestial maps. Maps are indeed
a unique media form, and it is not uncommon for a library to assign specific personnel for the task of maintaining the maps collection. By definition, globes and maps are symbolic replicas of the earth's features or characteristics. Maps of extremely large areas are limited in their kind of accuracy.

A good map collection in libraries ranges from maps used to learn how to read maps to maps that are read to learn. Maps illustrate a real distribution of many things on the face of the earth. Libraries can now acquire maps based on photographs taken from airplanes and satellites. Knowledge of the essentials involved in map making is important in selecting the right maps for the library, and so there are varieties of maps as:

1. Wall maps
2. Bound wall maps
3. Overhead transparencies

Relief maps: provide a three-dimensional perspective of the earth’s surface.

The library will need maps of major world areas (e.g., continents and oceans), of countries (political maps), and the states of a country. The librarian should define the local or regional area for which the library will provide maps and the kinds of maps it will acquire. Quite often it is the local library that acquires the most complete and extensive maps of a local area by developing an archives collection of maps. Maps have an historical value intended periods of time. If the collection of local maps becomes too extensive and cumbersome to maintain, rather than weeding out old maps, it may be advisable to consider committing them to microform. A final consideration of physical durability of the map is that it requires systematic maintenance.

(b) Atlas: An atlas is a collection of maps or charts, usually bound together. The name Atlas derives from a custom—initiated by Gerardus Mercator in the 16th
century of using the figure of the Titan Atlas, holding the globe on his shoulders, as a frontispiece for books of maps. Atlases in addition to maps and charts also contain pictures, tabular data, facts about areas, and indexes of place-names keyed to coordinates of latitude and longitude or to a location grid with numbers and letters along the sides of maps.

General-reference atlases emphasize place locations, the connections between them, and the relative size or significance of the places designated. Thematic, or special-subject, atlases deal primarily with a single subject, such as agriculture, geology, mineralogy, climate, history, industry, languages, population, religions, resources, or other characteristics of a geographic area. National atlases are usually produced by government agencies to cartographically present the whole range of a particular nation's salient features: physical, historical, economic, social, cultural, and administrative.

For Example:

(1) General Atlases:


(2) Subject Atlases:

i) Economic Atlas,

ii) World Agricultural Atlas

(c) Globe: A sphere or ball that bears a map of the Earth on its surface and is mounted on an axle that permits rotation is a globe. The ancient Greeks, who
knew the Earth to be a sphere, were the first to use globes to represent the surface of the Earth. Crates is said to have made one in 150 BC. The earliest surviving terrestrial globe was made in Nürnberg in 1492 by Martin Behaim, who almost undoubtedly influenced Christopher Columbus to attempt to sail west to the Orient. In ancient times, globes also were used to represent the constellations; the earliest surviving globe is the marble Farnese globe, a celestial globe dating from about AD 25.

Today's globe, typically hollow, is made of almost any light, strong material, such as cardboard, plastic, or metal. Some are translucent. They may also be inflatable. Terrestrial globes are usually mounted with the axis tilted 23.5° from the vertical, to help simulate the inclination of the Earth relative to the plane in which it orbits the Sun. Terrestrial globes may be physical, showing natural features such as deserts and mountain ranges (sometimes molded in relief), or political, showing countries, cities, etc. While most globes emphasize the surface of the land, a globe may also show the bottom of the sea. Globes also can be made to depict the surfaces of spherical bodies other than the Earth, for example, the Moon.

2.3.7 Microforms:

The invention of printing was the first major contribution to civilization. John Guttenberg's Movable types added the most significant dimension to the printed world, which today stands unmanageable. Paper and printed media although unrivalled today technological strides fear the existence of printed media in future. The growth of paper media is often compared to that of population explosion. This medium thus faced a situation of dual crisis-present unwieldiness and future shortage.

The three most common medias that are prevalent and used for storing information are, paper, electronic storage and microforms. The electronic storage
is catching up widely and paper has not only become dearer, but becoming unmanageable day by day. This has led in 1970's for the arrival of microforms. Libraries have acquired microforms to overcome their budget cuts and inflation, to avoid unlimited extension of library stacks, to maximize acquisition of relevant information with their inelastic budgets, to cut the delays in acquiring information and to achieve ease in handling and storage. Microforms were once considered modern, efficient, compact and powerful medium with their own advantages and disadvantages.

The main advantages of microforms are: (i) economy, (ii) saving in space, (iii) speedy acquisition, (iv) file integration, (v) easy mechanization and automation, (vi) low cost on-demand information dissemination and distribution, (vii) easy to archive and have security of information and protection of records, (viii) easy to store, handling and retrieve, (ix) ecological value and control of paper, pollution and cost, (x) integrity and durability of collection, (xi) easy reproduction and aesthetic quality.

The microforms came in a situation where they could provide some kind of solution to paper media explosion. It is stated “since 1930’s prophecies have warned that microform revolution will soon render books absolute”. And predictions and guesses are attributed to contain whole of Library of Congress in a small room with meager maintenance costs. The problems the Libraries faced are regarding space and the crisis of increasing paper shortage. Such critical situation was solved with the solutions provided by microforms and with them the collection development found to be more fruitful and economical. There was a strong contention to advocate only a selective collection development in microforms and not for a total replacement of print media.

The birth of microphotography is traced to John Benjamin Dancer who in 1839 introduced ‘Microphotography’ and in 1853 ultimate success was achieved.
to produce stable microforms. Their use was first made in transmitting secret messages/documents in military operations. The use of microforms was brought in library environment in or around 1930’s. An exploratory phase began since then and in 1970’s and 1980’s they were very much part and parcel of the library science and technology. Microforms available today are in numerous forms and sizes, and they are broadly classified as:

(A) Micro transparencies;

(B) Micro opaques.

(A) Micro transparencies:

(i) Roll Microfilm: It is the transparent (translucent) media, pages arranged sequentially. This form is available in 8, 16, 35 and 70 mm sizes. The roll runs to a length of 100 feet. The roll films are packed in reels, cartridges and cassettes. The roll films are photographed in different modes. Cine mode, comic mode, Duo mode and Duplex mode. The reduction of roll films ranges between 10x and 24x. Roll films are still a popular choice because of large quantity of information can be stored in very little space, at a very low cost. Microfilm on reels provide high measure of file integrity, are desirable when information is added continuously in sequence and updating is infrequent.

(ii) Microfiche: A microfiche, or “fiche”, is a sheet of transparent sheet of film containing multiple micro images in a grid pattern. It usually contains identification of information, which can be read without magnification. Available in a variety of styles, microfiche generally permit unitized data storage and updating. Microfiche’s flat pages are arranged in rows and columns contain from a few to several hundred images in different reduction ranges. Microfiche is normally in the standard size of 148 x 105 mm with 98 frames. But there are also fiche with 60 frames and as well as on the higher side of 98 pages. Most microfiche are printed on horizontal mode and the reduction ranges between 18x and 24x.
(iii) **Ultra (Micro) fiche**: These are ultra high reduction microfiche. The National Micrographic Association defines "Ultra-fiche" as microfiche at reduction in excess of 90x. The reduction parameters range between 30x and 90x and are termed from medium to high rate. There are even examples of very high reduction up to 150x. The National Cash Register's PCMI Library has microfiche with 3200 images on a 148 x 105 mm size. Ultra fiche permitting thousands of images per fiche, offered the advantage of storing (packing) more information in less space than standard microfiche.

(iv) **Computer-out-put Microform: (COM)** Computer output on microform is a microfiche produced directly from machine-readable text. This is a combination product of computer technology and microphotography. The text stored in computer media can be directly reproduced on film with the help of CRT without creating a paper copy. COM's are available in 24x, 42x and 48x reduction. They are both in horizontal and vertical modes. The storage capacities of COM's are much higher than normal reduction of 48:1.

The COM of 148 x 105 mm contains 270 frames hence can store 270 pages. COM's are found very useful in bibliographic recording and controlling and many libraries these days are producing their library catalogues in COM. Number of libraries in United Kingdom and US are using this technology for the production of their catalogue.

(v) **Aperture Cards**: Aperture cards may contain a single image, or up to eight page-size images on one 35 mm frame. The aperture cards are more common for drawings. A frame strip of 35mm film is permanently fixed on to an Aperture mode on a punched card. The punched card also bears the brief information about the contents of the strip and can be read without magnification. More than one image with related texts can also be combined into an aperture card, similar to Jacket films. These can be used for mechanical storage and retrieval as well as for handling in manual form.
**Micro-Opaque**: Microprints and micro cards are two versions of micro-opaque. Similar to microfiche in configuration, micro-opaque are, as their name implies, images on opaque thick stock. Therefore, images may be stored on both sides. Unlike microfiche where transmitted light is used for blowback, opaques use reflected light. They are printed on 75 x 125mm (3” x 5”) micro cards and on 148 x 105 mm (6” x 4”) microprint format. Micro cards are produced from film masters on photosensitive paper and the microprints are printed by ink by offset process. Both are invariably positive in polarity and card will have usually 100 pages in 10 x 10 matrix. The best example of microprint is the Compact edition of Oxford English dictionary in 2 volumes.

### 2.3.8 Microforms in Libraries:

The library functions, collection, storage, organization, dissemination and retrieval of documents/information when becoming costly day by day, the dissemination of documented knowledge has been in crisis. The advent of the microforms at this point brought some solutions. As the cost of printed media has been rising at a very high rate, there was only alternative to the change of the physical media, which was imperatively provided by microforms.

The libraries with problems of acute space and increasing cost of maintaining archival and back-files, microforms provided a best feasible solution. In such cases to propose microform was the easiest answer.

