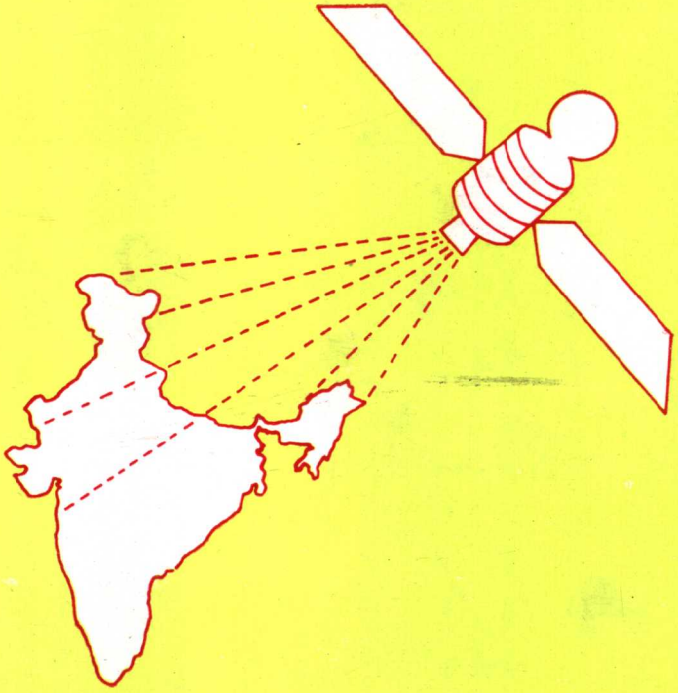
PERSPECTIVES OF MULTIMEDIA

MEDIA INFORMATION SERVICES IN INDIA



Editor

Kuldip Chand

Perspectives of Multi-media Information Services in India

Edited by
KULDIP CHAND

1996
BATRA
NEW DELHI

Preface

Multi-media has revolutionized the collection, storage and retrieval of information as it offers simultaneous availability of text, image, data and sound in an interactive way—at affordable cost. Multi-media can be applied usefully in various fields such as agriculture, education, health, transport, energy and entertainment.

In order to highlight state of the art on multi-media systems and services, and its future scenario, the Society for Information Science organised the XIII Annual Convention & Conference on, *Perspectives of Multi-media Information Services in India* at INSDOC, New Delhi during 27–29 January, 1994. Inaugurating the conference, Dr. Ashok Jain, (Director NISTADS, New Delhi) emphasized the need of using multi-media in the present, day complex world.

The theme was discussed under the following 4 technical sessions:

1. Multi-media Applications
2. Mutli-media Services
3. Multi-media Systems
4. Multi-media Networks

The book contains 15 papers contributed by various information professionals. It is hoped the volume would immensely benefit all those interested in multi-media.

Our grateful thanks are due to Prof. R.G. Gupta, President, Dr. S. Mallick, Secretary and Mr. I R Kumar, Vice President, SIS for their encouragement to bring out the volume in the present form.

The Publisher, Batra Book Service deserves our special thanks for having brought out the volume in a short time.

Kuldip Chand

Contents

	Preface	i
	Author Index	ii
1.	Multimedia in Information Management and Dissemination R P S DHAKA & USHA MUJOO MUNSHI	1
2.	Multimedia—A Technology of 21st Century ANAND PRATAP SINGH, T A V MURTHY & J N GAUTAM	6
3.	Multimedia and Indian Perspective S C GHOSE	14
4.	Multimedia Resource Centres : Role of Libraries in Distance Education UMA KANJILAL	20
5.	Emerging Trends of Information Technology ANAND PRATAP SINGH, T A V MURTY, J N GAUTAM & T GEETHA	28
6.	Hypermedia Systems and their Applications in Education CHENNUPATI K RAMAIAH	38
7.	Application of Multimedia Technology in Information Society ARUN KUMAR CHAKRABORTY	63
8.	Use of Multimedia in Popularisation of Science & Technology for Rural Transformation R D SHARMA	72

Contd.

