Course
„E-Business A"
Prof. Dr. Marius Dannenberg

Chapter 1
Introduction to the underlying economic theory of the E-Business era

Course Overview and Chapter Objectives

- **Not a Technical Course**
- **Focus on Strategic use of Information Technolgoy (IT)**
- **To Improve Performance, increase Effectiveness and Efficiency**
- **Explain why knowledge of information systems is important for business end users and identify areas of information systems knowledge they need**
- **Give examples to illustrate how E-Business, E-Commerce, or enterprise collaboration systems can support a firm's business operations, managerial decision making, and strategic advantage**
- **Provide examples of real world information systems, including the people, hardware, software, data, and network resources that compose them**
- **Provide examples of several major types of information systems from your experiences with business organizations in the real world**
- **Identify several challenges that a business manager might face in managing the successful and ethical development and use of information technology in a business**

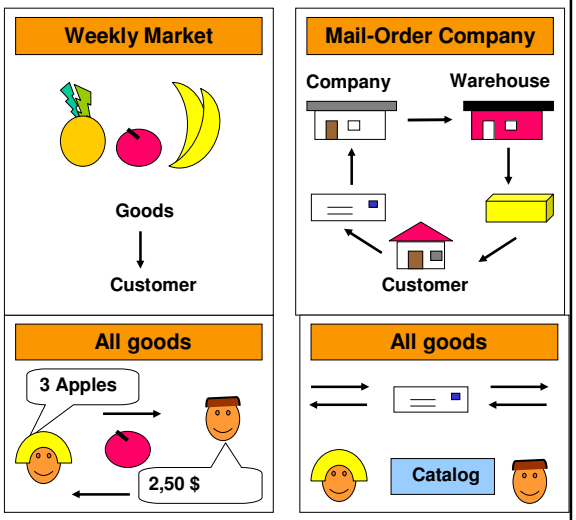
Why Study E-Business Information Technology (IT)?

Major Changes in the Business Environment:

- **Emergence of Global Economy**
- **Transformation of Industrial Enterprises**
- **Transformation of the Business Enterprise**
- **Emergence of the Digital Firm**

Neo-Classical Definition "Market"

Market:
- **Price mechanism**
- **Anonymous transactions**
- **Voluntary bargaining**

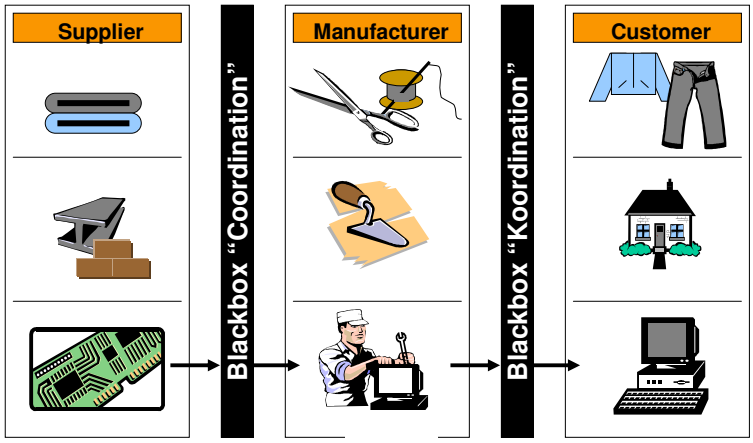


Neoclassical Theory: Ideally functioning markets

- **Homogenous goods**
- **All inputs & outputs the same (eg. labour is labour or wheat is wheat)**
- **Ideally functioning market: everybody is fully informed**
- **Perfect & costless information (no uncertainty)**
- **Princing mechanism is coordinating buyer and seller**
- **Coordination of buyer and seller causes no costs**
- **Production costs are the main costs to consider**
- **Information technology is a factor of production, like capital & labor**
- **Invisible hand of the market (works magically)**

>> Viewpoint is relatively far from reality

Ideally functioning markets



New Institutional Economics: Assumptions

- Transactions Costs (cost of using the market) do exist (Discovering prices, negotiating contracts etc.)
- Evaluate how firms organize themselves and others
- Bounded rationality
  - Economic agents are "*intendedly* rational but only *limitedly* so" (H. Simon)
  - "… because individual human beings are limited in knowledge, foresight, skill and time, organizations are useful investments for the achievement of human purpose" (H. Simon)
  - Decision makers can't accurately evaluate all possible alternatives
  - Too much information to know it all and some know more than others
  - Because bounded rationality, new institutional economics theory attributes to economic agents a self-seeking approach which is frequently described as "opportunism" (or moral hazard or agency)
- Irresoluble problems with contracting
  - Bounded rationality and opportunism render some forms of contracts infeasible
  - Contracts may not be complete: ex-ante comprehensive contracting is not possible, so ex-post contracting, i.e., disputes settlement, adaptation, becomes economically important… Organization is necessary
  - Economic agents are unreliable regarding their promises, so organizations should monitor their transactions and deter opportunism

Main focus in this class: Transaction Cost Theory of the Firm

Ronald Coase: Why is there not one huge firm?

Alternatively, why are we not all independent contractors?

Ronald Coase
born 1910
Nobel Prize 1991
„The legal nature of the firm"

Virtual Firm Ref. www.ccs.mit.edu/21c

Transactions Costs

Transaction:

- Transfer of goods/services from one individual to another
- Transaction is most fundamental unit of analysis
- Cost of executing a transaction should be decisive
- Williamson: ***„When a good or a service is transferred across a technologically separable interface."***

Transaction Costs:

- Cost of carrying out any exchange for products (outputs) or resources (inputs) either between firms or within a firm
- Coase: ***„Costs of running the economic system"***

Transaction cost and the firm

Traditional (neoclassical) economics:

- The business firm is apperceived as a production function
- Internal organization is ignored
  - no explication on how production is organized within firm
  - how conflicts of interest between the firm's various constituencies are resolved
  - how the goal of profit maximization is achieved
  - what would happen if two firms chose to merge to become a single firm or split to two independent firms

Transaction Cost economics:

- The business firm as a governance function (align transaction cost with governance structures)
- Focal problem: Vertical Integration and constitution of "hierarchies"
- Hierarchies are efficient because bringing a transaction from the market (i.e. contract are expensive to supervise) into the firm (i.e., integration), mitigates the opportunistic behavior and improves investment incentives

Transaction costs approach: Transaction costs means friction

Bounded rationality and incomplete contracts imply

TRANSACTION COSTS

If ex-ante agreements could be respected (i.e. non-opportunism, complete contracts) transaction costs would disappear)

Transaction costs economics

holds that economizing on transaction costs is mainly responsible for the choice of one form of capitalist organization over another

It applies this hypothesis to a wide range of phenomena:

vertical integration, vertical market restrictions, corporate governance, finance, regulation, technology transfer etc.

Transaction costs: the counterpart of friction

- Transaction occurs when a good or service is transferred across a technologically separable interface
- Economic systems organized in transaction layers look as complex mechanical systems transferring energy from one part to another: friction is impossible to avoid
- The economic counterpart of friction is transaction cost: do the parties to the exchange operate harmoniously or are there frequent misunderstanding, delays and malfunctions
- Transaction costs analysis entails an examination of the comparative costs of planning, adapting, and monitoring task completion under alternative governance structure
- Making the transaction as the unit of analysis, the main question becomes: What are the principal dimensions with respect to which transaction differ?

Transaction Cost Components

- Define needs
- Search for a party to transact with
- Match requirements to offerings
- Negotiate the contract (price, specifications, delivery dates)
- Specify a contract (verbal, formal written, informal written)
- Conduct business
- Monitor compliance with contract

Transactions Costs

1. Search costs: Buyers and sellers finding each other inside the increasingly broad and disorganized open and global market.

2. Information costs: For buyers learning about the products and services of sellers and the basis for their cost, profit margins, and quality. For sellers, learning about the legitimacy, financial condition, and need of the buyer.

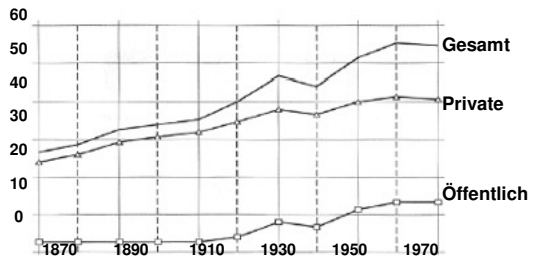
3. Bargaining (negotiation) costs: Buyers and sellers setting the terms of a sale or contract for services, which might include meetings, phone calls, letters, faxes, E-mails, exchanges of technical data, brochures, entertainment, and the legal costs of contract negotiation.

4. Decision Costs: For buyers, evaluating the terms of the seller compared with other potential sellers, and internal processes, such as purchasing approval, designed to ensure that purchases meet the policies of the organization; for sellers, evaluating whether to sell to one buyer instead of another buyer or not at all.

5. Policing costs: Buyers and sellers take steps to reduce risk and ensure that goods and services and the terms under which the sale was made, which may have been ambiguous or even unstated, are in fact translated into the real goods and services exchanged. This might include inspecting the goods and any negotiations having to do with late or inadequate delivery or payment.

6. Monitoring or enforcement costs: Arise after the exchange has been negotiated. Buyers and sellers insure that defects in products or service are remedied. This could range from mutual agreement on a discount or other penalties to the often high cost of litigation, that is, using an external tribunal to settle disputes associated with the transaction. Also include cost of legally enforcing a broken contract.

Development of transaction Costs in the USA from 1870 - 1970



Quelle: Wallis / North, 1986

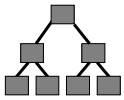
Transaction Costs or Market and Hierarchies approach: a "comparative institutional" perspective

- Transaction costs create "friction" (the equilibrium conditions are noised)
- There is a wide range of institutional arrangements that can used to govern transactions between agents
- Specific institutional agreements emerge in response to various transactional considerations in order to minimize transaction costs
- i.e., FIRMS, MARKETS and IN BETWEEN (cooperation, business networks)
- Firms can take on many different organization structures (vertical integration, vertical links, horizontal integration, conglomerate …)
- Markets transactions can take many different forms ranging from spot markets transactions to complex long-term contracts
- The game markets-hierarchies-in between may be dynamic (reversibility)
- The specific set of institutional arrangements chosen would represent the GOVERNANCE STRUCTURE that MINIMIZE the total cost of consummating the transactions of interest

Coordination in and between markets, hierarchies and Cooperations: Transaction Costs

- Markets: Institutions that succeed to coordinate the economic activity
  - Anonymous transactions
  - Price mechanism
  - Voluntary bargaining
  - Transmitting information (through prices)
  - Making convergent individual beliefs and plans
  - Selecting (and rejecting)
- Hierarchies (Business Firms): Organizations that know how to do things
  - Specialisation is key to productivity growth.
  - Authority relation
  - At first voluntary contract, then residual power is with the employer
  - Firms replace short-term contracts by long-term contracts. Long-term contracts have many uncertainties, which are not all contractible in principle ==> incomplete contracts
  - Thinking
  - Organizing resources
  - Transacting
- In-Between = Cooperation:
  - More flexible as hierarchies, less flexible as markets
  - Better planning possibilities compared to markets
- => Why are not all transactions accomplished by markets?

Coordination in and between markets, hierarchies and Cooperation

Markets	Companies	Cooperation
		
Flexibility: high Coordination Costs: high	Flexibility: low Coordination Costs: relatively low	Flexibility: variable Coordination Costs: variable

Coordination costs in markets and hierarchies

- In markets:
  - Determine prices (stock exchange)
  - Search and locate buyers and sellers (Market research)
  - Direct costs of the product transfer
  - Benefits not realized, because transaction failed
- In hierarchies:
  - Transmit info through the hierarchy
  - Time costs of delay
  - Costs of maladaptation because information was insufficient

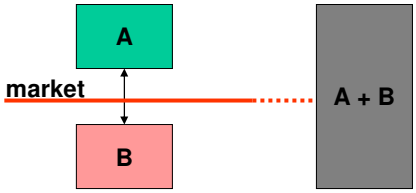
Disadvantages of markets

R. Coase, 1973: The firms arise to economize on transaction costs

on

- **search costs**
- **planning costs**
- **coordination costs**
- **contracting costs**

Advantages of internal organization (hierarchies)



The main idea is that agent A is less likely to hold up agent B if A is an employee of B than A is an independent contractor

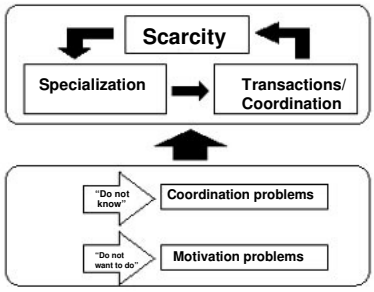
The advantages of internal organization in relation to markets:

- **Where complex, contingent claims contracts are infeasible and sequential spot markets are hazardous, internal organization facilitates adaptive, sequential decision making, thereby to economize on bounded rationality**
- **Faced with small-numbers exchange relationships, internal organization serves to attenuate opportunism**
- **Convergent expectations are promoted, which reduces uncertainty**
- **Conditions of information impactness are more easily overcome and, when they appear, are less likely to give rise to strategic behavior**
- **A more satisfying trading atmosphere sometimes obtains**

Scope of emergence of firms

- Reduce transaction costs
- Improve efficiency

Disadvantages of hierarchies: The organizational problem



- **Transaction as a unit of analysis (R. Coase, O. Williamson)**
  - **Focusing on institutions that harmonize trading (mostly contracts)**
  - **Studying markets and firms comparatively (as alternative forms of organization)**
- **Oliver Williamson: Adopt the type of organizational structure that minimizes transaction costs**

Source: Picot / Dietl / Franck 1999

Coase's Law

- Firms organize to reduce transaction costs
- Efficiency reduces numbers of firms needed
- Deregulation, Globalization, and Digitalization are reducing transaction costs:
  - challenging traditional firms to show how they add value to products and services
  - inviting innovative firms to claim market share with high-power/low cost technology and ideas

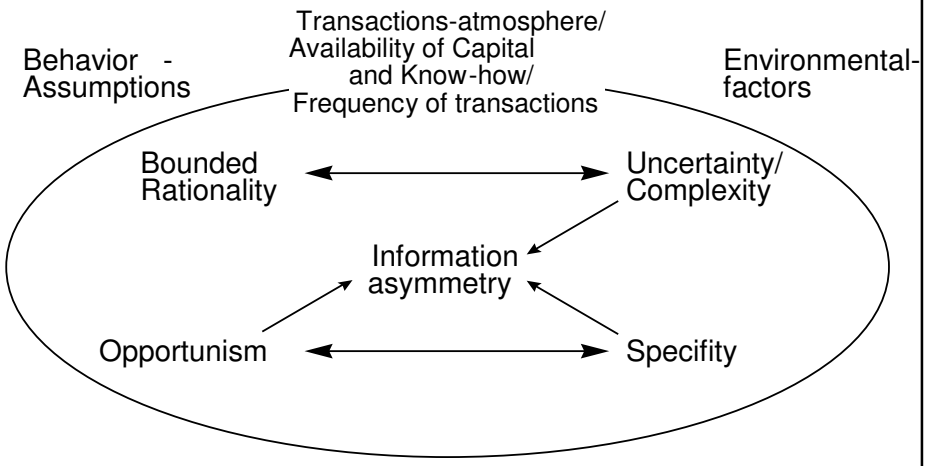
Transaction costs engineering

- Hypothesis: Transactions, which differ in their attributes, are assigned to governance structures, which differ in their cost and competencies in a transaction economizing way

- The principal dimensions on which TRANSACTION COST ECONOMICS relies for purposes of describing transactions are:
  1. The Condition of Asset Specificity (Asset Specificity)
  2. The Degree and Type of Uncertainty to which they are subject (Uncertainty)
  3. The Frequency with which they occur (The Fundamental Transformation)

ASSET SPECIFICITY: The most important!

Transaction costs engineering: Influence Factors on Transaction Costs



Source: Picot/Reichwald/Wigand, 1996, S. 42.

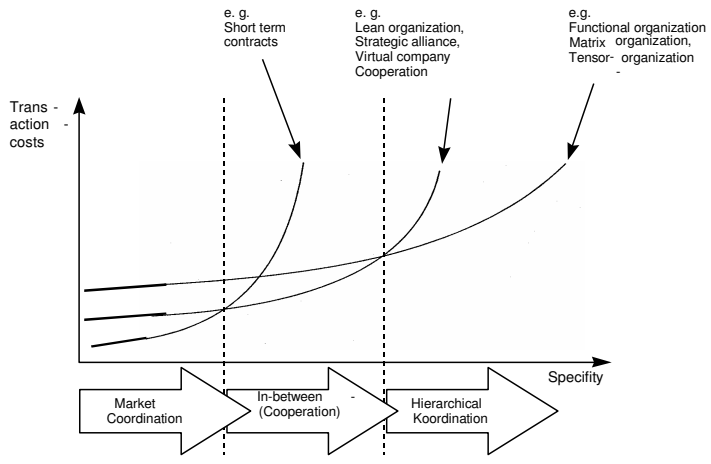
Transaction Costs Engineering: Asset Specificity

- **Asset specificity: the degree to which an asset can be redeployed to alternative users without sacrifice of productive value. Asset specificity**
  - **can take many forms, of which human asset specificity is only one**
  - **asset specificity not only elicits complex ex-ante responses but it also gives rise to complex ex-post governance structures**
- **Kinds of asset specificity**
  - **site (location) specificity**
  - **physical asset specificity**
  - **human assets specificity (learning by doing)**
  - **dedicated assets (investments made for a particular customer)**
  - **brand name capital**

Transaction Costs Engineering: Uncertainty and the Fundamental Transformation

- **Primary uncertainty: state-contingent kind of uncertainty**
- **Secondary uncertainty: lack of communication**
- **Generally speaking: the uncertainty refers more to *idiosyncratic trading hazards* than to *statistical risks***
- **A condition of large numbers bidding (ex-ante) at the outset does not necessarily imply that a large numbers bidding condition will obtain thereafter (ex-post)**
- **With specialized investments, the initial bidding winner realizes advantages over non-winners**
- **From a large numbers bidding condition to a bilateral supply**

Implications on transaction costs



Source: Rotering, 1993, S. 120. Schubert, 1995, S. 61. Picot/Reichwald/Wigand, 1996, S. 45. Jost, 2000, S. 247.

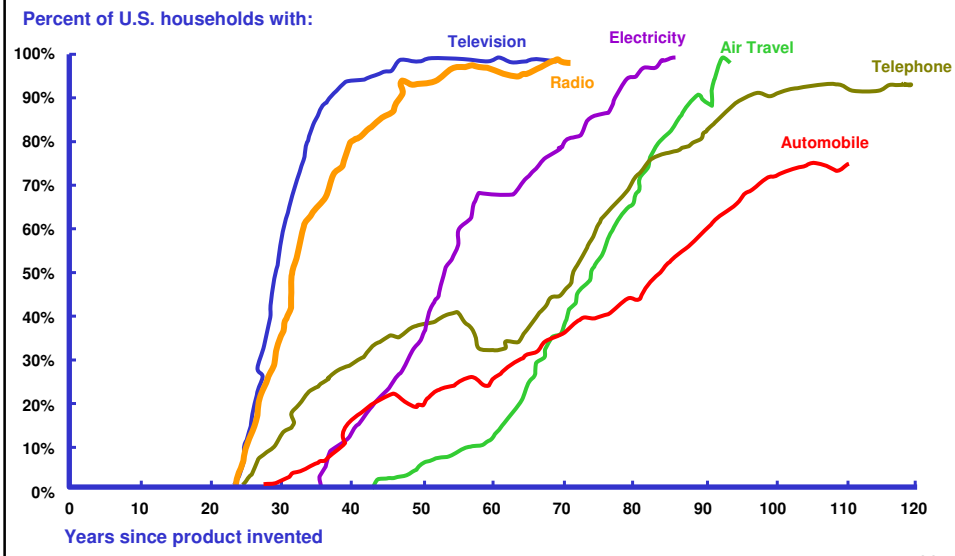
Effect of Information Technology on Transactions

- If you introduce IT in business transactions, information asymmetry is reduced because:
  - You can transact at a distance – wider search space
  - Matching requirements to offerings through e-markets
  - Negotiation using electronic means
  - Contracts via software
  - Monitor compliance with technology
- Technology will reduce transaction cost, people will tend to transact more business with outsiders, Functions done within organization will be outsourced
- Modern IT is working to reduce transaction costs not incrementally but exponentially. In the evolving "marketspace," it is not only the infrastructure that is different, but the content and context of transactions as well
- Because it's possible to make connections based on IT, business models start changing, more alliances.
- The Internet is the testbed for a new market economy, one that is global, continuous, & increasingly automating the processes of buying, selling, producing, & distributing
- Killer apps are reducing transaction costs, dramatically, for nearly all goods and services. **(Moore's & Metcalf's laws)**
- And they are doing it so much faster in the open market than they are for firms. **(The Law of Disruption)**

Effect of Information Technology on Transactions

- ***"This "telephone" has too many shortcomings to be seriously considered as a means of communication. The device is inherently of no value to us."*** **(Western Union internal memo, 1876)**
- ***"But what [is a microchip] good for?"*** **(Engineer at the Advanced Computing Systems Division of IBM, 1968)**
- ***"Dell has a great business model, but that dog won't scale."*** **(John Shoemaker, head of Sun's server division, 2000)**

Adoption Rate Of Industrial Age Technologies



Sources: J. Gerry Purdy's presentation "The Next 50 Years in Mobile and Wireless" at Silicom Ventures, Trade press, Industry sources

