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## 1.0 Multimedia Overview

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### OBJECTIVES

The purpose of this brief overview is to:

- Briefly consider the general relationship between media and society
  - Describe the basic components of a multimedia communications system
  - Consider some multimedia applications
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An excellent source of multimedia information and software can be found at:

<http://www.davecentral.com/>

http://

## 1.1 Media - A Discussion

[Net Socializing with Visual Communications Changing the Conventional Wisdom by Connectix Corporation](#)



### 1.1.1 Does society control the media, or does the media control society?

This question is very difficult to answer definitively, as there are numerous examples to support either view. Several websites have been established to consider the relationship between the media and society:

<http://www.aber.ac.uk/~dgc/influ05.html>

[http://www.independent.org/tii/content/events/f\\_medvedf.html](http://www.independent.org/tii/content/events/f_medvedf.html)

[http://www.freedomforum.org/FreedomForum/resources/media\\_and\\_soc/](http://www.freedomforum.org/FreedomForum/resources/media_and_soc/)

<http://www.mediaresearch.org/>

http://

From the above-mentioned sites, it is clear that this and other questions have no simple answer. It is necessary to get an overall perspective and assign proportional cause and effect. Regardless of the conclusion one arrives at, there will always be room for dissent. Often times these seems to be no right or wrong answer, just those that are well thought out and those that are not.

In times past, the most powerful media was the written or later, printed word. Of all such texts, the Bible has had the most profound effect on the world. It has shaped the history of mankind for millennia, but with the advent of the 20th century its influence seems to be on the decline. While the historical narrative of the Bible accurately reflects an image of ancient society, it seems inconceivable that the central moral message could have spontaneously emerged from a decadent society. In the view of many persons, its message is far above the ethical and legal codes found in the nations of the world. Although largely ignored at present, the Bible has shaped society, not the reverse.

It is interesting to note that with the advent of the internet and digital technology, it is now possible to electronically preserve copies of books indefinitely and distribute them on a scale never before imagined. For example, the book that started it all, The Gutenberg Bible printed in 1454 is available to anyone in the world with access to the internet.

http://

<http://www.gutenberg.net/>

<http://www.gutenbergdigital.de/>



### The First Page of Genesis

Today, there are only four complete original copies of this book in existence.

Many people would suggest that television, a multimedia communication system, is the most influential media today. It has been suggested that the decline of reading skills and comprehension is somehow related to excessive television viewing by at least some segment of the population however; it is very difficult to isolate cause and effect.

In some countries, the TV networks were built by governments, and revenues generated by issuing viewer licenses. Under those circumstances, revenue is generated independent of advertising; the content is driven by a complex combination of social and political forces. In other parts of the world, television broadcasting is funded by advertising. Consequently, the advertising industry has learned how to use the media to influence the purchasing habits of people.

Thus the question: Is the television industry influencing society or is it merely a reflection of society? The answer is of course both. However, the media does enlarge and exaggerate certain aspects of society, and thus can create a gross distortion of reality. This naturally opens the question: What is reality?

In the real world, an event may occur which will affect the lives of a few. Nevertheless, because of the magnification effect of the media, millions of people can suddenly become detached participants. As such, they formulate opinions, often without context. They then may act upon these opinions.

Society thus relies upon the presentation supplied by the media provider. They merely present events, as they seem to occur. This suggests that there is great potential for the media to become a propaganda tool, even inadvertently. Some might even suggest that the broadcast of commercials is a form of propaganda.

It is interesting to note that in the event of political unrest, one of the first events is often the seizure of various media, such as newspapers, and radio and television stations. This prevents the opposition from gaining an effective voice.

Broadcast networks also allow some people to promote their message for free. This is often done by means of news programs. A single event sponsored by a special interest group may be broadcast several times around the world. Thus special interest groups and politicians 'play up' to the media, in order to influence public opinion. In this case, it would appear that the media is used to shape society, or at least influence its opinion.

### 1.1.1.1 Media and the Mind

<http://interact.uoregon.edu/MediaLit/HomePage>

<http://www.media-visions.com/>

<http://simile.fis.utoronto.ca/>

<http://www.medialit.org/>

http://

It has been said that a picture is worth a thousand words. This statement is true, but only in certain situations. For example, it is easier to show someone how to disassemble a motor than it is to tell them. However, the power of words should not be minimized. Words convey reasons, purpose, and offer explanations, which may be difficult or impossible to provide otherwise. In some cases, a more specialized language such as mathematics, may be needed to convey ideas or provide insight.