9. From Print to Diskette : An Experience with Current Contents on Diskette, with Abstracts (CCOD/A) at NICHEM
VIDYA DALVI, MRUDULA CHIRMULE & M B PATIL 83

10 Object Oriented Database Management System— An Effective Tool for Multimedia Database Systems
PRAMOD KUMAR SINGH 93

11. Perspectives of Multimedia in Indian Marine Biology
VISHWAS CHAVAN 108

12. Use of Multimedia Technology for In-service Training of Agricultural Extension Personnel
V P SHARMA 115

13. Information Management in Film & Television Libraries
AMJAD ALI 120

14. Multi-media Services at Central Building Research Institute Library, Roorkee
R C GUPTA & S C SINHA 127

15. Application of Multimeida in Schools : A Proposal
I R KUMAR 133

16. Recommendations 137

Author Index

Ali, Amjad	120
Chavan, Vishwas	108
Chakraborty, Arun Kumar	63
Chirmule, Mrudula	83
Dalvi, Vidya	83
Dhaka, R P S	1
Gautam, J N	6, 28
Geetha, T.	28
Ghose, S C	14
Gupta, R C	127
Kanjilal, Uma	20
Kumar, I R	133
Munshi, Usha Mujoo	1
Murthy, T A V	6, 28
Patil M B	83
Ramaiah, Chennupati, K	38
Sharma, R D	72
Sharma, V P	115
Singh, Anand Pratap	6, 28
Singh, Pramod Kumar	93
Sinha, S C	127

1

Multimedia in Information Management and Dissemination

R P S Dhaka
Usha Mujoo Munshi
Indian National Scientific Documentation Centre
14, Satsang Vihar Marg,
New Delhi- 110067

1. What is Multimedia

There is no agreement on a universal definition of multimedia. However, a working definition of the term may be given as follows:

Multimedia is an electronic technology which provides a single medium with the power to integrate diverse types of information. Tony Feldman further elaborates it as "the seamless integration of data, text, images and sound within a single digital information environment and providing access to the stored information using computer systems which are user friendly and, above all, interactive".

2. Multimedia Applications

All of us are familiar with a situation when a lecturer, to substantiate his viewpoints, uses paper charts/tables, then a slide projection, and shifts to a video equipment for a motion picture at short intervals during his lecture. He handles different equipments for handling audio text, graphics, motion pictures and numerics. The multimedia technology

enables the speaker to call all the above mentioned items to his command through a single equipment. It has opened a vast panorama of excellent opportunities for different information environments. Its application in class room teaching, training sessions, lecture rooms, libraries and information centres has almost revolutionized the knowledge dissemination environment. In the present paper we shall restrict ourselves only to the application of multimedia technology in management and dissemination of information in libraries and information centres.

3. Information Scenario

The libraries are the store-house of information and knowledge. The information is stored in the form of printed paper, audio cassettes, videos having motion pictures, slides, microfilm/Microfiche etc. Due to the sheer volume of paper generated information (6-8 million research papers in about 60,000 periodicals per year in science and technology alone), the libraries are fast shifting to the electronic form of information. Whole books and periodicals have started appearing in digitized forms on CD-ROM discs. According to a report of the US Department of Commerce "Industries Outlook - 1990", over a period of five years the books showed an average annual growth rate of 8.25% while the electronic information grew at a rate of 20.30%. The growth rate of printed periodicals is somewhat negative. The picture is more or less same in UK and Europe where the electronic based information is growing at a steady rate of 20% and it is all set to overtake the printed form by the end of the recent decade.

A large part of the published information is being already transformed into electronic structured databases having either bibliographic information or full text. The existing printed material is being converted into WORMS or CD-ROMs for economizing the space in libraries. Online databases have already cornered a significant share of the information market. It is estimated that there are about 1000 vendors offering more than 5000 databases around the world. Frost and Sullivan estimated the online market in US around $6 billion and a growth rate of 20% per year. The European Information Industry Association estimated that this market will have grown to about S 7 billion by 1995 in Europe at an annual growth rate of 19%.

Having seen a clear trend that the entire information sector is fast becoming electronic, the librarians and the managers of information centres will have to change to the modern technology, lest rendering themselves redundant in the market. For this purpose, it is necessary that

ways and means will have to be found to offer integrated services from their store house of knowledge which shall combine text, audio, graphics, numerics and motion pictures. The multimedia technology is going to provide an excellent help in this regard. However, it is not still a cake-walk. The technology has just appeared in the market and is still far form solving the problems of libraries and information centres. A lot of research and developmental work is required to be done. The problems of each area of multimedia application are specific and require specific solutions. We shall try to enumerate here some of the specific problems and corresponding technological status in that regard.