Acquisition of documents in microforms presupposes development of micrographics facilities in library. In developing micrographics facility, other aspects like organization, maintenance, quality control and inspection of microforms, relation of micrographics with other systems of library, preventive measures regarding the work hazards in micrographics, design of furniture for use of micrographics, layout of micrographics unit, copyright problems relating to micrographics, etc., have to be addressed. One of the reasons for user resistance,
as mentioned repeatedly by experts, was lack of appropriate user aid equipment to read microforms and to take paper copies as and when needed. User equipment facility should also include acid free and fire resistance storing units, micrographics writing/marking pens, hand-held viewers, cleaning aid, microform projector, reader-printer/enlarger printer, automated microform storing-cum-retrieval system etc. These were subsequently overcome in a very large measure.

It is true that most of the manuals, reference books, standards and patents were no more published or brought out in microform. A large chunk of gray literature, particularly technical reports, newspapers and dissertations, are even now reduced and economically being acquired by libraries in microforms. Technical reports are important primary sources of information in the area like aeronautics, space technology energy and management.

Even today microforms have their own advantages over paper and electronic media. The every fact that large part of collections of the British Library and many special libraries even in India consists of microforms particularly technical reports and other grey literature are in microforms. The latest developments have enabled directly digitizing the contents of microforms proving the possibility of integrating microforms with digital environment. This possibility together with ideal suitability of microfilm medium for the purpose of archiving is likely to create new economic and efficient ways of information storage, retrieval, access and reproduction as and when required.

The British Library, the fifth largest library in the world with over 13 millions documents (excluding nearly 50 million patents), and a large collection of microforms (over 4 million), is possibly the best and largest document delivery system.8

Preservation Resources Department of OCLC is the international organization in the forefront of Information Technology and resource sharing.
Preservation Resources Department of OCLC has a state of the art micrographics Studio (where cameras are claimed to be working 24 hours a day) which has converted 69.5 m pages of old brittle books, newspapers, manuscripts, etc., into microforms in 12 years.9

It stores more than 87,000 reels of films equivalent to 5.5 lakhs titles for over 100 clients on its on site custom-built print matter storage vaults and reproduces hundreds of reels to meet inter-library loan demand.10 The rate of inspection is claimed to be 14 miles of camera master and 25 miles of duplicate films every month.11

2.3.9 Micropublishing:

The market for micro-documents like, technical reports, theses, patents, standards and more commonly for primary periodicals is considered in micropublishing. The printed sources of these documents are becoming costly due to:

1. Growing specialization in each discipline,
2. Number of copies required is very less compared with books,
3. Cost of printing is on the increase repetitively, and on the contrary;
4. Cost of microform producing is getting cheaper with technological developments.

All these reasons have accelerated the market of micropublishing in recent years. The documentary sources taken up by micropublishing are:

1. Data services.
2. Supplements to books.
3. Reports.
5. Primary and Secondary Periodicals.
7. Archives and Ephemera.

There are many important reasons for libraries and librarians to seriously consider for developing and rejuvenate building at least partially a microform collection. Microforms in due course of time will become indispensable and only alternative to kinds of electronic documents. Some of the areas, systems and services of Library and Information Centres that can be converted to microforms are as listed above.

In the next section developing trends in multimedia are discussed.

2.4 Current Trends

As society has begun to value information more highly, the so-called information industry has developed. This industry encompasses publishers, software developers, on-line information services, and other businesses that package and sell information products for a profit. It provides both an opportunity and a challenge to libraries. On the one hand, as more information becomes available in electronic form, libraries no longer have to own an article or a certain piece of statistical information, for example, to obtain it quickly for a user. On the other hand, members of the information industry seem to be offering alternatives to libraries, and on such alternative are the optical storage devices. The current trend of development surrounds this new media, which has revolutionized publishing, storage, retrieval and dissemination of information. The media has been responsible for the latest concept of “Multimedia” as the outcome of convergence of technologies.

Multimedia as in modern concept means, an electronic technology which provides a single medium with the power to integrate diverse types of information.
It provides endless integration of data, text, images, and sound within a single digital environment and access to stored information using computer systems which are user friendly and, above all interactive.

2.4.1 From The Past To The Present:

It was only from the middle of 19th century that rapid transmission of communication by electrical means became possible. Telegraph helped the transmission of written messages, almost instantaneously. Telephony from 1876 onwards facilitated the transmission of speech, enabling the dissemination of information and knowledge very rapidly. Telegraphy and telephony are, however, menace of communication from one individual to another, from any place and could be said to be known to millions only when it was printed and distributed through newspapers or otherwise.

The next quantum jump occurred with the invention of the radio broadcasting of information from a central source to any and everywhere equipped with a radio-receiving device. By the beginning of 1930’s, almost all over the world, radio broadcasting for information transmission over wide communities and areas had been established. From then onwards, any body can say that the information was becoming more and more electronic–based. 1950’s began the transmission of picture along with voice for broadcasting. Television increasingly affordable by more and more people because the transistors and the integrated circuits made the mass-produced radios as well as the television sets cheaper every decade. The invention and increased availability of portable recording and replaying devices enabled the capture of events as they were taking place and they’re near instantaneous transmission of news and views of events. Before the invention of the telegraph, it took weeks and months for news in one country to be known in other countries and continents. But with the radio and the television, both carried over satellites, distance and time has so shrunk that information
from one continent to another can be transmitted and known in as little time as it
takes good within a village. In other words, our globe itself has been reduced to
a village.

Audio and Videocassette recording their multi-fictions in million is enabling
the speread of instruction and training and entertainment and education. One
illustration of how an electronic medium involving education-spreading system
has come up could be useful. If all of them are, in the traditional fashion to be
sent to schools, the amount of expenditure over buildings, textbooks and
transportation programmers can be recorded on videocassettes and broadcast over
countrywide or region wide media through the satellite. What is called ‘Projection
Television’ is a versatile aid. Pictures are reproduced on a vary large screen
attached to the television monitor, enabling scores of viewers to be instructed
with the least expense. Also, instead of libraries of books, if there is a library of
videocassettes containing text and illustrated and explained by the best teachers,
and if these cassettes can be circulated among the schools, the quality of instruction
in the village-level schools, which are poorly--staffed, can be largely improved.

Electronics, computers and telecommunication media, are enabling the
simultaneous printing of newspapers from several centers. Electronic book
publishing is another rapidly growing activity. Personal computers, access to
databases over telecom media and print a mass of information in whatever formats
it is wanted. They are a great aid for information storage, retrieval and processing.

The major transformations in this context were first brought out by compact
disk technology. If microforms revolutionized handling in information explosion
(paper based) in 1970’s CD-ROM did it along with magnetic and other electronic
media in 1990’s. The advent of concept of digital library is partially attributed to
compact disk also.
2.4.2 Optical Media:

Broadly, Computer based storage technologies can be grouped into Magnetic and Optical Technologies. Archival storage has been a nagging problem for librarian. As the stock of libraries grows year after year, a variety of problems arise. Major problem associated with conventional print media include the need for a large shelf space, longer retrieval times, expensive maintenance, durability, and wear and tear. These problems made some of the libraries, especially those situated in large cities where addition of extra space is difficult, and with huge collection, to resort to either weed out at regular intervals, documents which are not active, or create dormitory collection to store unused and less used documents. These factors coupled with the ever-changing technological advances in the computer technology paved the way for the development of mass storage system that is provided by optical media. Advances in this field have resulted in the optical data storage devices, which have a long archival life, high resolution, and simplicity in handling and above all, enormous storage capacity.12

Among the information technology applications for library management system Compact Disk Read Only Memory discs have made considerable impact. Whether these are used to hold music, data or computer software, both CD's and DVD's have become the standard medium for distributing large quantities of information in a reliable package. These are in other words are the new optical storage media. The major features of optical mass storage media are; high optical/mechanical stability, high optical resolution, easy handling, low recording energy with high recording sensitivity, rewrite and/or duplicate, and short recording time. Other features include relatively low cost, ease of handling, compact size and high portability.

The Compact Disc (CD) technology a very name of optical disk is around for about over two decades now. The first CD (audio) was released in market
during 1982, The Compact Disc Read Only memory (CD-ROM) appeared in market in 1985. Many types of optical media, which flooded market in the past few years, met with variable degrees of success. However, the success of CD-ROM was phenomenal. Broadly, the media can be grouped in to three categories, viz., Read-only, Write Once-Read Many (WORM), and Erasable/Re-writable. Most of these are finding applications in library, publishing multimedia products, and software/database distribution.

The variety of Optical media includes CD-audio, CD-ROM hybrid discs, CD-Interactive (CD-I), CD-Interactive Video (CD-IV), CD-Video (CD-V), Digital video Interactive (DVI), Digital Video/ Versatile Disc (DVD), Photo-CD, Data and Optical ROM (DROM & OROM), CD-Recordable (CD-R), CD-PROM, recordable videodiscs, digital optical discs (with diameters of 5.25, 8, 12 and 14 inches), optical card, and optical paper; and the erasable/re-writable media include Erasable Programmable Memory (EPROM) discs, CD-Erasable(CD-E), also know as CD-Re-writable, (CD-RW) discs, phase change and magneto-optic devices. Most of these have a typical 650 MB storage capacity although a few (for example, erasable discs and DVD) have capacities up to and above 2GB. In the last few years Erasable and Re-writable optical systems have been in use extensively. Once information is recorded in these discs, it is permanent. This disadvantage has become advantageous in cases such as distribution of software, document storage and retrieval, and consumer applications like game and entertainment.

(a) Compact Disc-Read Only Memory:

The growth of multimedia titles, games and entertainment and cheaply available videodiscs and latest trend in software distribution through CD’s all made of CD-ROM discs. Also there is a gradual increase in the digital information component in Research and Development, Corporate and Academic Libraries, which are moving to digital information access gradually. And now libraries are joining the wave by introducing CD-ROM databases. It is the first practical
technology for mass-market distribution, suited to the developing countries. All these factors are making CD-ROM more and more popular for the Librarians, consequently CD-ROM, the 'digital' papyrus, has become synonymous with electronic publishing.