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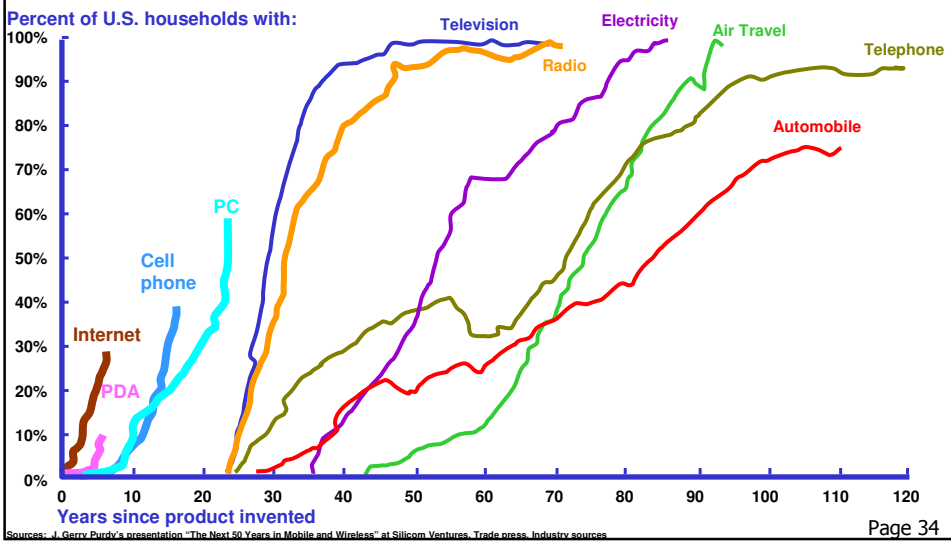
Adoption Of Information Age Technologies (Relative To Industrial Age Tehnologies)



Sources: J. Gerry Purdy's presentation "The Next 50 Years in Mobile and Wireless" at Silicom Ventures, Trade press, Industry sources

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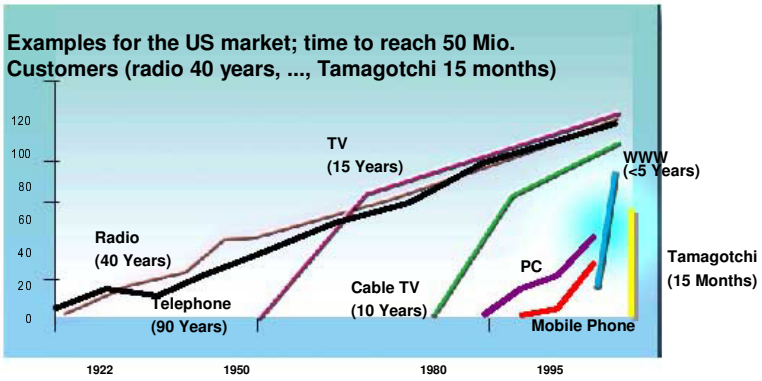
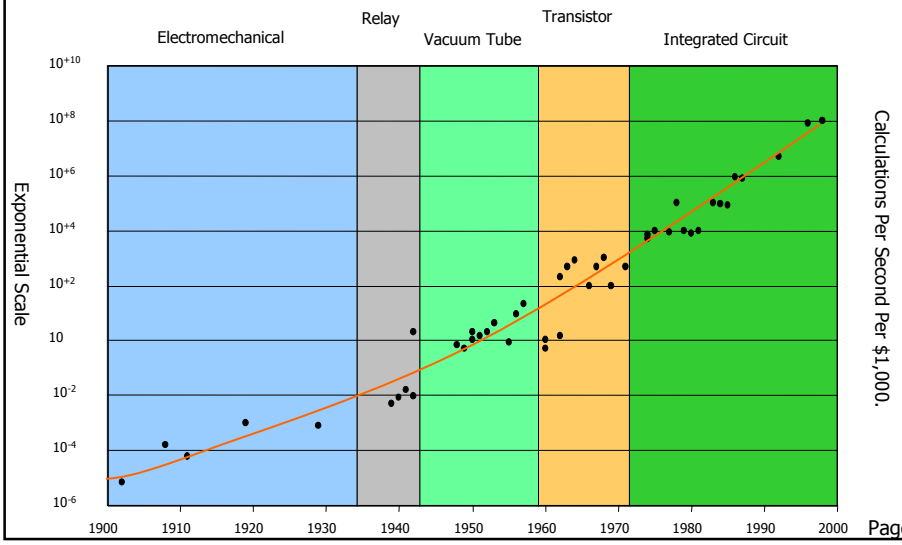
Time to reach 50 Millionen customers of technology in the US market



Quelle: Siemens

Technology Laws and Innovation Continue: Moore's Law – The Fifth Paradigm



Moore's Law: Reduction of transaction costs

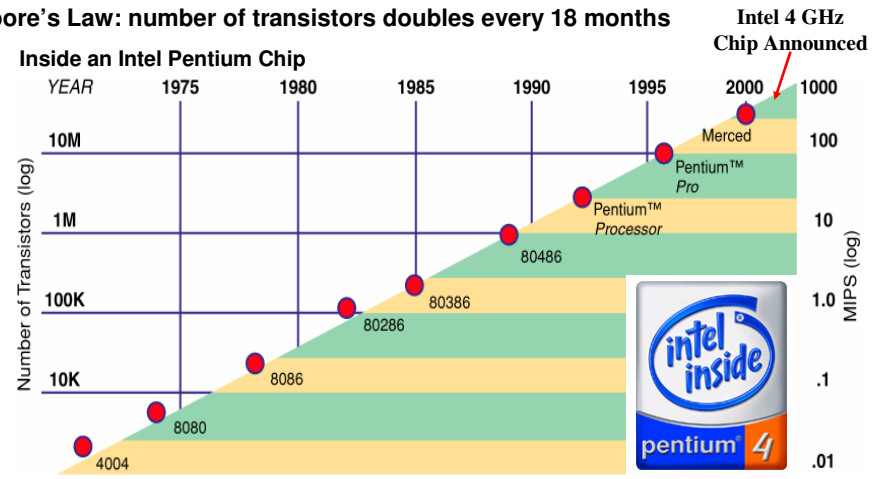
What is Moore's Law and why is it important here?

- **Every eighteen months, for the foreseeable future, chip density (and hence computing power) will double while cost will remain constant (Gordon Moore, late 1960's)**
- **The technology that is the driving force behind the digital economy and Moore's law is being shown to be conservative**
- **What did Intel announce recently?**
  - **3,6 GHZ, Pentium 4 chips**

http://info.astrian.net/jargon/terms/m/Moore_s_Law.html
http://www.intel.com/research/silicon/mooreslaw.htm
ftp://download.intel.com/research/silicon/moorespaper.pdf
http://www.intel.com/labs/eml/

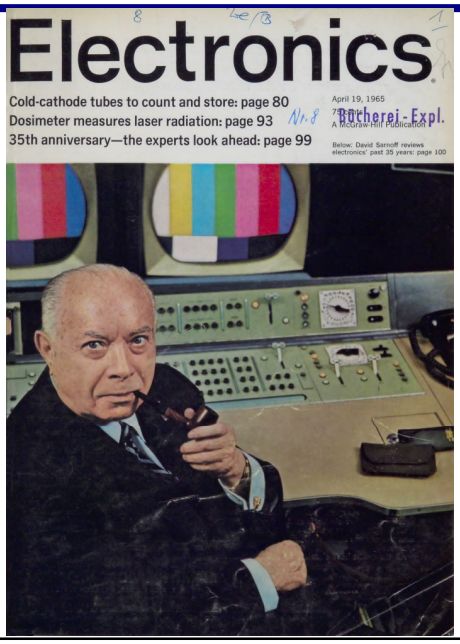
Moore's Law: Reduction of transaction costs

Moore's Law: number of transistors doubles every 18 months



Source: Paul Tallon, 2001

Moore's Law first was mentioned in an article in the journal "electronics" 19.04.1965


Electronics

Cold-cathode tubes to count and store: page 80
Dosimeter measures laser radiation: page 93
35th anniversary—the experts look ahead: page 99

April 19, 1965

Below: David Sarnoff reviews electronics' past 35 years: page 100

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Heat problems and the vision of an mac mini like computer

a few diodes. This allows at least 500 components per linear inch or a quarter million per square inch. Thus, 65,000 components need occupy only about one-fourth a square inch.

On the silicon wafer currently used, usually an inch or more in diameter, there is ample room for such a structure if the components can be closely packed with no space wasted for interconnection patterns. This is realistic, since efforts to achieve a level of complexity above the presently available integrated circuits are already underway using multilayer metalization patterns separated by dielectric films. Such a density of components can be achieved by present optical techniques and does not require the more exotic techniques, such as electron beam operations, which are being studied to make even smaller structures.

Increasing the yield

There is no fundamental obstacle to achieving device yields of 100%. At present, packaging costs so far exceed the cost of the semiconductor structure itself that there is no incentive to improve yields, but they can be raised as high as is economically justified. No barrier exists comparable to the thermodynamic equilibrium considerations that often limit yields in chemical reactions; it is not even necessary to do any fundamental research or to replace present processes. Only the engineering effort is needed.

In the early days of integrated circuitry, when yields were extremely low, there was such incentive. Today ordinary integrated circuits are made with yields comparable with those obtained for individual semiconductor devices. The same pattern will make larger arrays economical, if other considerations make such arrays desirable.

Heat problem

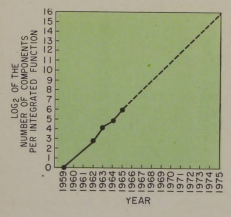
Will it be possible to remove the heat generated by tens of thousands of components in a single silicon chip?

If we could shrink the volume of a standard high-speed digital computer to that required for the components themselves, we would expect it to glow brightly with present power dissipation. But it won't happen with integrated circuits. Since integrated electronic structures are two-dimensional, they have a surface available for cooling close to each center of heat generation. In addition, power is needed primarily to drive the various lines and capacitances associated with the system. As long as a function is confined to a small area on a wafer, the amount of capacitance which must be driven is distinctly limited. In fact, shrinking dimensions on an integrated structure makes it possible to operate the structure at higher speed for the same power per unit area.

Day of reckoning

Clearly, we will be able to build such component-crammed equipment. Next, we ask under what circumstances we should do it. The total cost of making a particular system function must be minimized. To do so, we could amortize the engineering over several identical items, or evolve flexible techniques for the engineering of large functions so that no disproportionate expense need be borne by a particular array. Perhaps newly devised design automation procedures could translate from logic diagram to technological realization without any special engineering.

It may prove to be more economical to build large systems out of smaller functions, which are



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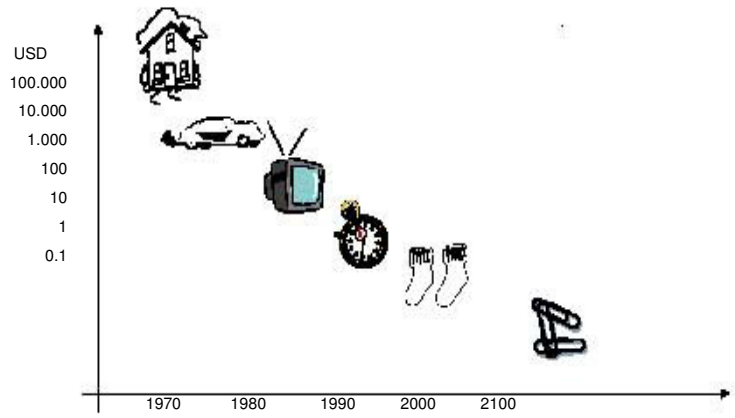
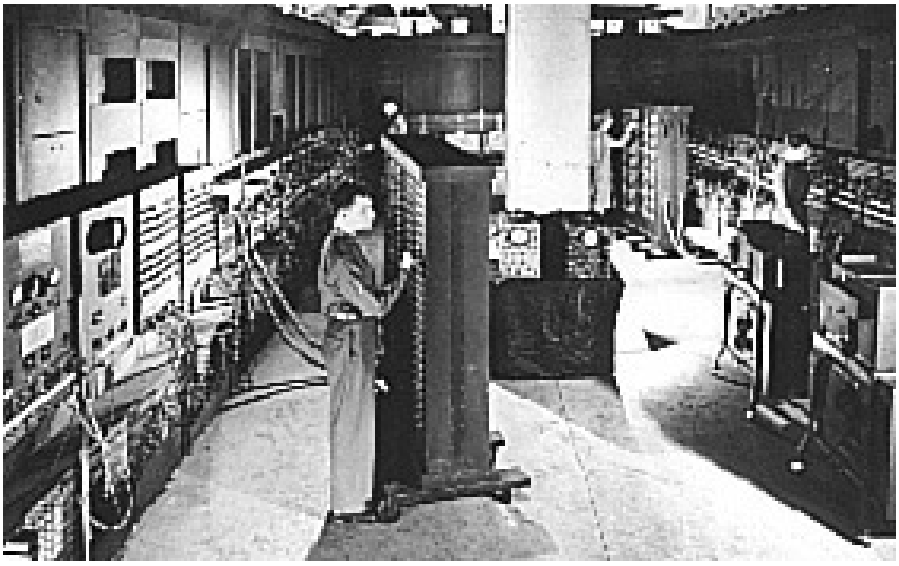
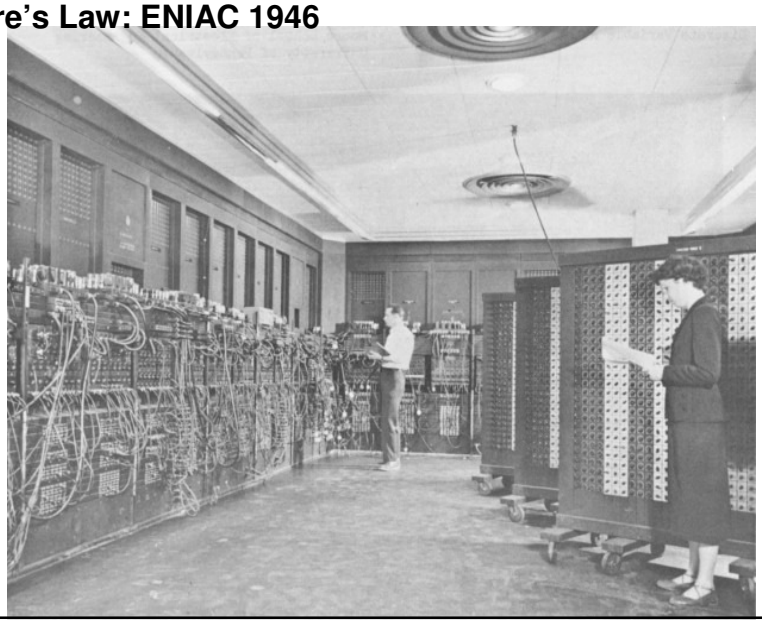
Moore's Law: Price reduction in the market for RAM-chips



Moore's Law: ENIAC 1946



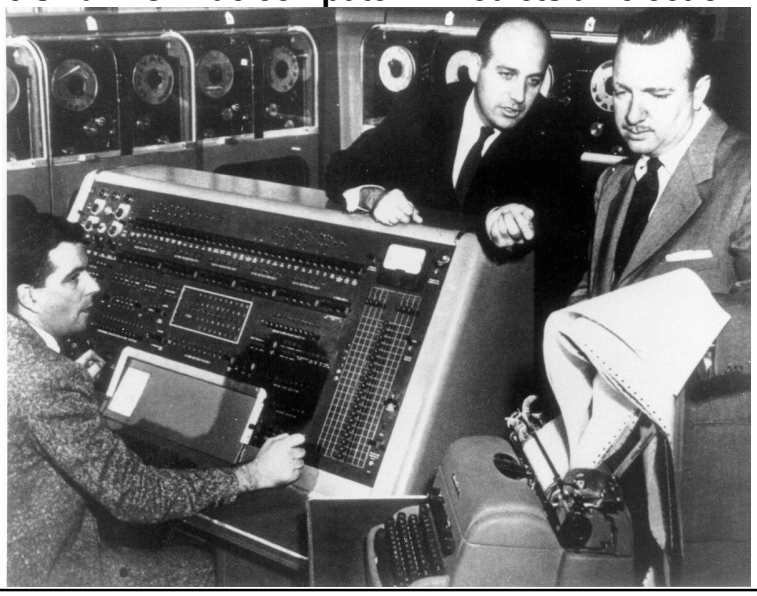
Moore's Law: ENIAC 1946



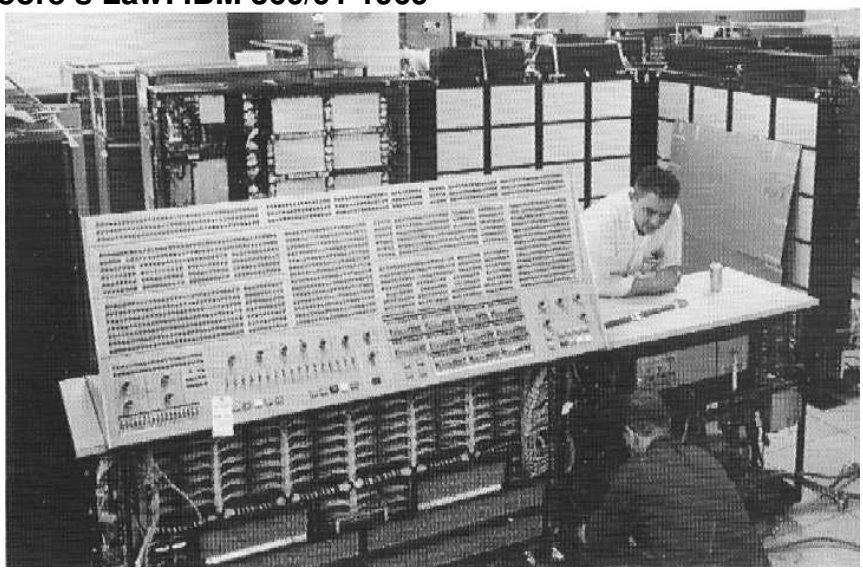
IBM 701

IBM 701: Gets even bigger (1951)

Moore's Law: Univac computer – Predicts an election 1952

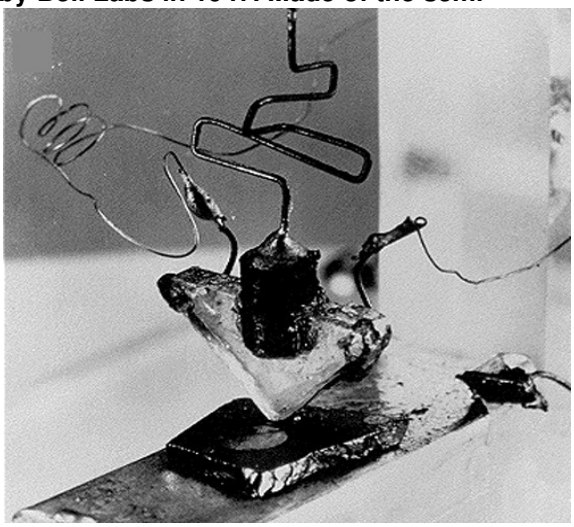


Moore's Law: IBM 360/91 1969



Moore's Law: Transistors and Integrated Circuits

- **First transistor invented by Bell Labs in 1947. Made of the semi-conductor germanium.**



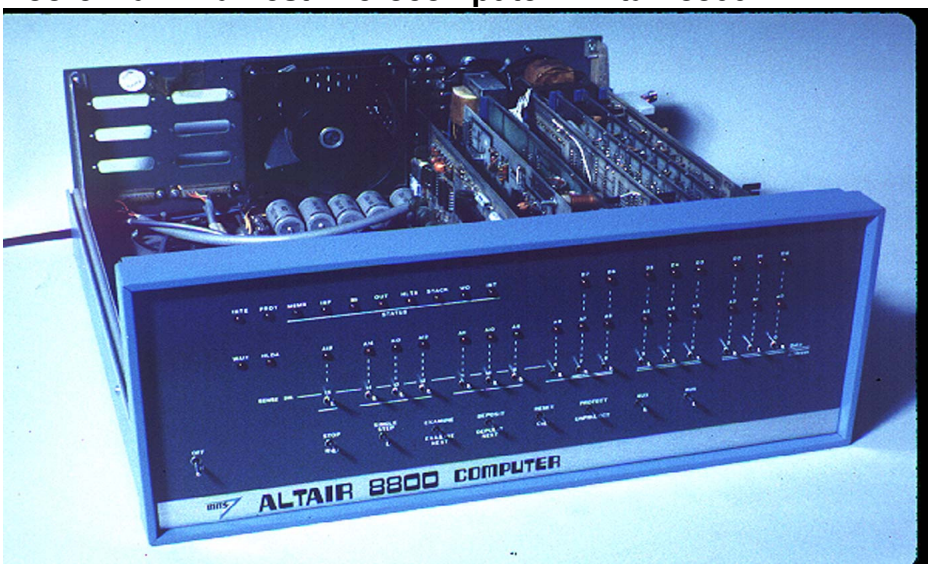
Moore's Law: Transistors and Integrated Circuits

- First transistor invented by Bell Labs in 1947. Made of the semi-conductor germanium.
- The first integrated circuits were invented at Texas Instruments and Fairchild Semiconductor around 1958.
- Gordon Moore and Robert Noyce left Fairchild to found Intel in 1968.
- The Microchip: But what ... is it good for?" (Engineer at the Advanced Computing Systems Division of IBM, 1968, commenting on the microchip)

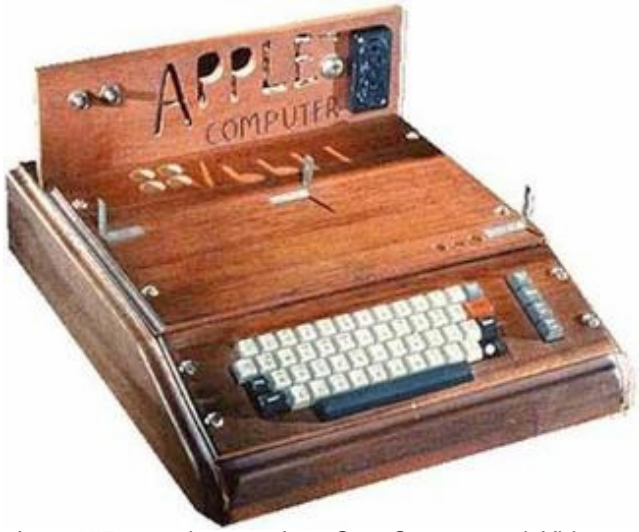
Moore's Law: The Microprocessors

- Intel's first general purpose microprocessor was developed for a calculator produced by Japanese company Busicom in 1971.
- It was the Intel 4004

