**Centre for
Telematics and
Information
Technology**

University of Twente
The Netherlands

INTERNET NEXT GENERATION
TECHNICAL DEVELOPMENTS AND NEW APPLICATIONS
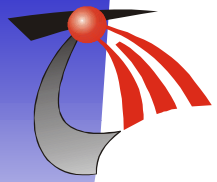
AIKO PRAS

http://wwwhome.ctit.utwente.nl/~pras

25 MARCH 1999

ACM

STAVERDEN

**Centre for
Telematics and
Information
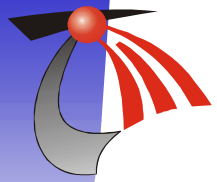Technology**

University of Twente
The Netherlands
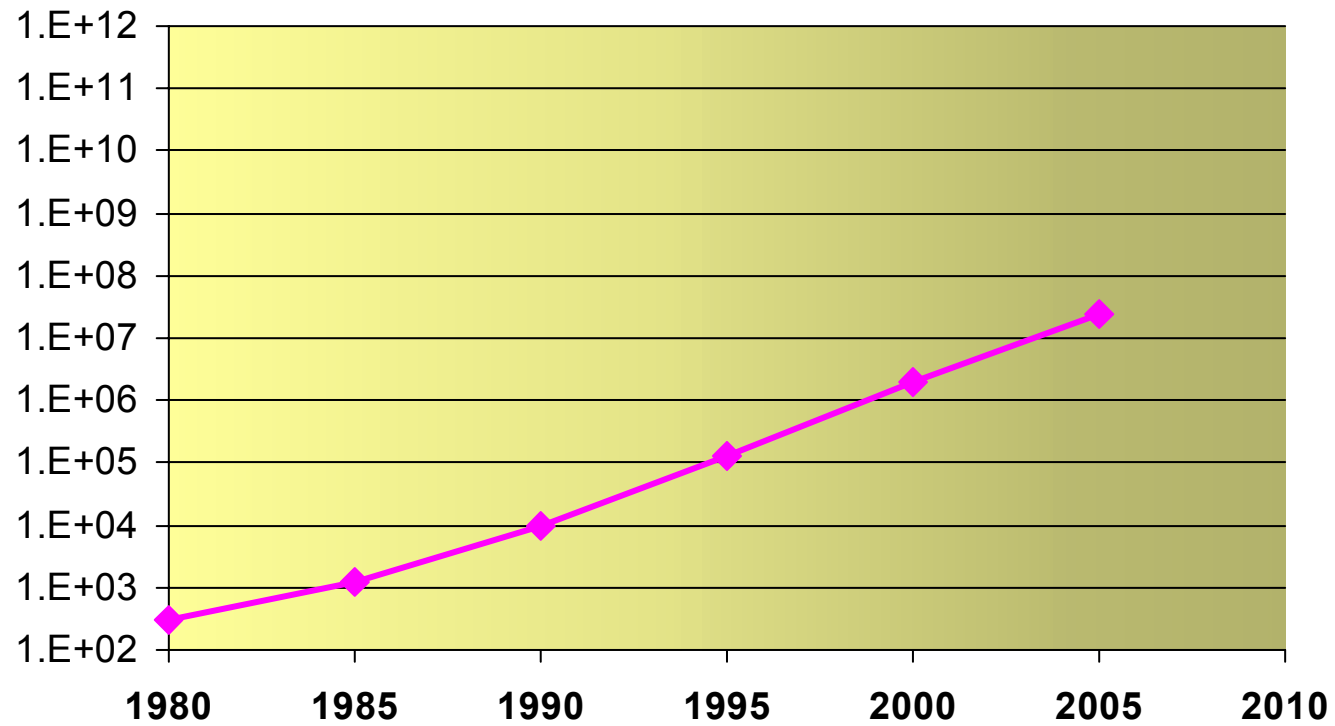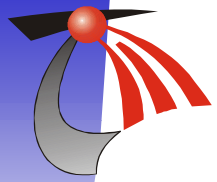
TECHNICAL DEVELOPMENTS

OVERVIEW:

- BANDWIDTH

- DIFFERENT QUALITIES
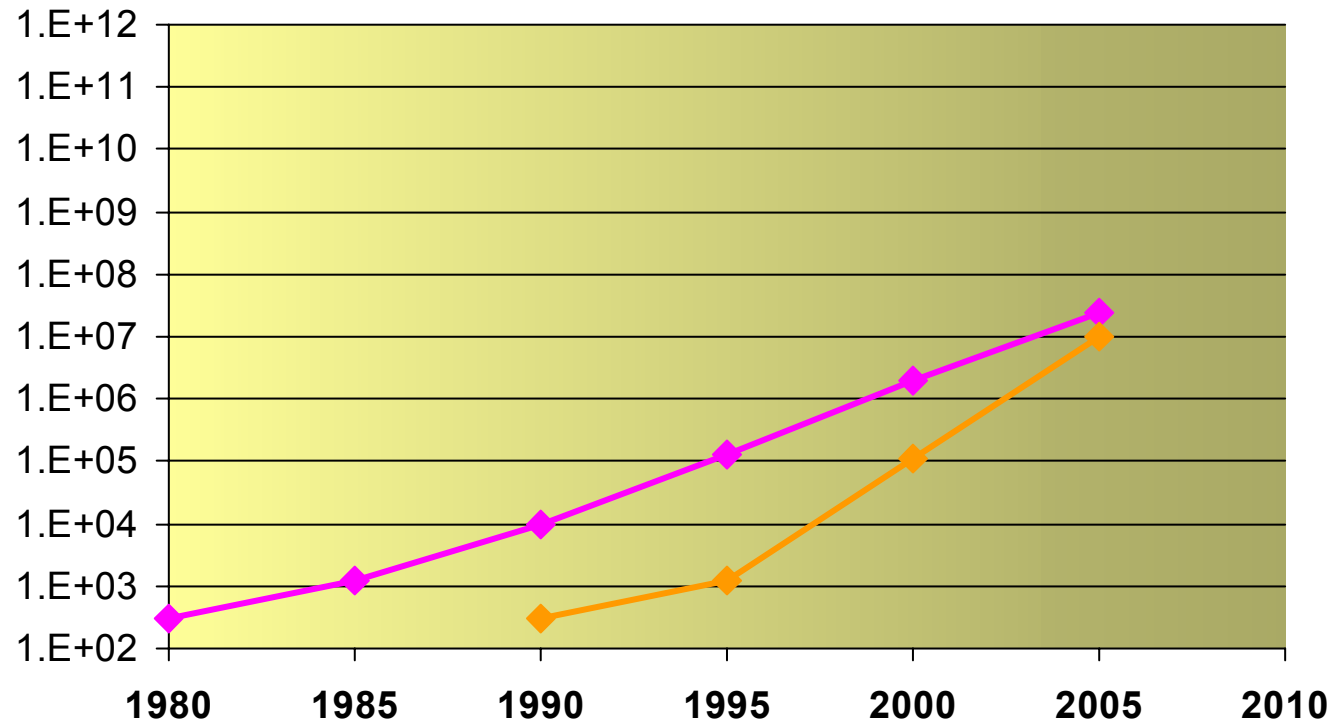
- ACCOUNTING

- ...

BANDWIDTH

LOCAL ACCESS - FIXED (IN BPS)

BANDWIDTH

LOCAL ACCESS - WIRELESS (IN BPS)
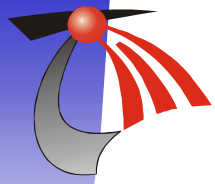
BANDWIDTH

BACKBONE LINE CAPACITY (IN BPS)

