Ubiquitous Networks and Their Impact on the Traditional Telecommunication Industry

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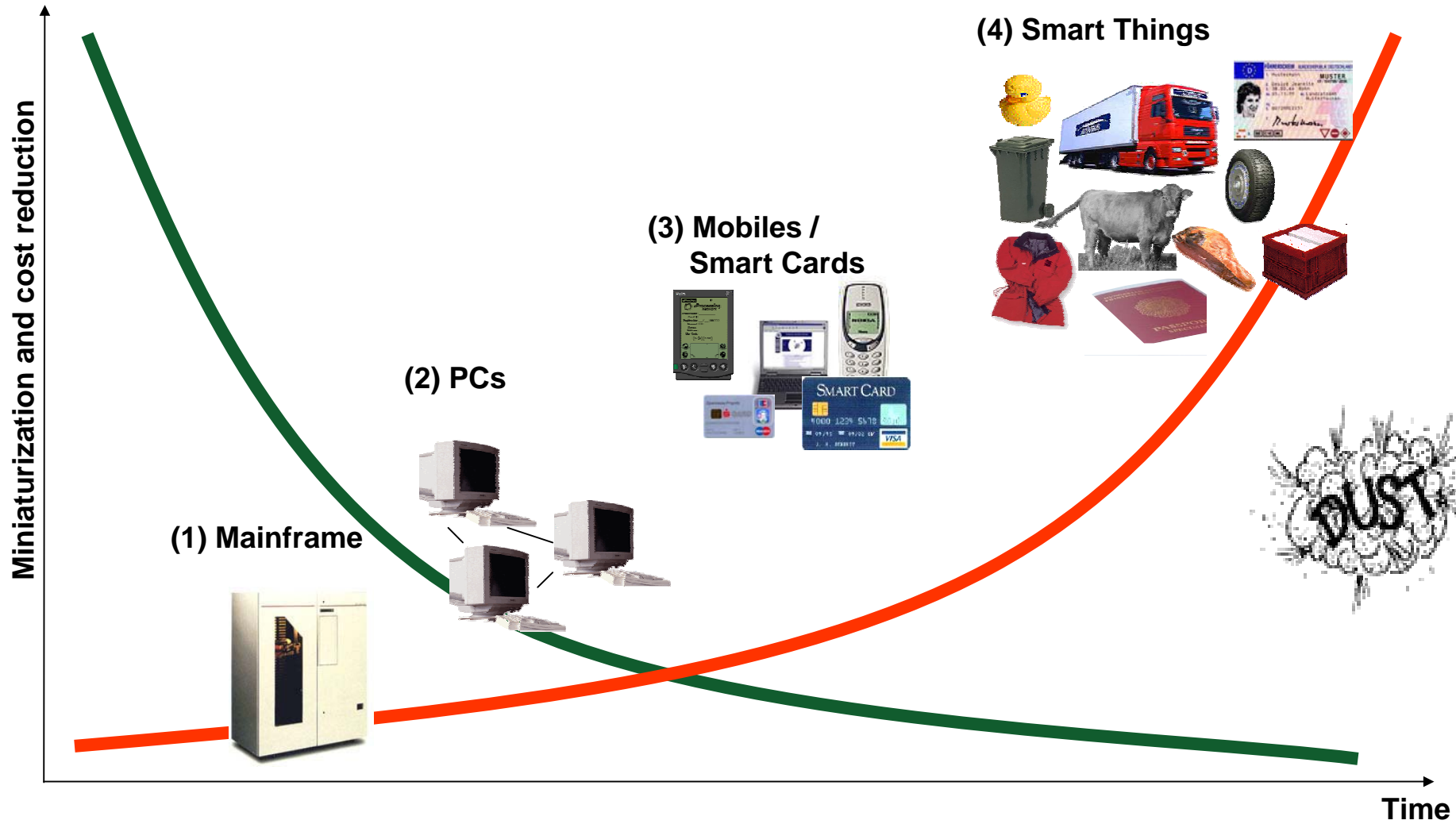Co-Chair Auto-ID Labs and M-Lab, Co-Founder intellion AG

ITU Workshop on Ubiquitous Network Societies
Geneva, April 6 2005

Agenda

- **Technology Trends**
- Business Drivers
- The Internet of Things
- Management Agenda

Recent advances in miniaturization, ...