There are multimedia informative CD-ROM’s on varieties of subjects like wild life, on Cities, on Music, CD-ROM’s to teach the alphabet, words, languages, games, sports, CD-ROM’s telling interactive fairy tales, etc. Encarta, a CD-ROM based Encyclopediade, which takes particular advantage of the computer’s dual abilities to search and to interact with the user.

To sum up, CD-ROM has more advantages than the present physical and computer based methods of Information storage and distribution.

(b) Digital Video Disc:

Digital Video Disc (DVD) also known as Digital Versatile Disc is similar to a CD-ROM in appearance. In simple terms, DVD offers far greater data density, smaller recording pits, more closely spaced tracks, and backward compatibility with CD-ROM. Many variant forms of DVD have been launched (in both 12 and 8 cm sizes) and a few are under various stages of development and those, include are DVD-Video or simply DVD, DVD-ROM, DVD-R, DVD-RAM and DVD+RW. Those, which are on the pipeline, include DVD-R, DVD-RAM and DVD-Audio. Ultimately, DVD is expected to replace CD-ROM in near future.

Multimedia publications like encyclopedias need more than one CD; this make user to swap CD’s while accessing information. Use of DVD solves this problem, and the market is en-cashing this advantage as revealed by the growth in the number of companies involved in the DVD publishing. The DVD Directory of the Water flow New Media Information covered more than 1220 companies active in DVD publishing in May 1999, a growth of 20% from previous year.14
The multimedia industry is already exploiting the technology. Many reference sources have been made available on DVD. MEDLINE Advanced, bibliographic database of international biomedical literature containing over 8 million citations and abstracts of articles from 3,700 journals published from 70 countries has been brought out by Silver Platter. The December 1997 issue of E-Media Professional listed 400 DVD titles. These include Multimedia Encyclopedia of Graphic Zone/Grolier, Animal Planet of Discovery channel, Vanishing Wonders of the Sea of Sumeria, etc. The 1999 edition of the Directory included 2318 DVD-Videos and 118 DVD-ROMs. Film studios are releasing more DVD videos year after year, leading to the rapid growth of the DVD industry; they accounted for 20 percent growth in 1999. The Directory 1999 lists 99 companies involved in DVD-ROM publishing and 77 who bring out DVD-Videos. Recently some DVD multimedia encyclopedias such as Microsoft Encarta Reference Suite (containing Encarta 99, Encarta Virtual Globe 99, and Microsoft Bookshelf 99x), Webster’s International DVD Encyclopedia, Encyclopedia Electronica, Funk and Wagnall’s Multimedia Encyclopedia, Britannica DVD99, and Grolier Multimedia Encyclopedia have been published. All the volumes of 110 years of the National Geographic Magazine have been accommodated on just 4 DVD’s.

(c) Hybrids:

The choice of the publication medium changes as per the situational need and depends upon various consideration including cost, availability of equipment, frequency of updating, and other factors. In situation where text, graphics and video (including animation) are part of publication, CD-ROM emerged as the best medium for e publishing. Networks, Intranets and Internet became the publishing medium when the environment warranted continuous updating. In such a hybrid environment, CD-ROMs combined with on-line networks become popular and acceptable hybrid publication media.
The CD-ROM/on-line hybrids allow the user searching a database or an encyclopedia on CD-ROM to get connected through Internet to forums, electronic publications, news services and chat rooms relevant to the subject. For example, Grolier Electronic Encyclopedia includes more than 12,000 links through CompuServe. World Book Encyclopedia (1998) of IBM links to a site offering current news and updates to the CD. Such many major encyclopedias offer on-line connection including the Encyclopedia Britannica. Databases vendors like Knight Ridder On Disc (Formerly DIALOG), and LEXIS-NEXIS allow users access updated information on their files being searched; these also allow users of the respective CD-ROMs save search strategies and then log on to the on-line files to search and download results. A number of CD-ROM periodicals (for example, Medio Magazine) with on-line links have been introduced. Some have links to Internet. America On-line (AOL) also offers Compton's Interactive Encyclopedia, and Market a hybrid CD-ROM shopping service; The Almanac, multimedia games and buyers guides.17 The multimedia and CD-ROM Directory of TFPLK multimedia listed 600 hybrids titles in mid 1997, an increase of 160 percent from January 1997.18 It is found that the same trend will be observed in future too.

2.4.3 Library Applications of CD-ROM

The contents of CD-ROM products generally include abstracts, databases, full-text articles, images, audio and software. As such these offer a number of advantages and avenues for library applications and not surprisingly, libraries are major customers of CD-ROM products. Comparison of CD-ROM databases with their printed counterparts have been made by many and it has been established that CD-ROM databases are cost effective, for reference tools, involve lesser transit delays and provide more current information than print media. Enhance the image of the library and serve as excellent public relation tools, especially in the present environment of marketing of information products.
CD-ROM is viable and cost-effective alternatives to On-line searching, though not as current as on-line databases. CD-ROM facilitates, library automation, retro-conversion of bibliographic data as well as cataloguing. Since many OPAC's of individual or groups of libraries are available on CD-ROM's, CD-ROM's allow exchange of bibliographic databases, software, etc, and are ideal for archival purposes of gray literature like internal reports, newspapers, reports, standards, and patents, support current awareness services (CAS) and selective dissemination of information (SDI) as it is possible to provide contents, abstracts, full text etc, and also facilitate information retrieval by a specific journal name, allow expanded quality of services, enhanced number of users, exhaustive coverage of information at little or at no extra cost or time.

CD-ROM's facilitate networking, searching by multi-and remotely located users, library cooperation and resource sharing. Help in saving of resources as less-used journals can be discontinued if they are included in bibliographic databases and only those articles needed from such journals can be procured based on CAS and SDI services, and Facilitate collection development, evaluation, print, purchase orders, produce card catalogue and quantitative / citation studies as databases like books-in-print plus with about 2 million records and a number of indexes offer such flexibility.

(i) The Development of CD-ROMs in Reference Work:

It has been argued that it was the advent of the On-line Public Access Catalogue (OPAC) that changed reference librarianship, but the revolution really occurred when public access CD-ROMs arrived in the reference library, for this was the start of the end-user revolution. Until that time, reference librarianship has not changed for a considerable number of years, for the arrival of on-line searching had been treated very much as an add-on service.
Libraries started ordering their first discs around 1985. Many were for in-house routine procedures, mainly in technical services areas (e.g., Books in Print on Disc or Ulrich’s Periodical Directory On disc), while the Grolier and Compton’s Encyclopedias were among the first standard reference publications for public use in the new format. Over the time these discs began replacing the printed editions that had been traditionally purchased.

The reference desk was the usual location for the first CD-ROM services, although there were some notable exceptions to this rule. The surprising success of the first databases forced an immediate rethink of service needs. Questions about CD-ROMs increased the number of inquiries at the reference desk by a considerable degree. The types of CD-ROM databases purchased for reference collections may be divided into two categories as: (i) standard reference work and (ii) abstracts and indexes.

(ii) Standard Reference Works:

Over the past ten years there has been a large increase in the number of dictionaries, encyclopedias, directories, and bibliographies published on CD-ROM. Some publishing houses have taken advantage of their traditional strengths to develop CD-ROM editions of their standard reference titles.

Traditional titles that have translated to CD-ROM include: Krik-Othmer Encyclopedia of Chemical Technology, Dictionary of Organic Compounds, Harrap’s Multilingual Directory, Concise Oxford English Dictionary, Kompass CD book, and the British Library General Catalogue of Printed Books. The transposition of these has given them and added value even though they are basically text files. Interactive publications with sound, color, and video are transforming reference works. The advent of Windows has made this new development technically possible, while a great investment of time, money, and expertise has succeeded in providing better and more innovative products.
Abstracting and indexing databases were most easily translated into the medium of CD-ROM. This was partly because the technology offered a readily available opportunity to exploit the existing software and data, but also because there was a ready market. As it is seen it has promised librarians the possibility of database searching within a fixed budget. Publishers devised search engines and produced CD-ROM versions that were immediately purchased by libraries and subsequently networked.

Some publishers, such as the H.W. Wilson Company, provided software that allowed direct access to the online database from the CD-ROM, thereby overcoming the problem of timeliness. For libraries, however, this brought budget control back into the equation, and few of them offered the online option.

Abstracting and indexing journals on disc were also important early purchases, especially in academic libraries. CD-ROMs offered many advantages over printed versions of these journals: one disc often covered several years; there was little difference in their currency and that of the equivalent print editions; keyword searching using Boolean operators provided added value; print editions; keyword searching using Boolean operators provided added value.

In addition to journal indexes, some journals are now available on the Web in full-text format due to projects initiated by specific universities or groups of institutions. Project Muse at Johns Hopkins University offers paid subscriptions access to more than forty of the journals published by Johns Hopkins University Press. Coverage is only for the last few years, but the electronic versions of these journals offer some features that the same journals in print do not provide.
(iv) CD-ROM Map Discs

Multimedia Atlases Similar to the traditional book atlases, multimedia versions contain maps, illustration, tables and statistical data relating to whole. However, they are better than the traditional ones by presenting the information in a more dynamic and involving way. Navigating the world is easy with each country having a hotspot. Choosing the hotspot can produce an animated display of the chief characteristics of that country-population, currency, cities, water resources, etc.

Furthermore, CD-ROM maps are encoded and updated regularly. One present limitation the CD-ROM maps cannot be effectively used for large group viewing. Libraries will no longer be burdened with outdated map information; maps and atlases of odd and various sizes, and the consumption of large storage areas. If a request should arise wherein a relatively small map must be used by large group, the map can easily be enlarged and projected onto a screen with an individual, it may be advisable to have large map tables with tilted surfaces for comfortable viewing and examination.