Moore' Law: Earliest microcomputer – Altair 8800



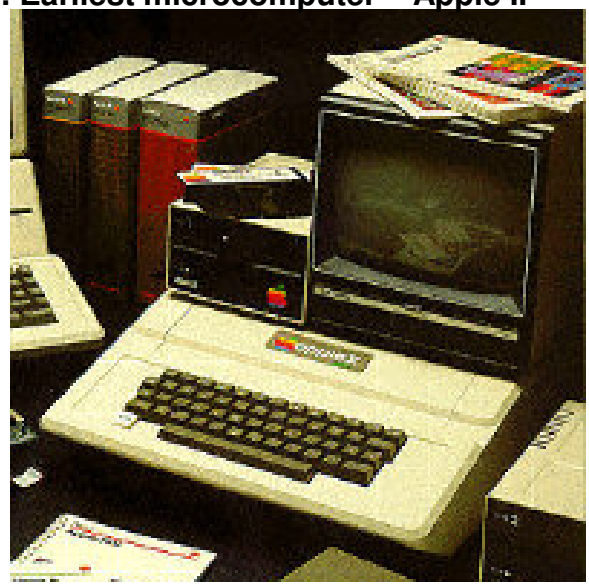
Moore' Law: Earliest microcomputer – Apple I



- Der Apple I von 1776 war der erste Low-Cost-Computer mit Videoausgang und 8 KByte RAM auf einer einzigen Platine

Moore' Law: Earliest microcomputer – Apple II

Moore' Law: Earliest microcomputer – Apple II



Moore' Law: Earliest microcomputer – Apple III

- **Der Apple III aus dem Jahr 1980 mit 1 MHz und 128 KB Arbeitsspeicher**

Moore's Law: The IBM PC

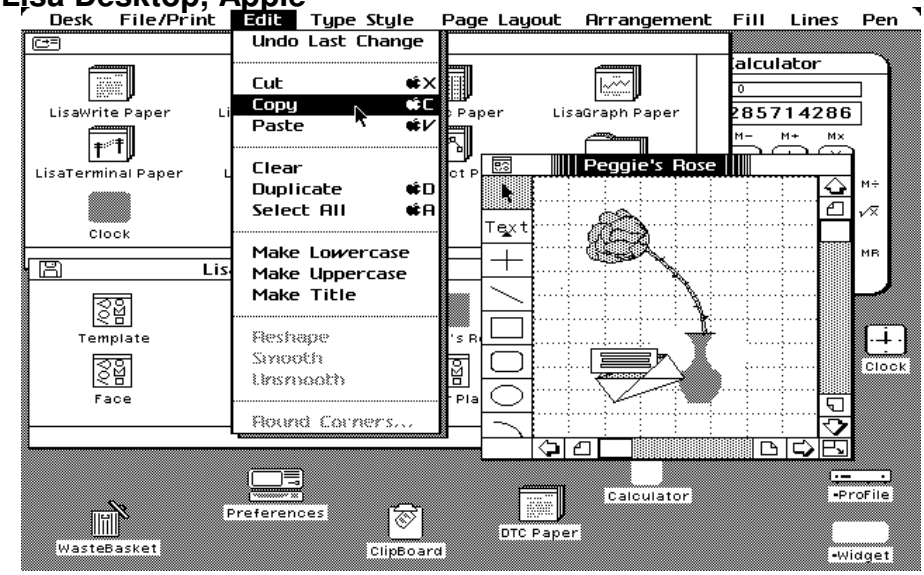
- **In 1978 Intel sold the 8088 microprocessor to IBM for the first IBM PC (model 5150) which was launched in 1981 for $2880(US).**
- **It ran at 4.77 MHz, had 64K of RAM and used a single-sided 160K 5.5" floppy.**

Star, Xerox, 1981

Moore's Law: Development of PC technology

Apple Lisa:
CPU speed: 5 Mhz
Motherboard RAM: 512 k
Maximum RAM: 2MB (via 3rd party upgrade)
Floppy: Internal 871k 5.25"
HD: 5 MB external (10MB in some configurations of Lisa 2/MacXL)
CD-ROM: none
Monitor: 12" 720 x 360 built-in (B/W)
Sound Input/Output: Continuously Variable Slope Demodulator (CVSD)
Ethernet: none
Weight: 48 lbs. Dimensions: 15.2" H x 18.7" W x 13.8" D
Min System Software: LisaOS
Max System Software: LisaOS/MacWorks
Introduced: January 1983
Terminated: August 1986

Lisa Desktop, Apple



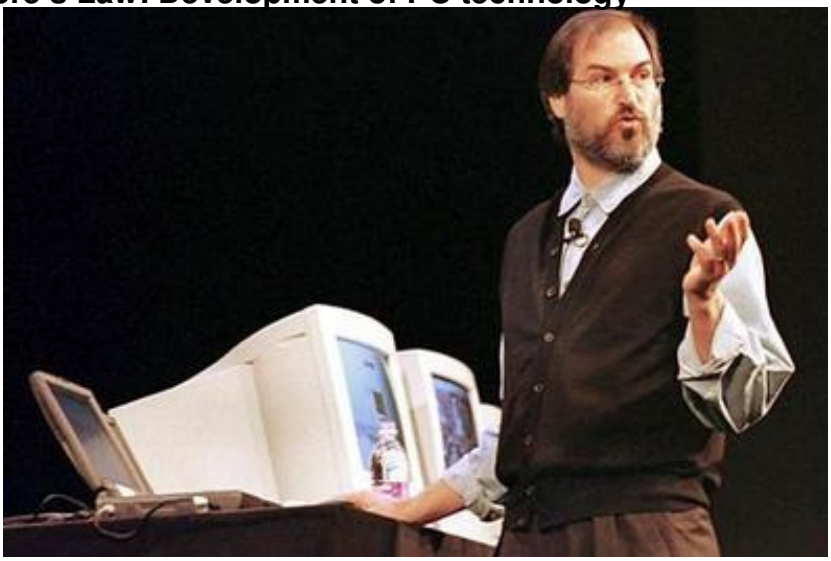
Moore's Law: Development of PC technology

- Der Vorsitzende von Apple Steven P. Jobs und der Präsident John Sculley (von links) stellen 1984 vor einer Aktionärsversammlung im kalifornischen Cupertino ihre ersten Macintosh Desk-Top-Computer vor.

Moore's Law: Development of PC technology

Apple Mcintosh:
CPU speed: 8 Mhz
Motherboard RAM: 128 k
Maximum RAM: 128 k
Floppy: 400 k
HD: none
CD-ROM: none
Monitor: 512x342 9" B/W built-in
Sound Output: mono 8 bit
Sound Input: none
Ethernet: none
Weight: 16.5 lbs.
Dimensions: 13.6" H x 9.6" W x 10.9" D
Introduced: January 1984
Terminated: October 1985

Moore's Law: Development of PC technology



- Jobs stellt 1997 in Cupertino seine neue Geschäftsstrategie vor

Moore's Law: Development of PC technology

Apple iMac:
CPU: PowerPC 750
CPU speed: 350Mhz
Maximum RAM: 1 GB
Built-in 128-bit 2D/3D ATI RAGE 128 VR (2X AGP)
Bus speed: 100 Mhz
USB: 2
Floppy: none
HD: 6 GB ATA-33
CD-ROM: 24x
Monitor: 15" RGB 24 bit (millions of colors) at 1024x768
Sound Output: stereo 16 bit (Harman Kardon Odissey)
Sound Input: stereo 16 bit (built in mono mic)
Ethernet: 10/100B-T
Airport: Optional card
Weight: 40 lbs. Dimensions: 15" H x 15" W x 17.1" D
Min System Software: 8.6
Max System Software: 10.1.3
Introduced: October 1999
Terminated: July 2000

Moore's Law: Development of PC technology

- Die neuen Farben des iMacs auf der MacWorld Expo 05 im Januar 1999

Moore's Law: Development of PC technology

Apple iMac Flat Panel:
CPU: PowerPC 7450
CPU speed: 700/800 Mhz
Maximum RAM: 1 GB
VRAM: 32MB NVIDIA GeForce2 MX (2X AGP)
Bus speed: 100 Mhz
USB: 3
FireWire: 2
Floppy: none
HD: 20/40 (700 Mhz)/60 (800 Mhz) GB ATA-66
Optical: CD-RW/Combo (700 Mhz)/SuperDrive (800Mhz)
monitor: 15" LCD, 24 bit (millions of colors) at 1024x768
Sound Output: stereo 16 bit, Pro Speaker out
Sound Input: built in mono mic
Ethernet: 10/100B-T
Airport: Optional card
Weight: 21.3 lbs.
Dimensions: 12.95" H x 15.1" W x 10.6" D
Min System Software: 9.2.2
Max System Software: 10.1.3
Introduced: January 2002
Terminated: August 2004

Moore's Law: Development of PC technology

Apple iMac G5 (M9250LL/A):
CPU: Power PC G5
CPU speed: 1,8 GHz
Maximum RAM: 2 GB
Graphics: NVIDIA GeForce FX 5200 Ultra, 64MB DDR SDRAM, AGP 8X
Bus speed: 600 MHz
USB: 3 (USB 2.0, 2 USB 1.1 (on keyboard)
FireWire: 2
HD: 160 GB ATA
Optical: 20-inch (viewable) widescreen TFT active-matrix LCD, 1680 x 1050 pixels, millions of colors
Sound Output: built in stereo speakers
Sound Input: Built-in microphone
Networking: Built-in 10/100BASE-T Ethernet and 56K V.92 modem
Wireless: AirPort Extreme ready (based on 802.11g specification; IEEE 802.11b Wi-Fi certified); internal Bluetooth module available as build-to-order option
Weight: 25.2 lbs. (11,4 kg)
Dimensions: 18.6" (47,2 cm) H x 19.4" (49,3 cm) W x 7.4" (18,9 cm) D
System Software: Mac OS X version 10.3 "Panther"
Introduced: September 2004
Terminated:

Moore's Law: Development of PC technology

- 2005: Jobs mit dem iPod Shuffle um den Hals und dem iMac Mini in der Hand

Moore's Law: Development of PC technology

- 2006: neuer iMac mit Intel Core Duo Prozessor

Apple Granted Patent For Touchscreen Technology

- Apple Computer Inc. has been granted a patent (http://appft1.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PG01&s1=%22apple+computer%22.AS.&OS=AN/%22apple+computer%22&RS=AN/%22apple+computer%22?www.dailytech.com) by the United States Patent and Trademark Office for touch-screen technology. The latest patent filed on Jan. 31, 2005, was approved on Feb. 2nd 2006.
- The patent is for touch screen, touch pad and other types of touch-sensing technology. The document identifies a computer method for processing touch inputs, including reading data from a touch sensitive device with multipoint capabilities and identifying at least one multipoint gesture from the touch-sensitive device. These touch inputs are translated into zoom or pan gestures, or grouping, rotating and page turning.
- Innovative companies, similar to Apple, file dozens, if not hundreds, of patents annually. It's not certain that Apple will ever use the technology. Written into the patent proposal, however, is an example for illustrating a method using two fingers to zoom in on a North America map that contains several layers of information.
- The zoom function is described in the following passage. "To zoom in on California, the user starts to spread their fingers apart" and "as the fingers spread apart further (distance increases), the map zooms in further on Northern California, then to a particular region of Northern California, then to the Bay area, then to the peninsula (e.g., the area between San Francisco and San Jose Area), and then to the city of San Carlos located between San Francisco and San Jose. In order to zoom out of San Carlos and back to North America, the fingers are closed back together following the sequence described above, but in reverse."

http://www.informationweek.com/news/showArticle.jhtml?articleID=178601955&subSection=

Moore's Law: Development of portable computer technology

- **Osborne 1. Introduced in 1981 as the first portable computer for $1,795 US (around $2,500 in Canada). Weighed 25 lbs.**
- **Had 64K of RAM, 2 single-sided 90K floppies and an 8 bit Z-80 processor with a 4MHz clock speed. The display was a 5 inch monochrome screen.**
- **There was no hard drive. An independent power supply (large battery) was extra. Came bundled with a suite of software (Wordstar, dBase II, Supercalc, C- Basic, CP/M OS)**

Moore's Law: Development of portable computer technology

IBM 5100 Portable Computer:

- **Price $14,275**
- **Memory 32K**
- **No hard drive**
- **Weight: 50 pounds**

Moore's Law: Development of portable computer technology

Dell Latitude 8200:

- **Price $ 2,357**
- **Memory 512MB**
- **60GB Hard Drive**
- **Weight: 5 pounds**

Moore's Law: Development of portable computer technology

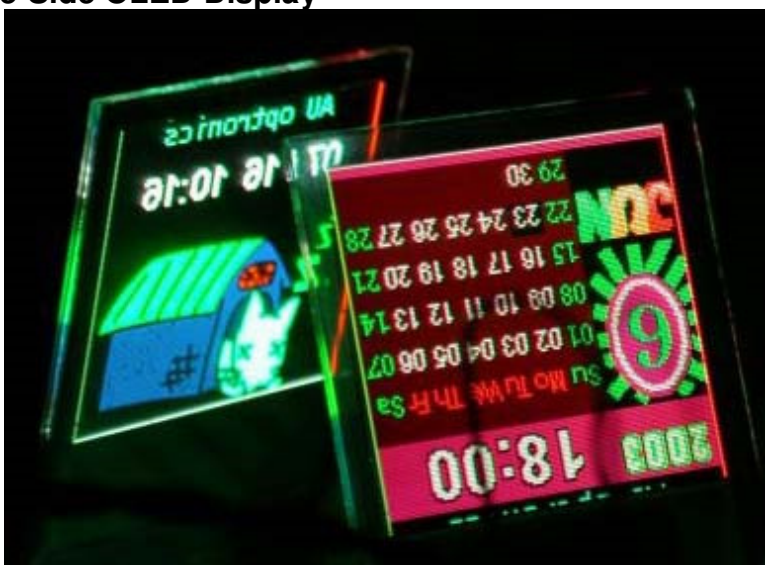
JVC MP-XP 7230:

- **Price $ 2,099**
- **Memory 384MB**
- **40GB Hard Drive**
- **Weight: 2 pounds**

New mobile Devices begin to become more successful

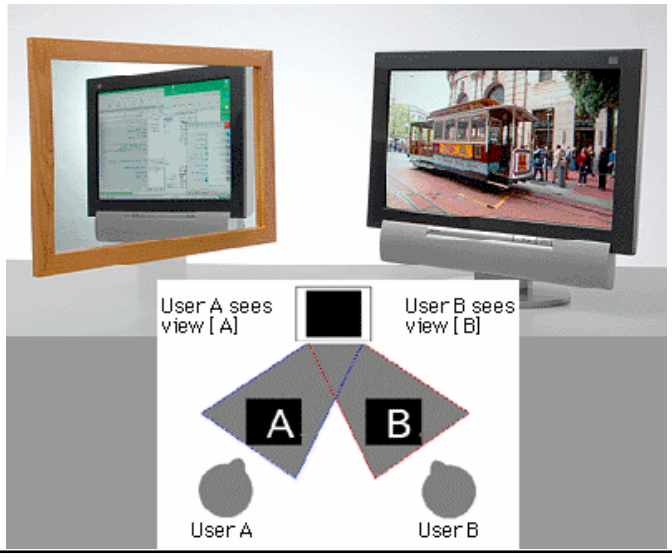
Moore's Law: Development of PC technology

Double-Side OLED-Display



http://www.heise.de/newsticker/meldung/60264

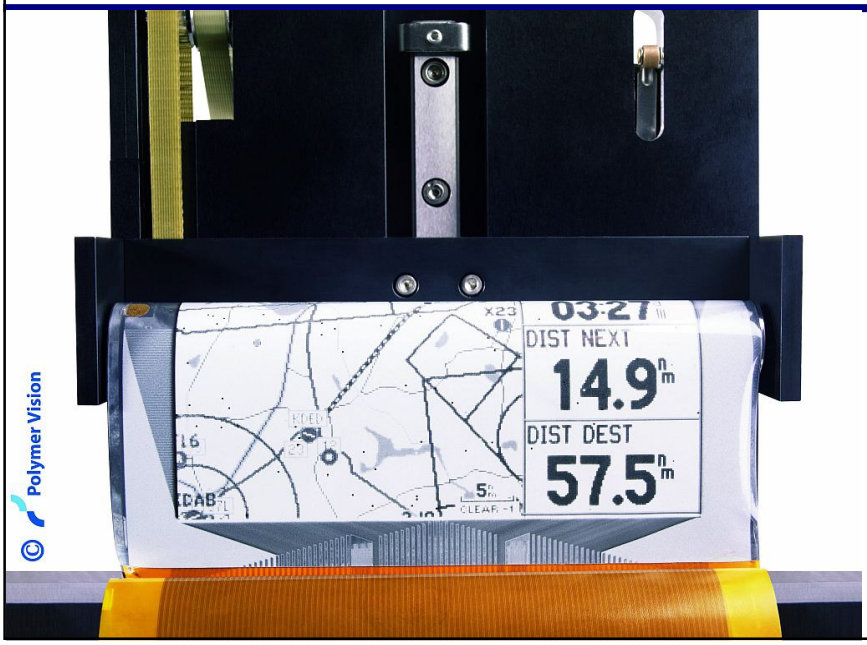
Dual-View-Display



E Ink: Development Kit with Electronic Paper

- **„Electronic Paper Displays (EPD)**
- Prototype-Kit (http://www.eink.com/kits/)
- Readius from Philips (http://www.golem.de/0509/40277.html)

Quelle: http://golem.de/0509/40681.html



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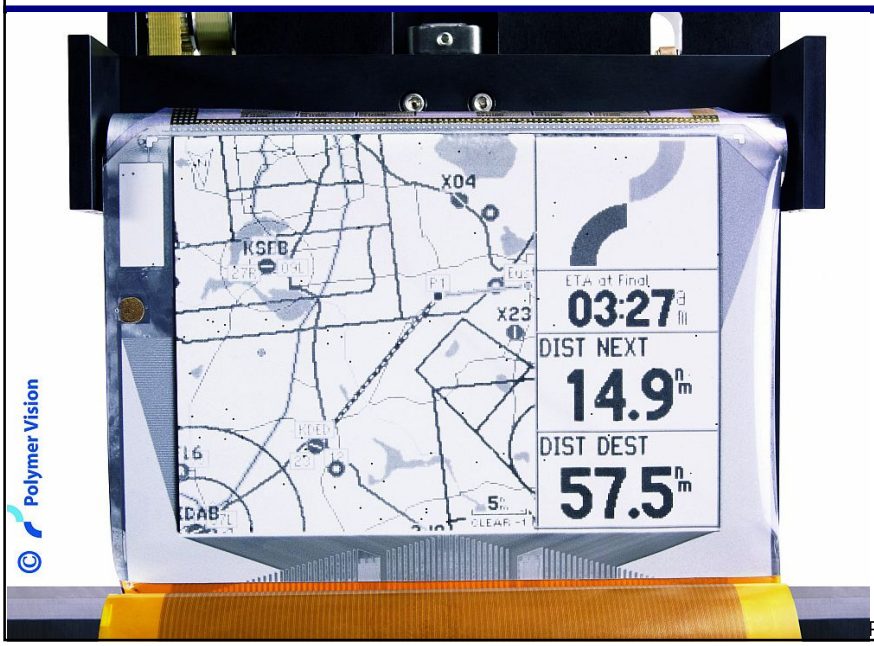