It is therefore inappropriate to think that one form of media is better than another, or that one can replace another. The power of knowledge is maximized when various media are used to complement each other in a multimedia format.

Today we live in what has been dubbed the *information age*, and one of its side effects is *information anxiety*. This happens when information accrues at a much faster rate than we can assimilate. Consequently, one cannot help but feel a little more ignorant and further behind each day.

### 1.1.1.2 Media and Information

It is not easy to determine what constitutes information. At one time information was simply a collection of facts. Today unprocessed raw data could constitute information to some, but meaningless gibberish to others.

Information is necessary to disseminate knowledge. However, it can also be used to obscure knowledge and bury facts. It is often difficult to separate reality from hype, the meaningful from the meaningless, the useful from the useless, the truthful from the false.

Knowledge, wisdom and understanding are not synonyms. Wisdom is the application of knowledge. However, wisdom can be turned into foolishness if relevant facts are ignored. Understanding distinguishes man from machine. A thinking being is needed to determine the purpose of information, and acquire insight as to how to use it.

Some institutions have made a serious effort to use multimedia as a vehicle to enhancing learning. Check out the following:

<http://www.colorado.edu/physics/2000/index.pl>

http://

### 1.1.2 Media and Integrity

<http://www.mediachannel.org/>

http://

Information stored on paper or parchment was once considered reliable, particularly if someone in authority notarized it. Even today personal documents, business contracts, and laws are printed in hard copy. Although paper documents can be falsified, great effort has been made to prevent this from happening; this is particularly true with paper currency.

Newer forms of media, photographs, audio and video recordings, once regarded as trustworthy are now suspect, since they can easily be altered. This is clearly seen in the movie industry where dinosaurs come to life, and the laws of physics easily suspended.

This change in the media has a profound effect on society. Whereas at one time 'seeing was believing' today seeing is merely seeing, and believing is often credulity.



### Fighting Bear Commercial

Multimedia provides added value to a wide range of information sources including: text, graphics, video images, and audio, by combining them into a single application. The applications may be completely stand alone, broadcast, or shared. As long as some form of presentation media, is involved, members of a skeptical or cynical society will believe only what they want to believe or are influenced to believe.

### 1.1.3 Video Opportunities and Limitations



<http://www.mediatv.net/>

Until very recently, the average person's involvement with video was as a passive observer. Today with the advent of the camcorder, the average person is able to interact in a limited way with the medium. New opportunities to act, direct, produce, and edit stories or domestic documentaries have presented themselves.

In spite of the various technical advances, which have made this all possible, there are severe limitations. Video editing tools and equipment are quite expensive and not particularly intuitive to operate. While duplication and distribution of personal video products is relatively easy, commercial distribution and promotion is not.

The commercial world has to consider many diverse technical issues:

Three major analog video formats: NTSC, PAL, SECAM

#### **The Colour TV Broadcast Systems Used in the World**



Several digital standards with differing compression algorithms: D-1, D-2, MPEG

Various storage formats: tape, laser disk, film

Progressive and interlace scanning

Variations in frame rate, resolution, bandwidth bit rate the soon to be here HDTV; etc.

#### ANALOG AND DIGITAL VIDEO FORMATS<sup>1</sup>

NTSC	North American analog broadcast standard
PAL	Western European analog broadcast standard
SECAM	Eastern European analog broadcast standard
JPEG	Still image compression standard
MPEG	Random access media compression standard
MPEG-II	High quality image compression
CD-1	Interactive consumer electronics format
Px64	Telecommunication video standard
D-1	Component production digital video standard
D-2	Composite production digital video standard
HDTV	High definition TV [still in development]

Until recently, video could not be considered an interactive domain since interactivity requires the video presentation to be modified by viewer response. This happens mainly in video games, virtual reality environments, and video conferencing, to name a few. This is now changing with the development of WebTV and other interactive technologies.

#### 1.1.4 Internetwork and Communications

The present communications networks were designed for very specific applications. Consequently, no present communications network is well equipped to handle all multimedia formats. The video broadcast networks were not created to handle real time viewer response. The broadcast nature of the signal prevents personal customization. The cable TV providers are attempting to provide some sort of viewer feedback and customization by allocating reverse channels and deploying bidirectional repeaters.

Large telecommunications networks are built with well-established standards. Consequently, it is quite easy for equipment vendors to manufacture compatible system components. This has led to a proliferation of reasonably priced end-user terminals such as TVs and telephones.