(v) CD-ROM in Distance education:

The technology of the CD makes it an attractive addition to distance education programmes. CD offers a unique way to store large volumes of audio programmes/instruction at one place through digital mode. A major advantage of the CD is its resistance to damage. Distance education learner can quickly locate selections on the disc and even programme them to play on desired sequences. Trainees can selectively retrieve the desired information. The use of CD in place of traditional audiocassettes will enable the distance education learners and teachers to use audio medium for instruction, teaching and learning in efficient and cost effective manner.
The CD-ROM can be useful format for teachers and learners of distance education with a unique databank that must be read often. By using this technology, the learners will be able to access different types of database belonging to different aspects of educational field. The distance education centers can create "Educational Resource Information Centre" on CD-ROM which may contain abstracts of journals, study materials, unpublished education documents, databank and other relevant information. By using this, it will be possible for learners and teachers to search out relevant information quickly and copy it as per their need. Over 70 million people are receiving and education over the Internet this year—because its easily accessible, and free of time and location constraints.

Nearly half the approximately 3,900 institutions for higher education in the US provide some variety of distance education, according to a study made by the US department of education. In just three years, that number will climb to more than 80 percent, with a growing share of that distance learning taking place online, over the Internet.21

(vi) Electronic Publishing

Electronic publishing is one of the widely discussed and published topics of information technology and, perhaps, second only to Internet in the number of papers published. After the introduction and success of CD-ROM and some of its variants as the medium of e-publishing, the technology as well as the subject became very popular. The number of CD-ROM titles, journal articles, books, monographs, reference sources reports, and conferences in various subject fields have been growing for quite some time now.

Since the publication of the first electronic book in 1985 in Germany, 22 there has been a steady growth in the number of e-publications. More and more publishers of scholarly, academic and reference works from almost all fields of human knowledge are entering into e-publishing field. Though many publications
exist in 'dual' (both on paper and electronics) versions, many 'electronics only' publications have also emerged. The first e-publishing products were mostly reference works, secondary publications, and machine-readable databases of indexing /abstracting services.

Electronic Publishing can be defined as the publication process where the manuscripts are submitted in electronic format, edited, printed, and even distributed to subscribers and readers (users) by employing computers and telecommunications. In the most pedestrian interpretation, computers and related devices are used for economy and convenience in producing a conventional print-on-paper publication. In the most sophisticated interpretation, the full capabilities of the e-media—including motion, sound, and interactive features—are exploited in the creation of completely new publication forms. In general, the fusion of electronic, computer and communication technologies with publishing can be termed as e-publishing. This would include sources distributed on magnetic tape and such media as videodiscs as well as sources not really distributed at all but only accessible (like data bases).

(vii) Optical Discs and Electronic Publishing

Optical discs have become synonymous with e-publishing and CD-ROMs have penetrated all branches of professional and scholarly publishing. This is because of the success of the CD-ROM as the medium of choice for the publishing industry and also due to its acceptance by major libraries around the world. Durability, capability to hold large volumes of data, and affordability are the important factors for the success of CD-ROMs. What happened with Microforms in 1970's is now can be attributed to Compact disks. Many publishers including McGraw-Hill, Wiley, Elsevier, North Holland, Meckler, Grolier, Prentice-Hall, Oxford University press have all ventured in publishing on CD-ROM's they have slowly replaced microform documents primarily due to their versatility, low cost...
and ease of use. The usability of CD-ROMs in a networking environment made this technology more attractive and acceptable to the library community. CD-ROMs, videodiscs and online bibliographic databases form a major part of the e-publishing field.

Electronic publishing replaced the printed reference sources to a large extent; secondary and some tertiary periodicals followed suit. The primary journals embraced CD-ROM rather slowly. Many publishers like Elsevier, IEEE, Chemical Abstract Service (CAS), SCI, BIOSIS, UMI, INSPEC are distributing primary, previewed periodicals in CD-ROM format; the full-text databases produced on CD-ROM during 1993 accounted for nearly 47 percent of the total CD-ROM titles. In the next few years, all the reference, primary and secondary periodicals are expected to be brought-out as dual publications, which later will be in electronic form only.

In recent times CD-ROM Publishing systems have been on the rise. These allow anyone to become a CD-ROM publisher/producer. These systems facilitate academic institutions that are involved in creating databases of their holdings (and archives) to produce CD-ROM based searchable products and to market them. The availability recordable CD/DVD drives have facilitated in house, CD publishing. Even in India, institutions have brought out databases on CD-ROM, for example INSDOC, NUCCSI, Mtech and Desidoc brought out library Holdings on CD-ROM respectively.

The latest development in electronic publishing is the Web publishing. The World Wide Web is offering limitless opportunities for becoming ones own publisher and seamless access to the (published) information, without any restriction. Many document-publishing systems enable Internet Publishing and even support the indexing of unstructured documents while providing full text searching capabilities for users. The advantage of Web publishing has facilitated
speedy publishing. Which were initially distributed in ASCII text files through listservs, are now available through the web browsers like Gopher or FTP protocols, and provide access to e-journals on the Net. Current technology provides hypertext links to connect to references to other articles/journals and other Web files.

2.5 Communication Media:

So far in this chapter a discussion on written, print, non-print, illustrative, audio and visual audio-visual materials as sources of information is made. Besides these sources the technological impact has converted or transformed the oral communication channel into new communication media. For example the telephonic communication has now its application found in the one of the most widely used communication system the electronic mail or e-mail.

The telephone is also instrumental in facsimile transmission, which has business, education and library applications. In business it is popularly known as fax service, where as in library one of its application is found in Document delivery service. Apart from the telephone the integration of computer and communication technology have created greatest impact on oral communication media, both face-to-face and otherwise. In this context the Teleconferencing, Videoconference, Bulletin board services are the new innovations in the communication media.

In addition to the technological oriented information and communication systems the human expertise and knowledge and institutional resources were also considered in the context of new and emerging communication media. In this context the growth of World Wide Web can be attributed to the role of the institutional and organizational information. The WWW, which was once a commercially oriented organizational information media has now spread to all types of institutions including the libraries. Hence in the discussion deliberated
on communication media the following are considered from both traditional as well as the part of current trends, it begins with INTERNET, one of the vastly spread communication media of today.

2.5.1 Internet As An Information System:

The Internet opened a totally new dimension. The convergence of media made it exciting and created new challenges for libraries to grapple with. Internet is today a huge information system only the parameters/components of this information system are in controlled environment and hence monitoring the various parameters is a problem. Though, the various components of information systems are present in Internet as an information system, there are marked difference as can be seen in Table 1.55

Table 1

<table>
<thead>
<tr>
<th>Library/Information system</th>
<th>Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controlled environment</td>
<td>Uncontrolled environment</td>
</tr>
<tr>
<td>Selective</td>
<td>Arbitrary</td>
</tr>
<tr>
<td>Purpose oriented scope</td>
<td>Disjoint and varied scope</td>
</tr>
<tr>
<td>Limited</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Organized</td>
<td>Chaotic</td>
</tr>
<tr>
<td>Time tested methods for organization and retrieval-includes automatic and manual methods</td>
<td>Lacks organization and retrieval aspects – only automatic methods</td>
</tr>
<tr>
<td>Permanent Volatile</td>
<td></td>
</tr>
<tr>
<td>Emphasis is on Ownership</td>
<td>Emphasis is on access</td>
</tr>
</tbody>
</table>

69
Libraries or information systems are defined by their function as systems that comprise of a spectrum of activates from generation and location of information to dissemination and use of it. The nature of the activities in the Internet information system also conforms to the components of an information system as depicted below:

Generation —> Storing —> Organization —> Retrieval —> Dissemination —> Control

In the following paragraphs these components are described briefly.

(i) Generation:

From the generation point of view, publishing information on the net, or electronic publishing, offered an alternative also to traditional publishing. Just any person who has connection to the Internet and has the tools to make information available can make it a part of the Net. Further, the information generated will not be restricted to any geographical boundaries and can be reached globally, thus widening its scope.

(ii) Storing And Access:

Internet is a distributed system in which all the documents are stored, on various machines, and networked together. The access to information or documents in these machines is available through the net using various communication channels.

(iii) Organisation:

The Internet collection, has no linear arrangement of Internet documents, hence Internet search tools and techniques provided linked access hence they have different tools. Search engines make pattern matching for the terms and retrieve the required information. The Search Engines also follow a kind of
classification of the universe of knowledge that constitutes the Net. This is not
the conventional classification of basic subjects as in Library Science but provides
some classificatory approach by the most popular areas sought by the users, such
as Education, Computers, Entertainment, Business, Politics, etc.

Subject Gateways: The experience of library science in classification can be
applied to organization of web resources, and access to information should be
through the subject approach. This is possible through subject gateways. These
subject gateways are domain specific and include organization and retrieval
approaches. There are today several such services on the Internet in fields such
as Medicine, Engineering, Geological studies, etc. These subject gateways
maintain information on a given subject and give access through subject/keywords
or resource types.

(iv) Retrieval:

The retrieval aspect depends to a large extent, on the description of the
document with location of the document as the primary purpose. In traditional
library science, the catalogue performs this function. In the Internet parlance,
‘the book’ or ‘information item’ is basically an Internet resource or most commonly
a ‘homepage’ or ‘web page’. The Internet Resources are peculiar by their
content and structure. Efforts are currently being made to identify descriptive
elements (also called metadata or data about data, which would be used to
adequately describe the net resource. The Dublin core suggests metadata elements,
which helps authors themselves (and not the cataloguer) to describe their
documents in a formal way so as to facilitate the search engines in efficient retrieval
facilities.
(v) Dissemination:

If one envisages that Internet as a virtual library, then it follows that many of the services of conventional libraries should be designed and delivered in the ‘Cyberspace’ also. Again, instead of the conventional book, the information is in web pages. Once there are ways and means of identifying and locating relevant information, services can be defined accordingly. In addition to the familiar services a few others could also be offered using the Internet as the base. To name a few information services;

1. Reference Service
2. Referral Service
3. Webliographies
4. BBS/Discussion forums
5. Alert Services, announcements
6. OPAC’s
7. Newspapers clipping Services

The list of services above is only partial; there can be innumerable services. Net-based information services will soon be a part of the library routine work. Familiarity with a few techniques required for handling the net resources would help to a large extent to generate and provide these net-based services.

