

The 4th G Ambient Internet

“ambient intelligence” serving the user with care, comfort, control and communication

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Material from me and others, but:
Special thanks to LM Ericsson & IOP Generieke Communicatie, Min. EZ

One plus Four Ambition for 2010

- **Ambitie 0** – “1 Dollar a day” breedband to every home
- **Ambitie 1** – elektronische betalen, veilig en draadloos:
- **Ambitie 2** – intelligent verkeer:
- **Ambitie 3** - multi-media ontspanning:
- **Ambitie 4** - elektronische zorg:

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The Past: The Narrowband 20th Century

“One public phone at each home”

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Now: The Broadband & Mobile 21st Century

- **Broadband before the end of this decade**
- **10Mbps at each hand**
- **100 Mbps at each home by end 2010**

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Mobile Telephony is not wireless the success is “mobility service”

HLR=Home Location Register
VLR=Visitor Location Register

LE= Local Exchange
TE=Transit Exchange

Fixed Subscribers: “Is Bill there?”
Mobile Subscribers: “Can you talk?”

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Productivity of more information cheaper

Agriculture age: till 1900 from 10M to 1B humans (100 x)


Industrial age: since 1840 making & transport of goods improved 45 x


Information age:


Year	Service	Manufacturing
1960	~50	~50
1970	~80	~80
1980	~100	~100
1990	~100	~140


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Information Growth


1800 Craftsman  14

1900 Efficiency  cost price

1960 Quality + Effic.  process logging (usage info grows)

1975 Flexibility + Q + Effic.  planning/orders/batches/barcodes

1990 Speed of Innovation + Flex. + Q + Effic  design data (weight docu > product)

2000 Reverse logistics/manuf. + Innov + Flex + Q + Effic.  total life-time logging unique product

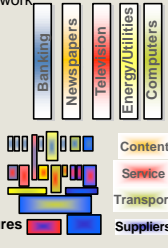
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Cost of Coordination

New technology will enable us to reduce the costs of coordination, increase the speed & quality of our heavily information-activity work

At the 3rd phase of technology adaptation we will realize the benefit as in transportation and ICT

- 1st order: **substitution:**
 - change from horse-back to train/car
 - substitute human coordination by computers
- 2nd order: **reduce costs** of traveling/coordination
 - commute to work, larger distances
 - increase of amount of coordination
- 3rd order: **new "transport/coordination-intensive" structures**
 - suburbs, shopping malls
 - shift towards coordination-intensive organizations (the Net society)

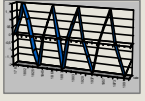


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Long-wave Economic Cycle: 5th Kondratieff

4-years waves, 8-10 years, 20 year & 50 (long) waves

- 1-wave: French + 1st Industrial Revolution (Railroad)
- 2-wave: Marx + Steel Industry (Steam)
- 3-wave: Capitalism + Electricity (1892-1948)
- 4-wave: Consumption + Oil (1948-1990)
- 5-wave: triggered by "computer as communicator"



value creation by handling information cheaper and faster

Kondratieff: - a combination of technology & society - during upswing a lot changes rapidly, after 15-20 years it gets quiet again

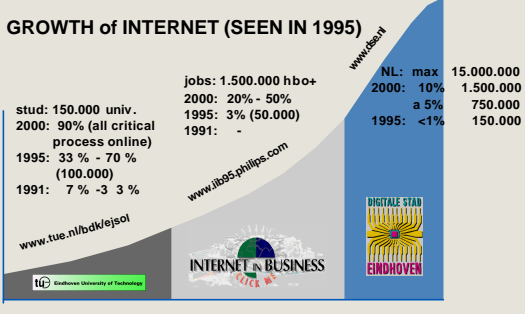
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GROWTH of INTERNET (SEEN IN 1995)

stud: 150.000 univ. 2000: 90% (all critical process online) 1995: 33% - 70% (100.000) 1991: 7% -3 3%