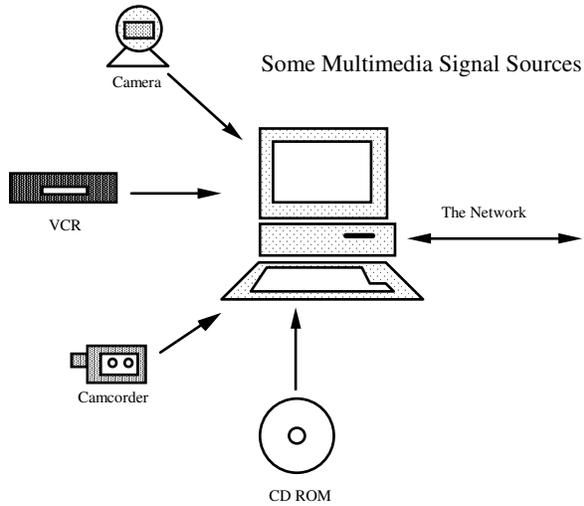
The computer world however, has not been regulated and there is very little standardization. Vendors tend to design their own proprietary hardware, software, and protocol suites. Consequently, the end-user equipment is often quite expensive since it is designed for a fragmented rather than aggregate market. Furthermore, corporations tend to form alliances in order to promote their own vision of the future. Consequently establishing multimedia communications standards is a long, drawn out process.

<sup>1</sup> Based on "Toward an Open Environment for Digital Video" by M. Liebhold and E.M. Hoffert, from *Comm. ACM*, Vol. 34, No. 4, Apr. 1991, table 1

NETWORK TYPES AND BIT RATE<sup>2</sup>

POTS	56 Kbps
DS-n	n x 64 Kbps
BISDN	64 - 144 Kbps
T1	1.5 Mbps
T3	45 Mbps
LocalTalk	230 Kbps
Ethernet	10 Mbps
FDDI	100 - 200 Mbps
SONET	n x 51.84 Mbps

### 1.2 Multimedia System Components



The standards used in multimedia presentation include:

- JPEG Joint Photographic Experts Group
- MPEG Motion Pictures Experts Group
- MHEG Multimedia Hypermedia Experts Group

These are simply the end-user components. In order for true multimedia communications services to exist, there has to be an enormous underlying infrastructure. This would include high-speed backbones, transport protocols, video servers and a host of other technologies.



[Today's Video Servers: Key Technology Issues by Concurrent Computer Corporation](#)

<sup>2</sup> Based on "Toward an Open Environment for Digital Video" by M. Liebhold and E.M. Hoffert, from *Comm. ACM*, Vol. 34, No. 4, Apr. 1991, table 2

## 1.3 Multimedia Services

DAVIC<sup>3</sup> is a non-profit association, which promotes interactive multimedia applications and services.

[DAVIC Specification Part 1](#)

[DAVIC Specification Part 2](#)

[DAVIC Specification Part 3](#)

[DAVIC Specification Part 4](#)



The MMCF<sup>4</sup> End-User Applications Subcommittee has also created some useful documentation.

[Overview of End-User Applications for Multimedia Communications by MMCF](#)

[Multimedia Desktop Collaboration by MMCF](#)

[Reference Architecture Model Specifications by MMCF](#)

[Reference Architecture Model Specifications by MMCF](#)



### 1.3.1 Video on Demand

<http://www.ccur.com/ivod/index.html>

http://

[Hospitality Industry Switches Gears by Del Kunert](#)



In most cases, VoD service is equated with a home based video rental service provided by the telco over a DS-1 link. The DS-1 is a 1.544 Mbps digital facility usually used by the Telco to carry 24 digitized voice channels.

MPEG encoding can be used to digitally compress the video signal onto a DS1 facility and produce a VCR quality signal. The decoding process used at the receiver is relatively straight forward, but unfortunately, the encoding process is not. Therefore a VoD service would have to have extensive libraries and multiple copies of precoded videos.

It is also possible to provide a VoD service over the cable TV network. These services are a little more complex since the subscriber must share the transmission medium. CATV service providers could use excess bandwidth over fiber networks to support VoD. However, FTC or FTTH has not yet proven to be economically viable.

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<sup>3</sup> Digital Audio-Visual Council

<sup>4</sup> Multimedia Communications Forum

### 1.3.2 Distance Learning

**http://**

<http://vod.org/>

Distance learning can be greatly enhanced if the student can interact with the teacher. It should be possible to offer this service over a DS-1 link, but a more cost-effective solution may be ISDN, since it already incorporates a control overhead structure.