(vi) Control:

Information centres have various functions that are dynamic in nature. There is a need for monitoring all the activities from start to finish to bring about efficiency in their services. This involves the concept of ‘control’, with ‘planning and management’. In a virtual library such as the Internet, the aspect of control takes on a new dimension. The virtual library has to co-ordinate the information need and the information item, identify, retrieve and deliver the document at the time of the demand. This involves a great deal of instantaneous decision-making
and application to achieve maximum efficiency of the system. Tips can be taken from the traditional management techniques, which can be applied with desired modifications and orientation.

2.5.2 WWW as a Reference Tool for Libraries

The World Wide Web (WWW) has made it possible for several organizations and institutions to make their presence felt on the Internet. Today there are many library websites on the Internet and most of them are academic libraries. These websites give extensive information about the library and its activities. They have also integrated such services that can be delivered online, using web pages. One of the common services offered on the websites is the OPAC of the libraries. Web OPAC’s have made it possible to browse the collections of distant libraries online.

Many libraries have set up homepages on the Web and included an “Ask the Librarian” link to the reference department for asking reference via E-mail. Reference sources, like other forms of information on the Web, are burgeoning, and with good reason. The Internet is proving to be an especially suitable medium for accessing and using reference materials. From online catalogs to college catalogs, from dictionaries to directories, the Web provides a time, quick, convenient, and direct way to get answers. With knowledge and practice, librarians can make full use of this electronic collection.

The professional literature has begun to reflect that librarians are recognizing the rise of this new medium as a reference tool. In her article “New Technologies and Reference Service”, Janice Simmons–Welburn\textsuperscript{26} depicts the effects of new technologies on reference librarians and users. She describes the increasingly complex process of choosing from a multitude of systems, as well as the learning curve involved in developing needed expertise. Don Lanier and Walter Wilkins\textsuperscript{27} predict that the Internet will have a significant impact on ready...
reference service. They encourage librarians to become familiar with Internet resources in order to assist users effectively. They emphasize the need for staff training and for evaluation of resources.

Further, Paul Healy in “Untangling the Web: The World Wide Web as a Reference Tool”, describes the Web’s potential to transform how we conceptualize and use the Internet. He contrasts the “shifting and disappearing” of Internet resources with the “fixed” nature of print material, and he describes how the lack of peer review and the ease of publishing on the Web contribute to the need to evaluate Web sites. Scott A. Melendoff focuses on using the Internet to address specific user needs such as reference tools. In the following discussion, we will explore successful techniques for integrating the World Wide Web into day-to-day reference service.

2.5.3 E-communications

Communication has never been faster, simpler, or more universally accessible than it is with today’s technology. When many people think of electronic communications they think of electronic mail, or “e-mail”. From being used almost exclusively in academic and government circles in the early 1990s, at the start of the millennium email is a household phenomenon, used all around the world and by all levels of society. But electronic communications encompass a border spectrum of possibilities than just email. The television, the mobile telephone, and the computer all have a major part to play in our digital age, linked together by a huge global communications network.

The e-mail System:

The email system has much in common with the postal service. From your address you post mail to your ISP, which sends the mail via the worldwide network of servers to the recipient’s post office Internet Service Provider (ISP), from that he or she can collect any mail addressed to them.
After the telephone, e-mail presents the most effective and cheap technology that has singularly changed the way people communicate locally nationally and internationally. E-mail has become the business and educational lifeline in most countries, and is now gaining prominence in India as well.

**The dotcom mail:**

The development of Sabeer Bhatia’s Hotmail.com was a turning point in the history of e-mail. This was a website that allowed users to access e-mails with an easy-to-use web based interface. Hotmail now has over 500 million users world wide, generating a response that has analyzed even Microsoft as it constantly upgrades its Servers to accommodate more and more users that sign-up with the site. Many other websites have now joined the bandwagon, and search engines like yahoo.com, Excite.com and Rediffmail, AltaVista, Usa.net, Lycos.com, Sify.com, Indya.com are also providing similar services.

Free mail paid mail: With the full of dotcoms and technology sectors the world over, the times are getting tough for even the free mail service providers. Top e-mail service providers such as usa.net and 123India.com have switched over to paid or subscription – based e-mail services, wherein the user is expected to pay for accessing these services.

**2.5.4 Listservs:**

Listserves are one of the most popular uses of the Internet. They can be used to network with other librarians across the country, to share similar problems and to find out how other libraries are dealing with issues that often encountered in our libraries. For example, the issue of how can new technologies is used to promote library and information organization? Here user of listservs for discussion can be used as a resource of getting answers to their questions. A message can be posted asking for a particular piece of information, and within a few hours, other
subscribers will provide answers. Some lists are used to distribute electronic journals. Listservs are powerful communication tools.

2.5.5 Usenet:

Usenet newsgroups are the vast array of discussion groups located on the INTERNET. Librarians may be reluctant to use such a source in order to answer reference questions, because answers to posts can come from anyone and there is no way to verify the authoritativeness of the answer received. However, some libraries have found Usenet useful for answering questions about popular culture as well as about specialized topics.

The overwhelming majority of reference resources on the web have no print counterparts. The richness and variety of Internet sites have turned thousands of Web pages into potential reference sources. The pages of newspapers and news services, corporations, government agencies, chambers of commerce, museums, corporations, sports teams, and travel agencies all have distinct reference possibilities. Knowing what categories of questions can best be answered on the Web is a helpful first step toward efficient use of the Web for providing reference services.

As Sara Ryan noted in "using the Internet for Reference, not all reference questions are good candidates for the Web. To be sure, many questions can be answered using Web resources, but it may be easier to grab a familiar ready reference book than to search for the same information online.

2.5.6 Internet On Tv:

The Internet has gradually moved from institutional home to an everyday information tool, entering to homes. The efforts made in this direction have made Internet accessible through home television, and one can tunes into the Net through the cable network TV. The idea behind Internet-ready television was to bring the
Internet to those who cannot quite come to terms with computer technology. The TV, being an electronic device that is almost universally found in homes around the world, was the most obvious tool to use. Internet-ready TV usually consists of a set-top box that provides the actual connection to the Internet by plugging in a telephone line and, of course, the TV itself. There is an in-built modem that takes care of the their connectivity. Cable operators are likely to offer Internet services through their set-top boxes in the next few years, eliminating the need for an Internet-ready TV. Thus Internet is now gradually moving from PC to TV.

If anybody uses PC primarily for surfing the Internet or exchanging e-mail, he may never need to sit in front of a computer monitor again. In addition to the Internet connection, Internet-ready TV includes remote keyboards, hard drives and printers, as well as a central processing unit to handle computing types of task. Such TVs also include a streaming multimedia processor chip that handles all the video, graphic and audio input, layering, processing, as well as the output on TV set. An Internet-ready TV is more than just replacement for computer and cable box; it can also replace video-editing set-up, and could include video and audio inputs for video cameras and camcorders. Coupled with a hard drive, video processing hardware and software, this new Internet-ready TV's could be used to edit video and to create own home movies.

2.5.7 Internet-2:

The Internet initially built to help universities to share research data; soon it was bogged down under the weight of commercial traffic. Research institutions no longer had the bandwidth they needed. It was time to build on exclusive new network that could handle bandwidth intensive applications from the ground up. Internet experts started looking for solutions to get rid of Internet bottlenecks or the traffic jams on the net, and came about with Internet-2. It is an ambitions project to build a virtual, private, high speed network among higher education
institutions was touted for its ability to aid education and research activities, as well as for its potential to improve the commercial Internet.

With these Objectives in mind, 34 United States research institutions got together in 1996 to form the Internet-2 consortium. Now Internet-2 is a major development programme, funded by a consortium of universities commercial suppliers and network service providers. It is run by the University Corporation for Advanced Internet Development (UCAID), which includes over 180 US universities developing and deploying advanced network applications and technology, accelerating the creation of tomorrow's Internet.

With Internet-2, researchers aim to create a world leading high-performance network infrastructure for higher education where any person can interact with colleagues across the continent. Internet-2 brings together institutions and resources from academic industry and government to develop new technologies and capabilities that can then be deployed in the global Internet.

2.5.8 Intranet: The New Wave:

The application and use of Internet standards and technology within an organization is termed as Intranet. In other words it is a by-product of Internet. In which internal www sites by which users communicate using a standard common language and protocol. The word Intranet summaries area's like a LAN, a private WAN to hybrid directory services & searching systems to just about every type of Groupware (most often open or standards based). Currently the word Intranet is generally used to define modern networking. Intranets seek to seamlessly integrate desktops, LAN’s, Client/Server applications, legacy systems, and the public Internet to enhance existing computing process.
2.6 Push Technology: Information at Desktop:

With the staggering volumes of content on the web, users often find it difficult to locate information of Internet even when using sophisticated search engines. Search process is barely tolerable and certainly for from compelling.

With push technology, the publisher can deliver content directly to the user’s PC, thus substantially improving the likelihood that the user will view it. Push technology borrows some of the concepts used in traditional publishing, such as the subscription model, to streamline the delivery of content to the end-user. Push content can be extremely timely, and delivered fresh several times a day. In addition, push content can be customized to the specifications of each individual end-user.

Push applications and technology building blocks narrow that focus even further and add considerable case of use. Using push technology, an electronic published with content aggregated from multiple sources applies the subscriber’s Internet profile to select information to be delivered to the subscriber directly on ‘automatic’ basis. Push technology helps to enable the delivery of multimedia content on the Internet through the use of locate storage and transparent content downloads.