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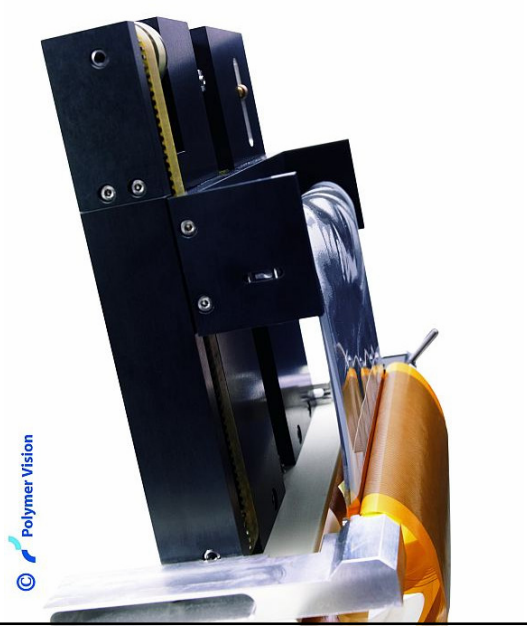
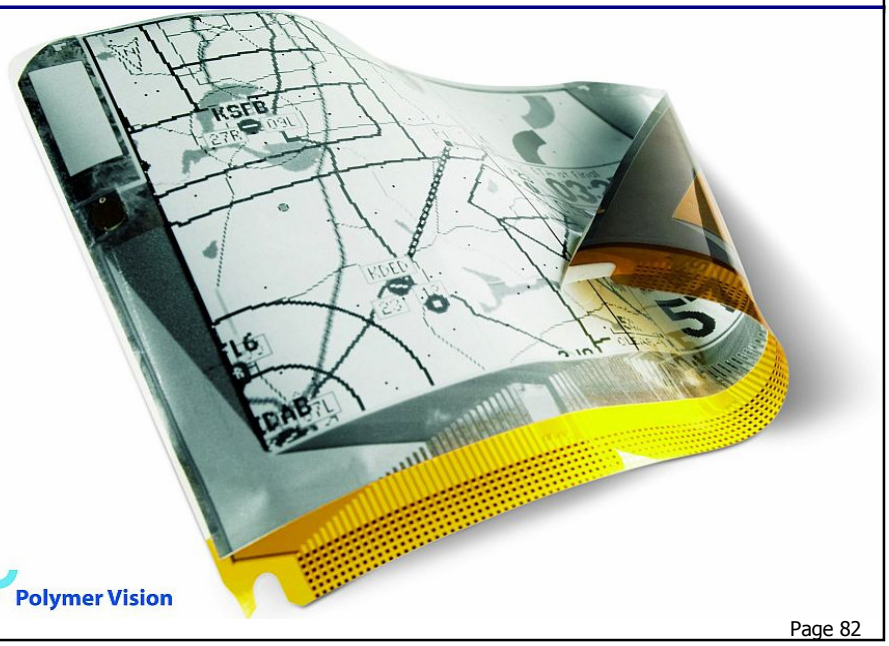
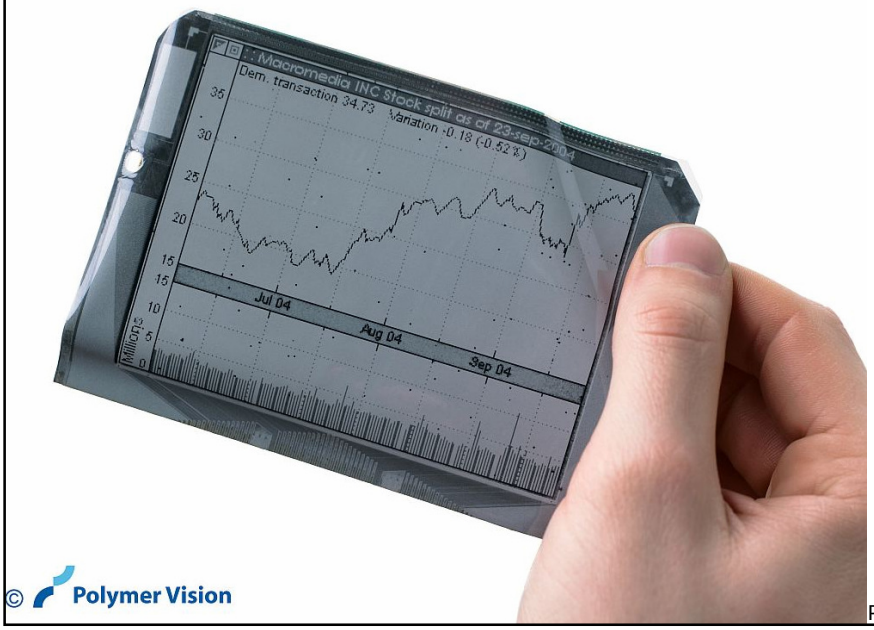
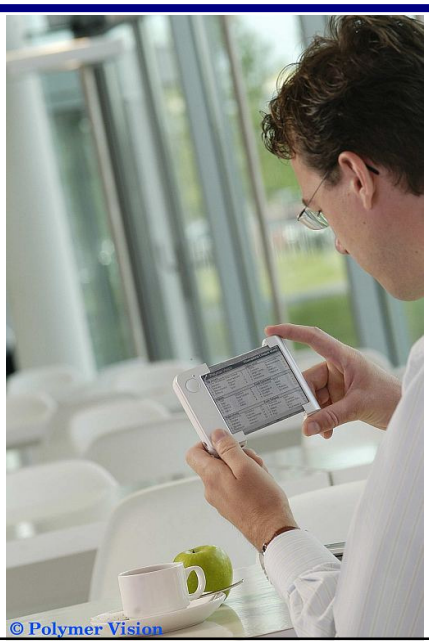
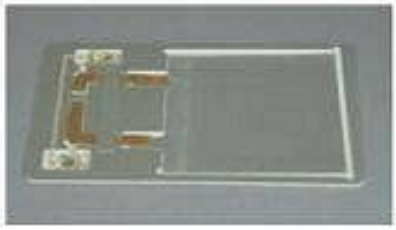

© Polymer Vision


© Polymer Vision





NEC Flexible Battery



http://golem.de/0512/42089.html

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Colored E-Paper from Bridgestone

http://www.netzeitung.de/internet/402844.html

2004: T-Shirt with flexible LED-Display for clothes

http://www.golem.de/0407/32195.html

2004: T-Shirt with flexible LED-Display for clothes

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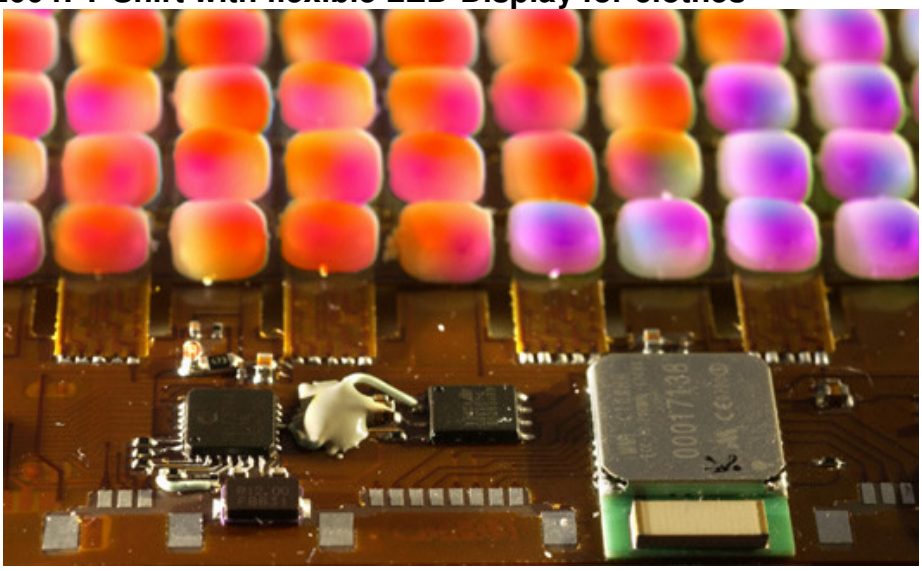
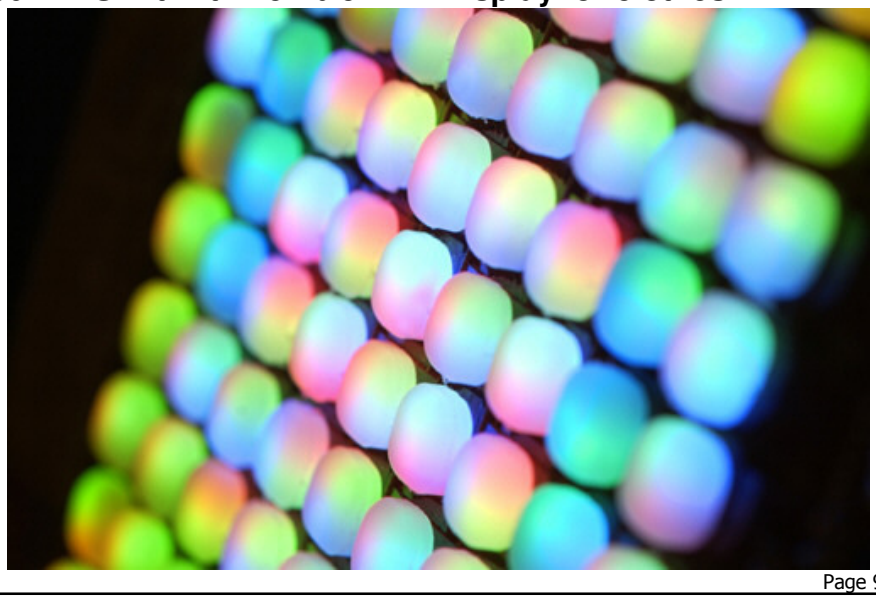
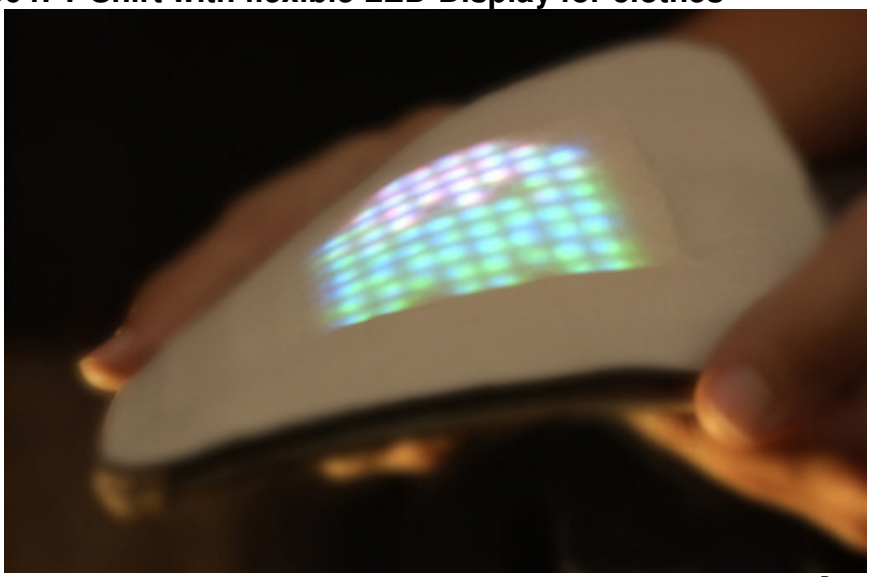


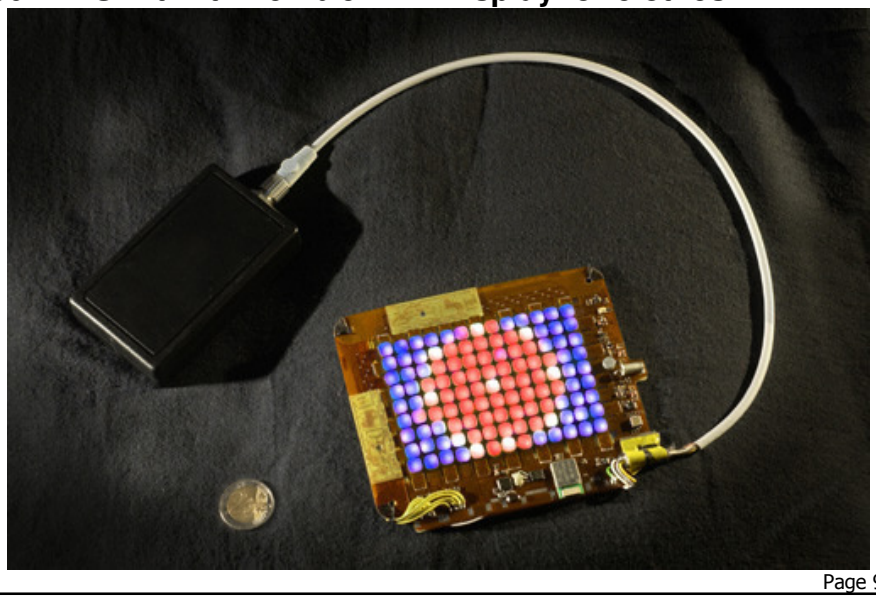
2004: T-Shirt with flexible LED-Display for clothes



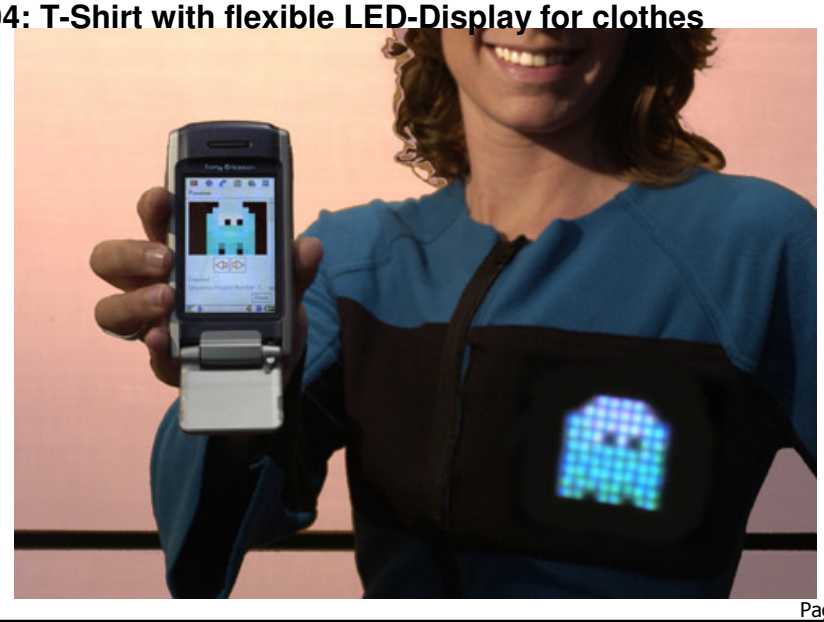
2004: T-Shirt with flexible LED-Display for clothes



2004: T-Shirt with flexible LED-Display for clothes



2004: T-Shirt with flexible LED-Display for clothes



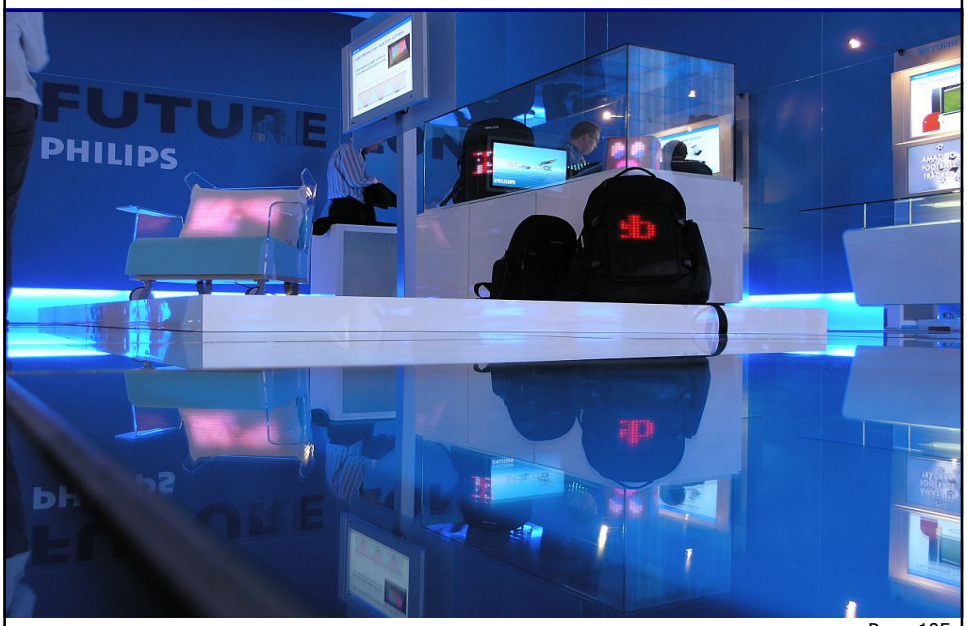
2004: T-Shirt with flexible LED-Display for clothes

2005: Photonic Textiles

http://www.golem.de/0509/40192.html

Course „E-Business A"
Chapter 1 Introduction to the underlying economic theory of the E-Business era

http://www.golem.de/0509/40192.html



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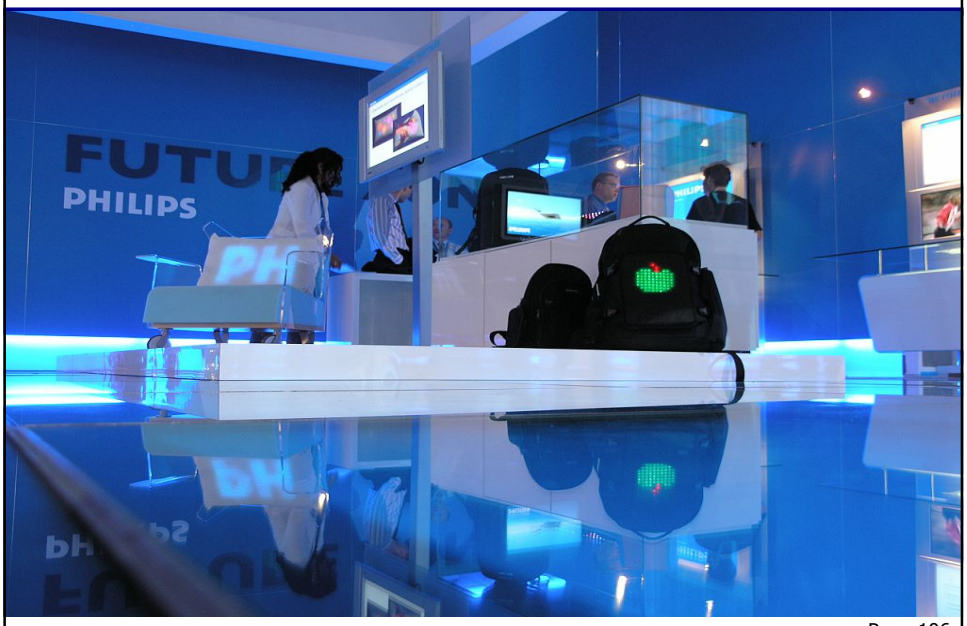

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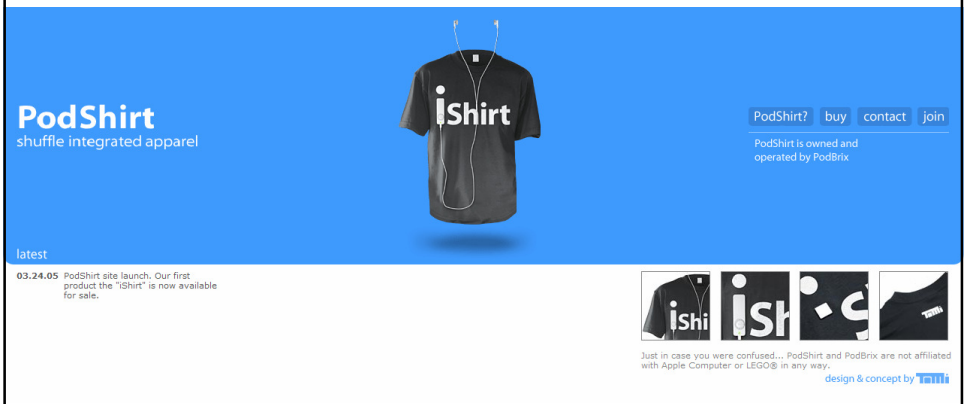
http://www.golem.de/0509/40192.html

http://www.golem.de/0509/40192.html

http://www.golem.de/0509/40192.html

Example: New-Product (http://podshirt.com/)



grooveRider

http://www.golem.de/showhigh2.php?file=/0603/43754.html&wort[]=ipod&wort[]=shirt

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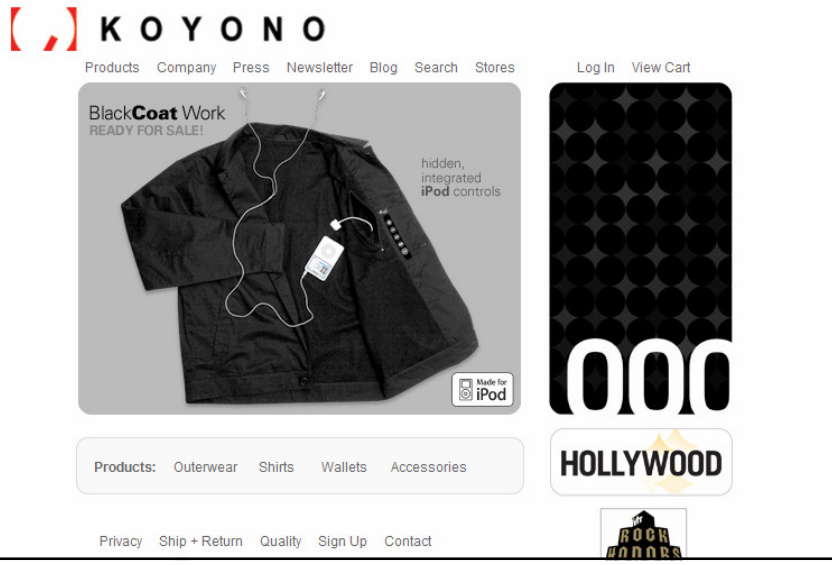
http://koyono.com/



http://tunebuckle.com/

Moore's Law: Evolution of Mobile Phone Handheld Units

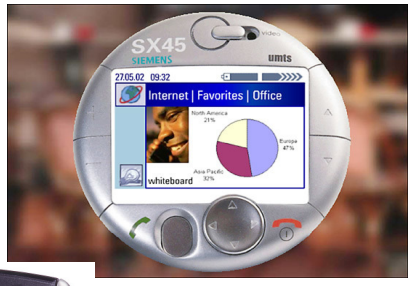
Moore's Law: Evolution of Mobile Phone Handheld Units

J-PHONE 3G (UMTS) 移動機概念

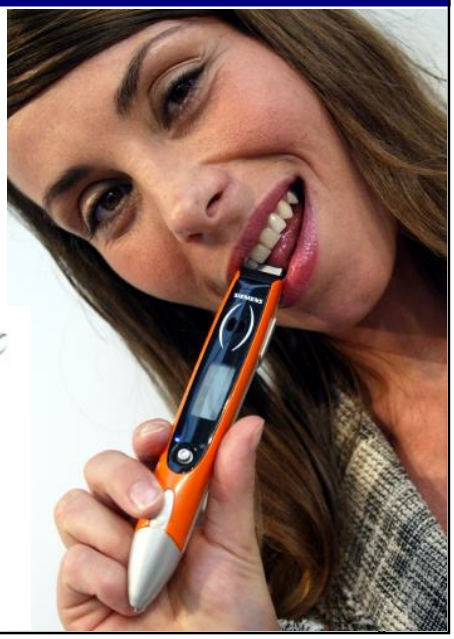
Course „E-Business A"
Chapter 1 Introduction to the underlying economic theory of the E-Business era

J-PHONE 3G (UMTS) 移動機概念

J-PHONE 3G (UMTS) 移動機概念



2004: Siemens Pen Phone



09/2004 Samsung introduced cell phone with harddisk

2006: Xcutemobile phone with 6 Mega Pixel Camera

http://www.xcutemobile.de/frame.htm

2006: Samsung phone with 10 Mega Pixel Photo Camera and TV-Receiver

02/2006: Toshiba W41T – 4 GByte Harddisk Cell Phone with 3-Megapixel-Camera

Grundig: Handy with 6-Megapixel-Kamera and TV-Output

http://scr3.golem.de/?d=0602/Grundig_X5000_E660&a=43388&s=1

Grundig: Handy with 6-Megapixel-Kamera and TV-Output

Grundig: Handy with 6-Megapixel-Kamera and TV-Output

Grundig: Handy with 6-Megapixel-Kamera and TV-Output

Samsung SGH-P900

http://scr3.golem.de/?d=0602/Samsung_P900&a=43325&s=1

Samsung SGH-P300 with 1,3-Megapixel-Kamera and Bluetooth

http://scr3.golem.de/?d=0511/Samsung_SGHP300&a=44341&s=1

2006: More phones with Digital Cameras, recorders, Gaming, FM Radios, TVs, etc. (DOCOMO Vision)

Samsung SCH-V770
7 Mega pixel Camera

Sanyo W32SA
With Disney UI
FM Receiver/Transmitter

Samsung V740
14mm thin, 1.3MP Camera

Samsung SCH-i730
Windows Mobile 2003, 802.11b

Maxon MiniMax MM-5500U
USB Modem

LG VX8100
V-Cast – Streaming Video, 3DGames

Audiovox
XV6600

Casio W21CA
2.6 inch WQVGA, 2 MP Camera

au Design Project
PENCK
1.3 MP/Camcorder

LG KV3600
Enhanced 3D Gaming Graphics

Source: www.3Gtoday.com

A Phone's Best Friend

- Designer: GoldVish
- Model: Piece Unique
- Price: $1.26 million
- Availability: U.S., end of 2006
- Emmanuel Gueit, whose credits include items for jeweler Harry Winston, designed this mobile phone made of solid gold and featuring 120 carats of diamonds.
- Pushing on one of the precious stones unlocks a secret compartment that can be used for carrying medicine or jewels.