**Centre for
Telematics and
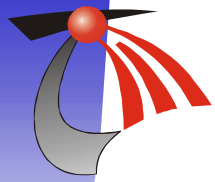Information
Technology**

University of Twente
The Netherlands
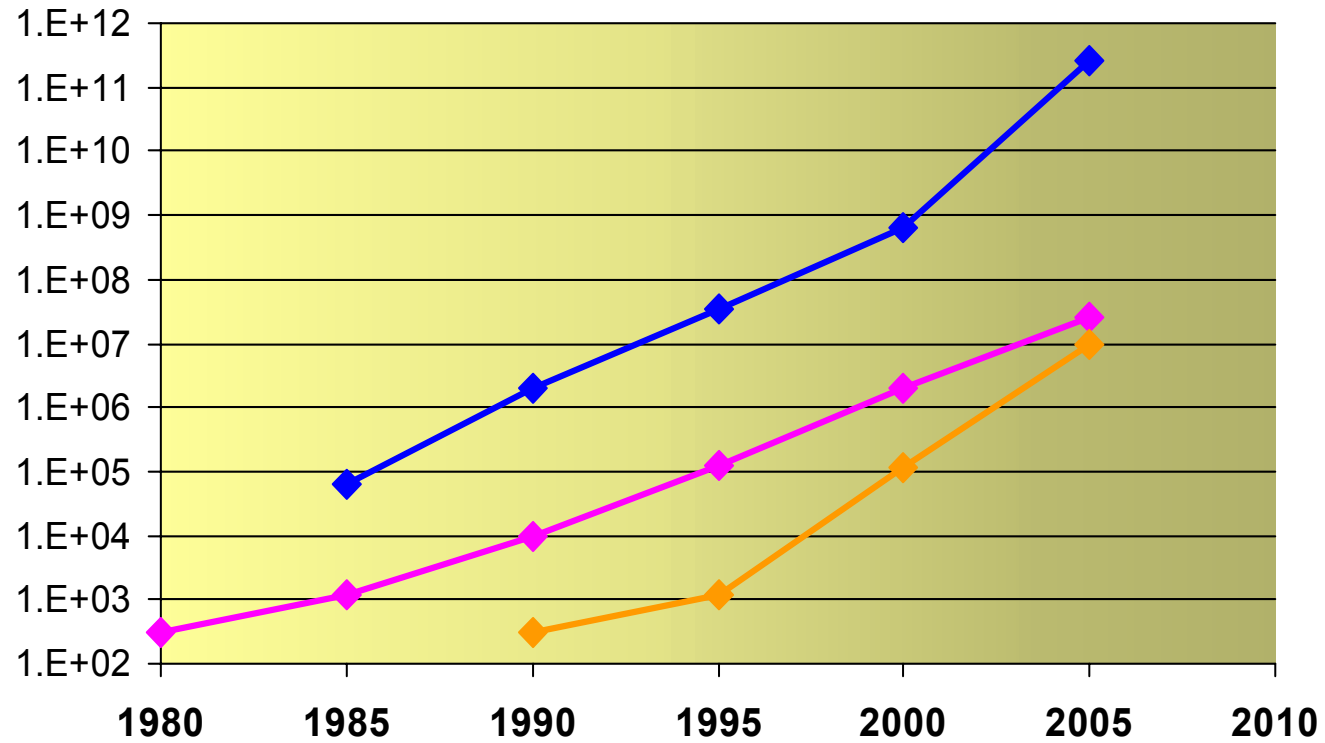
BANDWIDTH

CAPACITY ACCESS LINE IN THE YEAR 2005:

- 4 TO 10 DIGITAL TV SIGNALS
- 100 TO 250 HIFI AUDIO SIGNALS
- 2000 WEB PAGES PER SECOND

CAPACITY BACK BONE LINE IN THE YEAR 2005:

- 100.000 DIGITAL TV SIGNALS
- 2.500.000 HIFI AUDIO SIGNALS
- 15 MILLION TELEPHONE CALLS
- 25 MILLION WEB PAGES PER SECOND

**Centre for
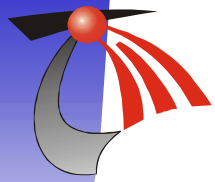Telematics and
Information
Technology**

University of Twente
The Netherlands

BANDWIDTH

DEVELOPMENT GOES ON!

CAPACITY BACK BONE IN THE YEAR 2010:

- 3 MILLION DIGITAL TV SIGNALS
- 75 MILLION HIFI AUDIO SIGNALS
- 500 MILLION TELEPHONE CALLS
- 1 BILLION WEB PAGES PER SECOND