2.6.1 Push application in Use:

Currently there exist a host or push vendors or web casters. Examples include Air media, Back web, Data Channel, Diffusion (Intra Express), In common (Down town), Intermind (communicator), Marimba (castanet) Microsoft (Internet Explorer and Netscape’s Net caster.

The push delivery model provides an easy way for end users to get the information they want from the Internet, and creates a more effective way for content publishers to reach users. The Internet is a great way to deliver timely
information, and push technology carries timely content delivery one step further. Traditional applications can be enhanced with push technology by providing an excellent mechanism to deliver new content and content updates to the end-user.

2.7 Online Education:

Online education, as generally understood, is the learning at a distance through the use of computers. However, as Jegede points out, online learning has not been properly defined or understood by practitioners of learning. A university of Illinois Report defines ‘online instruction’ as “teaching and learning material by a computer” but adds the proviso that there has to be a “connection to a computer system at a venue distinct from a learner’s personal computer”. Computer aided learning using a CD-ROM is, by implication, not online learning, nor is learning through radio and television broadcast or telephone supported distance learning.

Online education is primarily Internet based. Generally the world wide web (WWW) is the main communication tool though other un-integrated media like the e-mails are also used. Online learning may involve two distinct forms, namely, resource based learning that is electronically delivered, and ‘virtual classroom’ learning using computer-based synchronous and conferencing.

2.7.1 Methodologies of Online Education:

As discussed by Alexander S. and Boud Online education can be delivered in various ways including e-lectures, computer conferencing, online debates and role-plays. Of these, only the first two are relevant in the Indian (or Asian) context. While e-lectures essentially imply individual learning with some interactive learning, computer conferences by and large project collaborative and interactive learning.
With the personal computer and Internet becoming household items (at least in the upper and upper muddle class families of urban areas) online education is becoming important. Business houses, government and educational administrators in the developing countries are examining the possibilities of using the potential of the Internet for further education, especially in professional areas, as also for formal education in conventional areas. Open Universities must take notice of the ‘trend’ and start online programmes. While doing so they must take note that online education is different from conventional distance education and requires special skills. As Good\textsuperscript{35} argues online education not only need expertise in traditional classroom pedagogy and online communication and moderation, but also high levels of technical skills and awareness. The supporting staff also needs to be trained accordingly if quality is to be assured.

The British Library Automated Information Service (BLAISE) is an online service with three functions. BLAISE-LINE provides bibliographic information on books and audiovisual materials and allows access to British Library records and related databases. The service can be used for checking bibliographical information or for preparing specialist bibliographies. The databases available include the British Library Catalogue, UKMARC records from the British National Bibliography, the Library of Congress MARC records, AVMARCH and HELPIS. Conference proceedings, BL Humanities and Social Sciences Division, and Science Reference and Information Service, HMSO and UK National Serials Center files and the Whitaker database of British books in print.

Users must pay an annual subscription to BLAISE, which covers administration and documentation, and then costs depend on the volume of use. There is an important support and training programme to help users and to keep them up-to-date with improvements and changes.
ORDER! Is an online service, which allows users to request material located on BLAISE-LINE from the British Library Document Supply Center.

BLAISE LINK provides access to a wide range of medical databases originating from the United States National Library of Medicine.

BLAISE LOCAS is a centralized cataloguing service, which operates by creating local catalogues by accessing the British Library’s cataloguing data online. The value of the resource is its wide range of records, and the integrity of those records in cataloguing terms.

2.7.2 Campus 2000

Campus 2000 is a merger of the Times Network Systems and Pestle Education, and as such has an enormous potential for use in schools and colleges. Users can access a huge variety of information databases, and they can also communicate with other users in the network using electronic mail or computer conferencing facilities.

Campus Pestle is a modified version of British Telecom’s Prestel service, which is a view data service, which provides access to information held in the Prestel computers. Campus Gold is based on the BT Gold e-mail service.

Premium services allow Campus 2000 users to access other databases produced and held by other providers. The additional premium services include: ECCTIS 2000 which supplies information on courses; PROFILE, supplying the text of UK newspapers and the New Scientist for the last three years; DIALOG classmate which is a modified version of the international current affairs database for schools; and SATELLITE which gives information about BskyB educational services. Campus Consultant provides access to advice and information on Local Management of Schools from the Department of Education. Campus Teletel gives access to French Minitel system.
Subscribers must choose the level of subscription they require. Campus gives access to basic services, and Campus Plus gives additional access to basic services, and Campus Plus gives additional access to Prestel and Premium services.

2.8 Other Communication Media

2.8.1 View Data: View data is another type of videotext system. It is also computer-based information system. The network operates by linking View data terminals to a central computer through telephone lines, like in the case of teletext, on a request by the viewer, page appears on the screen or printer. Originally, information is transmitted on pages.

2.8.2 Prestel

Prestel, operated by BT, incorporates the use of a television receiver, keypad and the user’s telephone line. In contrast to the teletext services which are one-way, Prestel is an interactive viewdata system using the TV screen to present information and to respond to specific requests from the user. The Prestel computer database stores millions of pages of information and these are being added to and updated continually. A subscriber to the service uses a code index in order to locate the information required. The code is dialed by telephone or input by keypad and the appropriate page of information is displayed on the TV screen. The user can also use the keypad to reply to the system a limited way. The subscriber is charged for the telephone call, certain items requested, and for computer time access to pages. Almost limitless information can be made available subscribers, but the systems are expensive to use.

Pestle (Great Britain) Antipode (France), Captain (Japan) and Telidon (Canada) are good examples of successful videotext systems. Among these, Prestel was the first to become a world videotext service in 1979. Telexes, on the other hand provides for one-way facility. The Listener/viewer cannot seek additional information. Videotext is relatively faster and provides easier access to and more
fruitful use of computer database. Videotext thus holds greater promise for Indian Open Learning System.

2.8.3 Teletext:

Teletext is an electronic device of communication operates with sophisticated communication technology, which provides an opportunity for communication with the general public. This technique of communication offers a limited or narrow choice of information and services. The messages are transmitted and delivered by the conventional television signals and decoded by a device attached to a television set. Teletext is only one-way like the television.

In the U.K., these teletext have been developed under a variety of trade names since 1979. For instance, Knight Redder Newspaper and AT and T have developed a video system called as View Ron. The system combines a space age technology with a television set and telephone lines. Since 1983, View Ron began operating in the U.S.A. South Florida. Taft broadcasting, USA, has developed one-way teletext system. These two systems have been meeting the needs of lifestyle information.

Teletext refers to the transmission of text on the usual television channels. The system display text on the T.V. Set. The British Broadcasting Corporation (BBC) and Impendent Television (ITV) render pages of information when requested by the viewer. Teletext system is more popular in British region. On switching the key pad. Within a few seconds, the required page appears on the screen. The system cover many specific topics like stock market, consumer prices, financial matters, weather information economics, technology etc.

Teletext systems which use a television receiver to communicate information to viewers are being widely adapted for use in industry and business. Teletext is operated from a handset, which enables viewers to summarise pages
of broadcast text information. These systems provide a free source of regularly updated information where currency is important. At present teletext services carrying current awareness type of information like news, sports, travel information, financial data, weather, and entertainment information are popular. In recent times, advertising and personal messages also entered the arena.

With its larger use base and cheaper price tag over teletext is ideally suited for message communication.

In India Intext is the joint venture Teletext Service of Doordarshan and the National Informatics Center (NIC). Intext intends to use the unutilized picture space in the television transmission for sending textual material in data communication form. The incoming signal can be decoded by using decoders and displayed on a television.

2.8.4 Videotext:

The international name for the system originally designated view data but also often taken to mean the broadcast service, generally known as videotext. Sometimes, the term “broadcast videotext” is used. The remarkable development in the electronic media, among others, is the videotext. This technology increases the capacity to the television set to function like a computer terminal and retrieve information and graphics from a remote database. A videotext system would be very useful in disseminating general information about courses and programmes available through distance education.

Word processors and text processors have made text editing much less cumbersome and they now provide easy availability of simpler versions of text to suit the competence of individual learner. Electronic publishing could be videotext based. Videotext system comprises a telephone, a television set for monitoring, a compute red database, a keyboard controllers and a modern unit. “Modem” is
an acronym for a modulating-demodulating device because it converts a digital square-wave signal that cannot be processed by a telephone into an analogue signal that can be easily processed by it. It also provides for reverse function, i.e., conversion from the analogue into the digital form. The following figure represents a schematic diagram of a videotext system.

The listener / viewer operates the key controller and oral information is available through modem over the telephone and its visual counterpart is flashed on the T.V. screen. The telephone and modem allow for a two-way interactive system wherein the listener / viewer can ask questions, seek clarifications or get supplementary information.

Information can be stored in large quantities in the database. The Council for Educational Technology of Great Britain provides a good example of a fast developing educational database. Large databases stores on the mainframe computers with multiple access points can put learners in contact with an almost inexhaustible storehouse of information. The American Center at New Delhi. Through instant access to various database in the U.S. now makes available the latest information that he seeks Data vendors like DIALOG, MEDLINE, MUXUS can be hooked on to the telecommunication network in the U.S.A. made available to information – seekers almost all over the globe.

Videotext is a transmission device system. It uses a T.V. set to display text. It helps to use the computer-based information services. Teletext and view data are the two kinds of video systems. Thus, videotext is an electronic device of sophisticated communication technology. It greatly helps as it provides new opportunities for communication with the general public. In videotext, the viewer is directly connected to a central computer by way of home terminal permitting the viewer to call upon or send information. It is a two-way communication system like a telephone.
2.8.5 Telidon:

It is the Canadian videotext service. It differs in a number of respects from the UK Prestal Service, particularly in that the data are transmitted in the form of "picture description instruction" rather than serial character stream. As those PDI's occupy more than one byte each, it may be a less efficient method of transmitting data. But this, in fact, is dependent on a data being transmitted. The graphic displayed are of a higher resolution than those possible in alpha-mosaic system such as prestal. 24 A Canadian video system. Technologically advanced countries have developed a useful combination of cable TV, electronic blackboard, and fiber optics and converts a simple television set into a powerful and educational tool called the Telidon.

