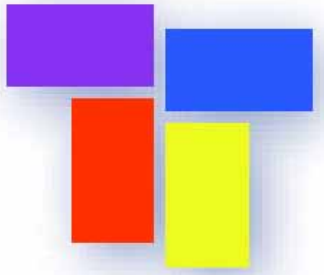
Prof. Dr.iur.
Bernd Lutterbeck
贝恩特　鲁特贝克　博士



柏林工业大学经济信息系　　教授
欧共体耶蒙特活动中心　常任教授

Professor of Business Informatics
Permanent Lecturer,
Jean Monnet Action, CEC

Berlin University of Technology/Germany

Coming soon: Pervasive Computing

Yet annother hype?

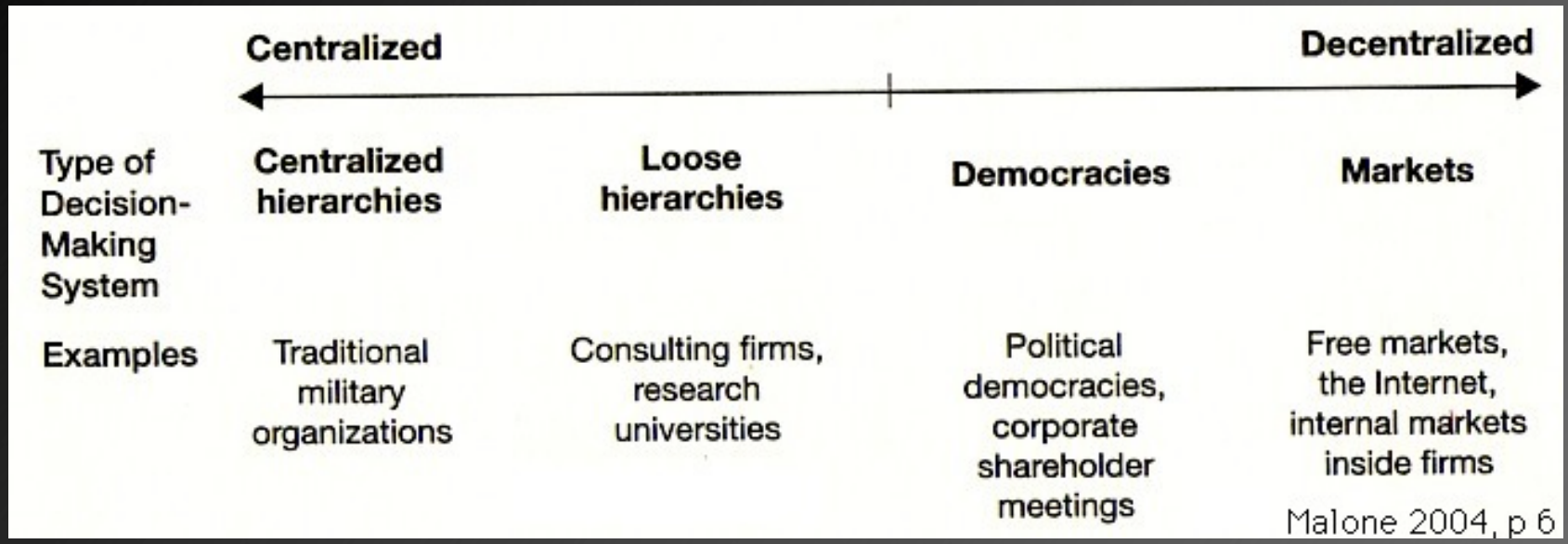
Global Ministerial Summit on International Cooperation in Software & Information Service and Entrepreneurs' High Level Forum

Dalian, June 22th, 2005

Information society: the portfolio

- Communication infrastructure
  - content
  - services
- Telecommunication networks
- Broadband Internet access
- «3G» mobile communications
  - Internet telephony
- Digital material (eg cinema releases)

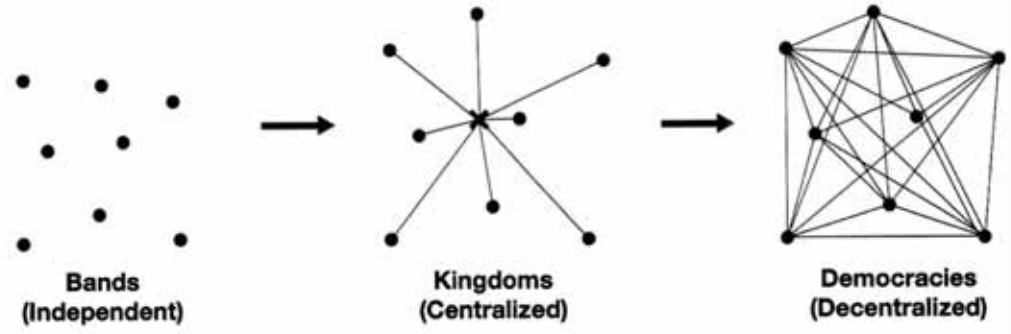
The Decentralization Continuum



Malone 2004, p 6

Organizational patterns through history

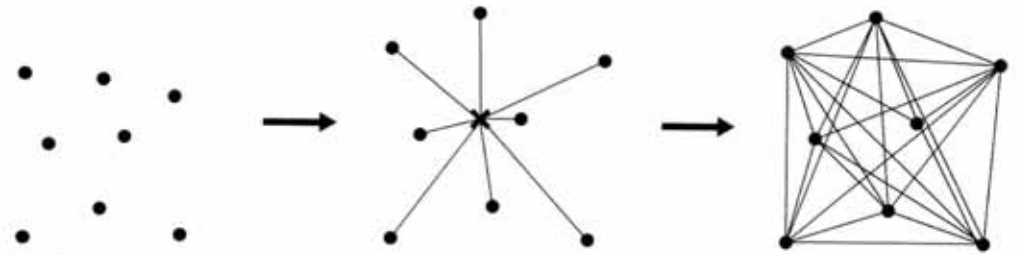
The major ways human societies have been organized throughout history reveal a remarkably simple pattern that foreshadows how businesses are now changing.