4. Specific Problems

As discussed above, the multimedia technology in a library/ information centre environment is required to integrate on one computing platform the text, graphics, audio, numerics and motion pictures. All these diverse information media create a number of technological problems which are required to be solved by hardware and software specialists. Some of the most important problems are as follows:

(i) Storage Space

When a A-4 size page of text is scanned and stored in a computer, it occupies about one MB of space. If the page has a full size coloured picture, the space required is several times more. If the resolution of the screen is increased in order to store a better quality of the picture, the space required also increases proportionately. The space requirement for a motion picture frames is simply gigantic and non-feasible to be achieved. The TV screen has about 600 horizontal lines of information and change 50 times per second for producing a good quality impression on the eye. Each line has about 700 dots. Therefore, the full TV screen has about 0.45 million dots. Considering that each dot is equivalent of 16 bits of information and 25 full frames are occurring per second, the space required for storage will be 20 MB per second. A similar data transfer rate from the storage will be required to create a good quality image on the screen.

The technology has not yet been able to solve this massive space requirement and data transfer rate problem. However, some partial solutions have emerged thanks to R&D efforts. The most important of them is the data compression and decompression softwares or hardware cards. The present available programmes reduce the space requirement in case of textual data by 20 times and in the case of motion picture by

about 1000 times. The problem of data transfer rate is also ameliorated commensuratively. The data is compressed before it is transferred and decompressed before display on the screen. The software or the hardware card has both the features of compression and decompression at appropriate ends.

(ii) Interactivity

Interactivity are the way in which a user can search or browse through an electronic database. The interactivity is one of the most important features the digital environment has provided to the electronic databases. Each electronic database has its own specific features and the retrieval/search software is developed keeping in view the relations between elements or boolean operations. However, the picture in multimedia databases is somewhat different due to highly complex nature of the databases integrating very large data comprising voice, images, pictures, texts and numerals. The interactivity in such databases is further complicated by the exceptionally large volume of data. Therefore, the online access to multimedia databases has thrown a real challenge to the software engineers where a highly efficient search is required in order to economise on communication costs and database search charges.

A solution for the problem of interactive access to multimedia databases is being tried by emulating hypertext search methods in multimedia databases. The method is called hypermedia technology. Some mechanical facilities in recent hardwares, like graphic user interfaces (GUI) which can be operated directly from the screen by a mouse have further facilitated the interactive access to multimedia databases in libraries and information centres.

iii) Networking and Online Access

We are already well familiar with Wide Area Networks (WAN) providing quick messaging services or facilities for remote access of electronic databases. The networking of CD-ROM databases for remote access purposes called CD-Net are also round the corner. However, the networking or establishing facilities for online access of multimedia databases is far more complex as compared to purely textual databases. The volume of data required to travel on network is extremely large and present infrastructure not only in India but also in developed western countries is still incapable of handling the problem. Tony Feldman in his Report on Multimedia describes the situation as follows:

"Extremely powerful local area network will be needed to handle the kinds of data volumes that could be involved at any given moment. For example, 50 users working simultaneously with, say 20 different blocks of multimedia data each of 100 megabytes implies 100 gigabytes of data in the network. Today's local area network systems are totally inadequate for such gigantic flow of information".

Therefore, it is almost impractical to think of online access of multimedia databases at present. A whole range of changes will be required to be carried in the present communication infrastructure. Some countries are talking of laying out "Information Highways" for networking or accessing these databases. These networks based on optic fibre cables will be able to sustain a data flow rate of hundreds of gigabytes per second. That is way, some people are already speaking about broad band ISDN while the ISDN itself has not yet been realized at large scale.

While concluding the paper, we would like to say that multimedia environment or the multimedia databases have a bright future in general life and in libraries and information centres in particular, because it has more less succeeded in passing out both the tests required by a new technology for success. The one being that it has got commercial value and people are ready to pay for it. Nothing can survive in the market if people do not pay for it. The market sales projections for these databases are already very encouraging in US and Europe. The second reason is that having integrated diverse information media like sound, video images, pictures, and texts in one digital platform for interactive access, the multimedia technology has opened excellent opportunities for several spheres of human activity.

2

Multimedia—A Technology of 21st Century

Anand Partap Singh
Central Library,
Indian Institute of Technology,
New Delhi;

T A V Murthy
Indira Gandhi National Centre for the Arts,
New Delhi;

J N Gautam
Central Library, Jiwaji University, Gwalior

1. Introduction

In the near future multimedia networks will become easier to use and more cost efficient; they will move into mainstream and many potential users will seriously begin to adopt the technology.