Miniaturization and cost reduction

(4) Smart Things

(3) Mobiles / Smart Cards

(2) PCs

(1) Mainframe

DUST

Time

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… sensor & communication technology, and new materials drive for a new computing paradigm.
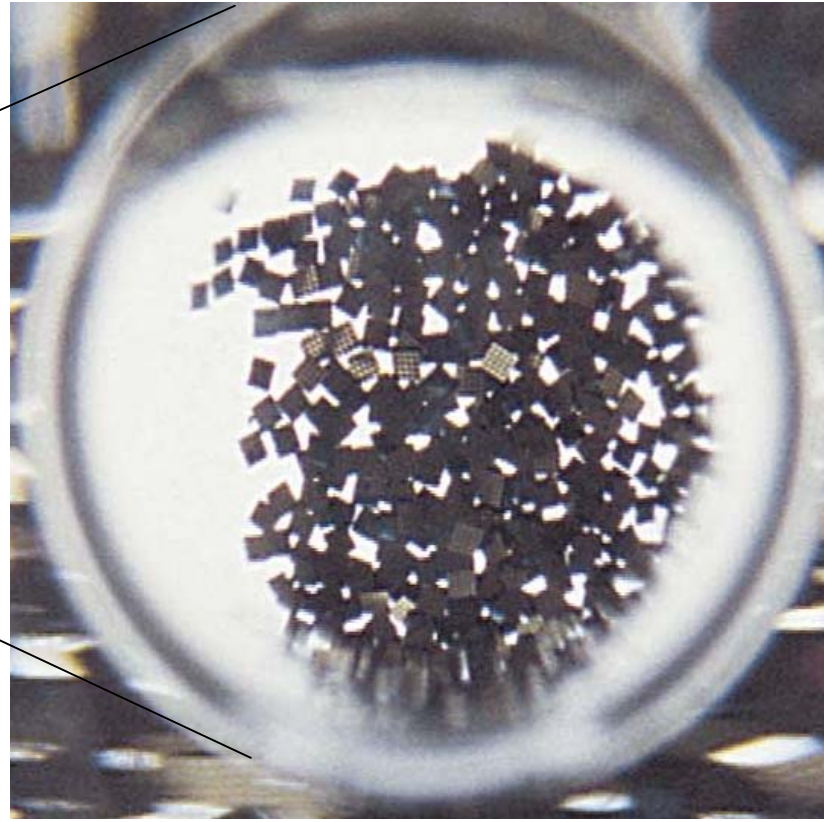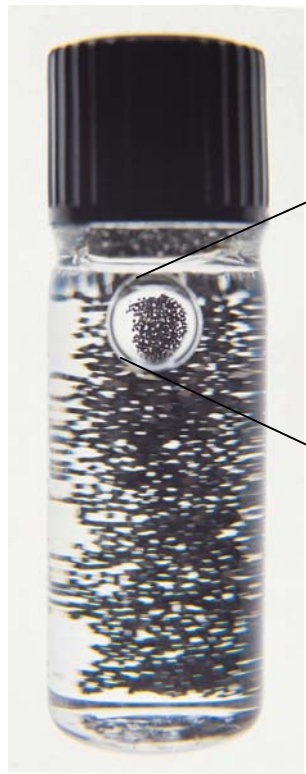
- Communication protocols
  - Wi-Fi
  - Bluetooth
  - RFID
  - ZigBee
  - NFC