Human societies

Business Organizations

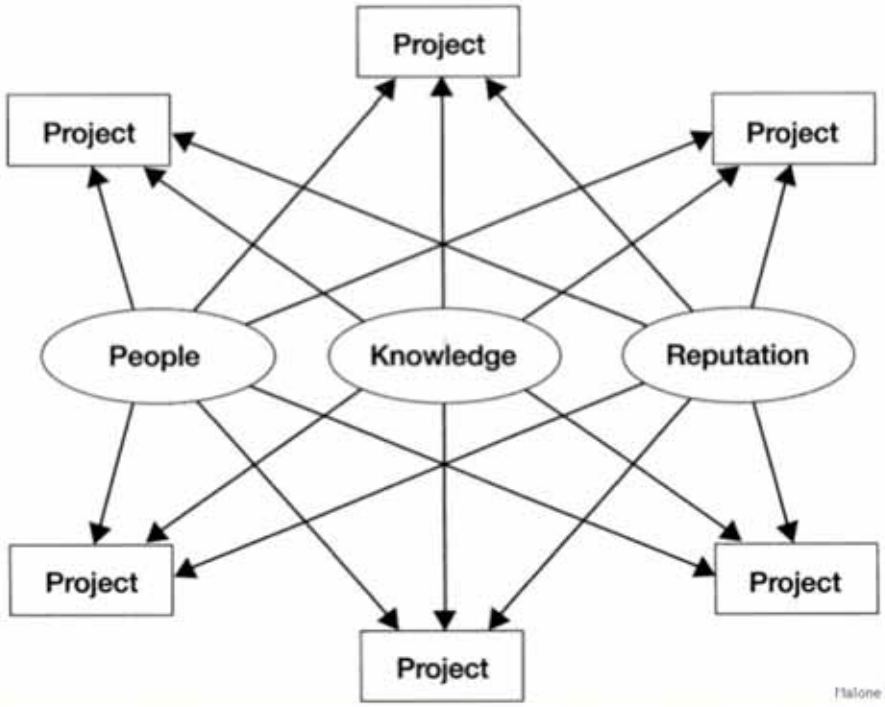
The major changes in how businesses were organized throughout history echo the changes in how societies were organized.



That's what decentralization is about: Sharing people, sharing knowledge, sharing reputation

One View of the Deep Structure of a Consulting Firm

The lines between projects represent three types of dependencies: sharing people, sharing knowledge, and sharing reputation.



Malone 2004, S. 143

User Innovation Networks

User – firms and individuals – centered innovation

versus

Manufacturer-centric innovation development

The advantages of user centered innovation are eminent.

The best example is software

Industrial products	Type of users	Percentage building products for their own use
CAD software	136 user attendies	24 %
Piper hanger hardware	employees in 102 firms	36 %
Library information systems	employees in 102 Austrlian libraries	26 %
Surgical equipment	261 surgeons in university clinics in Germany	22 %
Apache OS server software	131 Apache users (webmasters)	19,1 %
Consumer products		
Outdoor consumer products	153 recipients of mail order catalogs	9,8 %
«Extreme» sporting equipment	194 members of 4 sporting clubs	37,8 %
Mountain biking equipment	291 mountain bikers in one region	19,2 %