jobs: 1.500.000 hbo+ 2000: 20% - 50% 1995: 3% (50.000) 1991: -

NL: max 15.000.000 2000: 10% 1.500.000 a 5% 750.000 1995: <1% 150.000



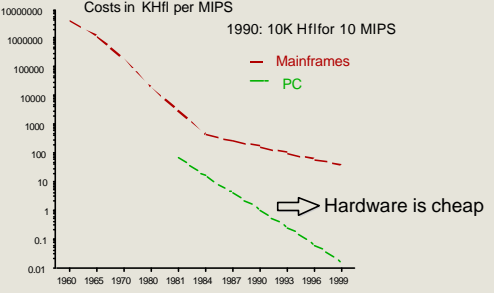
1e Generation: UNIVERSITIES 1985 2G Internet: BUSINESS 1995 3G PUBLIC 2005

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Computer Hardware Price/Performance

Costs in KHfl per MIPS

1990: 10K Hfl for 10 MIPS




Hardware is cheap

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The Computerless Computer Company (HBR 1991)

Value is created as software enables new/more usage of cheaper hardware

Initially software was scarce, so you asked a high price (and got rich)



HARDWARE IS COSTS SOFTWARE IS SCARCE

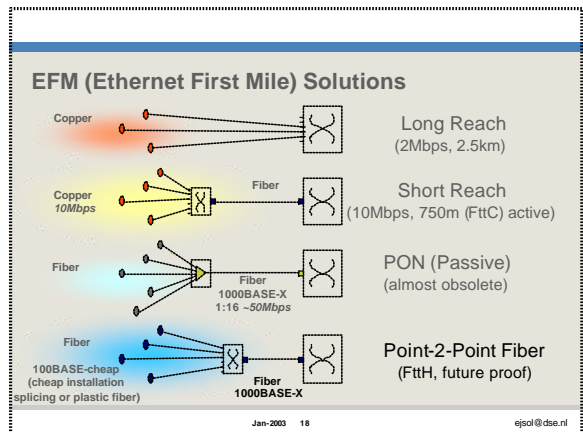
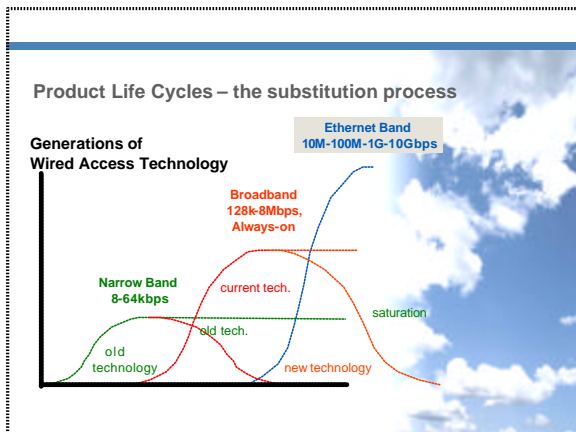
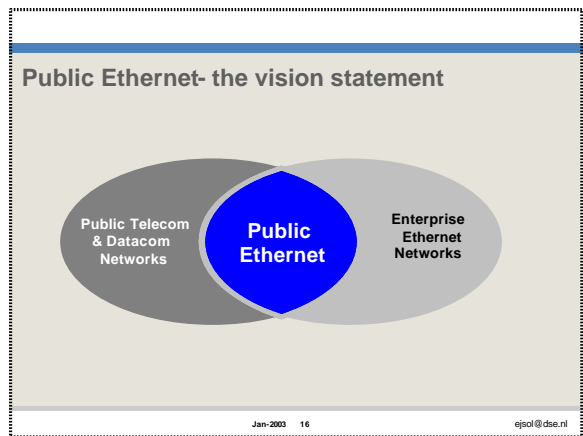
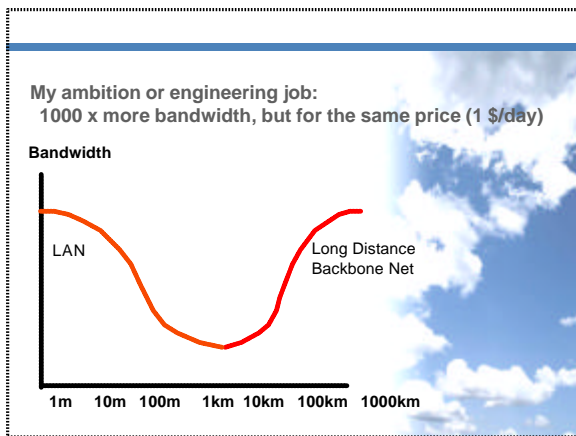
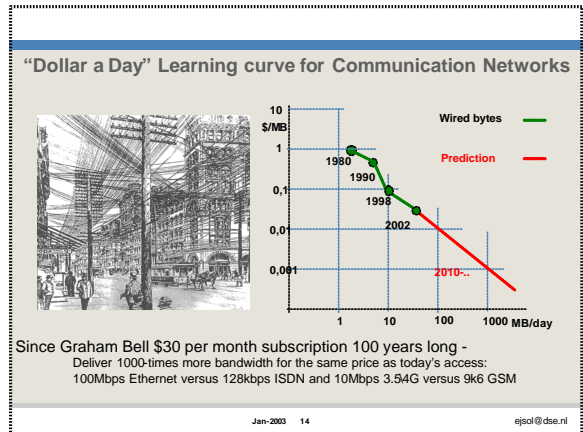
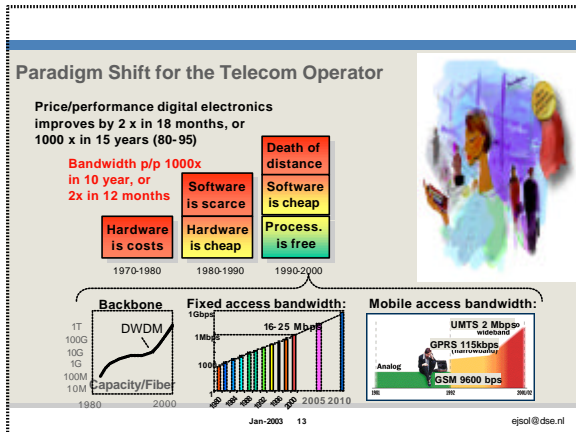
HARDWARE IS CHEAP