- Sensors

- Polymer-based electronics
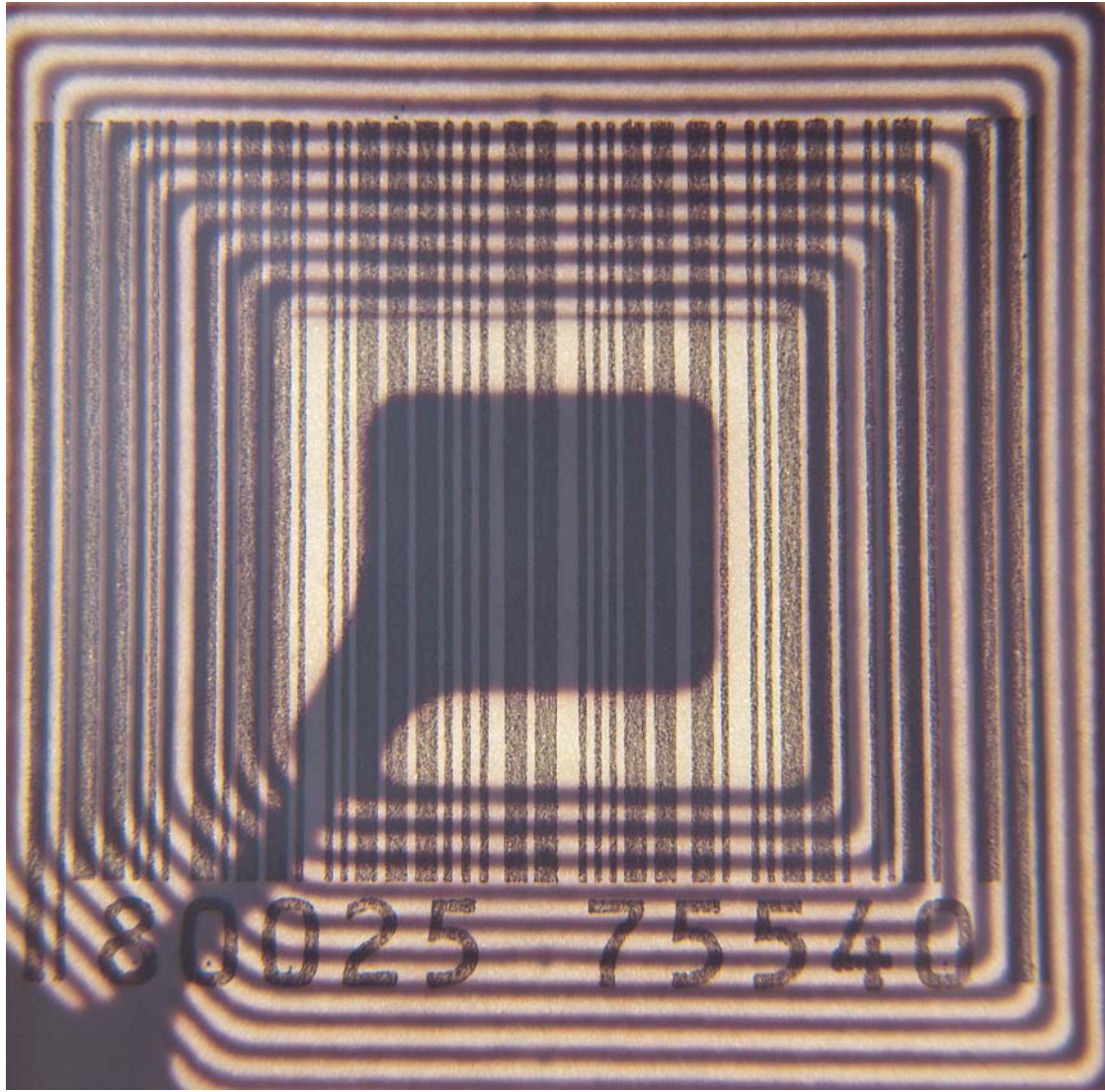 - Organic light emitting diodes
  - RFID
  - Sensors
  - Actuators

Quelle: Henkel

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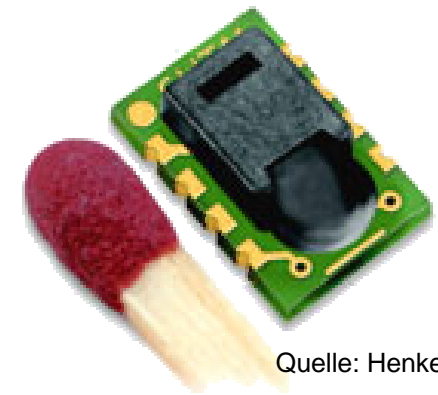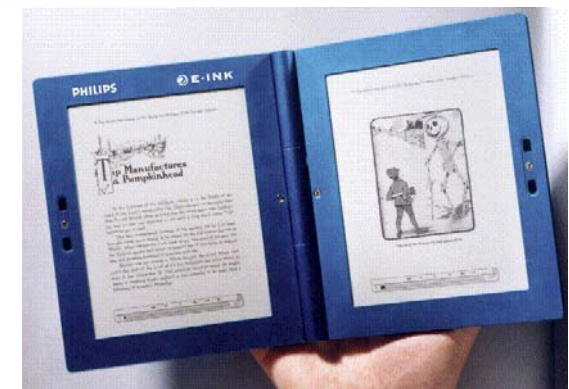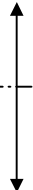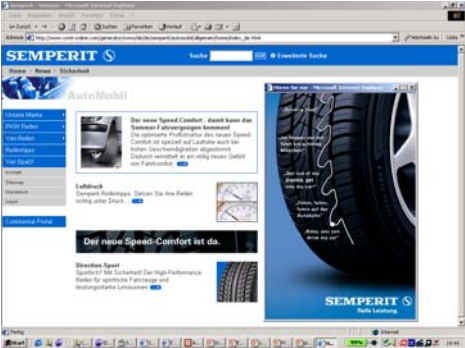
Low cost minicomputers ...

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... with mobile communication capabilities ...

… finally help to implement the vision of ubiquitous computing.

Virtual world

Real world

But what is it good for? No technology for technologies sake.