Source: von Hippel 2005, p 20

Transaction costs for communication - about zero

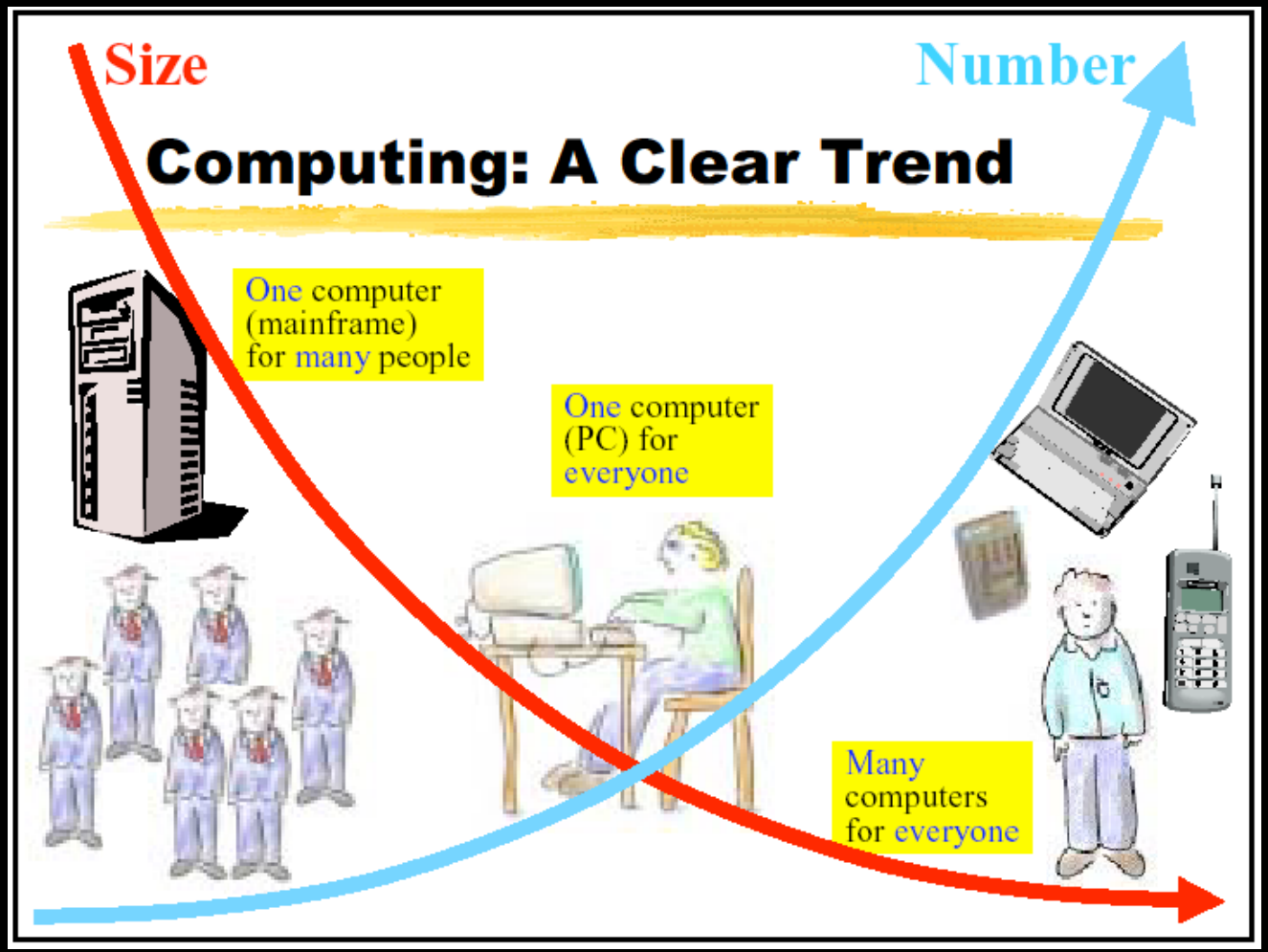
Delay and Cost for Transmitting One Page of Text via Different Media

Medium	Delay in Hours		Cost	
	1 Destination	100 Destinations	1 Destination	100 Destinations
Pre-railroad Mail, 1840s	252.000	260.3	$0.25	$107.17
Railroad, 1850s	48.000	56.3	$0.03	$85.17
Telegraph, 1850s	0.083	8.3	$7.50	$750.00
E-mail, 2000s	~0	~0	~0	~0

Malone 2004, S. 33

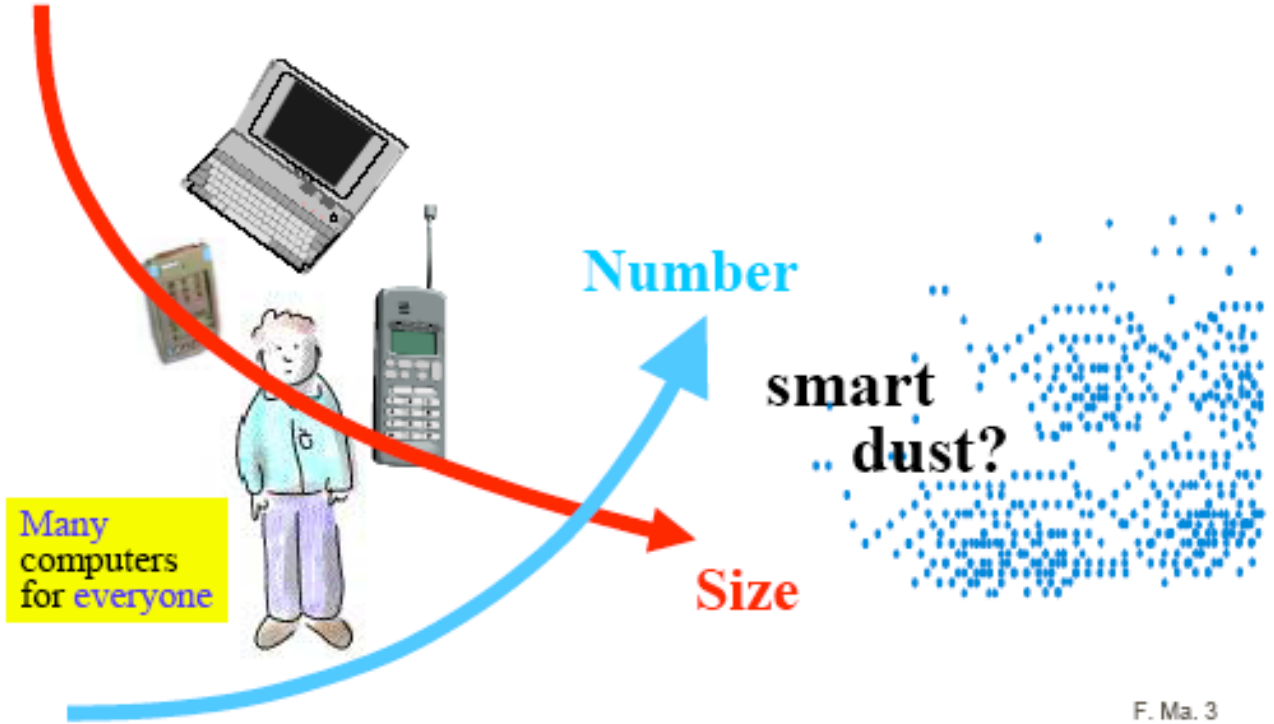
That's what makes Open Source Software a success: Sharing people, sharing knowledge, sharing reputation

What is Pervasive Computing*



The following slides courtesy of F. Mattern/ETH Zuerich (CH)

The Trend... What's Next?