2.8.6 Facsimile:

Facsimile was invented in 1842 by the Scotsman Alexander Bain. Many improvements were made to Bain's contraption in the following half century, including synchronization of transmitter and receiver (1869) and the use of a photoelectric cell for transmitting photos (1902).

In 1924 the first wire photo was sent from Cleveland to New York. Facsimile began to spread rapidly; by the mid-1950 the International News Service was using the system to transmit pictures and voice signals. Facsimile transmission and computer graphics are related fields, using methods closely similar in principle and detail. As personal computers allow information handling and processing to be carried out in the home it is to be expected that facsimile systems will come to play a similar role.36

Telefacsimile is the technology that facilities the fast electronic transfer of written materials between distant points. Digital equipment's compatible with the same standards have resulted and contributed to the improvement in quality
of the copy hence attracts librarians for interlibrary loan transactions. Scanning is done in a manner similar to that used in television. An original, a photo for example, is illuminated and systematically examined in small adjacent areas called pixels (picture elements). Light reflected from each pixel is converted into electric current by an electronic device, a photocell, photodiode, or charge-coupled device (CCD). In a commonly used facsimile scanning system (invented by Frederick Bakewell in 1848 and based on Alexander Bain’s work of 1842) the subject copy is wrapped around a drum. A finely focused spot of light falls on the copy and the light reflected from that pixel is picked up by the photo device. The drum is rotated so that the light spot traces a line across the copy, examining each pixel in turn. In early facsimile systems the current impulses or analog signals resulting from scanning were sent directly over telegraph or telephone wires. Today, the signal current is transformed (encoded) before transmission. The modulated facsimile carrier signal is usually transmitted over telephone facilities. When facsimile signals in digital form are used the telephone circuit must be suitable for data transmission. Long-distance telephone circuits usually involve microwave or satellite links. Radio and wire transmission facilities outside the telephone systems may also be used. An important aspect of this use of the telephone is cost. The method of reproducing the facsimile image depends on the recording medium, which may be plain paper, treated paper, or photographic film. The example on the subject is Tele-fax Library Information Network (TALINET) – Project 1978. Since then hundreds of libraries are using Telefacsimile machines.

2.8.7 Bulletin Board:

Many systems were employed to deliver information services to the home and business sectors. Now a day’s Internet has brought Bulletin board System (BBS), in most popular shape, which creates the possibility to engage in public discussions and create an interactive community. It makes many-to-many communication possible.
Any person can leave a message for all to read and anybody can attach his comments. Leads to topic oriented discussions – which are a learning experience to all. Any body may ask a question and all those with something to offer can react instantly with their advice. Infact BBS is much older system before the Internet became popular and widely acceptable. WELL (Whole Earth Lectronic Link), the first BBS (www.well.com) originally affiliated to the Whole earth review magazine, was set up in mid 1980s by a group of enthusiasts. It is a lively for discussion on diverse range of topics. Today more than 12,000 BBSs are available in USA alone, and 1,000 Bulletin boards covering a number of subject fields and sub-fields are available over the net.

General applications of BBS include e-mail, electronic publishing, conducting surveys, exchanging news and research findings, mailing lists, access to network resources, etc. It is observed that in India, about 22 BBSs were active during 1995.

2.8.8 Telepresence:

Telepresence use virtual – reality technology to simulate objects, people, sound and environment. The components are – Sensor equipped gloves connected to a computer and – Head mounted displays. The computer simulates events in a distant virtual world using databases or real – time objects and sounds.

The output forms the digital database of real – time objects and sound are sent to the user though a display mounted on the head, showing scenes. The user’s senses get immersed in a illusionary yet sensible world. The person may be mounted on a movable chair fitted with movement sensors to have corresponding changes in the viewpoint of the virtual world.

The examples of the systems are Software packages to crate simulated objects, people, sounds and worlds using interactive, 3-D real time graphics – World Toolkit – on Multimedia PC.
2.8.9 Teleconferenceing

Teleconferencing integrates data, voice and image and can be used by groups working on same subject but spread over a large geographical area. It can reduce travel expenses and speed up decision-making.

Using the right software, one can have a meeting with a colleague located at another office. He can send documents without breaking the conversation or constantly exchange data through attached Input Output devices on the data channel. Using a network more participants can be included while the computer will do the switching between different participants.

Teleconferencing is also called as “video-conferencing” or “telephone conference” in which practically all-direct communication between the participants is carried out via the public telephone system. It is an arrangement, which facilitates the speakers to communicate each other in different localities using public telephone links. Participants of the conference located in different geographical distance areas can discuss issues by using their terminals that are linked together via the telecommunication network.

Participants in the teleconferencing can use facsimile devices, electronic blackboards which give chalk impressions to be reproduced on distance T.V. monitors, picture phone, meeting service, and other communicating technologies to transmit opinions, facts, feelings figures etc., over a wide distance in real time. This system passes papers, back and forth to one another as they talk. argue, debate, exchange, interact the important points.

For example on this system (a) Text teleconferencing – talk through key boards instead of their voices;(b) Video Telecom, USA – multi-participant video teleconferencing system – Media Max;(c) Desk-top system – Northern Telecom, USA - a dial – up video teleconferencing system – Visit. (d) Bhart Sanchar
Nigam Limited (BSNL) India, has four public video conferencing centers at Mumbai, New Delhi, Kolkata and Chennie.

2.8.10 Games and Simulations:

In an attempt to provide the patron with a wide variety of media alternatives from which to choose, the library can offer games and simulations as still another means of acquiring information. Also, games and simulations produce an enjoyable experience, often involving group interaction, which is difficult to obtain from other types of media. When assessing and selecting games and simulations, it is important to bear in mind that the term's game and simulation are not dichotomous. Many other games and simulations are commercially available to the library, and the librarian should seriously consider their inclusion in the library program as a service to patrons.

Games and simulations are generally chosen to make available a structured activity in which knowledge, information, or learning experiences can be acquired. Although the entertainment aspect is often an inherent factor of games and simulation, it is not primary reason for selecting them. The following discussion should prove helpful in identifying the characteristics of games and simulations.

The element of chance is usually involved in games. Games usually involve a win or lose situation. The game reaches climax and a conclusion when the winners and losers are identified. The game, although a pleasurable activity also provides the participant with a means to learn, develop, and master the skills.

Participant behaviour is usually emphasized in simulations. The skill and ability the participant brings to the simulation will directly affect the progress of the simulation and influence the eventual outcome. Moreover, a simulation is usually based on a real-life situation. Finally, simulations are usually used to apply skill. Also, most games and simulation incorporate an element of play,
tending to make them enjoyable. To improve decision-making, communicating and learning skills. Games and simulation afford participants an opportunity to exercise and apply learning in a controlled situation. To improve interpretation skills the participant must use newly acquired information and apply it in a real-life social context.

2.8.11 Computer Games and Simulations

Relative to the library’s existing collection, a whole new genre for the delivery of games and simulations is now available with the use of the microcomputer. By using a microcomputer to play a game or simulation the patron can function independently without the need for human interaction.

The quality of computer games and simulations has continually improved in ease of use, and most importantly educational value. The computer game and simulation affords the learner an opportunity to learn, try out, refine, expand, and build upon a new skill. The librarian’s task of selecting games and simulations involves several considerations. Certain fact needs to be known about the patron, which is expected to use the library’s games and simulations. The game of Monopoly is a good example. If most of the patrons, the community the library serves, own their own Monopoly games, then they will obviously not be going to the library to request them. Nor will there be any requests for the game if the library’s community has no need for or interest in it.

Basically, there are two places where games and simulations will be used in the library and outside the library. If games and simulations are to be used inside the library, and activity area must be allocated for this purpose. Because games and simulations contain many individual pieces, they can be difficult to manage. As indicated previously, games and simulations can be used in or out of the library. When used in the library, appropriate areas will have to be provided to allow for the interaction and activity necessary to achieve the objectives of
games and simulations. Introducing and encouraging the use of games and simulations in the library can be a welcome and valuable service.

2.9 Human Resources

Generation of all types of data, information and knowledge credited to human beings, is on account of human observations, experience, activities, creative abilities, ingenuity, etc. These data are documented systematically through different channels and media of communication and are made accessible and available for study, research, application and / or further developments.

In every sphere of activity, there are human beings who have the necessary qualifications, training and expert knowledge obtained/acquired through research and experience, in their fields of specialization. This expertise of persons may also be supplemented through their knowledge of literature sources, peers, institutions, historical development of the field, significant landmarks in the growth of the subject, including reference sources pertaining to a given field. These kinds of persons operate in different types of institutions (not necessarily always) at different levels with various responsibilities. They may also be willing to share their knowledge and skills with others, offer help or guidance to those who seek assistance mostly with a fee charged for the same. Such persons constitute a very valuable resource.

2.9.1 Need for Tapping Human Sources:

In libraries and information institutions, there are often enquirs on persons, institutions, intricate subject at micro levels, training facilities, rules and regulations for various entrepreneurial activities, say, manufacturing, diagnostic equipments for various medical tests, and many others. The conventional reference sources stocked in the host institutions may not have the right resources to answer such enquiries and hence may have to be collected from other special libraries
and information centres. But it is also likely that the libraries from where the information is sought may not also have the right and appropriate resources.

The service required here is only to identify a possible source from where the information can be obtained. In such circumstances, the only source to obtain the information may be individuals/institutions who are associated with a given discipline or work. It is necessary, therefore, for libraries and information centres to have knowledge of such experts/institutions. Such individual expertise may occasionally be available within the parent organization of the libraries. Sometimes it may be necessary to seek the services of other institutions or even free-lancers.