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- The Internet of Things
- The Telephone of Things

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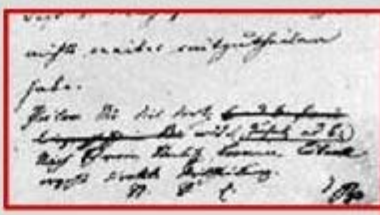# The lack of integration between the real and the virtual world …

- Out-of-stock
  - Average OOS level in retail industry: 8.3%
  - Average OOS level in direct store delivery product categories in US: 7.4%
- Shrinkage
  - Average shrinkage rate for supermarkets/grocery in US: 1.5% of sales
- Invoice inaccuracy
  - Average deduction level: 9.9% of annual invoiced sales in US
- Unsaleable products
  - Cost of unsaleable food and grocery products in US: 1% of sales
- Counterfeiting
  - Product counterfeiting is estimated to account for between 5 and 7% of world trade, with a value of 280 billion USD.
  - 30% of pharmaceuticals in the developing world and 6-10% in the developed world are counterfeits.
- Data inaccuracy
  - Mean difference between physical and book inventory in a single case study: 6.8 units per SKU or on average 35% of target inventory

Source: C. Tellkamp, E. Fleisch, Auto-ID Lab St. Gallen

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… causes many tough business problems

Konstantinische Schenkung

Emser Depesche

Marlboro

SUPER ZICHTEN

Himmelsbriefe

NIVEO Creme

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Integrated information systems…

… and e-Business systems up to now fail to integrate the real world
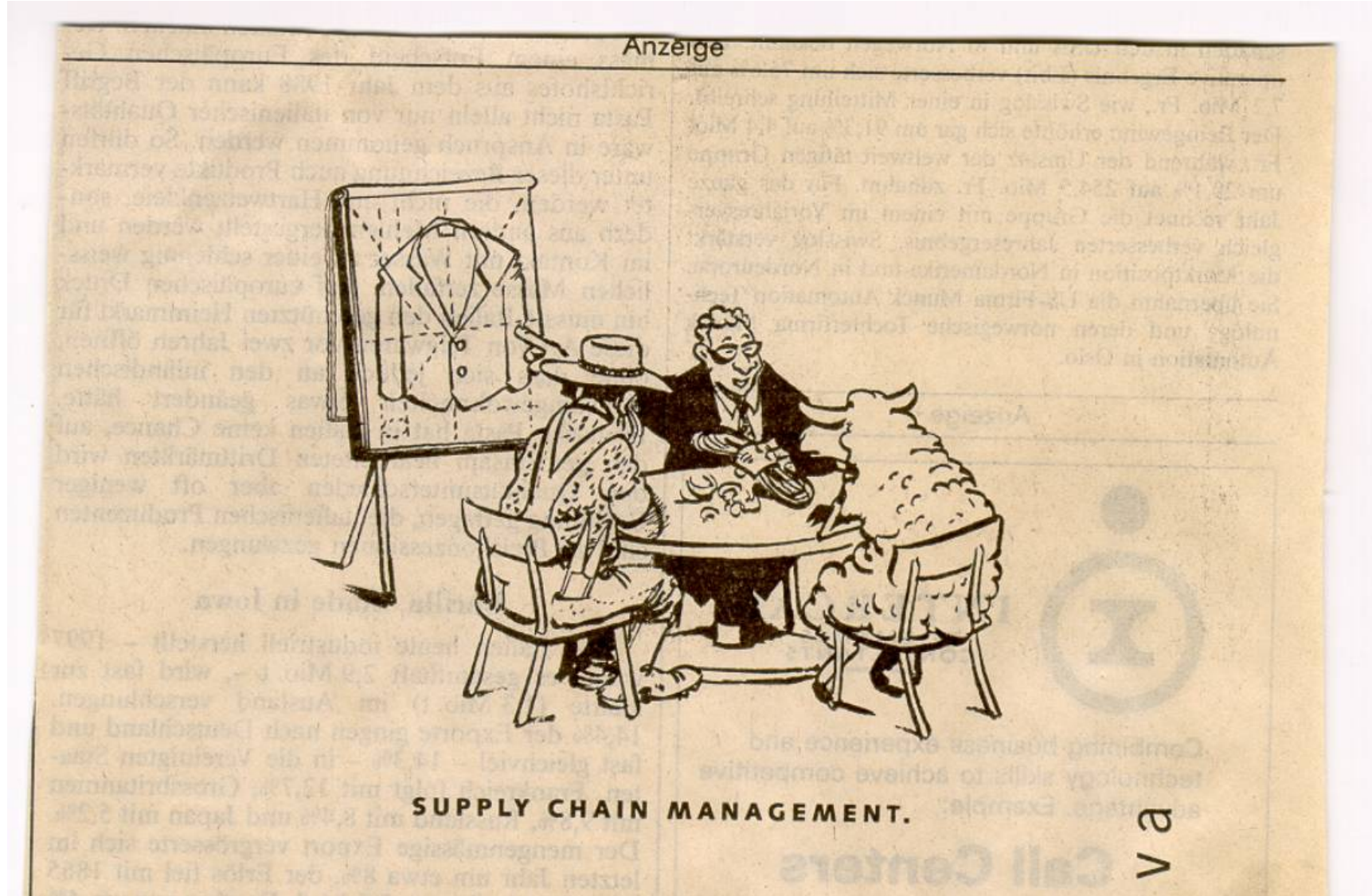
Quelle: NZZ