The Vision

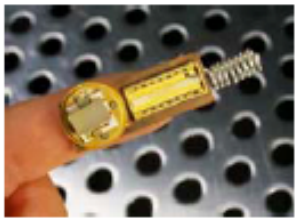
„In the 21st century the technology revolution will move into the everyday, the small and the invisible..."

Mark Weiser (1952 – 1999), XEROX PARC

- Small, lightweight, cheap, mobile processors and sensors
  - in almost all everyday objects („embedded computing")
  - on your body („wearable computing")
  - embedded in the environment („sensor networks")

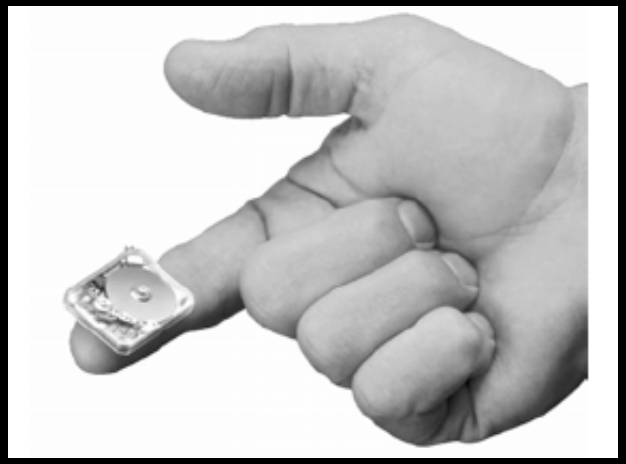
3. Better Sensors

- Miniaturized cameras, microphones,...
- Fingerprint sensor
- Radio sensors
  - without power supply
- Location sensors
  - e.g., GPS
- ...



POSITION
N 047°
23'17"
E 008°
34'26"

RFID tags



Toshiba (2004) 4 GB
0,85 inch harddisk

Fingerprint
sensor

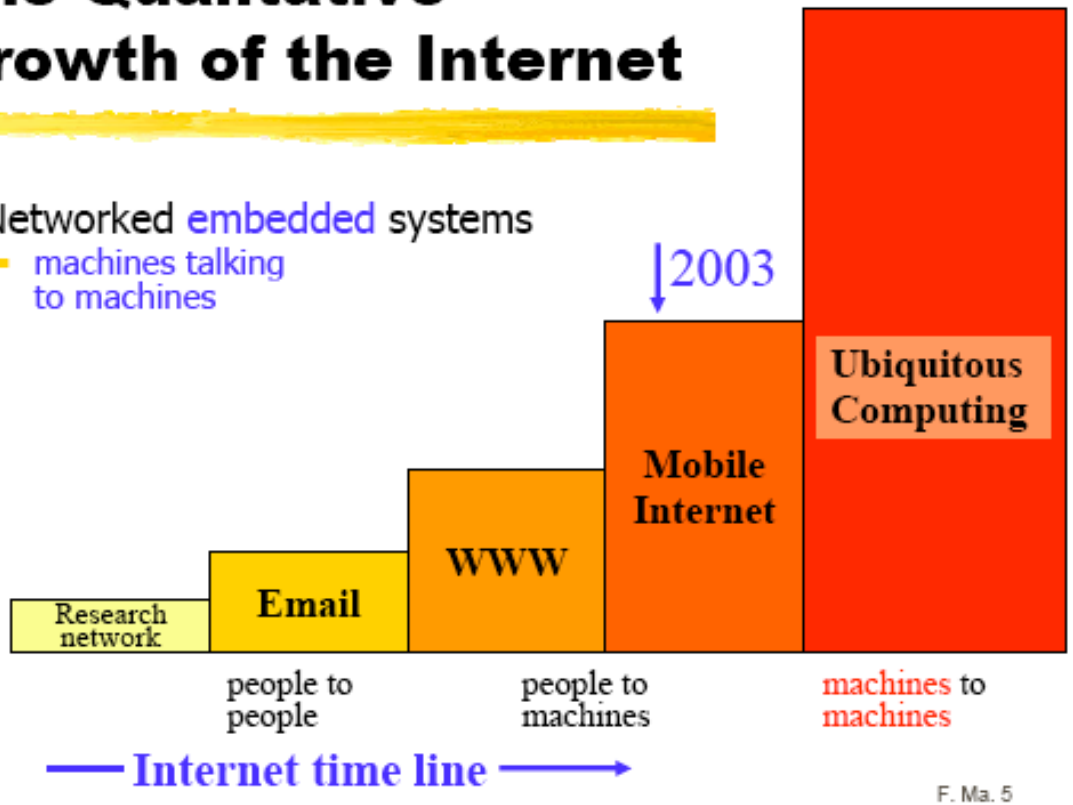
2. Progress in Communication Technologies

Nostalgia

- Fiber optics: from Gbit/s to Tbit/s
- Wireless
  - mobile phone: GSM, UMTS
  - wireless LAN (> 10 Mbit/s)
  - Bluetooth
- Body area networks

The Qualitative Growth of the Internet

- Networked embedded systems
  - machines talking to machines



F. Ma. 5

Embedded Computing Enables „Cooperating Smart Things“

Real world objects are enriched with information processing capabilities

- Embedded processors
  - in everyday objects
  - small
  - cheap
  - lightweight
- Wireless communication
  - spontaneous networks
- Sensors