One unlikely possibility is that distance learning replaces the classroom. Students could learn from the best teachers in the world. There could be enormous savings in modern education if the present infrastructure of schools and teachers is eliminated. However, it should be noted that education is more than just collecting information. If information was the only thing needed, we could all just as easily stay at home and learn all we need to know from a book.

### 1.3.3 Telecommuting

Telecommuting is a natural marriage of computer technology, the telephone system, and work. As we enter into the 'information age', it appears that fewer jobs require personal interactions. This means that it is not always necessary to provide people with their own desk or office. Many people can and do work quite well from home and simply use the telephone, fax, modem, or even desktop video conferencing equipment. Telecommuting could have a dramatic impact on urbanization, and in theory at least, reduce the need for cities.

The H.261 standard attempts to address the issue of providing video services over the PSTN. This family of standards is more commonly known as Px64. Among other things, it allows the end-user to determine the grade of service, and hence cost, by adjusting the digital bit rate in increments of 64 Kbps. As the bit rate increases, the picture quality and cost increase.

### 1.3.4 Videophone

The videophone has been a long time in coming. Many technologies could have provided this service years ago, but there was never sufficient demand to justify its deployment.

Today, the H.261 standard can be used to support picture phone service over a basic rate ISDN line. The image quality is not particularly good because the maximum bit rate is limited to 2 B channels [2 x 64 Kbps]. Never the less, this application may become widespread, particularly when offered as a feature of personal computers. It is interesting to note that although people are generally only willing to spend a few tens of dollars for a phone, they are quite willing to spend several thousands of dollars on a personal computer.

### 1.3.5 Virtual Tours

One of the more advantageous applications of multimedia is the virtual tour. This allows people to see things that they would not normally be able to see. This is more than simply seeing a photograph. It involves some sort of interaction.

This allows people to visit museums of famous places that they would not otherwise be able to do. However, unlike simply watching a documentary video,

the observer can move about or zoom in to see or examine some object more closely.

One of the premier museums, which have pioneered this technology, is the Oriental Institute at the University of Chicago.

[http://www-oi.uchicago.edu/OI/MUS/OI\\_Museum.html](http://www-oi.uchicago.edu/OI/MUS/OI_Museum.html)

http://

Check out the following QuickTime panorama clips:

[Egyptian Galley](#)

[Assyrian Gallery](#)



### 1.3.6 Web TV

<http://www.webtv.com/>

[www.webtv.net](http://www.webtv.net)

<http://developer.webtv.net/>

http://

WebTV combines broadcast television and internet access which can be viewed on a TV screen or computer monitor. In addition, it provides many of the features associated with broadcast television.

The basic idea is that the broadcaster places the video stream on a browser window. The viewer can then access a range of features using standard browser controls. A sports channel for example may carry multiple viewing angles, supplementary player/game information or a feedback form.

An early version of this was Intel's Intercast product. It allowed television networks to transmit Web pages during the vertical blinking pulse. In this respect it was similar to European broadcast teletext. However, it has now been discontinued.

<http://support.intel.com/support/technologies/multimedia/intercast/>

<http://www.stb.com/products/multimedia/tvpci/tvpci.html>

<http://www.futuremedia.org/Media/imedia/new/wnew.html>

http://

### 1.3.7 Multimedia and Education

Perhaps the most altruistic application of multimedia communications is in the dissemination of knowledge to the public. This can be seen by the partnership of NASA and certain multimedia service providers. One could suggest that even this is merely a cynical propaganda tool, but perhaps for once we could suppress our suspicions.

<http://www.dreamtime.com/home.html>

http://

## 1.4 Performance Issues

In the past, people were relatively happy with new inventions and did not immediately place great demands on new technology or services. Today, most people expect a high quality of service right from the start.

Today, services such as videophone must compete with the quality offered by other video service providers. Unfortunately, the existing telecommunications infrastructure was optimized for narrow band voice and is not suitable for multimedia communications.

Because of its vast size, it is very difficult to quickly modify the telecommunication networks of the world. However, the telecom backbone has been evolving steadily over the years, and it may be possible to bypass the existing switching centers to provide high capacity services to the end-user.

The development of PC and networking technologies has caused a vast improvement in understanding the infrastructure and service requirements for multimedia communications.

### 1.4.1 Bandwidth

Bandwidth considerations occur at all levels in a communications system. As more and more demands are placed on a network, it becomes imperative to improve the transportation backbone. The expense of this costly process is distributed among all users.