**Centre for
Telematics and
Information
Technology**

University of Twente
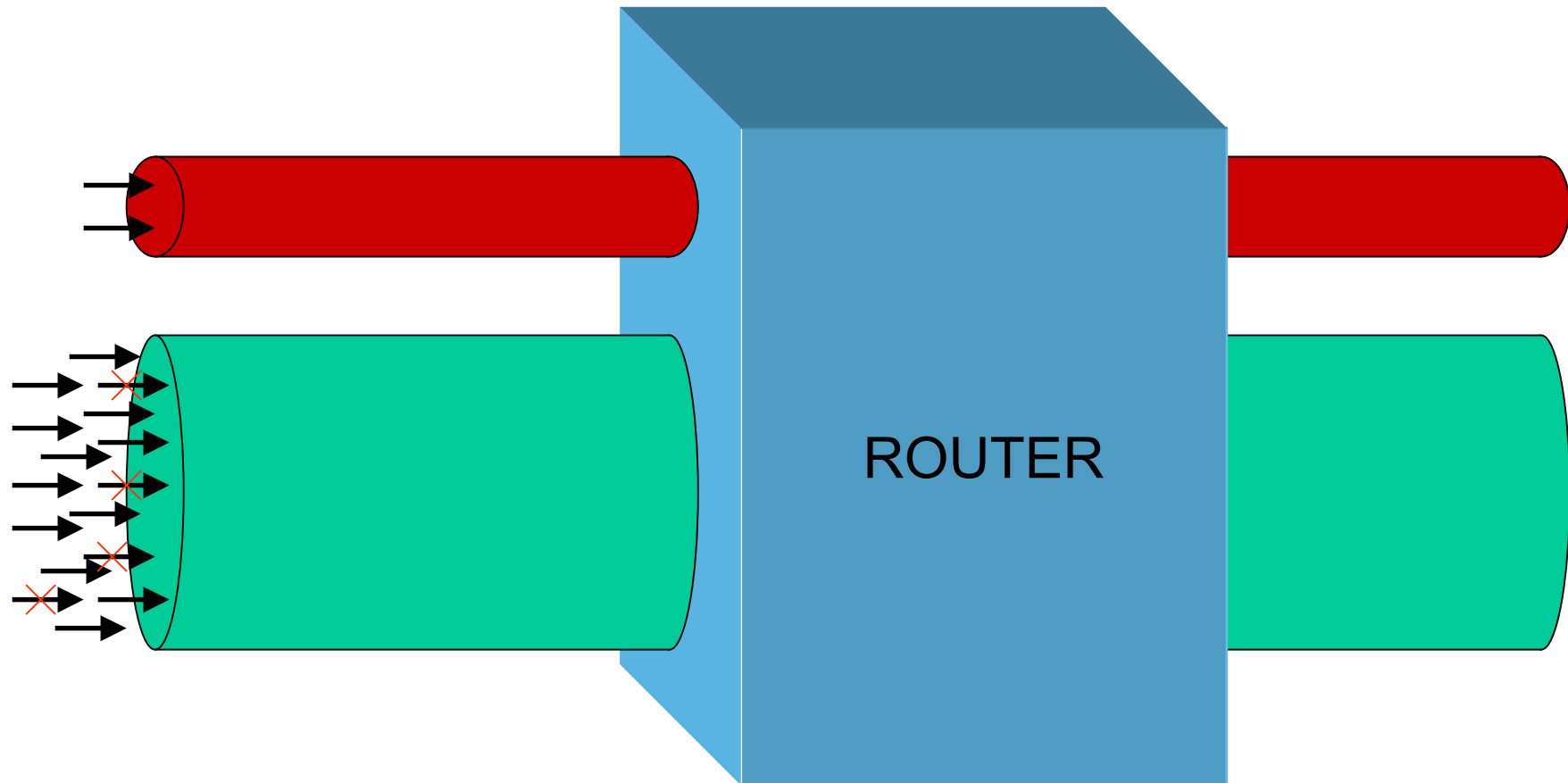*The Netherlands*

DIFFERENT QUALITIES

APPLICATIONS HAVE DIFFERENT REQUIREMENTS

**IT IS NOT SURE THAT THE NETWORK WILL ALWAYS BE ABLE
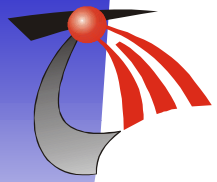TO SATISFY THESE REQUIREMENTS**