F. Ma. 39

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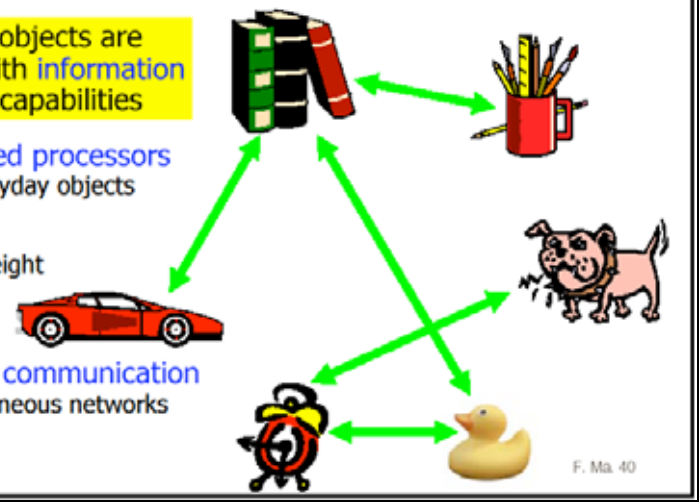


F. Ma. 40

Today's Prototype: A Retina Eyeglass Display

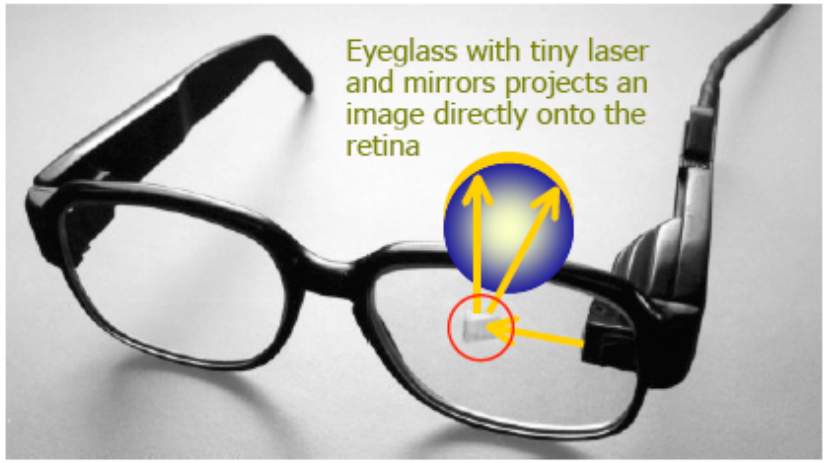


image source: Microoptical Corporation

European banknotes:
RFID against crime

Shopping for daily life: Future Store/Germany

Fresh chese, champoo, razor blades
All articles tagged with RFID

All Trends Together Lead to a New Era

- Progress in
  - computing speed
  - communication bandwidth
  - material sciences
  - sensor techniques
  - computer science concepts
  - miniaturization
  - energy usage
  - battery technique
  - display technologies
  - price
  - ...

→ Ubiquitous Computing

Ubiquitous Computing

Image source: "Die Zeit"

- Information technology will be everywhere

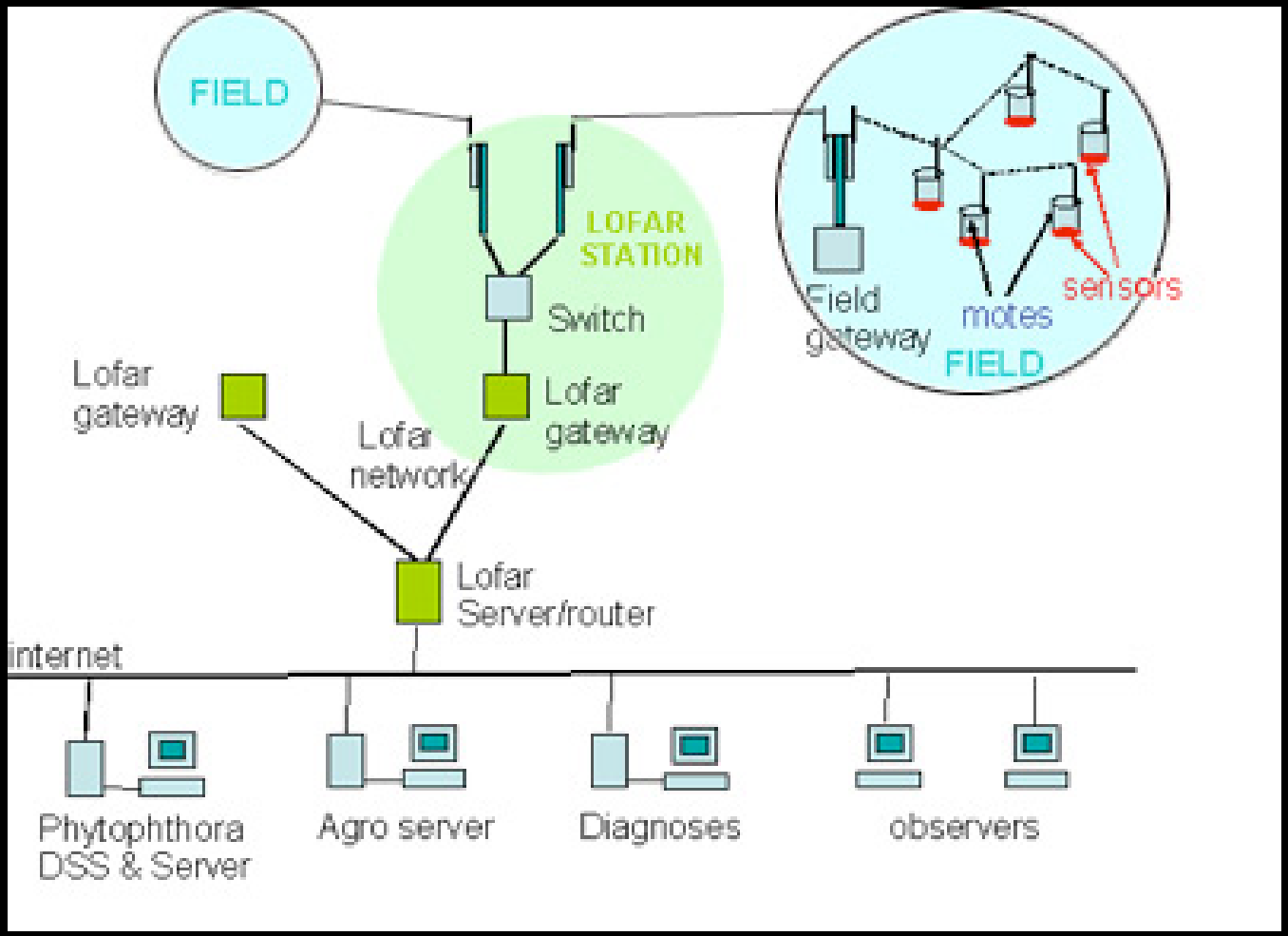
- Everyday objects will become smart
  - embedded processors