Microsoft BIOS IBM, Compaq, Taiwan, ...

1975-1985: Hardware Decade 1985-1995: Software Decade

Replacing: typewriter by a text editor calculator by a spreadsheet

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Forget ADSL, Ethernet is less expensive and simple

- A switched Ethernet network avoids costly protocol translations

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Ethernet for transport (IP too complex & costly) (1\$/day!)

IEEE 802 48bit MAC | VLAN 2B 4096 max or VLAN Q-in-Q | MPLS nested | IETF 32bit IPv4 or 128bit IPv6

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From shared 802.1 classic Ethernet To 802.1p/Q full QoS enabled point-to-point Ethernet network

Classic Ethernet – shared LAN
Coax cable, 180 meter, hubs, collisions, broadcasts, max 500 PCs, 10/100Mbps

IEEE 802.1p/Q Ethernet – switched individual UTP cable, 100m-10+km
1 PC/switch port, wire speed switch full duplex operation, 10/100M, 1/10GE QoS (p) & VLAN(Q) enabled network

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Public Ethernet: Scalability of Ethernet LAN

Public Ethernet: The Ethernet based public access network serving more than 100.000 subscribers in an area

"Public Ethernet is not the extension of a shared LAN with 250 computers"

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Content

Introduction – high hopes and devastating drops

100 Billion devices to serve – the new rules of the game

where to create and add value yesterday, today, tomorrow

knowledge and ICT are not means to create value, but the key production factors themselves to create services