The significance of multimedia as a separate technology and market will increase in coming future. Instead, it will become an aspect of almost all computing and communications, similar to today's computer graphics. It will become common as it would be employed in business, schools and homes. This technology is eligible to enhance following applications (i) Multimedia Education; (ii) Self directed learning; (iii) Desktop Videoconferencing; (iv) Multimedia Conference; (v) Compound Document Mail; (vi) Audio-visual presentations; (vii) Multimedia Databases; (viii) Multimedia Groupware; (ix) Desktop Video

Production; (x) Other Applications.

2. Multimedia Education

People learn more when they can see, hear and work with new concepts, which makes multimedia a natural mode for training and education. This technique mixes text, video, audio, graphics and even animation while freeing an instructor from having to be in the same location as students (Fig. 1).

A class can view a lesson of PCs, VCRs and then ask questions via fax, audio channel or (on advanced systems) two-way video. The instructor, also at a PC or VCR, can answer in the same way. Long distance and low population densities are thus no longer obstacles to quality education.

3. Self Directed Learning

Multimedia has tremendous potential in self directed learning. Hypermedia documents make it possible for users to learn at their own pace. Courseware is software that uses hypermedia techniques to establish an interactive learning system, and training on demand is possible if student workstations are linked to video servers equipped with courseware. All these approaches will use audio, video animation and so forth, and all will find their way into a range of applications including electronic catalogs and their manuals.

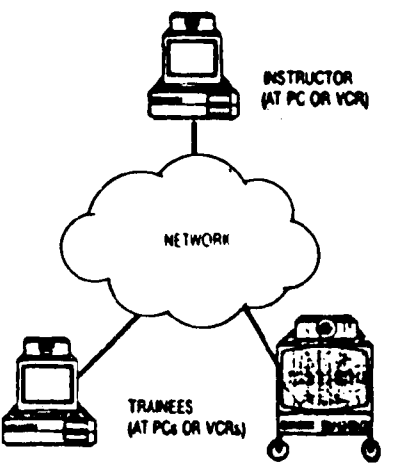


Fig. 1 - Location independant learning

4. Desktop Videoconferencing

Videoconferencing is a booming business, doubling each year. Despite this growth it still has not reached the vast majority of office workers. Video meetings are often restricted to special rooms, which tend to make them harder to arrange and more formal then impromptu gatherings. Desktop videoconferencing with PCs and workstations will change this, making electronic conversations more like upgraded phone calls than downgraded meetings.

Desktop videoconferencing collapse into one out of the two networks now dedicated to data and video (Fig. 2). It connect two or more desktops with live videoconferencing links, displaying images in a window on a PC, Mac, or Unix workstation. The camera may be a hand held unit that clips onto a user's display. In either case, it interfaces to a specialized video card installed in each participating workstation.

5. Multimedia Conferencing

Today, most multimedia applications are isolated. As noted, video conferencing remains limited to specialized conference rooms. Multimedia conferencing offers a clear opportunity to merge these two technologies—and others—so that they run simultaneously in different windows on a workstation. Conference participants will take advantage of the fact that they can share not just video but data files, graphics, animation, and stored audio. This will facilitate network based collaborations, via a shared wrokspace in a window, with participants jointly annotating and altering memos, diagrams, spreadsheets, graphs and other documents.

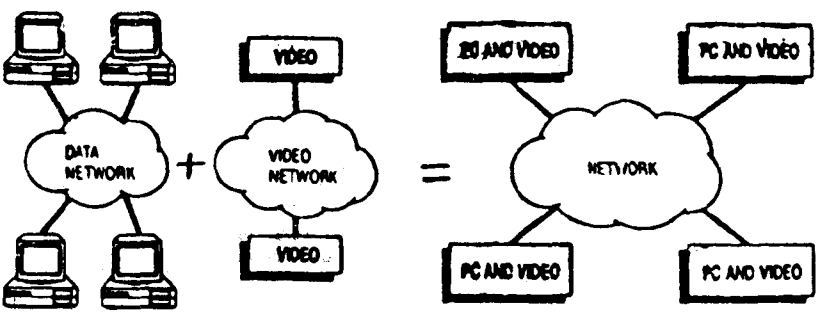


Fig. 2 - Desktop videoconferencing

6. Compound Document Mail

Adding data, voice and videos to today's electronic mail will yield far more powerful communications tools. Compound document mail systems will make it possible to send short segments of video recorded at the desktop or forward previously produced video segments. Voice, animation, and other multimedia applications also will be included in the list of compound mail objects.