- ...and they will all be interconnected
  - wireless communication

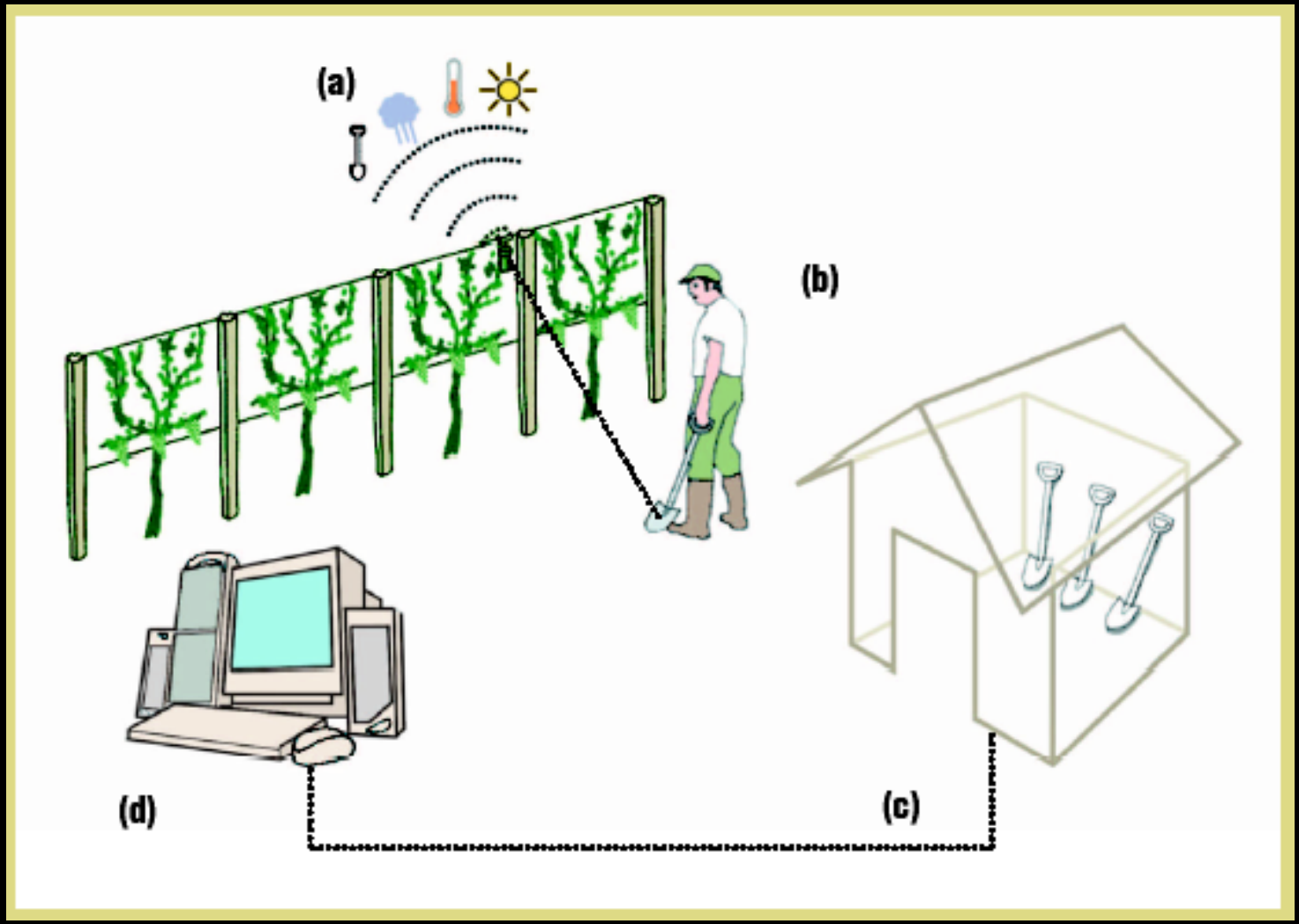
The «real» vineyard*

* British Columbia/CDN

The «calm» vineyard



Workflow of the vineyard



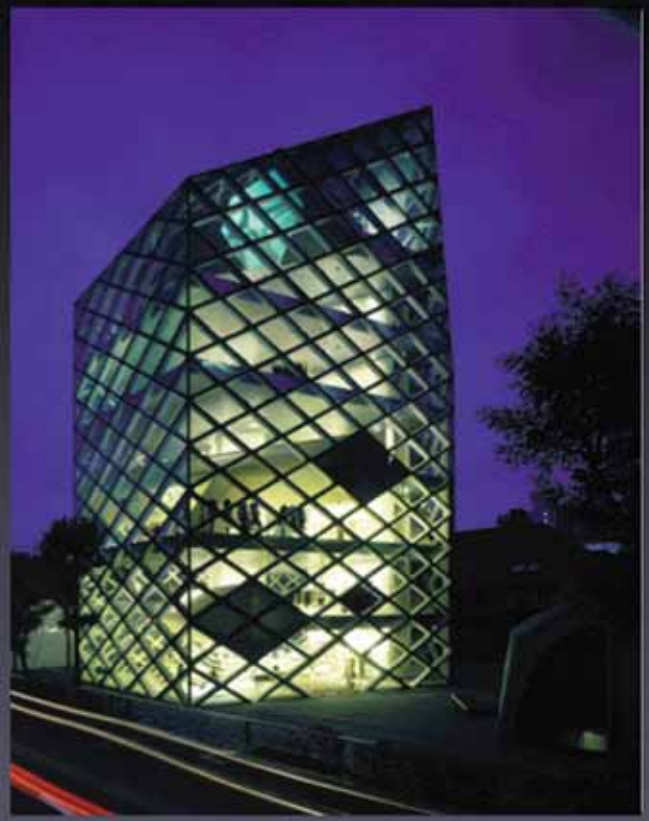
Prada Store/New York

Opening 2001
Architect: Rem Koolhaas/NL
All articles with RFID-tags
Integration with consumer cards
More content linked with ID's

«Prada uses architecture in conjunction with digital technology, to create urban identity and branding»

Prada Store Tokyo in Omote Sando Street

- Opening in 2003