CAPACITY FOR (WIRELESS) ACCESS WILL BE SCARCE

WE NEED RESERVATION SCHEME'S

IETF: INTSERV

CAPACITY FOR BACKBONE MAY BE SCARCE

RESERVATION DOESN'T WORK
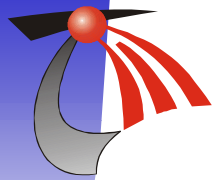
IETF: DIFFSERV

DIFFERENT QUALITIES - II

ROUTER

Centre for
Telematics and
Information
Technology

University of Twente
The Netherlands

DIFFERENT QUALITIES - III

INTERNET NEXT GENERATION PROJECT
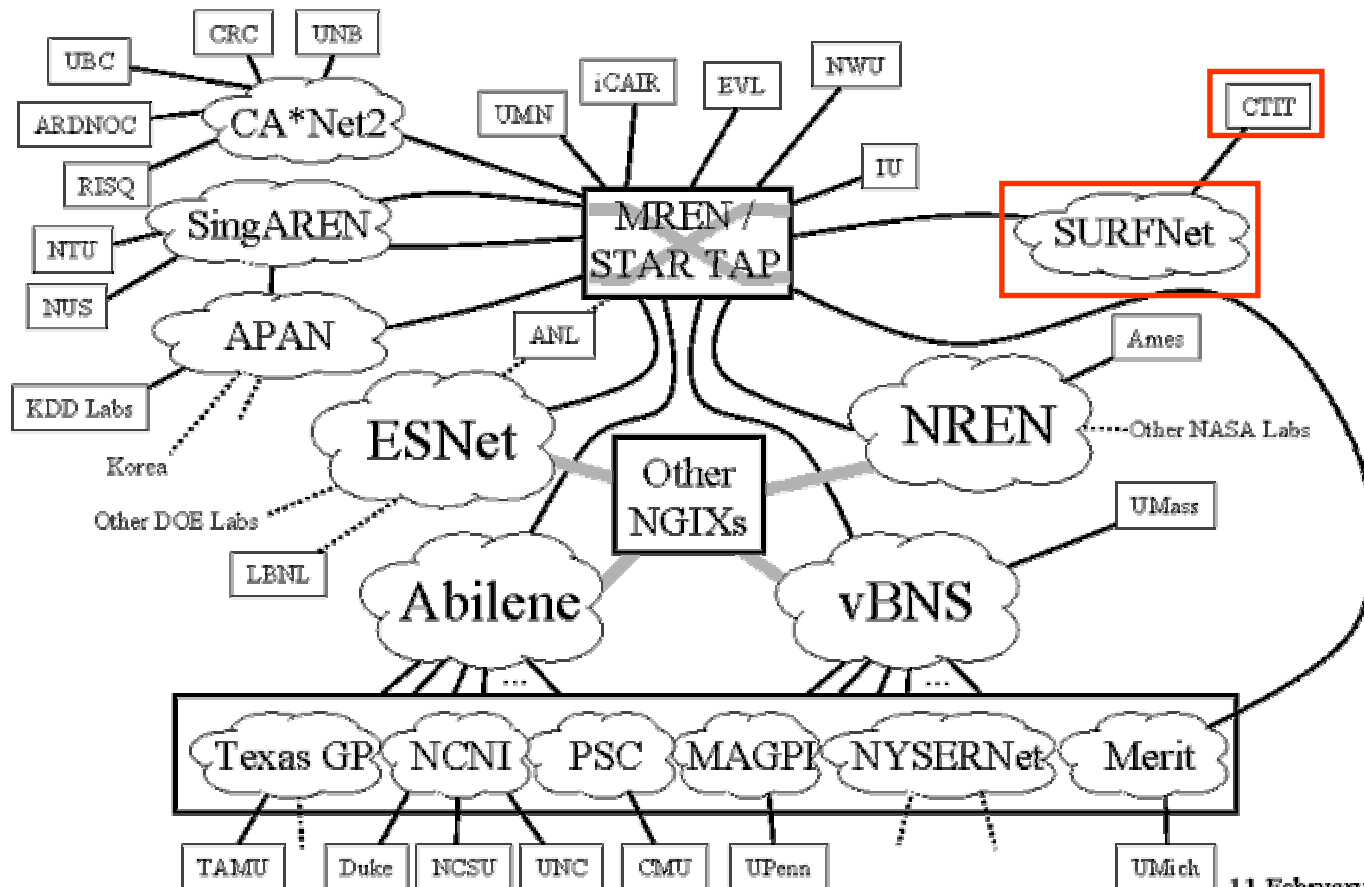### CTIT (UT), ERICSSON, KPN-RESEARCH, TI-CO
http://www.ctit.utwente.nl/

QBONE
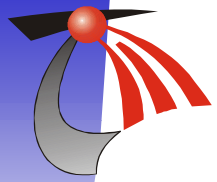## INTERNET-2

Initial QBone Participants and Connectivity*

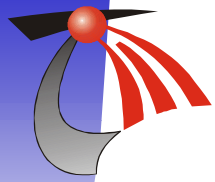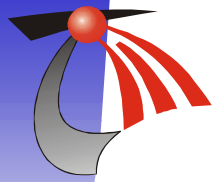* Actual connectivity and participant group will vary as deployment progresses

11 February, 1999

**Centre for
Telematics and
Information
Technology**

University of Twente
The Netherlands

ACCOUNTING - I

DIFFERENT QUALITIES?

DIFFERENT PRICES!