1 + 4 Ambitions for the Netherlands

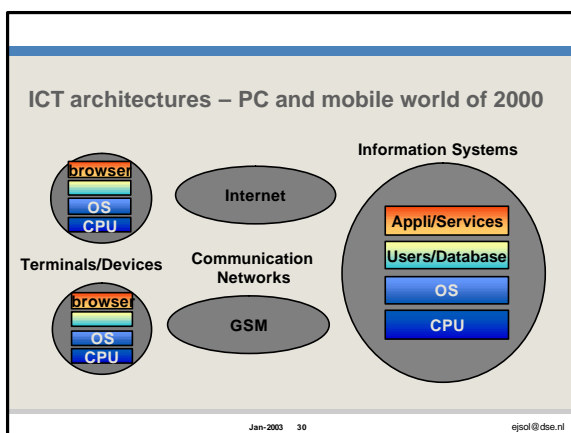
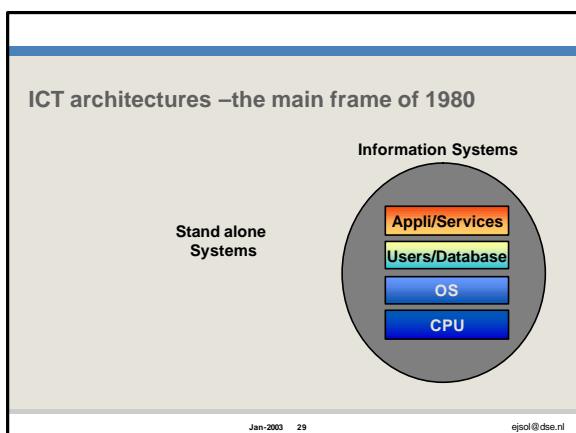
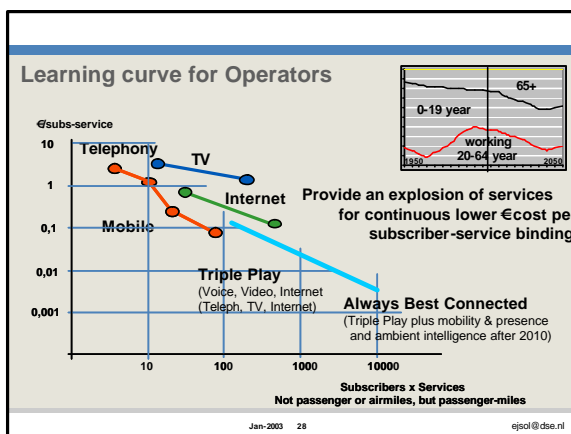
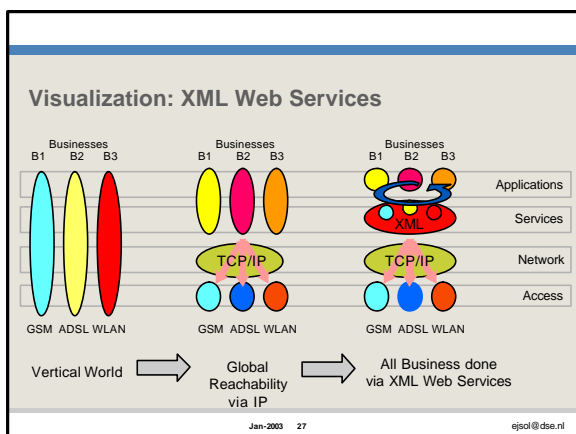
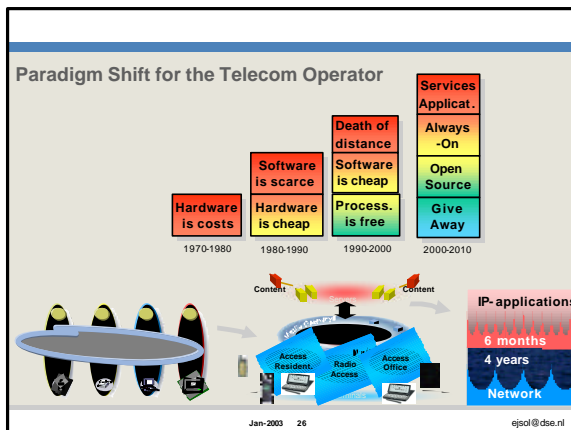
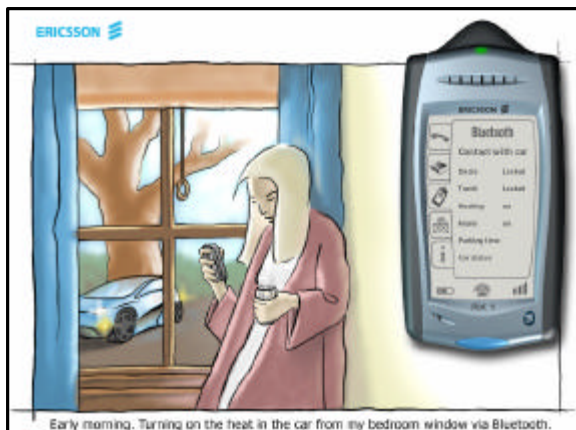
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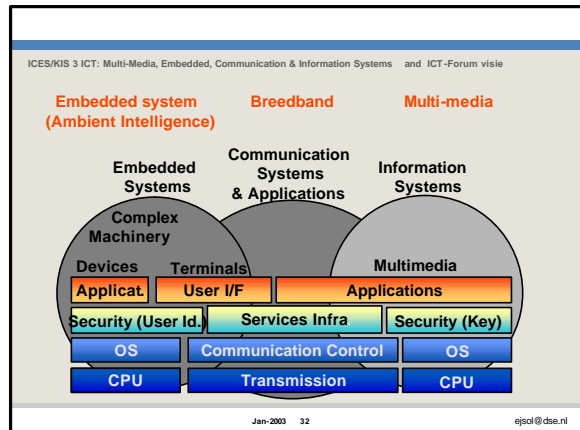
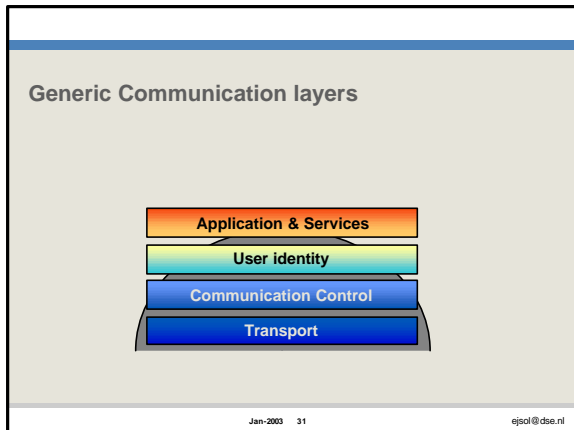
The 3G (Mobile) Internet and 4G (Ambient) Internet

1980: 100 users on 1 mainframe
2000: 1 mobile + 1 PC per user
2020: 100 Embedded, wireless devices per user @ 2B humans is:

Device and Device	200B (1B NL)
People and Devices	2B (10M NL)
People and People	20M (100K NL)

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- ICES/KIS 3 ICT: Multi-Media, Embedded, Communication & Information Systems and ICT-Forum visie
- Embedded system (Ambient Intelligence) Breedband Multi-media
- ### One plus Four before 2010
- Ambitie 0 – “1 Dollar a day” breedband en hogesnelheid:
 - Ambitie 1 – elektronische betalen, veilig en draadloos:
 - Ambitie 2 – intelligent verkeer:
 - Ambitie 3 - multi-media ontspanning (IP-TV)
 - Ambitie 4 - elektronische zorg:
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- Dutch Government: “We have to win in 4thG Internet to sustain wealth ISOC.nl: ambition 0 is the foundation to build on, invest in it
- Ambitie 0 – “1 Dollar a day” broadband to every home EJS: technology is there
- 10 Million PC's at 300Watt implies 3000MW, 3000MW is very large power plant, what are we doing
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