As end-users demand more services, the need for bandwidth increases. Voice paths require about 4 KHz of analog bandwidth, which translates into 64 Kbps in the modern digital telephone system. This represents the maximum capability of the POTS network. With the advent of ISDN, it is possible to combine slightly more than two POTS channels in the central office into a single end-user channel. This increases the end-user bit rate to 144 Kbps. However, ISDN is quite expensive, as it requires changing equipment on both ends of the loop and redefining the network.

Customers who demand real-time multimedia services require bit rates in excess of 1 Mbps. This development forces fundamental changes in the network infrastructure. DSL or cable modems can provide the needed local loop bandwidth, but they act as a bypass for the PSTN and connect directly to the emerging public packet network.

High quality ubiquitous multimedia will be expensive to implement and may not be widely available well into the 21st century.

### 1.4.2 Network Considerations

Demand for increased infrastructure occurs as the customer base grows. Today however, this is no longer the primary driving mechanism. Now end-users demand high bandwidth services. This forces a change in both the transportation backbone and network components.

Providing backbone speed of hundreds of Mbps is not particularly difficult. However, providing value-added services such as high speed switching is difficult. This becomes even more complex if the services demand a change in switching methodology.

The traditional voice telephone network is based upon circuit switching techniques. Since the call holding times are relatively short and a high quality of service is required, a physical circuit could be assigned for the entire call. The only media expected is audio.

Traditional data users had short holding times and required an extremely high quality of service. This led to the development of packet switches, where virtual circuits could be assigned. These networks support text and graphics.

Today, with the advent of the Internet, local loop call holding times are long while network routing paths must be constantly established and removed. Furthermore, end-users expect multimedia communication, text, graphics, audio, video etc. to be supported in a completely transparent manner. The existing network was not designed to handle this type of situation.

### Synchronization

Multimedia applications typically require a high degree of synchronization. Video images for example require a high degree of compression and therefore require a great deal of time to process and display. Audio signals do not require the same degree of processing. Consequently, it is necessary to realign the two data types prior to their presentation.

#### 1.4.2.2 Quality of Service

QoS is generally synonymous with delay control. In circuit switched connections, the data path is constant and the delay is fixed. In packet switch systems, the delay is variable and dependant on the overall traffic. The best solution to providing a packet type delivery with a relatively constant delay is ATM.

[Conformance Testing to Users Needs by Applying the “The Document Suite” for the MMCF](#)

[Multimedia Communications Quality of Service by MMCF](#)



ATM s receiving wide acceptance as a backbone transport technology but is still too expensive to provide at the desktop.



## Assignment Questions

### Composition Questions

To answer these questions, it may be necessary to do some research.

1. In your opinion, why do so many people today have personal computers?
2. Why is it conceivable that videophone may be provided as an add-on to a computer, but not to the phone?
3. What does the process of reading do to the mind that watching events cannot do?

## For Further Research

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### The Gutenberg Bible

<http://www.gutenbergdigital.de/gudi/start.htm>

### Multimedia Communications

<http://hulk.bu.edu/>

<http://www.mmc.org/>

<http://monet.engr.mun.ca/>

<http://www.amcomm.org/>

### Video Systems

<http://www.mantis.co.za/elec/video.html>

<http://www.mantis.co.za/elec/video.html#standard>

### Media

<http://www.mediamall.com/>

### Multimedia Communications

[http://dirdri.inria.fr/Technoparc/Whitepapers/IDC\\_1198.html](http://dirdri.inria.fr/Technoparc/Whitepapers/IDC_1198.html)

### Industry Information

<http://www.hardware.com/complist.html>

<http://www.telstra.com.au/info/communications.html>

<http://www.multimediator.com/>

### Media and Society

<http://www.kqed.org/cell/mediaeducation/mediaedproject/mediaandsociety.html>

### Critical Thinking

[http://www.umsl.edu/~klein/Critical\\_Thinking.html](http://www.umsl.edu/~klein/Critical_Thinking.html)

<http://www.criticalthinking.org/>

<http://www.ida.net/users/marie/ed/think.htm>

<http://www.idcnet.com/~cstewart/elibcrit.htm>

<http://lonestar.texas.net/~mseifert/critres.html>

<http://www.wiu.edu/users/mucwf/crit.html>

### Website Animation

<http://www.screamdesign.com/>

### Website Marketing/Design

<http://www.marketingtips.com/tipsltr.html>

<http://www.webdeveloper.com/>