A Phone's Best Friend

Who's Got the Button?

- Designers: Pilotfish and Synaptics
- Model: Onyx
- Price: Not available
- Availability: Not available
- This handset, still in the conceptual phase, has no buttons. Instead, it uses sensor technology to let users dial numbers or open applications with signs and gestures. It also recognizes body parts. Lift it to your cheek to answer a call.

Who's Got the Button?

Back to the Future

- Designer: Spark Fun Electronics
- Model: Port-O-Rotary
- Price: $399 for black model, $499 for red
- Availability: www.sparkfun.com
- This phone is retro rotary dial in looks only. It operates on the mobile networks run by Cingular Wireless and Deutsche Telekom's T-Mobile and lets you transfer data from one phone to another with a SIM card.

Back to the Future

Triple Watching

- Designer: Manon Maneenawa
- Model: The Triple Watch Cell Phone
- Price: Not available
- Availability: Not available
- This phone can be transformed into a wristwatch or an alarm clock. As a wristwatch, it has a speaker button that lets users talk while driving. Like the Onyx, it is still just a prototype.

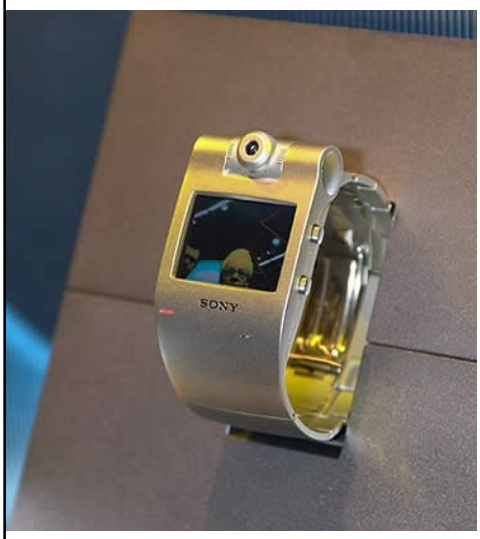
Triple Watching

Pivot Point

- Designer: Lunar Design, for Pantech
- Model: Pivot
- Price: Not available
- Availability: Not available
- This handset features a swiveling screen that can be set up like an easel for easy typing, say, with a keyboard attachment. If it ever gets out of the design stage, the device is sure to be a hit with mobile TV and video-conferencing junkies

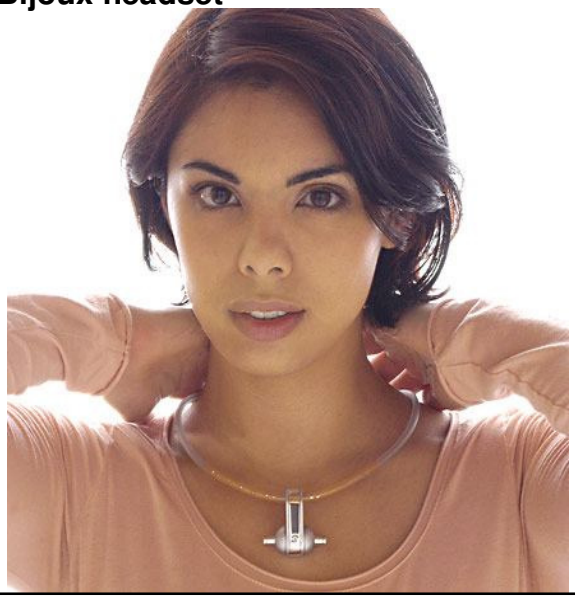
Pivot Point

New Form Factors 2007?



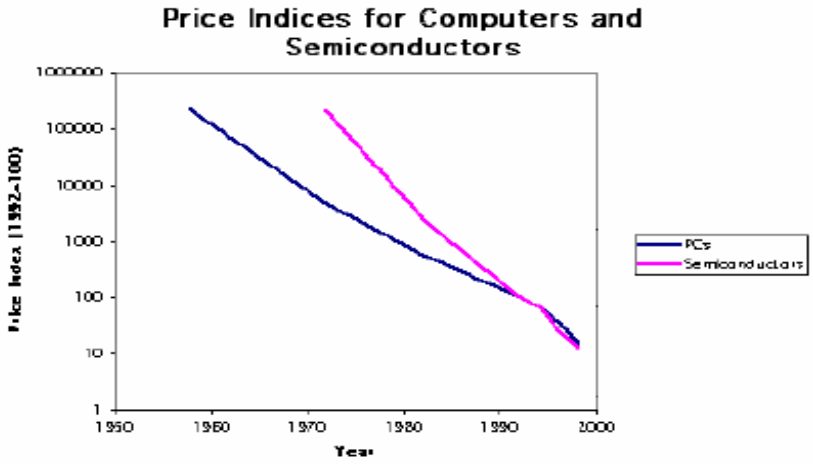
Nokia Strapup phone bracelet

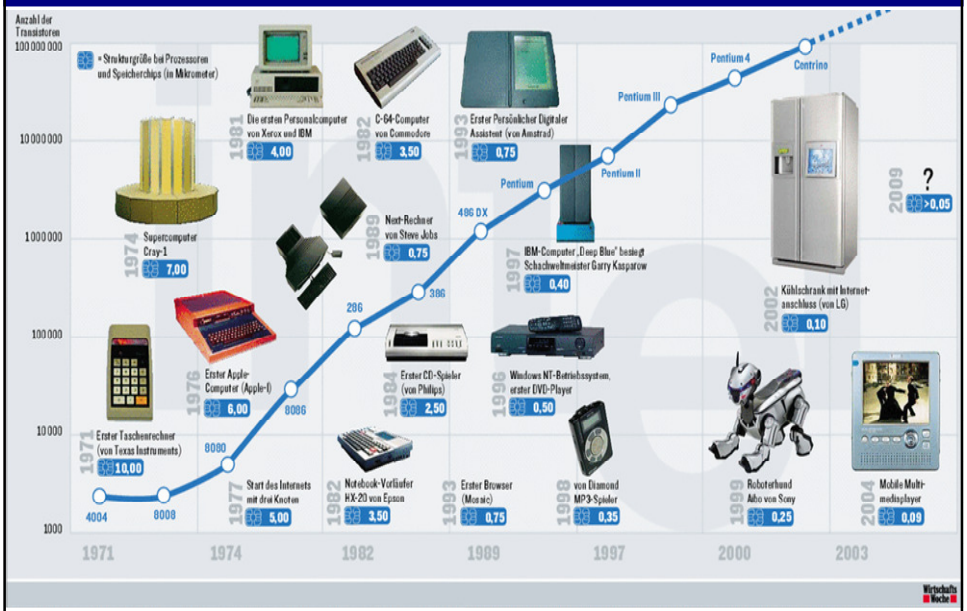
Plantronics Bijoux headset



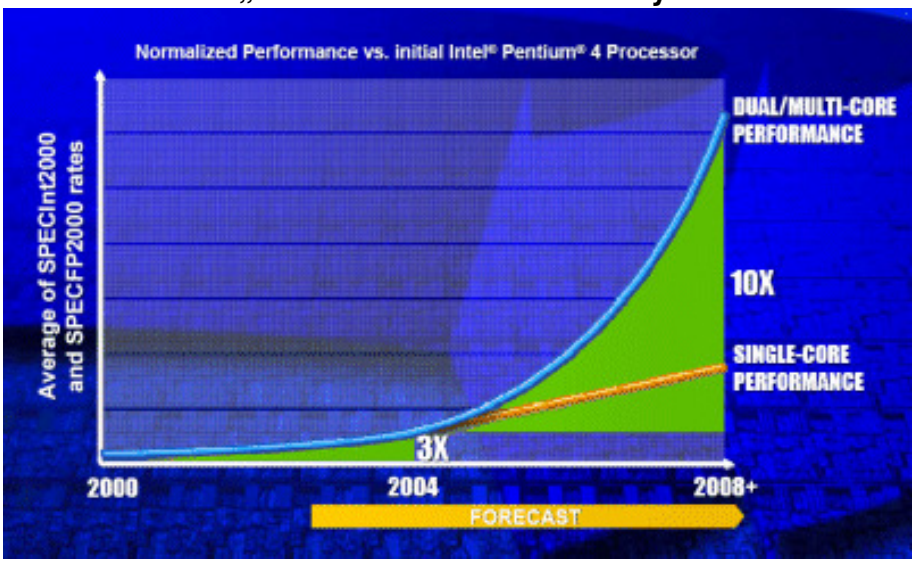
J-PHONE 3G (UMTS) 移動機概念

Moore's Law: Today's computers have 66,000 times computing power, at the same cost, as the computers of 1975





Moores Gesetz: „Valid for the next 10 to 20 years"



http://www.heise.de/newsticker/meldung/54021

Potential of Information Technology: Trends in Computing

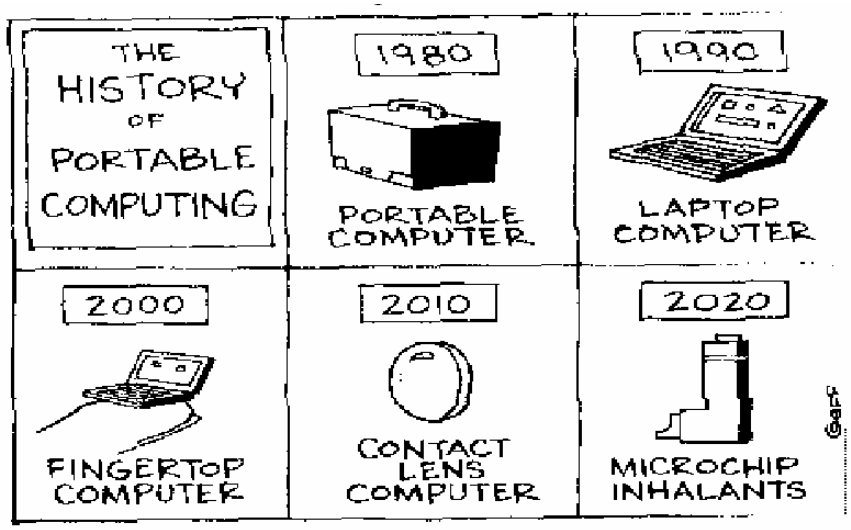
Moore's Law still going strong
- Smaller, more computing devices every 18 months

Miniaturization continues
- 100Gb per square inch hard disk density
- 128MB memory on a single chip

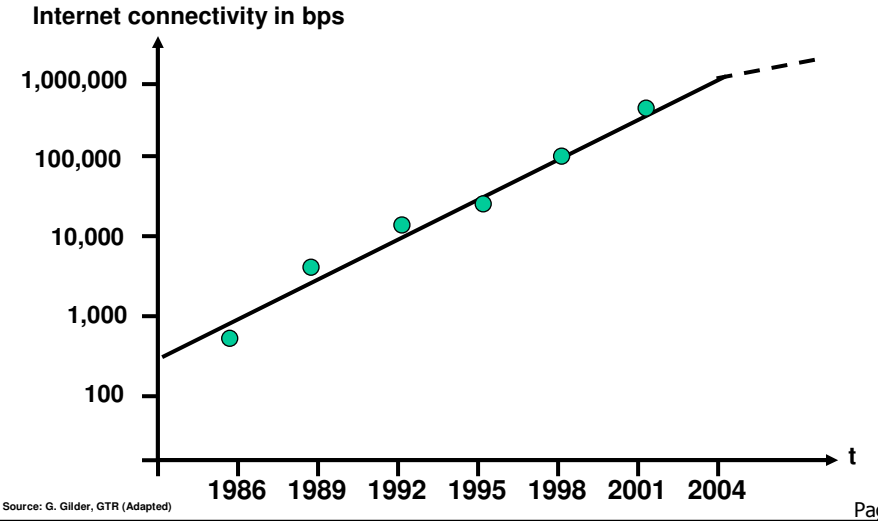
Dramatic innovation towards longer battery time
- Low power CPUs from Intel, Transmeta, AMD
- Fuel Cell battery (1 month cell phone usage) in the horizon

Smaller, lighter PC, PDA, phone designs enabling new networking scenarios
- TVs on Cell phones, Wearable computers, digital cash, eBooks

Comic Strip?.. Or Reality Check?



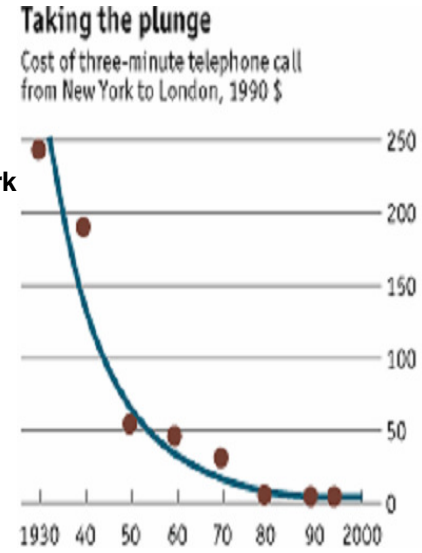
Gilder's Law: "Bandwidth access doubles every 6-12 months"



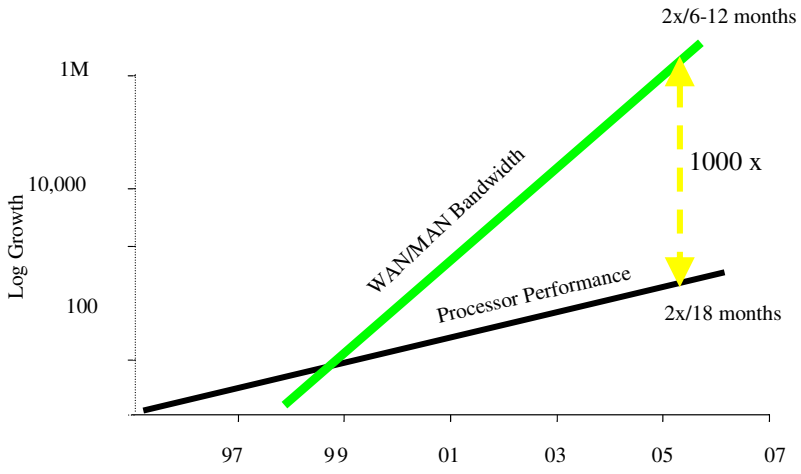
Source: G. Gilder, GTR (Adapted)

Gilder's Law: "Bandwidth access doubles every 6-12 months"

- Doubling of communications power every six months
- Due to advances in fiber-optic network technologies
- The cost of transmitting a trillion bits of information from Boston to Los Angeles has fallen from $150,000 in 1970 to 12 cents in 2000



Gilder's and Moore's law



Source: Greg Papadopoulos, Sun Microsystems

Today's Bandwidth

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Tomorrow's Bandwidth

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Metcalfe's Law

What is Metcalfe's Law and why is it important?

- **Networks (whether of telephones, computers, or people) dramatically increase in value with each additional node or user. The utility of such a network can be valued as the square of the number of its users (Robert Metcalf)**
- **This is important to keep in mind because once a technology standard has achieved critical mass, its value to everyone multiplies exponentially**
- **Remember that the Internet's communications protocols reached critical mass in 1993**

Metcalfe's Law

Metcalfe's Law: The Value of a network scales as the square of the number of those connected to it.

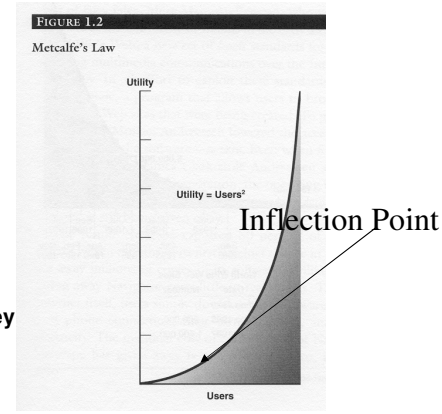
$$\text{Value} = n^2$$

- **Value: economic, personal, societal, (…)**
- **Double the network = four times the value!**
- **"Network economics"**
- **Also known as "Network externalities"**
- **Bob Metcalf - inventor of ethernet, 3Com founder**

Metcalfe's Law

"The power of a network grows exponentially every time the size of the network doubles"

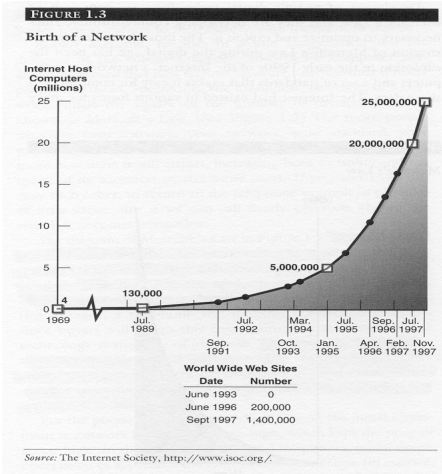
- **Critical mass is required for value to expand exponentially**
- **Speed to critical mass depends on cost to the customer**
- **Once critical mass is reached, cost can be increased to reflect value**
- **The larger the number of people using a technology or sharing a dream, the more they can accomplish (just look at the Internet)**



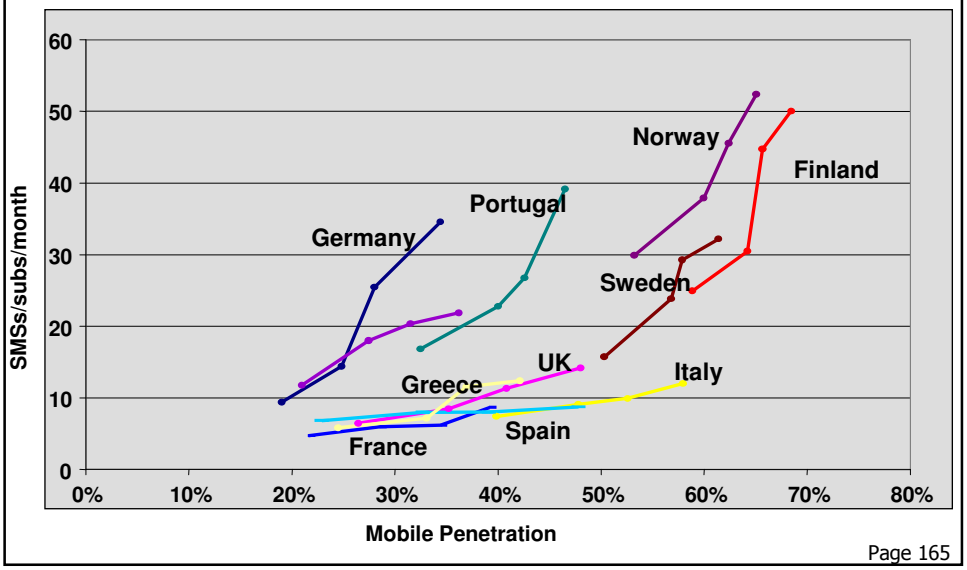
Metcalfe's Law

Development of the Internet as an Example of Metcalf's Law

- **Internet reached critical mass in 1993**
- **Internet users continue to grow to 100+ million in 1999**
- **Internet users continue to grow to 500+ million in 2002**
- **Operating Websites exceed 6 million in 1999.**
- **Industries created for other software, audio, video, 3-D modeling, web site developing, hosting, management**

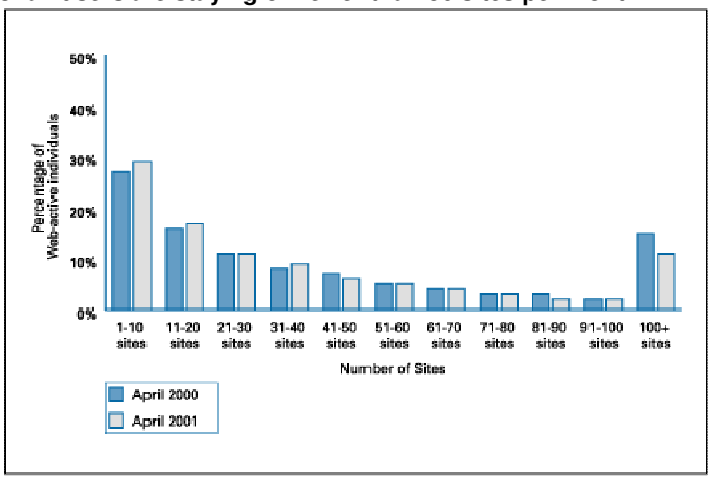


Metcalfe's law in action – SMS growth in Europe



The Network Effect: Most Consumers Visited Few Sites

- Nearly 30% of users spend their time on less than 10 sites a month.
- 57% of all users are staying on fewer than 30 sites per month.