RFID and related technologies finally close this gap
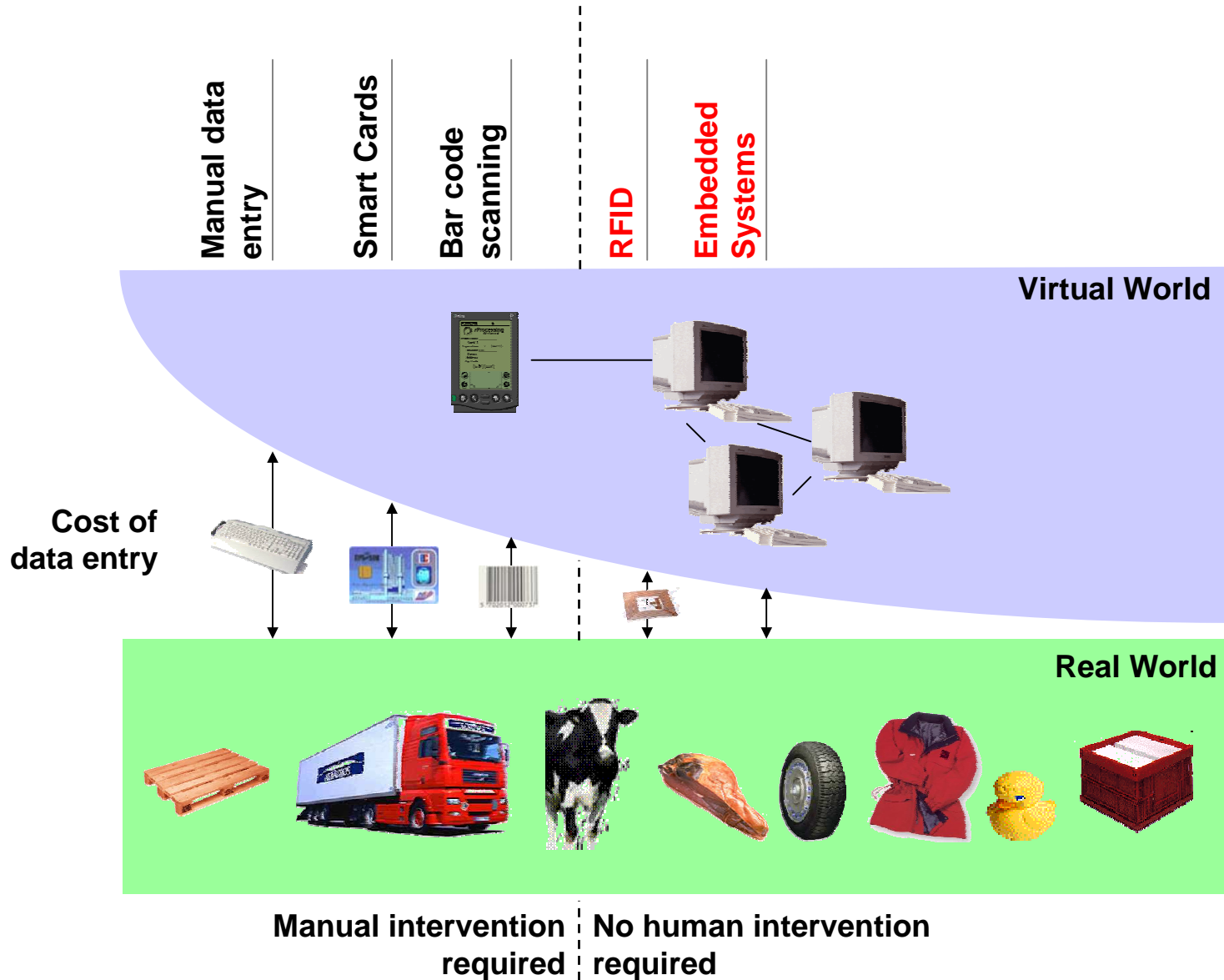
Manual data entry

Smart Cards

Bar code scanning

RFID

Embedded Systems

Virtual World

Cost of data entry

Real World

Manual intervention required

No human intervention required

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Automatically connecting objects around the world is a vision of many powerful player.

- Gillette
- Wal-Mart
- P&G
- Unilever
- Kraft
- Philip Morris
- Nestle
- Best Buy
- Target
- Tesco
- Home Depot
- CVS

- Sun
- Philips
- Intel
- ST Micro
- Canon
- Alien
- BT
- NTT
- Metro
- Mitsui
- Pfizer
- Sara Lee

- USPS
- UPS
- DoD
- UCC/EAN
- Accenture
- IBM
- Coca-Cola
- Pepsi
- Kodak
- NCR
- SAP
- Symbol

Over 100 in total!