While it is generally agreed that store—and—forward mail will be one of the most important applications for multimedia technology, opinions differ as to the final form of compound document mail systems. Most likely, e—mail will be adapted in several ways, some users will augment text with audio; others, image with text; still others, image with audio.

7. Audio-visual Presentations

Computers are already being used to help generate the slides and overhead transparencies that are the staples of most audio-visual presentations. Multimedia technology has the potential to revolutionizing such presentations with animation, sound tracks, and video clips, all of which can be added using inexpensive desktop equipment.

Multimedia also makes it possible for presentation to be delivered across a network, much the same as multimedia conferences. It also paves the way for network developing a presentation.

8. Multimedia Databases

Databases that combine text files with image and video information will be at the heart of many multimedia applications. They will be particularly, useful to those who work primarily with visual information, such as health care professionals. These databases will make it possible not only to retrieve compound record but also add voice annotations and alter video and images.

9. Multimedia Groupware

Groupware servers today alter, combine, computer data, text and remote wire service feeds to give groups a shared workspace over a network. In the future, some of these groups will choose to augment such servers with images, video clips, sound, music and animation.

10. Desktop Video Production

Although most video is still produced on expensive, professional equipment, some users who do not require studio quality, are creating videotapes on Macs, PCs and Unix workstation equipped with video inputs and outputs. Such tapes can be complied from video stored locally (on other tapes and disks) or called from a remote video server. Some production systems make it possible to assemble a videotape with "Cuts—only" editing and rudimentary audio mixing. More complex systems make possible so-called nonlinear editing using compressed digital video stored on disk

11. Other Applications

Multimedia technology looks very promising for electronic newsletters. Many current news clipping services and on line databases are now limited to text, even though the periodicals they are called from include diagrams, photographs, and so forth. In the future customers will be interested in obtaining color graphics, animation, and video on a periodic basis via electronic newsletter.

Electronic kiosks also will be enhanced with a variety of multimedia applications. Experiments have augmented pay phones, automatic tellers, and airline ticket machines with local video to show commercial messages while the consumer is a captive audience. It seems likely that there will be a hierarchy of information kiosks, with today's devices serving as the simplest in the market place. Full-service teller machines and airline kiosks may be required full video communications and high quality video form servers over local networks.

12. Multimedia Conferencing—Some Issues

The impact of advances in information systems technology, which include integrating computing and communications, multimedia multiparty conferencing, computer supported collaborative work (CSCW), hypermedia systems, and other distributed multimedia services, may revolutionize society. Multimedia conferencing is not only a way to reduce travel so people can work together in a global marketplace; it also is a method to help people work together more effectively and more productively, regardless of their locations. By bringing computer tools and on-line information access to the meeting room, the decision making process can be improved, and intellectual property such as designs or documents can be created during the meeting.

Hypermedia systems (i.e., multidimensional, multimedia documents), may need to interactively access information located to many places over a network. Video compression and the *Integrated Services Digital Network* (*ISDN*) are "enabling" technologies to help this revolution possible. Another required enabling technology is a set of standards, protocols, and a signaling system to access these revolutionary new services. These news services present two major communication requirements—

(i) Multimedia Requirements

The network must transport multimedia rather than today's audio-oriented unimedia. To transport multimedia information, multiple network connections may need to be associated with each other and also synchronized.

(ii) Multiparty Operation Requirements

Groupwork implies multiparty operation. Thus, two new requirements must be considered:

- — Signaling for managing multimedia multiparty calls. In which there is a need for flexible conference dynamics, e.g. adding or dropping parties, and changing media bandwidth allocation.
- — There must be provision for media specific bridging, i.e. audio bridging, video bridging, and data bridging.

13. Multimedia Conference Bridge System Architecture

Architecture is developed using a multipoint control unit (MCU). The MCU is connected to the network via one or more digital trunk interfaces. It can be connected to a central office switch, a PBX, or any other convenient point that is accessible via dial-up point-to-point services form the user terminals.

To conduct a multiparty, multimedia conference, point-to-point clear-channel circuit connections based on the conventional ISDN signaling procedures are established between the user terminals and the MCU. The MCU performs several basic functions:

(i) Conference Management

It involves making and securing calls, negotiating and dynamically managing the bandwidth allocated to each media, adding and dropping conferences and managing the media specific bridges.