Sharing: The Net's Next Big Disruption

- New technologies are marshaling the talents, resources, and dollars of millions of people worldwide.
- That collective power is shaking up the status quo in many industries

http://images.businessweek.com/ss/05/06/sharing/source/1.htm

Telecom

- More than 41 million people use Skype software to share processing power and bandwidth, allowing them to call each other for free over the Internet.
- Partly as a result, combined 2005 revenues of AT&T and MCI are expected to fall by $7.4 billion, or 15%.

Software

- Coordinating efforts online, programmers worldwide volunteer on more than 100,000 open-source projects such as Linux, challenging traditional software.
- Some 52% of businesses in a recent survey had replaced Microsoft's Windows server software with Linux.

Retail

- The 61 million active members of eBay have created a new economy out of goods once relegated to antique stores and garage sales.
- By rating each other on most transactions, they have established a self-sustaining alternative to retail stores—and made eBay worth $52 billion

Finance

- The investment management firm Marketocracy Inc. runs a sort of rotisserie league for 70,000 virtual stock traders, using the top 100 portfolios to determine stock picks for its $60 million mutual fund.
- The jury's out: After beating the market for two years, it trailed the S&P 500 in 2004.

Entertainment

- Despite legal assaults by record companies and movie studios, at least 100 million people continue to share music files online.
- Currently, there are about 1 billion songs available for file sharing.

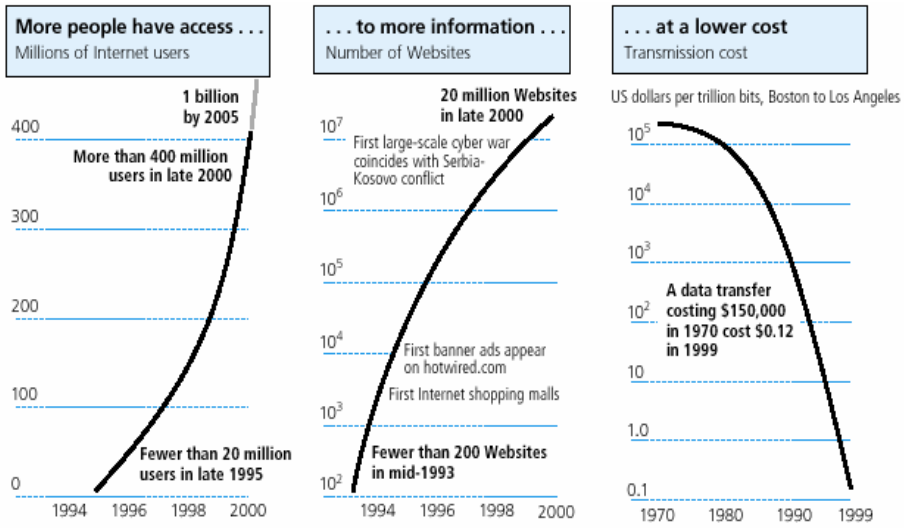
Media

- Reversing the traditional broadcast model, more than 53 million Americans have contributed material to the Net, such as product reviews and blog postings.
- At least 10 million blogs, some drawing more visitors than mainstream news sites, are now read by 32 million Americans.

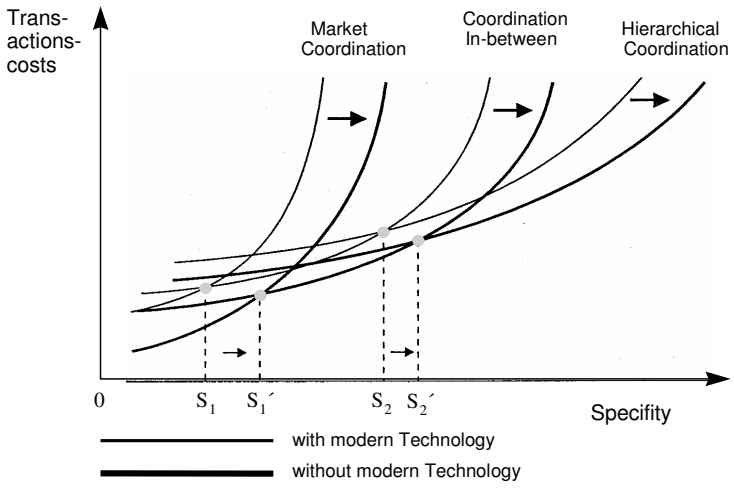
Advertising

- Search engine Google instantly polls millions of people and businesses whose Web sites link to each other, producing an entirely new ad venue that grossed $3.2 billion last year, up 118%.
- That compares with an 8% increase in TV ad spending and 5% in newspapers and magazines.

More information at a lower cost

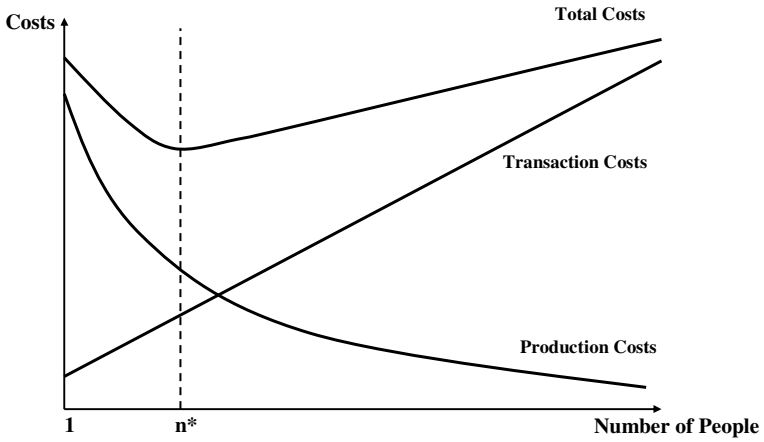


Influence of IT on Transaction Costs



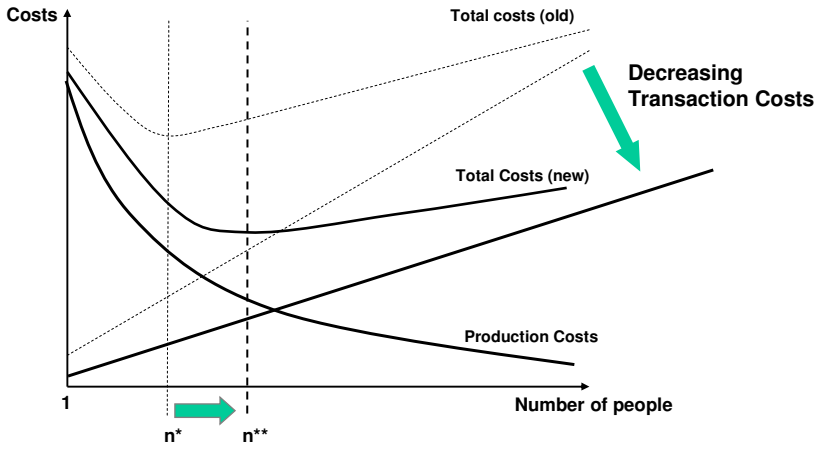
Source: In Anlehnung an Picot/Reichwald/Wigand, 1996, S. 59. Jost, 2000, S. 260.

Production Costs, Transaction Costs and optimal Number of people



Quelle: Bakos/Brynjolfsson 1997

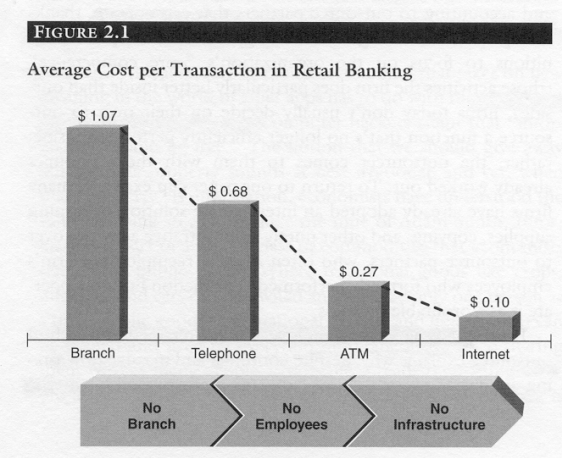
Decreasing Transaction Costs through modern technology



Quelle: Bakos/Brynjolfsson 1997

Effects of Reduced Transaction Costs

- **Companies must focus on activities they can perform most efficiently based on expertise, scale and other properties**
- **Repetition allows the firm to use scale to outperform the market**
- **Transaction costs force firms to reconsider who, within the supply chain, is capturing the margins**
- **Downsizing results in outsourcing and employment in smaller firms.**



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Shrinking Transaction Costs Shrink the Firm

- **Firms are created because the costs of creating them are less than the transaction costs involved when using the market**
- **Technology reduces the cost of operating a firm, it also reduces the cost of the market**
- **Transaction costs decrease exponentially as the market gets more efficient**
- **As the transaction costs of the market shrink, the firm shrinks**
- **The Law of Diminishing Firms: As transaction costs in the open market go to zero, so does the size of the firm**

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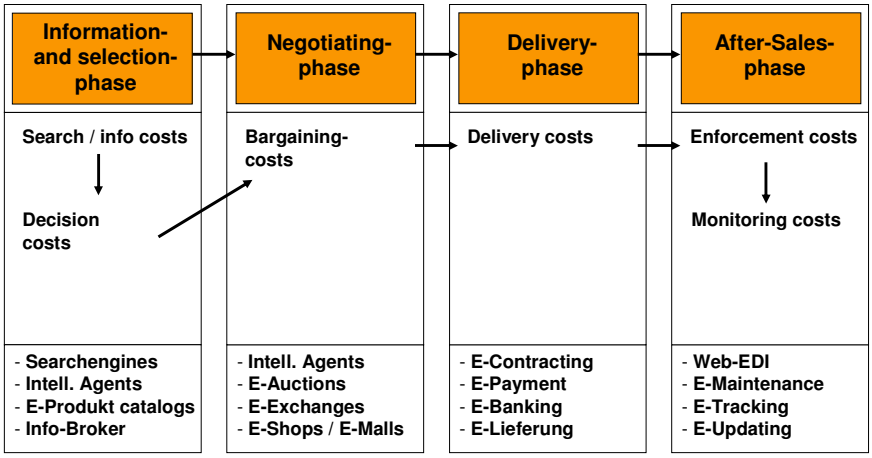
The Law of Diminishing Firm

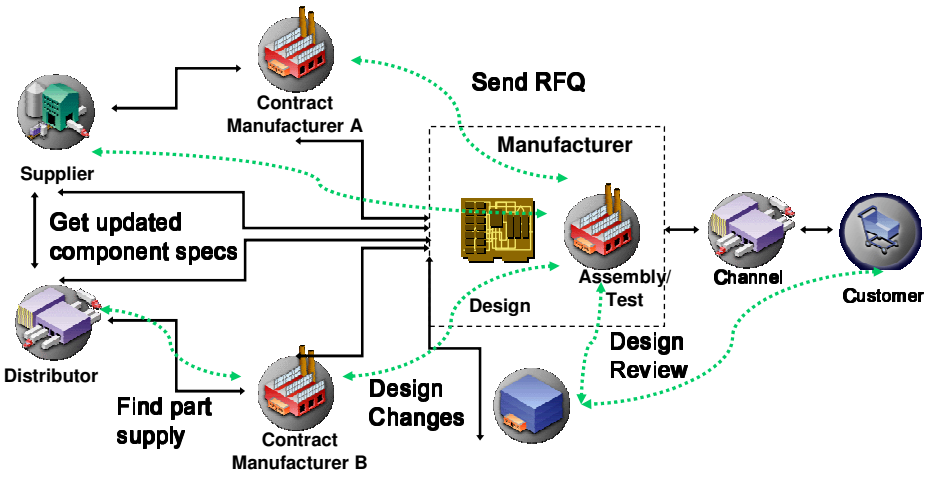
Where does the Law of Diminishing firms come from and why is it important?

- **A corollary to Coase: As transaction costs in the open market approach zero, so does the size of the firm**
- **The firm as a physical entity, defined by its permanent employees & fixed assets, is giving way to a "virtual organization," where employees are contract workers, assets are jointly owned, & separation between what is inside and outside the firm becomes hazy**
- **Individuals will be participants in many enterprises (entrepreneurs) & enterprises will be formed around events much closer to transactions than to an immortal "company"**

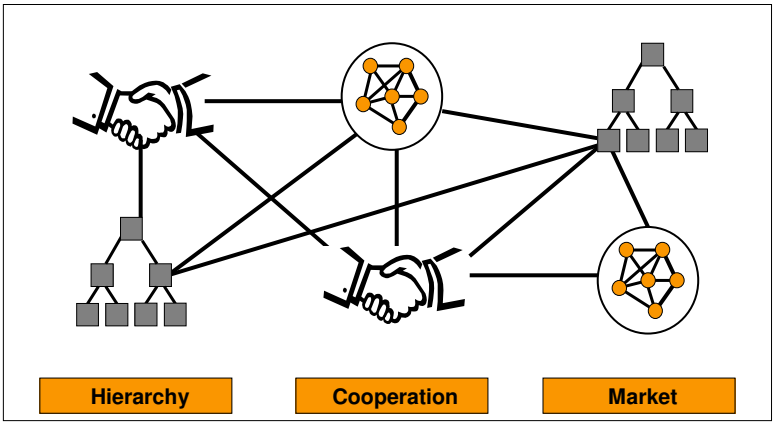
Transaction Costs and usage of modern IT



The Law of Diminishing Firms



Structure of a new market economy (1)

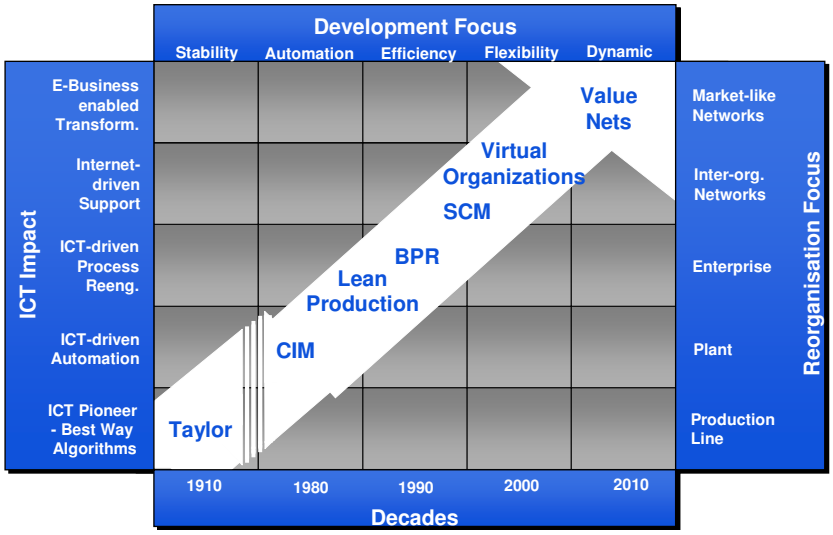


Structure of the new market economy (2)

Hierarchy	Cooperation	Market
Intranet	Extranet	Internet
E-Workflow	E-Integration	E-Commerce
internal	Partner	Customer
Organization	Logistic	Sales
- Administration - Controlling - IT-Standards	- Procurement - EDI - Just in time	- Marketing - Sales - Support

>> ... Leads to „Electronic Business" (E-Business)

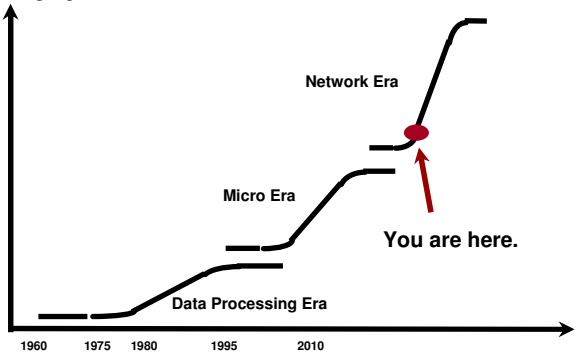
IT and ist impact on organizational structures



Legend BPR: Business Process Reengineering ICT: Information & Communication Technology
CIM: Computer Integrated Manufacturing SCM: Supply Chain Management

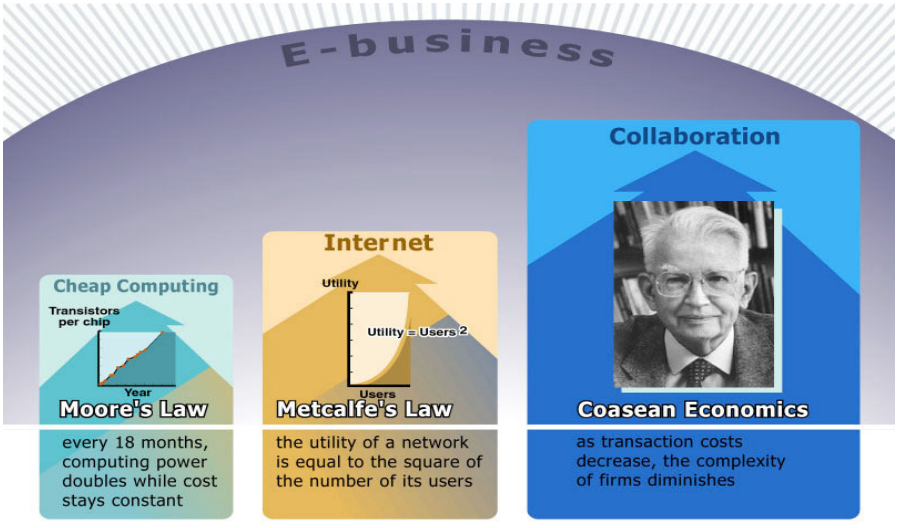
Net-enabled Organizations (NEOs)

- NEOs employ *innovative* uses of *digital networks* to reduce barriers of time and distance,
- substitute information for physical processes, and
- engage in innovation that aligns the firm to its competitive environment.