So, we started to number the world …

ELECTRONIC PRODUCT CODE TYPE I

01 · 0000A89 · 00016F · 000169DC0

Header	EPC Manager	Object Class	Serial Number
8 bits	28 bits	24 bits	36 bits

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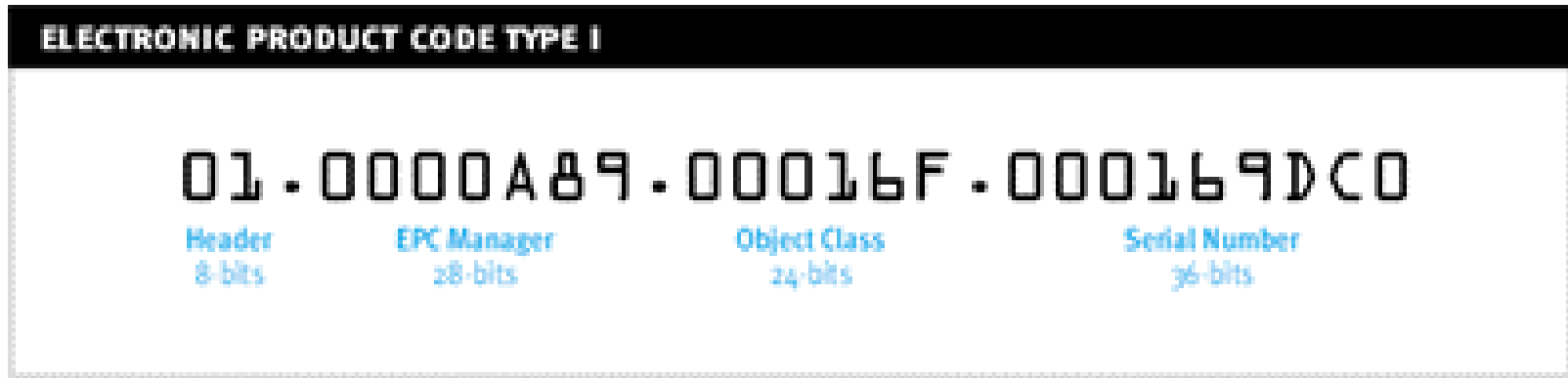
… and built the infrastructure for the Internet of Things …

Digital world (=bits)

ERP
IP 130.82.102.55

PML
IP 130.82.102.71

CAD
IP 130.82.130.57

(Object) Name Service

EPC 01.0003452.000456.00000015E1
IP-Number
SIM-Number

RFID Chip
IP-Service
GSM-Module

Real world (=atoms)

