# Multimedia Technology

## A Graduate Course

**Winter Semester 2001/2002**

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## Recommended Reading (1)

Ordered by relevance for this course)


1. R. Steinmetz: Multimedia-Technologie – Grundlagen, Komponenten und Systeme. 2. Auflage, Springer Verlag, Heidelberg, Berlin, New York, 1998 (English version of the second edition to appear soon)
2. F. Kuo, W. Effelsberg, J.J. Garcia-Luna-Aceves: Multimedia Communications – Protocols and Applications. Prentice Hall, Upper Saddle River, 1998
3. W. Effelsberg, R. Steinmetz: Video Compression Techniques. dpunkt.Verlag, Heidelberg, 1998
4. K. Froitzheim: Multimedia-Kommunikation. dpunkt.Verlag, Heidelberg, 1997 (in German)
5. W. B. Pennebaker, J. L. Mitchell: JPEG Still Image Compression Standard. Van Nostrand Reinhold, New York, 1993
6. J. L. Mitchell, W. B. Pennebaker, Ch. E. Fogg, D. J. LeGall: MPEG Video Compression Standard. Chapman&Hall, New York, 1996
7. Michael F. Barnsley, Lyman P. Hurd: Bildkompression mit Fraktalen. Vieweg-Verlag, Wiesbaden, 1996




## Recommended Reading (2)


8. All issues of the "IEEE Multimedia Magazine"
9. All issues of the "Multimedia Systems Journal„ (ACM / Springer-Verlag)
10. All issues of the journal "Multimedia Tools and Applications" (Kluwer Academic Publishers)

## Acknowledgement

We would like to thank our colleagues Lars Wolf, Carsten Vogt, Jörg Liebeherr and Jana Dittmann for allowing us to use some of their transparencies in this course. Their support is gratefully acknowledged.



# 1. Introduction

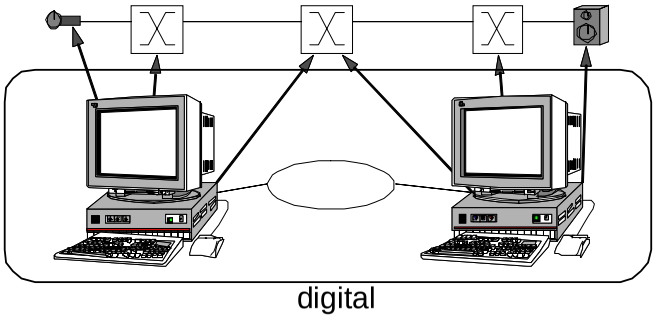
## 1.1. What is a multimedia system?

A multimedia system supports the integrated storage, transmission and representation of the discrete media types text, graphics and image and the continuous media types audio and video on a digital computer.

## A Hybrid (analog/digital) Multimedia System

Early multimedia system, around 1985

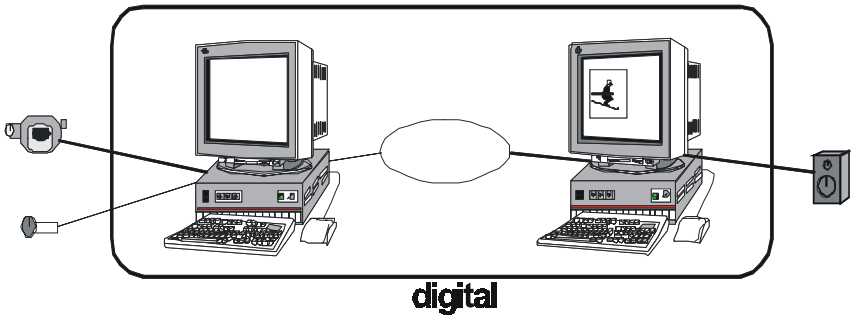
The Eighties:
Analog solutions




Computers control the analog media streams, e.g., via cross-connect switches.



## Digital Multimedia System




The media streams are digital. They can be processed (e.g., compressed/decompressed, analyzed) in the computer.

## Time-Independent and Time-Dependent Media

### Time-Independent Media

- Information is not related to timing of the data stream
- All „classic“ media in the computer, such as:
  - **text**
  - **graphics** (line drawings, vector graphic)
  - **image** (photo, pixel graphics).