- Architects:
  Herzog & De Meuron/
  Switzerland



Prada is
architecture
plus
(IT-)technology

But Prada is more
– an arrangement of
public sphere in the
21th century

Shopping mall in Bloomington/Minnesota

Largest Mall in US
4.2 Million square foot
37,5 Million visitors in 1998

The vision has become real

«The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it.»

Marc Weiser, 1990

Conclusion

You Remember the lesson from the previous chapters

Cooperation

Decentralisation

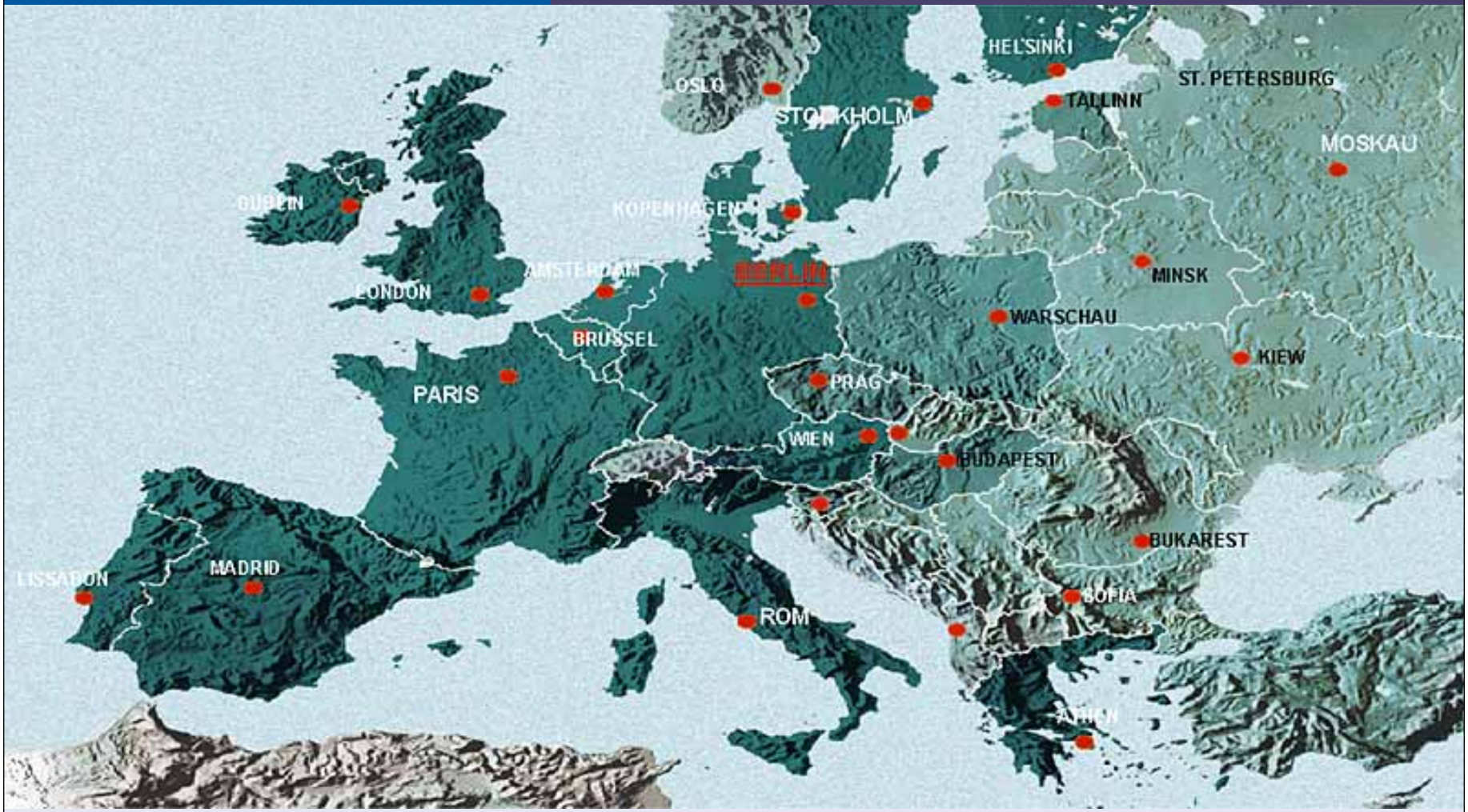
Ubiquitous Computing?