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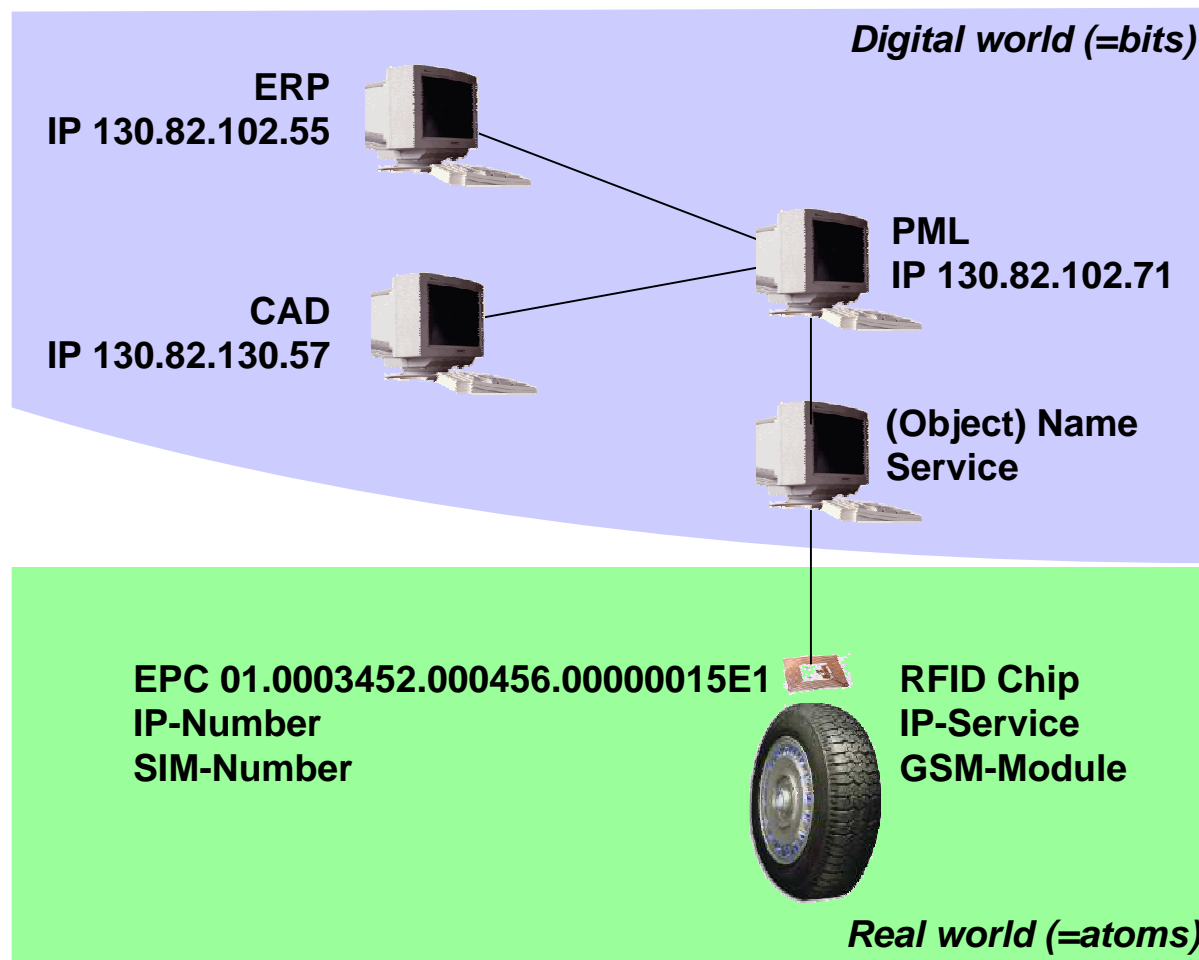
… to track every physical object in the world.
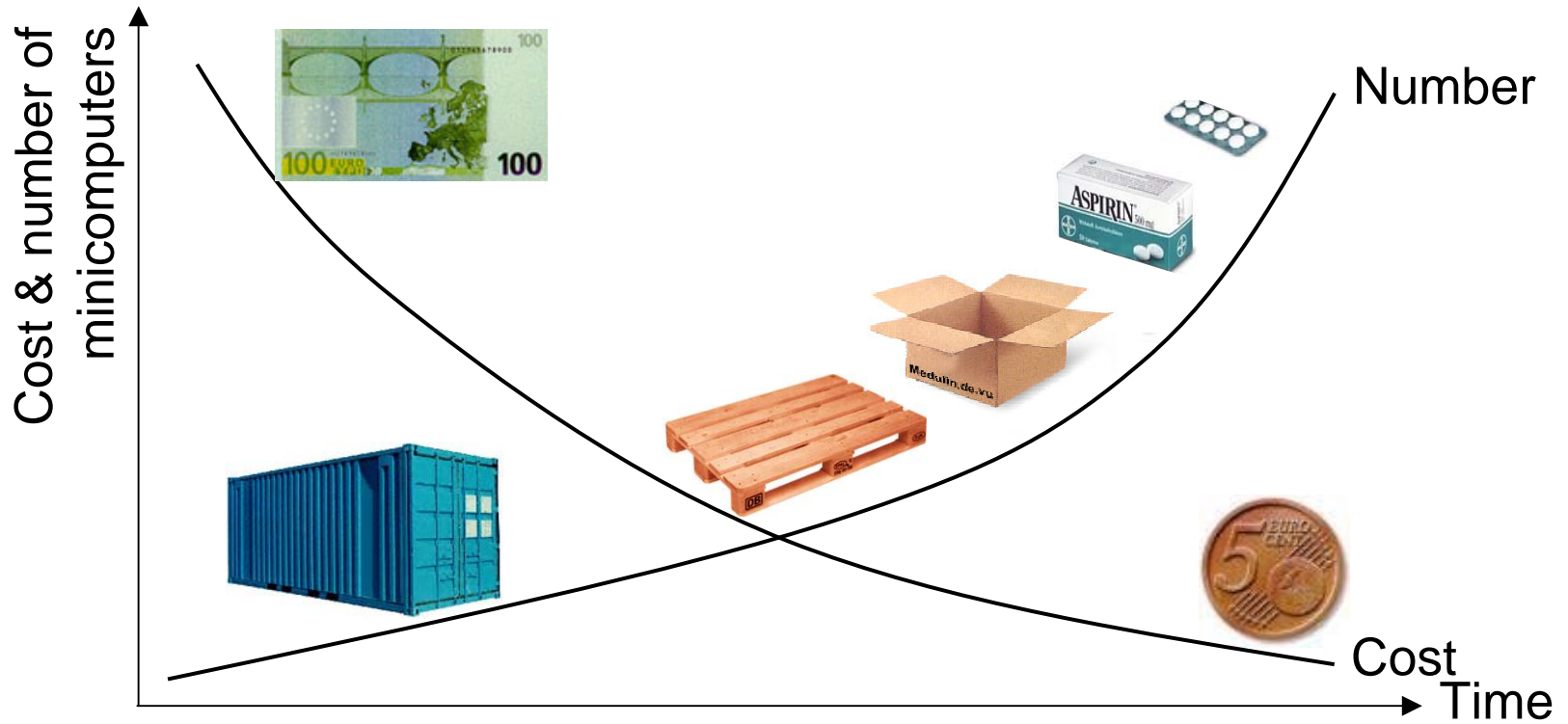
Because only what you can measure you can manage. RFID leads to better processes, new products and new services.