### Time-Dependent Media

- Information is time-related, must be shown to the user at specific points in time
- **Continuous data streams**
  - Data appears in regular intervals
- Examples:
  - **Audio** (continuous)
  - **Video** (continuous)
  - **An animation** (not a continuous stream, but time-dependent)
  - An **interactive game** on the Internet (not a continuous stream, but has real-time requirements)

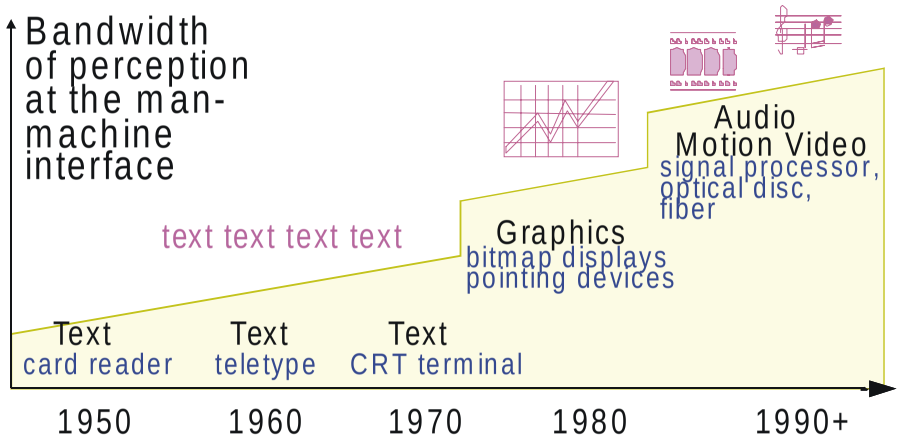


## Our Definition of Multimedia

A **multimedia system** is characterized by the

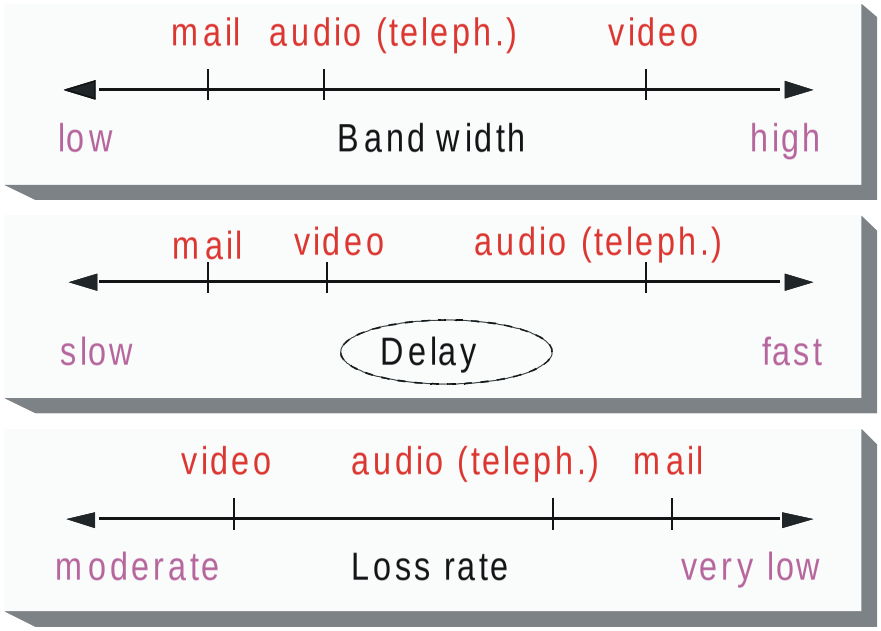
- **integrated**
  - production,
  - processing,
  - storage,
  - representation,
  - and transmission
- **of several time-dependent and time-independent media streams.**

## History of Bandwidth in Computer Networks

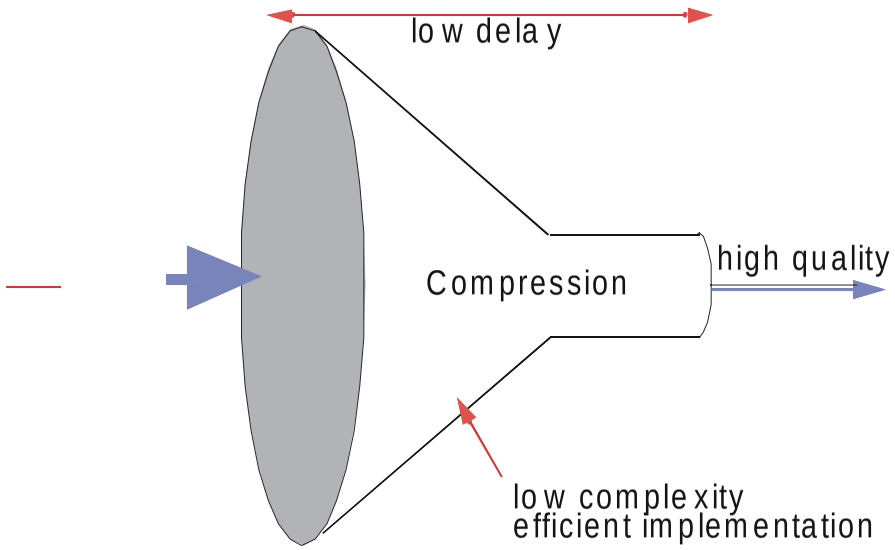





## Network Requirements of Different Types of Data Streams



## Goals of Compression




The compression of multimedia data streams saves

- storage space
- transmission bandwidth.



## Architecture of a Multimedia Workstation