From technology emerges the freedom to create an endless variety of new environments

Cooperation and Decentralization are among the best devices

Berlin in the center of Europe

Berlin
Wirtschaftsförderung Berlin GmbH
INTERNATIONAL
Berlin Business Development Corporation



Berlin. One of Europe's largest research center

Berlin
Wirtschaftsförderung Berlin GmbH
INTERNATIONAL
Berlin Business Development Corporation

Fields of specialization

- Information and Communications technologies
- Microsystems technology and optics
- Traffic engineering
- Transportation engineering
- Medical technology
- Biotechnology
- Media engineering

Berlin. One of Europe's largest research center

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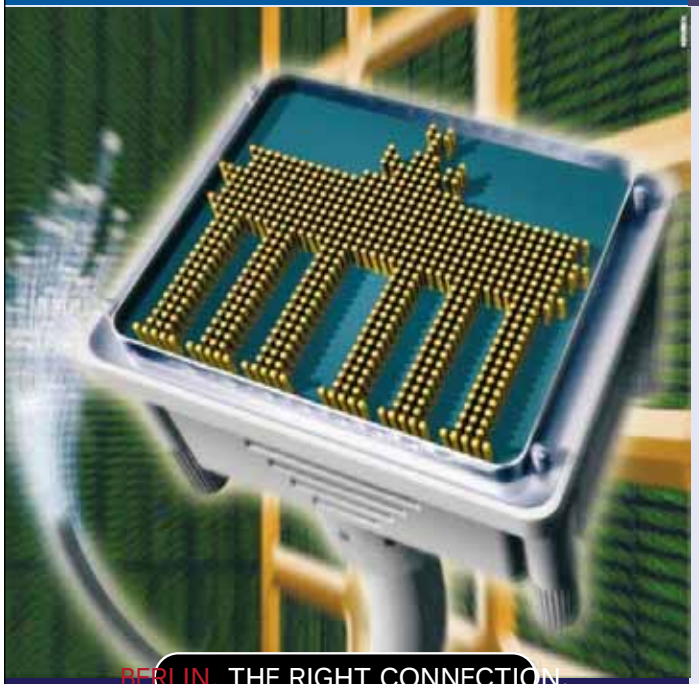
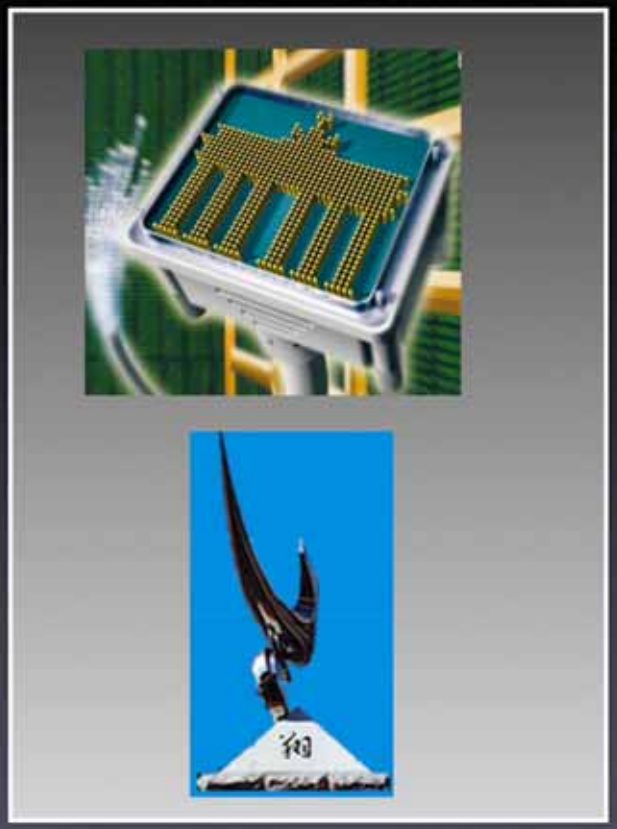


Science and research parks and institutes (examples)

- **Adlershof Technology Park (one of the 10 largest technology parks worldwide)**
- **Biomedical Campus**
- **Germany's Largest Fraunhofer centre**
- **DLR (The German Aerospace Center)**
- **FIRST (Research Institute for Computer Architecture and Software Technology)**
- **HMI (Hahn-Meitner-Institut, Department Silicon Photovoltaics)**
- **BAM (Federal Institute for Materials Research and Testing)**
- **Department of Computer Science/Berlin University of Technoiogy**

My Advise

We shall start up with
common projects of Dalian
and Berlin researchers
Capital, and firms will follow