Keeping in view these reference requirements, it has become a practice to build up Human and Institutional mechanisms to specialize in directing enquiries to right sources, necessitating compilation of referral tools.

While any expert or professional could be deemed to be a potential source of information, it is not practical to identify every such person and seek the person’s skill or knowledge. Such expert persons may or may not always be available for such help or guidance, even after identifying the right person.

The task has to be, therefore, entrusted to institutions specializing in collecting and compiling referral tools, such as directories of experts in different disciplines/professions, institutions, on-going research projects, testing centres and there by develop other appropriate databases for services.

2.9.2 Categories Of Human Expertise:

There are certain categories of persons functioning in different institutions whose nature of work is associated with information or knowledge, in one way or the other. The list given below is merely illustrative identification of such groups and not exhaustive and these are not mutually exclusive either. Their roles are
also interchangeable, depending upon the nature of work they undertake. However, by and large, they may be classified in accordance with their primary nature of work.

- Information Generators;
- Information Gatherers;
- Information Processors;
- Information Recorders;
- Information Disseminators;
- Information Retrievers;
- Information Technologists.

(a) Information Generators:

This group includes researchers, inventors, innovators, authors, writers, planners, policy makers, executives, and such others who have an assigned role to generate knowledge or create information. The knowledge or information arising out of their activities, may be made available in the form of books, journal articles and such others. Hence constitute a very valuable source of information, particularly when they don't make their information available in any published form.

(b) Information Gatherers:

There is a group of persons whose jobs require the gathering of information and report them through appropriate channels. Such group includes newspapers reporters, correspondents, journalists, compilers of reference sources such as bibliographers, encyclopaedists, lexicographers, etc.
(c) **Information Processors:**

Editors, software documentation specialists, and persons who are involved in giving a shape to collected information for ease of use are another category or specialists. Newspaper editors, editors in publishing houses, journal editors, and such others involved in transforming a draft into a fine reading material are very often invaluable source of information. Software documentation specialists transform information collected in a highly user-friendly fashion, for example, user manuals of software packages.

(d) **Information Recorders:**

Persons who engage themselves in activities such as translation work, printing, publishing, data entry operators, etc. and have useful knowledge of the information they re-record, are also sometimes excellent sources of information. Technical translators, who are involved in recording commercial transactions in business houses, language interpreters may have information which is not recorded anywhere.

(e) **Information Disseminators:**

Publishers, library professionals, documentalists, information specialists, extension workers, teachers, sales persons, consultants, advertisers, etc. are persons who are involved in disseminating information or knowledge, already collected and available in some form, each one having a particular purpose. They play an intermediary role in dealing with information already available in some form.

Extension workers play a very important role in disseminating knowledge to agricultural farmers, low-cost housing in rural areas, family planning and health care to rural people; social health persons, social welfare worker sand such others are also specialists not only in their subjects but also in carrying information.
with them to be passed to the relevant groups in a most useful manner, using all form of personal communication techniques.

Teachers and educators have been the most traditional and conventional disseminators of knowledge and information. These persons deal with persons in different age groups, cater to different categories of professionals and even experts. They are also the persons who are always most willing to assist.

(f) **Information Retrievers:**

The persons working as classifiers, cataloguers, reference officers, indexers, abstractors, etc. are involved in creating tools for information storage and retrieval. Their nature of work makes them very closely associated with the subject areas they are handling.

(g) **Information Technologists:**

This group includes computer hardware and software specialists who get involved in many aspects of system design, maintenance, and similar other services. Telecommunication specialists maintain design network architecture, establish networks and extend facilities to share resources. Other technologists such as media specialists also provide services in creating audio/video cassettes.

As said earlier in this section, it must be noted that these groups of person are only potential sources of information. It should not be misunderstood that these persons are always available for consultation and assistance. Apart from their readiness or willingness or availability for help and assistance, their identification and location are not tasks of a easy nature.

In the next section it is examined how these sources of information can be usefully tapped, what sorts of enquiries they may respond to, and how to keep records in libraries to use these sources consistently.
2.9.3 Human Resources As Reference Source:

(a) *Information Generators* by their nature of work, produce primary literature. Many of them operate at the wave front of knowledge and have a good background of the literature of the subject and also keep themselves updated with what is currently happening in their discipline. Therefore the nature of queries they may be in a position to respond would be relating to: new development in a given discipline where the literature has not come out sufficiently, innovative skills that have been developed, new product development, new fields for aspiring entrepreneurs; and similar others pieces of information.

(b) *Information Gatherers* operate mostly in the designing and production of secondary information. They will, therefore, be knowledgeable in information already published or available with them. They may possibly answer questions on: current events and activities, definitions and meanings or new words, technical terms or subjects, persons of eminence in any given field; and so on.

(c) *Information Processor's* acquaintance with information collected should provide clues to the type of enquires they could answer. These may be relating to: analytical information on current activities, technical problems relating to software documentation, and so on.

(d) *Information Recorders* may be useful in dealing with queries relating to: names of language experts available for interpretation work, problems of technical translation, technical skills to be picked up for data entry operation, similar others.

(e) *Information Disseminators* constitute a large group. Each one of these groups may be approached for information pertaining to their specialization.
Library and information professionals may be consulted whenever there is a possibility of identifying a bibliographic reference, historical and geographical information for which there are answers that could be obtained only from their personal knowledge or reference sources.

Extension workers render direct assistance to agricultural farmers with reference to various problems—cultivation or crops, such as the choice of high yielding variety of a seed, the duration of the crop and nature of water required, etc. and such other related issues.

(f) *Information Retrievers* may help in identifying a technical thesaurus which has not been published automatic indexing, standards for abstracts for an abstruse subject in philosophy and so on.

(g) *Information Technologists* may be useful in dealing with the various aspects of computer system selection for a particular set of activities, software selection and local or wide area networks and a number of related issues.

There are indeed many groups of consultants, information brokers, intermediaries and others who specialize in offering their services at a price, of course, to deal with the many enquiries mentioned above. Even so, to identify the right source of information may be a problem. It is here that one needs to approach referral centres who specialize in gathering such information and create the appropriate tools, including computer databases.

2.10 **Institutional Information Sources**

A human activity invariably cause generation of new information of knowledge, which is recorded, is some form or the other for immediate or future use. It is also significant, that almost every activity is pursued through an institution for which it has been created. In the last half a century, every society—developed or developing, has become a society of institutions.

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Education, research, health care governmental functions, defense and security, business and industry, cultural activities—in fact, almost every human activity is performed through institutions. It is the performance of these institutions that determines growth, development or progress of any society. Institution building has, therefore, become a prerequisite for any organized human development. This section focuses attention on the aspects of institutional information sources.

When every institution has invariably an information component, in the sense that some kind of information generated by it. The information institutions whose prime activity is the creation of knowledge / information, and disseminate, store, retrieve, and deliver them in different forms to those who seek them.

Every institution builds up its resources of finance and manpower through direct subsidies from government, funding agencies or earns funds through sale of its own products and services. In performing their activities, institutions generate information / knowledge of various kinds, depending on their activities. Some of this information gets disseminated through formal channels such as by journals, reports and special publication. Others get stored in the files of the institutions in some form or the other. While published information gets properly noticed in secondary sources, the information filed in the institutions' records, generally, doesn't get noticed in any secondary sources. For example University house journal. In addition to these recorded information's, experts performing their duties and responsibilities in these institutions, also become invaluable sources.

Thus, institutions are sources of information in items of their published and unpublished information. Very often unpublished information may be in the form of statistical data or other kinds of factual information, which may not be available from any other sources except the institution, which generates them.
Libraries and information centres, therefore, should become acquainted with various types of institutions, their nature of work and activities, their publications and the types of unpublished data and information that may be available from them. Directories of institutions carrying all the details of functions and activities including their publications and other facts are also, sometimes available in published form. But most often one may have to tap referral centres to obtain the right location of these institutions and the way the information sought may be obtained.

2.10.1 Types Of Institutions:

Institutions invariably perform these link activities, and it can broadly grouped into three categories as given below:

1. Knowledge Creating Institutions;
2. Research Institutions and Laboratories;
3. Research and Development Establishments

These institutions disseminate information generated by them through learned journals, research and technical reports, and other specialized publications.

Various executives, legislative and judicial bodies of governments also generate information of high research value, which would, of course, not constitute information resulting out of research. But the potential value of this governmental information for research and development is immense. Statistical data, government legislations and their implications for various executive processes, significant judicial pronouncements and many other types of information generated by government agencies are as important as new knowledge created. All of these may not always be available in any published form. They may have to be sought from the respective institutions that generate them through specific requests. The
under mentioned institutions do not generate data, information or knowledge but have the means and mechanisms to collect and organize the assembled information and disseminate it in a form to suit different categories of customers.

(i) Libraries;
(ii) Documentation Centres;
(iii) Information Centres;
(iv) Information Analysis Centres;
(v) Referral Centres;
(vi) Clearing Houses;
(vii) PRO's of and Industrial Organizations

They create different access tools like indexing and abstracting services and distribute or deliver them to customers according to their needs. These institutions, it must be noted, have evolved over a period of time. This pattern of growth can be seen in three groups of information systems as given below:

(1) Discipline-oriented information systems reflecting needs of academic studies, research in pure and applied sciences and the like;

(2) Mission-oriented information systems reflecting, mostly government sponsored projects/programmes such as Nuclear energy missions. Space research and the like;

(3) Problem-oriented information systems reflecting the need for solutions to deal with various socio-economic and other developmental problems such as industrial planning, environmental problems and the like.

The word 'system' is used here to indicate a particular type of information institutions that grew during these different periods, without any organically links co-ordinating for purposes of inter-library co-operations.
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