Centre for
Telematics and
Information
Technology

University of Twente
The Netherlands

ACCOUNTING - II
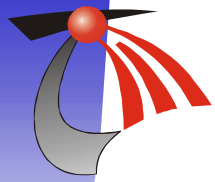
- IS IT POSSIBLE TO HAVE DIFFERENT TARIFS FOR LOCAL, NATIONAL AND INTERNATIONAL TRAFFIC?

- IS IT POSSIBLE TO HAVE DIFFERENT TARIFS FOR INTER AND INTRA OPERATOR TRAFFIC?

- SHOULD ACCOUNTING BE BASED ON VOLUME?

- DO YOU HAVE TO PAY FOR RETRANSMISSIONS?

- WHAT INFORMATION IS NEEDED FOR ACCOUNTING

- WHERE SHOULD THIS INFORMATION BE COLLECTED?

- WHO MAKES THE BILL?

**Centre for
Telematics and
Information
Technology**

University of Twente
The Netherlands

OTHER DEVELOPMENTS

- MULTICASTING
- SECURITY
- ...

MANY THINGS WILL HAPPEN!

**Centre for
Telematics and
Information
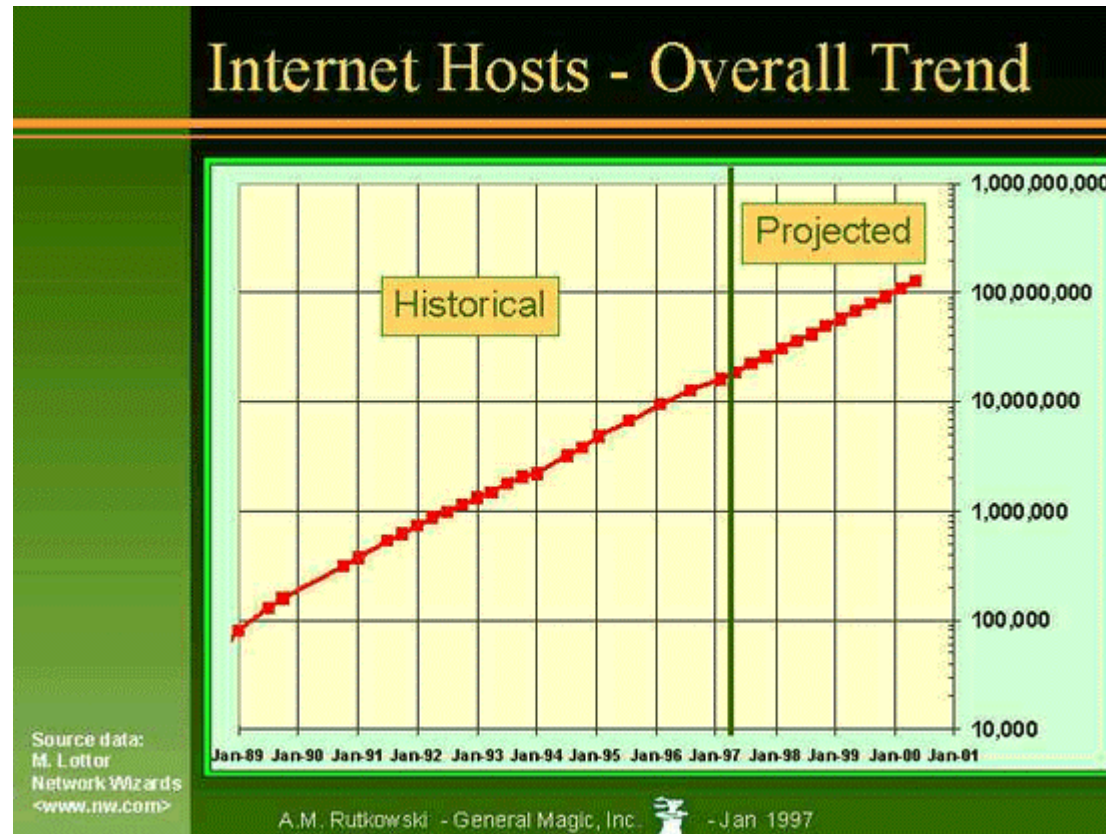Technology**

University of Twente
The Netherlands

NEW APPLICATIONS

INCREASING NUMBER OF USERS

- ELECTRONIC COMMERCE

- TELE-EDUCATION

- ENTERTAINMENT