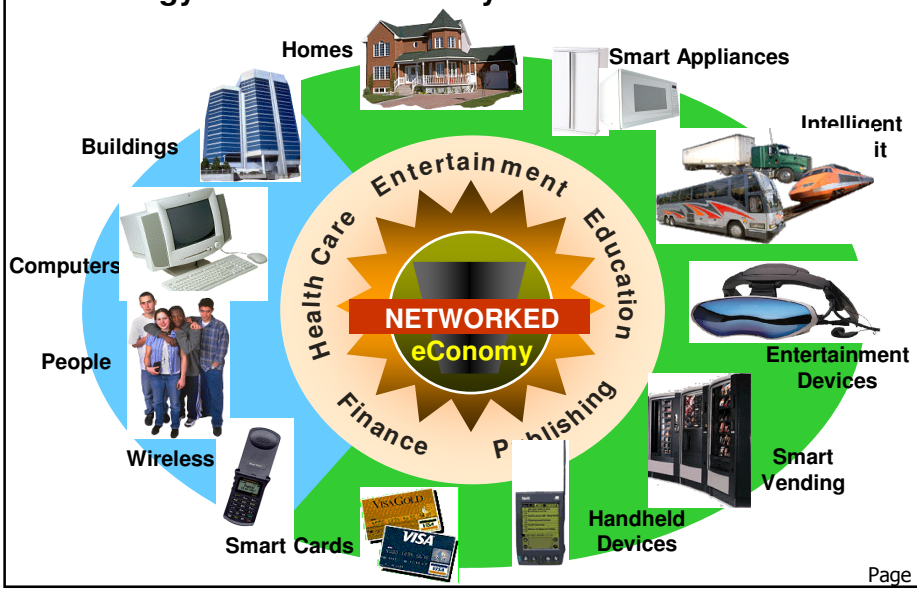


Source: Straub & Watson, 2001, Weil & Vitale, 2001

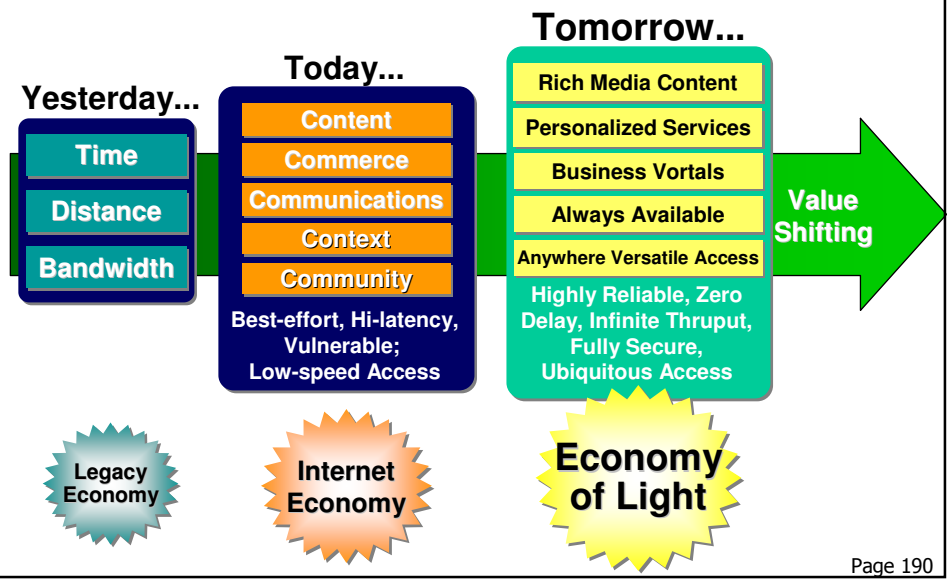
Foundation for a New Economy



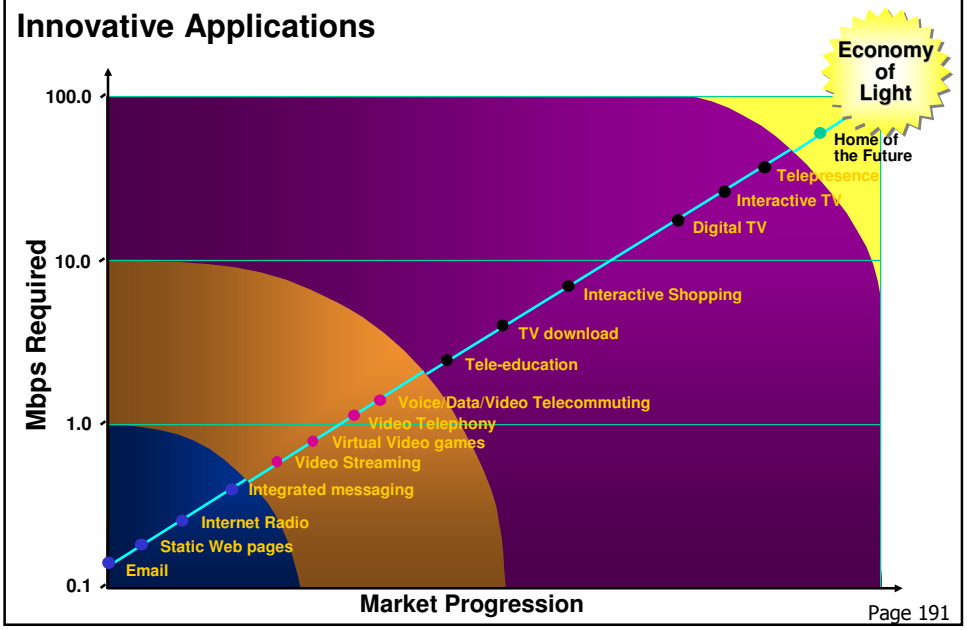
Technology Fuels the Economy



The Shifting Value of Communication Services

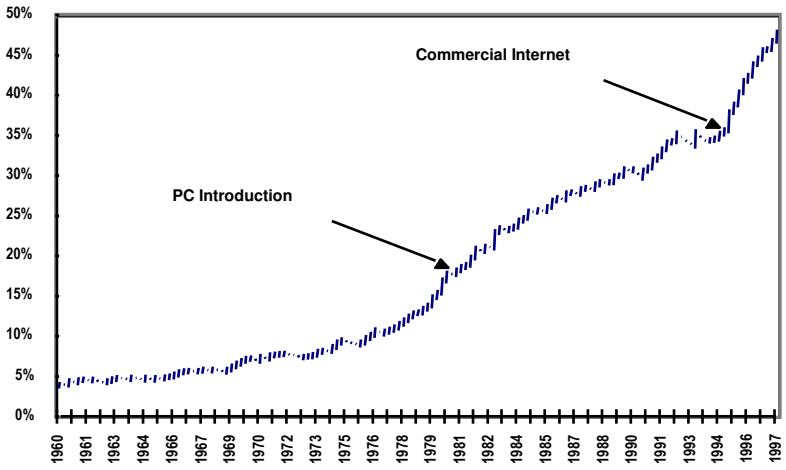


Innovative Applications



Internet revolution fuelled corporate tech spending…

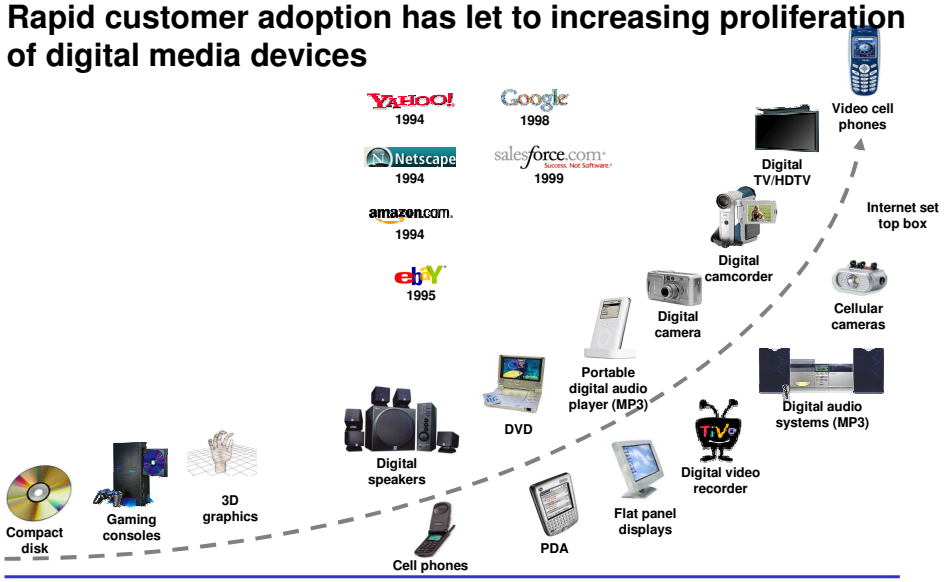
US-based IT spending as a share of business capital equipment spending



Note: Information technology spending includes purchases of information processing and related equipment (including office, computing, and accounting machinery), computers and peripheral equipment, communication equipment, instruments, and photocopy and related equipment.

Source: U.S. Department of Commerce

Rapid customer adoption has let to increasing proliferation of digital media devices



Sources: CIBC World Markets with changes, Trade press, Industry sources

The Law of Disruption

What is the Law of Disruption and why is it important?

- **It states that where social systems change incrementally, technology changes exponentially and as the gap between the two increases, so does the potential for non-continuous, disruptive, indeed revolutionary change**
- **Until a critical mass of users is reached, a change in technology only affects the technology. Once critical mass is attained, social, political, and economic systems change**
- **The authors believe that the velocity & trajectory of the digital revolution will create more frequent and more disruptive ripples to virtually everything than any previous technology changes**
- **Killer apps result from the combination of Moore's & Metcalf's Laws & are examples of the Law of Disruption!**

The Law of Disruption

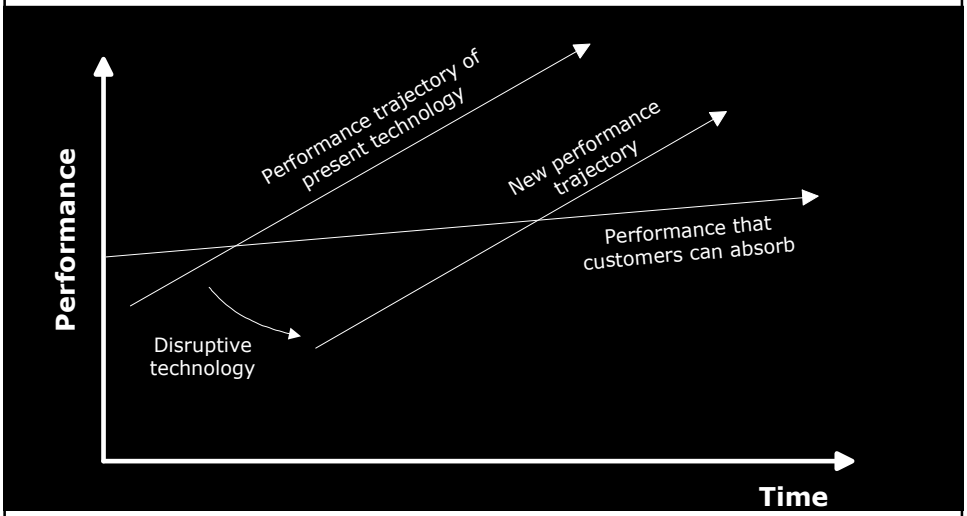
Easy, inexpensive, and quick access to digital information transforms:

- **Economies**
- **Societies**
- **Governments**
- **Businesses**

Digital information enhances economies through:

- **more efficient markets,**
- **more jobs,**
- **information access,**
- **communication globalization,**
- **lower barriers to foreign trade and investment, and more.**

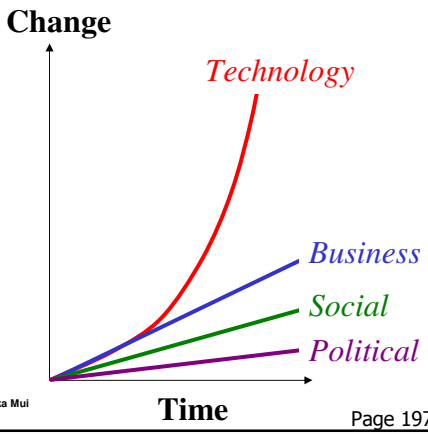
The Law of Disruption



The Law of Disruption

All Institutions are falling behind the pace of technology changes

- **Social, political, and economic systems change incrementally, but technology changes exponentially (Movie)**
- **Large differences between technology and other systems create disruption**
- **Learning-on-demand and Life-long learning is the key to individual survival in this world of change**



Source: Unleashing the Killer App : Digital Strategies for Market Dominance: Larry Downes, Chunka Mui
http://www.killer-apps.com/

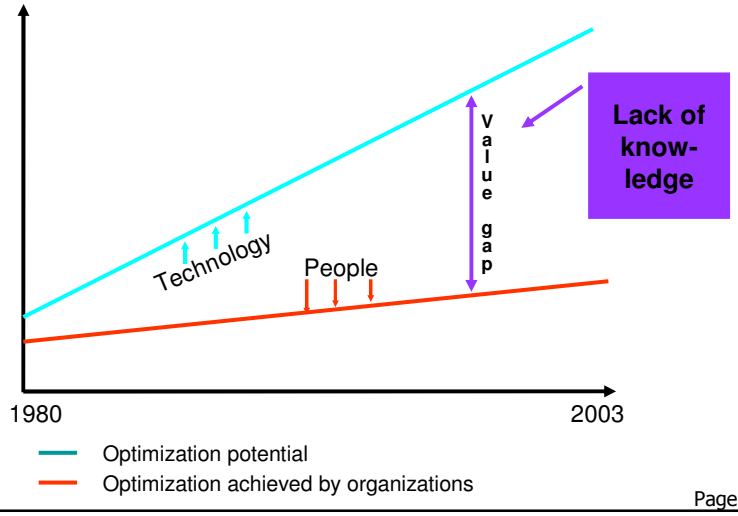
Technological Discontinuities and Innovation

Peter Drucker's Principle

"A 10-fold increase in anything represents a discontinuity for humans"

Industrial age	Semiconductor age	"Telecosm" 1996 Telecom Act Internet phenomenon
• Started around 1750 • Industrial power (or price performance curve) doubles every 18 years	• Planar process 1960 • Moore's Law: semiconductor densities double every 18 months	• 1995 onward, currently in its infancy • Increase in performance -700 times today's standard • 1996 – Typical LAN 10 Mbps shared capacity (Ethernet or Token Ring) – Average WAN 56/64 Kbps (Frame Relay and ATM coming) – Average PC has 14.4 or 28.8 modem • 2006 – Typical LAN 155 Mbps ATM – Average WAN 45 Mbps ATM – Average modem 10-12 Mbps (approx. today's LAN) via cable or 12.5 Mbps VDSL over copper – Cost of ATM = today's LAN cost (boards <$350, switched ports <$500)
• 4 discontinuities in 250 years • Discontinuity every 62 years (roughly once every lifetime)	• 7 discontinuities in 35 years • Discontinuity every 5 years	• 3 discontinuities in next 10 years
Created bulk of world market capitalization	**Created $1 trillion in U.S. market capitalization**	**What is the total and real size of the opportunity?**

The Law of Disruption



The Law of Disruption: Uneven impact of the Internet across the globe:

- **605 million users connected to the Internet worldwide = 8.5% of the global population (http://www.nua.ie/surveys/how_many_online/)**
- **Developed nations = 15% of the world's population = 88% of all Internet users**
- **U.S. Internet users = 182 million = 64% of the population**
- **Indigenous peoples in remote locations gaining health, legal, and other advice, or selling native products using the Internet**

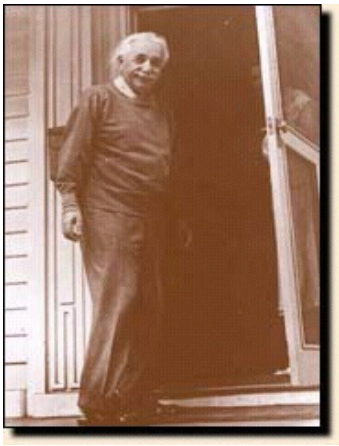
The Law of Disruption: Undesirable changes created by a networked world

- Societies change as global communities based on interests form,
- Worldwide information access slowly decreases cultural and language differences,
- Easy computer networking = work and home boundaries are blurring = more convenient work = encourage more workaholism and less time with family.
- Class divisions will grow, preventing the upward mobility of people on lower socioeconomic levels and even entire developing countries,
- Digital divide: Internet adoption occurs when folks have:
  - Enough money to buy a computer,
  - The literacy to read what is on Web pages,
  - The education to be motivated to do it.

The Digital Divide

- The digital divide raises challenging questions for global policy makers, international businesses, and local entrepreneurs.
- What responsibilities do these different groups have for narrowing the gap between those that have and those that don't have access to technology?
- Global policy makers at the United Nations, the World Bank, and the G8 believe the answer is yes.
- Some e-marketers are successfully helping to close the digital divide.
- www.villageleap.com, the Robib village website (Cambodia):
  - Women market traditional Cambodian silk weavings to overseas buyers,
  - Money is reinvested in the local pig farm,
  - Also allow villagers to send and receive medical information = reduce the number of two hour road to the nearest hospital.

Change Our Thinking



"Everything has changed but our ways of thinking, and if these do not change we drift toward unparalleled catastrophe."

Albert Einstein

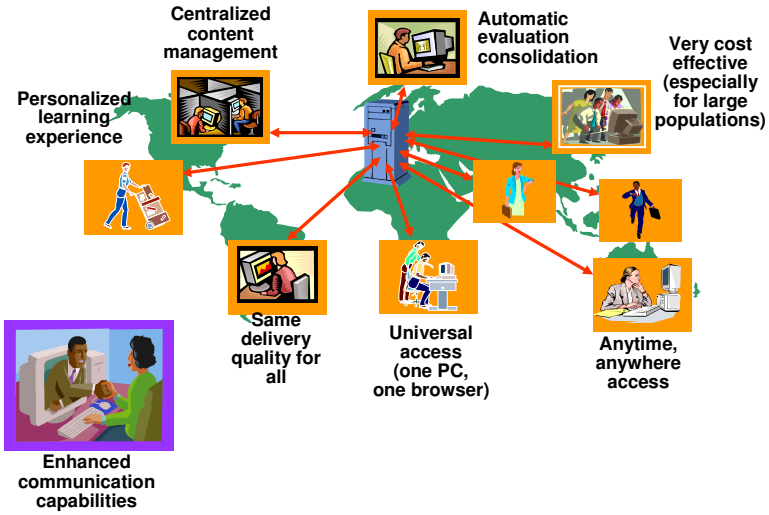
Solution Learning: The Killer Application – Learn more, learn fast, use technology

Is (E-)Learning the "Killer Application" of the next generation of computing and can it help against the law of disruption?

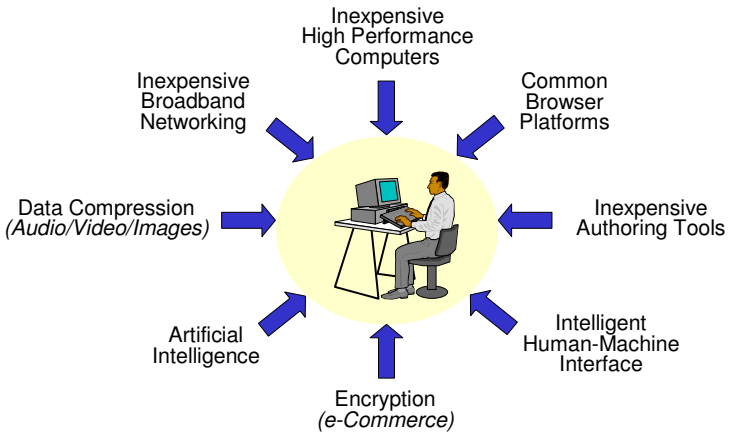
Evolution of Computing

- First we thought the PC was a calculator
- Then we thought it was a typewriter
- With multimedia we thought that it was a TV
- Now, with the World Wide Web
  … we've realized it's a brochure
- Source: Douglas Adams, Author Hitchhiker's Guide to the Galaxy

E-Learning: A Revolutionary Enabler for Knowledge Transfer



Technologies for E-Learning



Relentlessly modern technology is changing the way we:

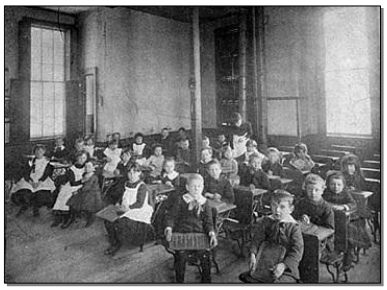
- **Labor**
- **Live**
- **Love**

and

- **Learn**

- **Inspire new ways of teaching and learning**
- **Extend learning beyond the classroom**
- **Bridge learning between school and home**
- **Write more and produce higher-quality work**
- **Spend more time using computers for homework**
- **Conduct more research and collaborate more often with others**
- **Have greater confidence in their technology skills**

New learning environments through evolving IT Cycles



Classroom

Individual

The digital economy is changing the focus in learning and education from the classroom to the individual (Desktop)

Enhanced learning environments

Passive Learning

Lectures (Video)
Reading (Audio)
Example Database
Videos (On-demand)
Animations (On-demand)

Collaborative Learning

Design Teams
Study Groups
Chat Rooms
Virtual Labs
Remote Labs
Video Conferencing
Discussion Groups

Active Learning

Tutored Homework
Interactive Simulations
Real Design Tools

Assessment

Learner Preferences
Construction Monitoring

Enhanced learning environments

Passive Learning

Lectures (Video)
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Real Design Tools

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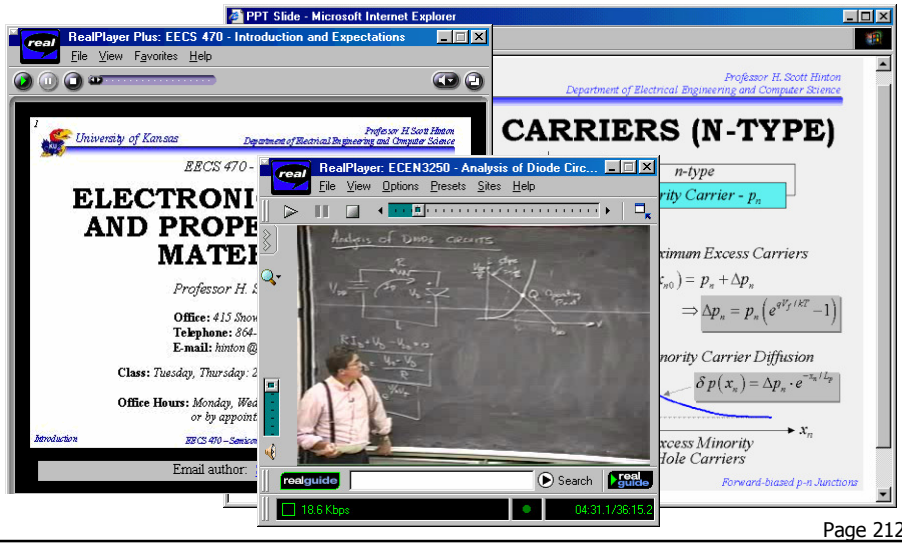
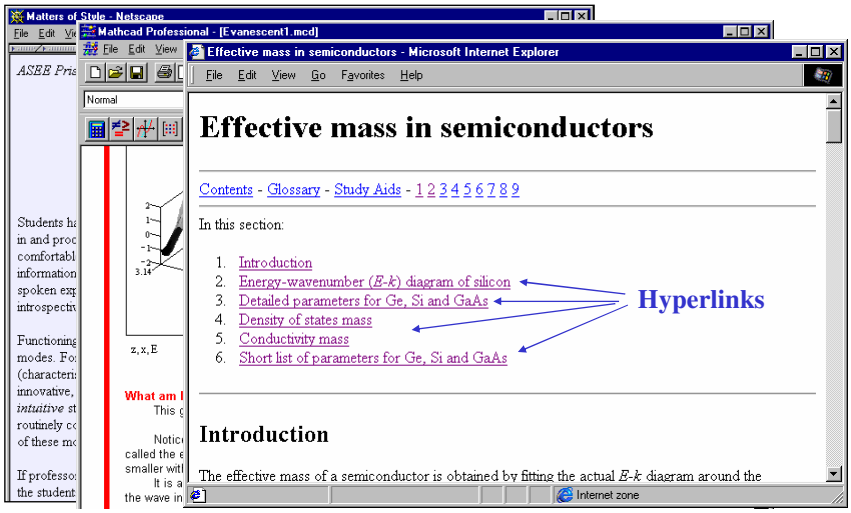
Construction Monitoring

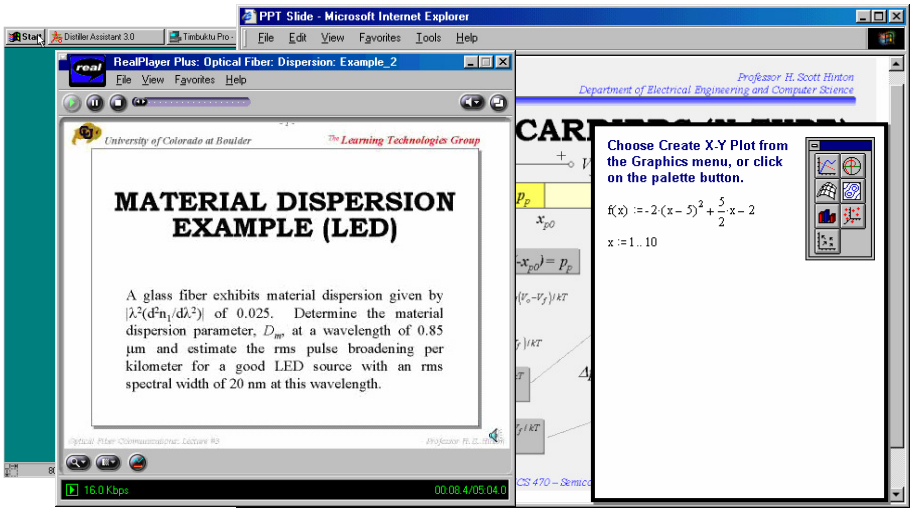
Passive Learning: Video Tutorials and Lecture