**Centre for
Telematics and
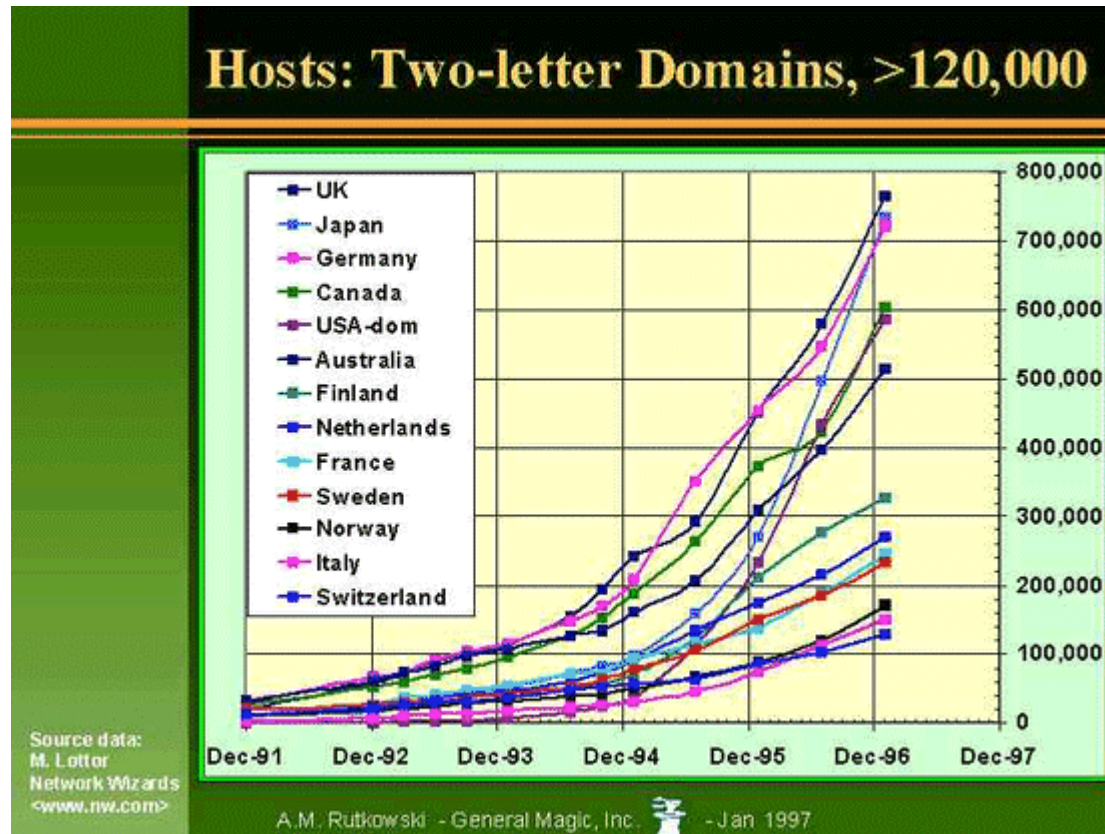Information
Technology**

University of Twente
The Netherlands

INCREASING NUMBER OF USERS

Source: http://www.genmagic.com/Internet/Trends/

**Centre for
Telematics and
Information
Technology**

University of Twente
The Netherlands

IINCREASING NUMBER OF USERS - II

Hosts: Two-letter Domains, >120,000

**Centre for
Telematics and
Information
Technology**

University of Twente
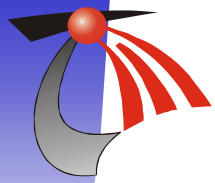*The Netherlands*
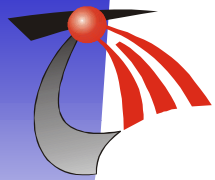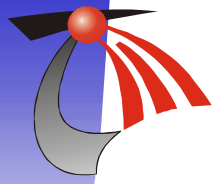
IINCREASING NUMBER OF USERS - II

- **MORE PERSONS**

- **MORE PCs PER HOUSEHOLD**

- **NEW TYPES OF EQUIPMENT**

Centre for
Telematics and
Information
Technology

University of Twente
The Netherlands
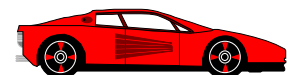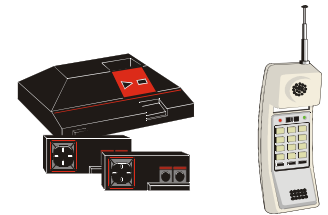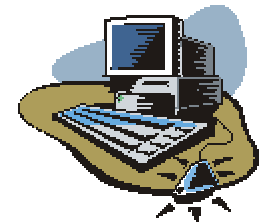
ELECTRONIC COMMERCE - I

ELECTRONIC BOOKSHOPS
www.amazon.com

BILL GATES
BUSINESS
@
THE SPEED OF
THOUGHT
USING A DIGITAL NERVOUS SYSTEM
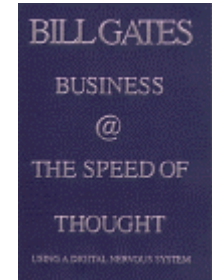
- **ROLE OF LOCAL BOOK SHOP?**

- **ELECTRONIC BOOKS?**

- **ROLE OF PUBLISHERS?**

- **ROLE OF CENSORSHIP?**

**Centre for
Telematics and
Information
Technology**
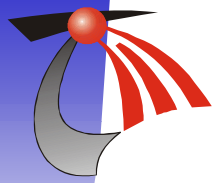
University of Twente
The Netherlands
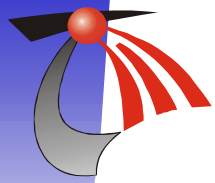
ELECTRONIC COMMERCE - II
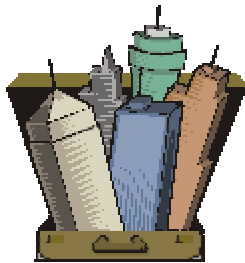
HOUSES

www.nvm.nl

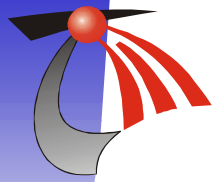- ### ROLE OF REAL ESTATE AGENTS?

- ### NO MORE INFORMATION MONOPOLY?

ELECTRONIC COMMERCE - III

IN GENERAL:

- SMALL COMPANIES GET DIRECT ACCESS TO END-USERS

- END-USERS GET DIRECT ACCESS TO MANUFACTURERS

- MORE SPECIALIZATION

- MORE DIFFERENTIATION

- GLOBAL COMPETITION

**Centre for
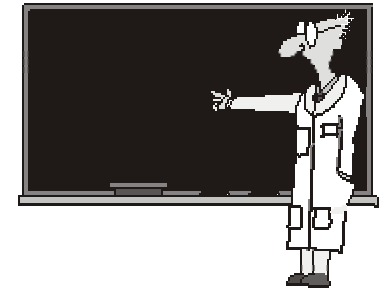Telematics and
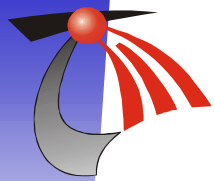Information
Technology**

University of Twente
The Netherlands

TELE-EDUCATION

WITHIN UNIVERSITIES

http://teletop.edte.utwente.nl/

BETWEEN UNIVERSITIES

- ## COURSE COMPONENTS
- ## COMPLETE COURSES

Centre for
Telematics and
Information
Technology

University of Twente
The Netherlands

ENTERTAINMENT

CNET Television
Online. On the air.

CNNin
interactive
CNN.com

CONTACTS
RADIO
GAMES
MULTI-USER GAMES
VIDEO ON DEMAND
TELEVISION

WHAT ROLE REMAINS FOR THE GOUVERNMENT?

**Centre for
Telematics and
Information
Technology**

University of Twente
The Netherlands
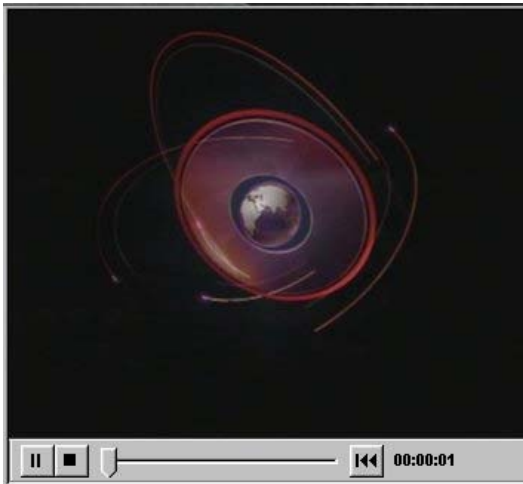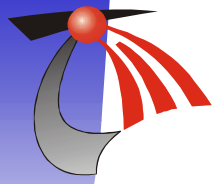
CONCLUSIONS

- MAJOR TECHNICAL DEVELOPMENTS
  - MANY NEW APPLICATIONS
- IMPORTANT CHANGES IN SOCIETY
- CHANGING ROLE OF GOUVERNMENT

- WE'RE JUST AT THE BEGINNING ...