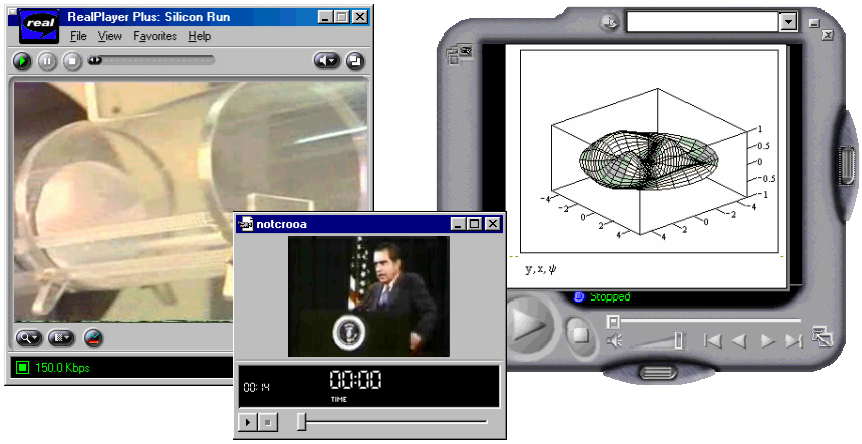
Passive Learning: Reading, Audio



Passive Learning: Tutorials



Passive Learning: Videos and Animations



Enhanced learning environments

Passive Learning

Lectures (Video)
Reading (Audio)
Example Database
Videos (On-demand)
Animations (On-demand)

Collaborative Learning

Design Teams
Study Groups
Chat Rooms
Virtual Labs
Remote Labs
Video Conferencing
Discussion Groups

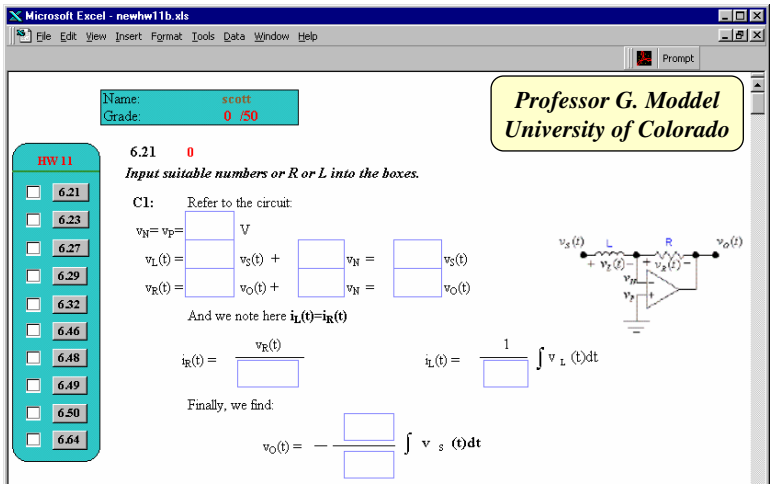
Active Learning

Tutored Homework
Interactive Simulations
Real Design Tools

Assessment

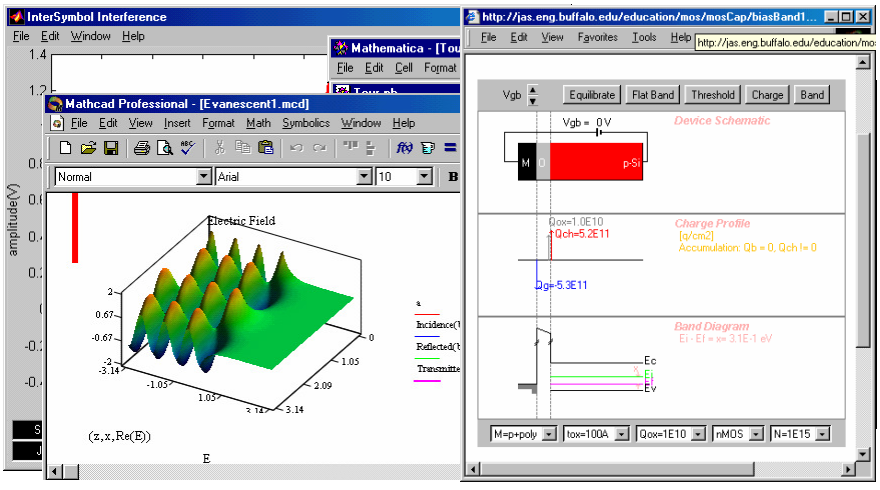
Learner Preferences
Construction Monitoring

Active Learning: Tutored Homework

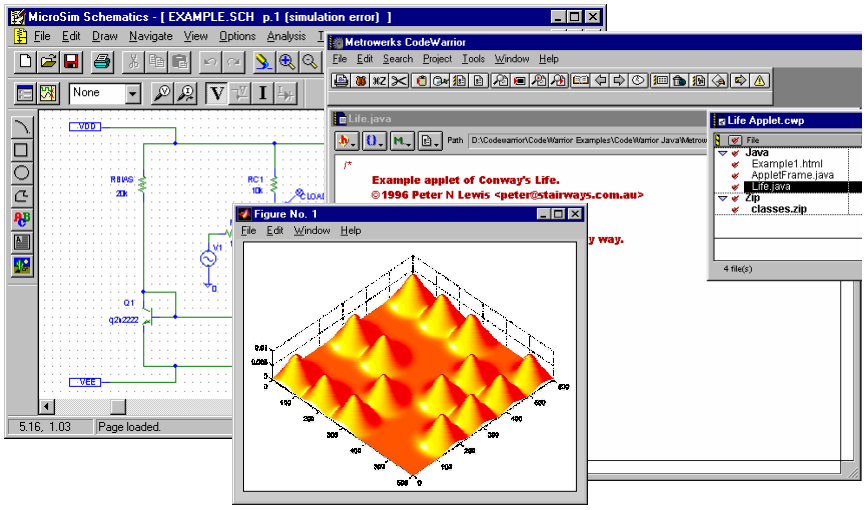


http://www.3dlearn.com/

Active Learning: Interactive Simulation



Active Learning: Real Design Tool



Enhanced learning environments

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Animations (On-demand)

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Real Design Tools

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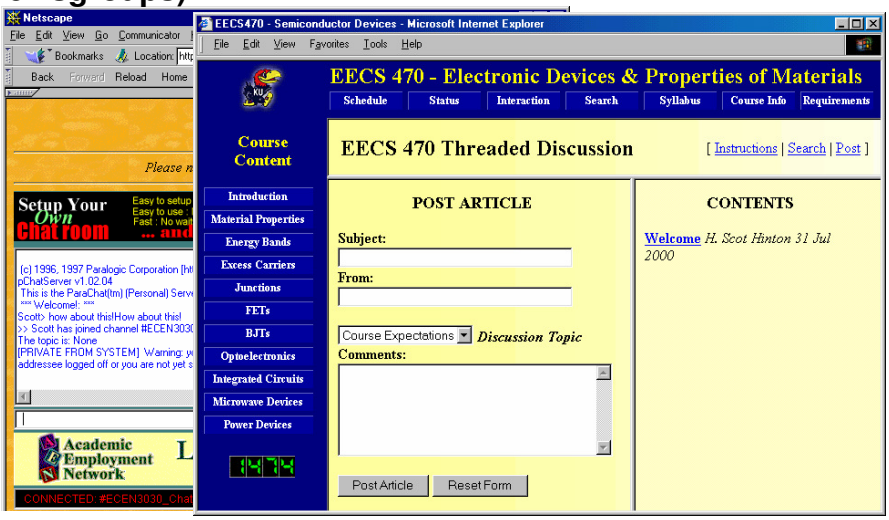
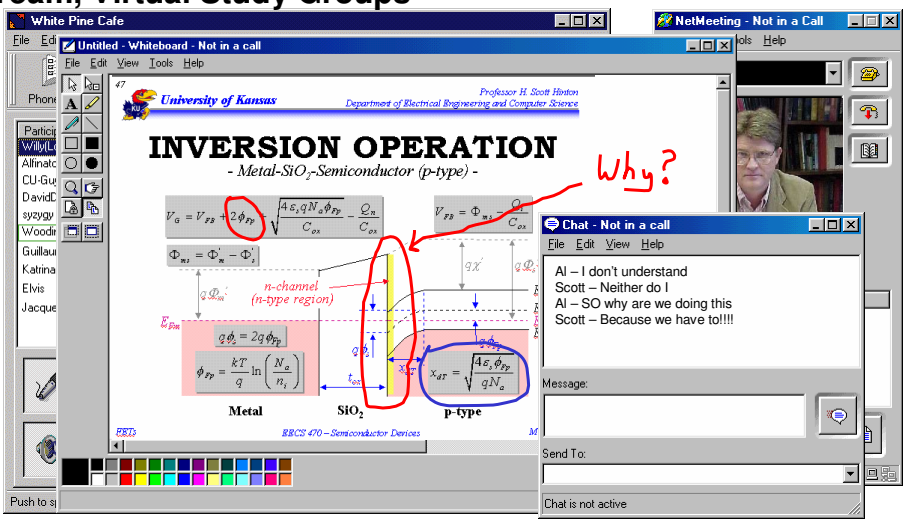
Learner Preferences
Construction Monitoring

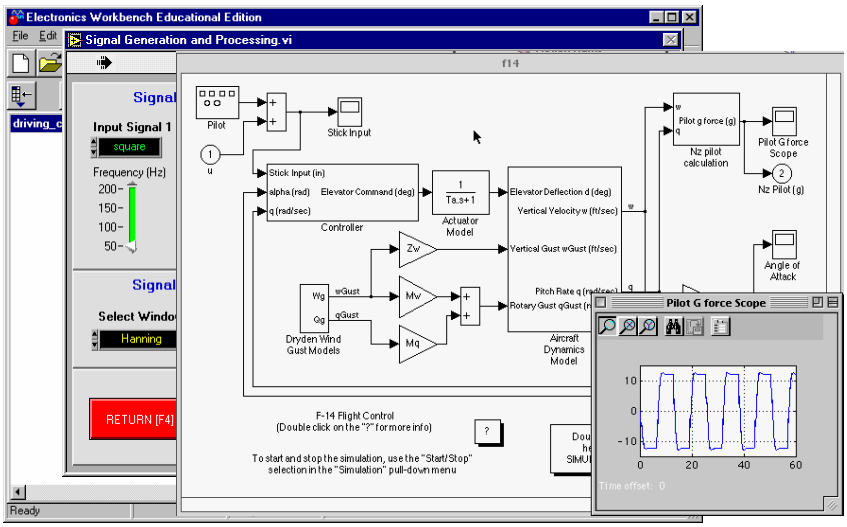
Collaborative Learning: Chat Rooms, Discussion Groups (Newsgroups)



Collaborative Learning: Video Conferencing, Virtual Design Team, Virtual Study Groups



Collaborative Learning: Virtual Labs, Remote Labs



Enhanced learning environments

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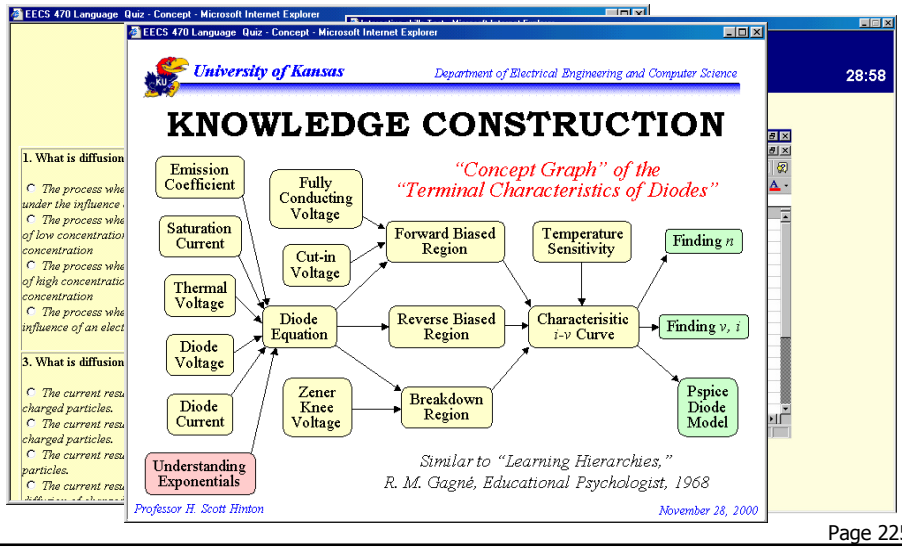


The Fact:

- **The Internet (WWW) is the worlds best communication tool. Combined with what will be the**
- **World's Largest Library**
- **Creating the First and Only Global Continuous Learning Environment**

http://rzblx1.uni-regensburg.de/ezeit/ezb.phtml
http://www.doaj.org/
http://www.onlinenewspapers.com/
http://www.cia.gov/cia/publications/factbook/
http://ocw.mit.edu/index.html (Movie)
http://www.medlineplus.gov/
http://www.visualthesaurus.com/index.jsp

The Fact: MIT Open Curseware

Example: MIT Open Courseware

http://ocw.mit.edu/index.html

MIT's Open Courseware is spreading out to other Universities

- http://ocw.jhsph.edu/ (Health Care)
- http://ocw.tufts.edu/ (Dental Medicine, Medicine)
- http://ocw.usu.edu/Index/ECIndex_view (various departments)
- China Open Resources for Education (CORE), MIT OCW's Chinese language translation partner, now offers links to 451 China Quality OpenCourseWare (CNQOCW) courses for use and sharing in China and globally. The Chinese Ministry of Education plans to develop 1500 national-level quality courses by the end of 2007. To see Simplified Chinese translations of MIT courses, visit: http://www.core.org.cn/OCW_CN/Global/all-courses.htm
- The top six universities in Japan -- Keio University, Kyoto University, Osaka University, Tokyo Institute of Technology, the University of Tokyo, and Waseda University -- have announced the formation of the Japan OCW Alliance. These six universities now offer open access to close to 100 courses, in both English (http://www.jocw.jp/sub2.htm) and Japanese (http://www.jocw.jp/sub1.htm)
- Inspired by the MIT OCW initiative, the Fulbright School Economics Teaching Program (FETP) in Vietnam launched FETP OpenCourseWare (http://ocw.fetp.edu.vn/fetpocw.cfm) in 2003, the first "opencourseware" project to launch after MIT opened in September 2002. The Fulbright School participates with other academic institutions in Vietnam to promote the use of innovative long-distance learning activities

Weitere E-Learning Ressourcen

- **www.br-online.de/alpha Sendungen von BR alpha, oft mit Übungen im Web**
  - **http://www.br-online.de/alpha/it-kompaktkurs/index.shtml**
  - **http://www.br-online.de/alpha/it-kompaktkurs/faecher.shtml**
- **http://www.bbc.co.uk/learning/ Sendungen und Kurse der BBC**
- **http://free-ed.net/free-ed/ Sammlung kostenloser Kurse**
- **http://www.dhm.de/lemo/ Virtuelles Museum des 20. Jahrhunderts**
- **http://www.microsoft.com/germany/technet/webcasts/default.mspx kostenlose Schulungen von Microsoft per Video-Stream**

Example: Wikisource

- **Wikisource** (http://wikisource.org/wiki/Main_Page:English) is a Wikimedia project to create a growing free content library of primary source texts, and translations of source texts in any language. Till today Wikisource reached more then 20,000 articles.
- Some of included text types are:
  - Original texts previously published by any author
  - Translations of original texts
  - Historical documents of national or international interest
  - Mathematical data, formulas, and tables
  - Statistical source data (such as election results)
  - Bibliographies of authors whose works are in Wikisource
  - Source code (for computers) that is in the public domain or compatible with the GFDL
- The difference between Wikisource or Wikibooks?
  - The distinction between these two projects is relatively easy.
  - Wikisource focuses on material published elsewhere. Wikisource can be viewed as a library of public domain works.
  - Wikibooks are instructional materials written by the contributors themselves (e.g. study guides, classroom textbooks, and annotated texts).
  - See Wikisource and Wikibooks for additional information
- Wikisource or Wikipedia?
  - While Wikipedia is an encyclopedia, Wikisource is a library.
  - Wikipedia contains articles about books, while Wikisource includes the book itself.
  - To some extent both may include bibliographical material about the author

Example: Wikimedia Commons

- The **Wikimedia Commons** (http://commons.wikimedia.org/wiki/Main_Page) is a project that provides a central repository for free images, music, sound & video clips and, possibly, texts and spoken texts, used in pages of any Wikimedia project.
- Unlike images uploaded on other projects, images on Commons can be embedded on pages of all Wikimedia projects.
- The Commons was launched on September 7, 2004.
- Currently it contains **14,035** collections and **147,053** media files.

Example: Wikiquote

- Wikiquote (http://en.wikiquote.org/wiki/Main_Page) is a free online compendium of quotations in every language, including sources (where known), translations of non-English quotes, and links to Wikipedia for further information.
- The English version of Wikiquote has **3,577** pages so far with many thousands of quotations and proverbs.
- The **Quote of the Day archives** contains listings of quotes that have already been used.

Example: Wiktionary

- Wiktionary (http://en.wiktionary.org/wiki/Main_Page) is a collaborative project to produce a free multilingual dictionary in every language, with:
  - definitions
  - etymologies
  - pronunciations
  - quotations
- Wiktionary is the lexical companion to the open-content encyclopedia Wikipedia.
- In the English edition, started on December 12, 2002, are now 76,598 entries.
- The content of Wiktionary is covered by the GNU Free Documentation License; see Wiktionary copyrights for details.

Example: Wikinews

- All content written for Wikinews (http://en.wikinews.org/wiki/Main_Page) is in the public domain.
- By making the content perpetually available for free redistribution and use, the creators hope to contribute to a global digital commons.
- Wikinews also aims to write stories from a neutral point of view.

More Examples

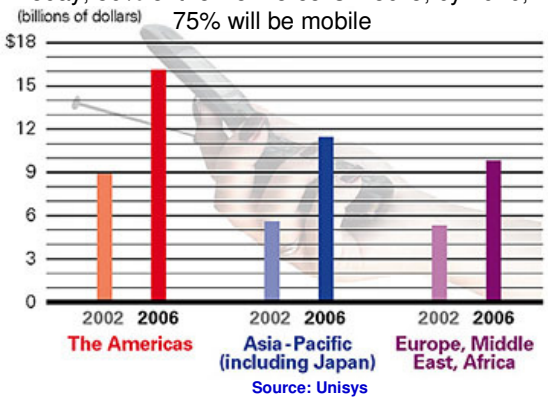
- **Wikibooks**
- **Wikispecies**
- **WikiReader Digest**

Wikipedia

Wikipedia in German:	**de.wikipedia.org**
Wikipedia in English:	**en.wikipedia.org**
For Desktop PCs:	**http://www.wapedia.de oder http://www.de.wapedia.org/wapedia:Start**
For Pocket PCs:	**http://pda.wapedia.de oder http://pda.de.wapedia.org/wapedia:Start**
For WAP-Mobilphones:	**wap.wapedia.de und http://wap2.de.wapedia.org/wapedia:Start**

Wireless is Top Technology Trend: Mobile Devices Get Smaller and More Powerful

Today, 50% of the workforce is mobile; by 2010, 75% will be mobile

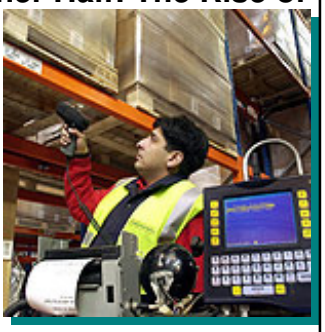


"A new cell phone has computing power equivalent to that of a 1998 desktop computer; next year's will be better yet."
Jonathan Lurie, "The New Human Frontier of Software: Mobile Computing," developer.com, November 2004

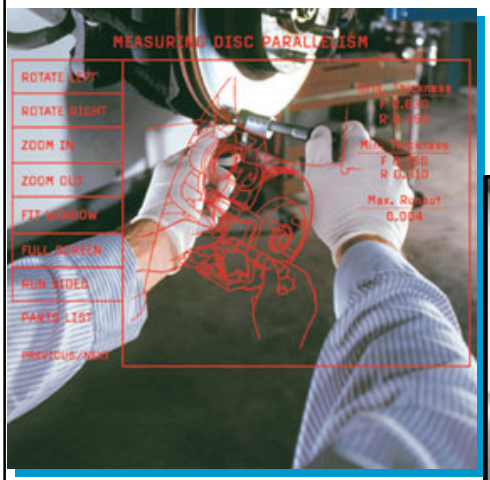
Augmented Reality – Eyeglasses and Displays

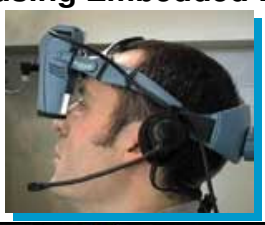
Augmented-reality displays will overlay computer-generated graphics onto the real world

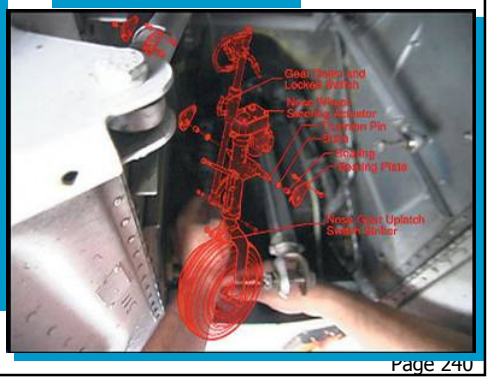
Personal Learning Technology for the Other Half: The Rise of Blue Collar Geeks



Blue-collar Knowledge Workers using Embedded Learning in Personal Learning Devices







Source: Microvision, 2003