Control quality

Technology

Life Stream
RFID / Ubiquitous Computing

Digital (motion) pictures
Barcode, visual codes

Chemical photography
Manual data entry

Brush and easel
Punch card

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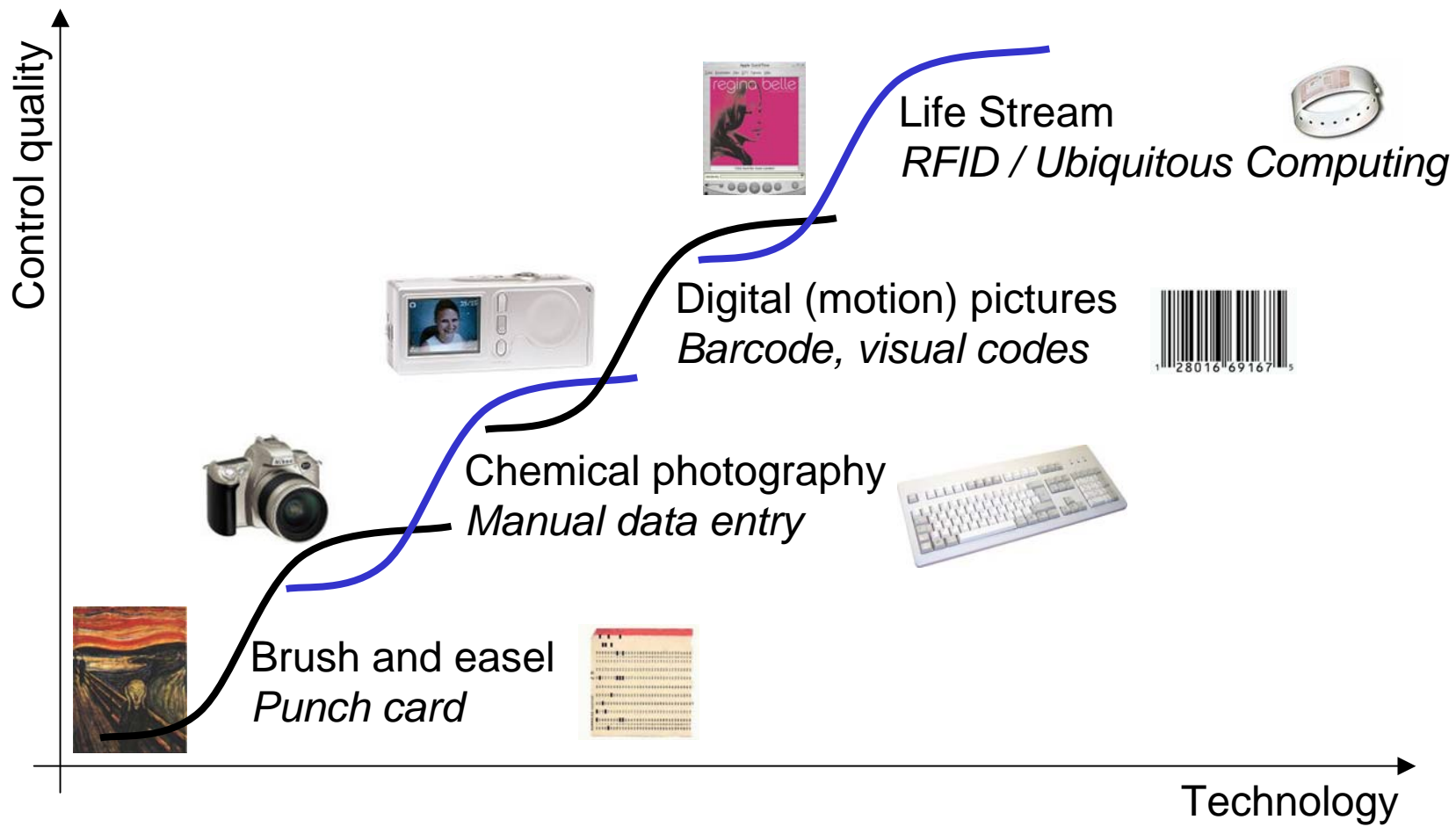
Better processes: Libraries around the world are tagging media.

Better security measurements: From ePassport to eTickets and secure banking applications

Smart Products: Guns and bikes link functionality to the proximity of jackets.

Smart services: RFID enables many new services, from track & trace, proof of origin, counterfeit protection, maintenance…
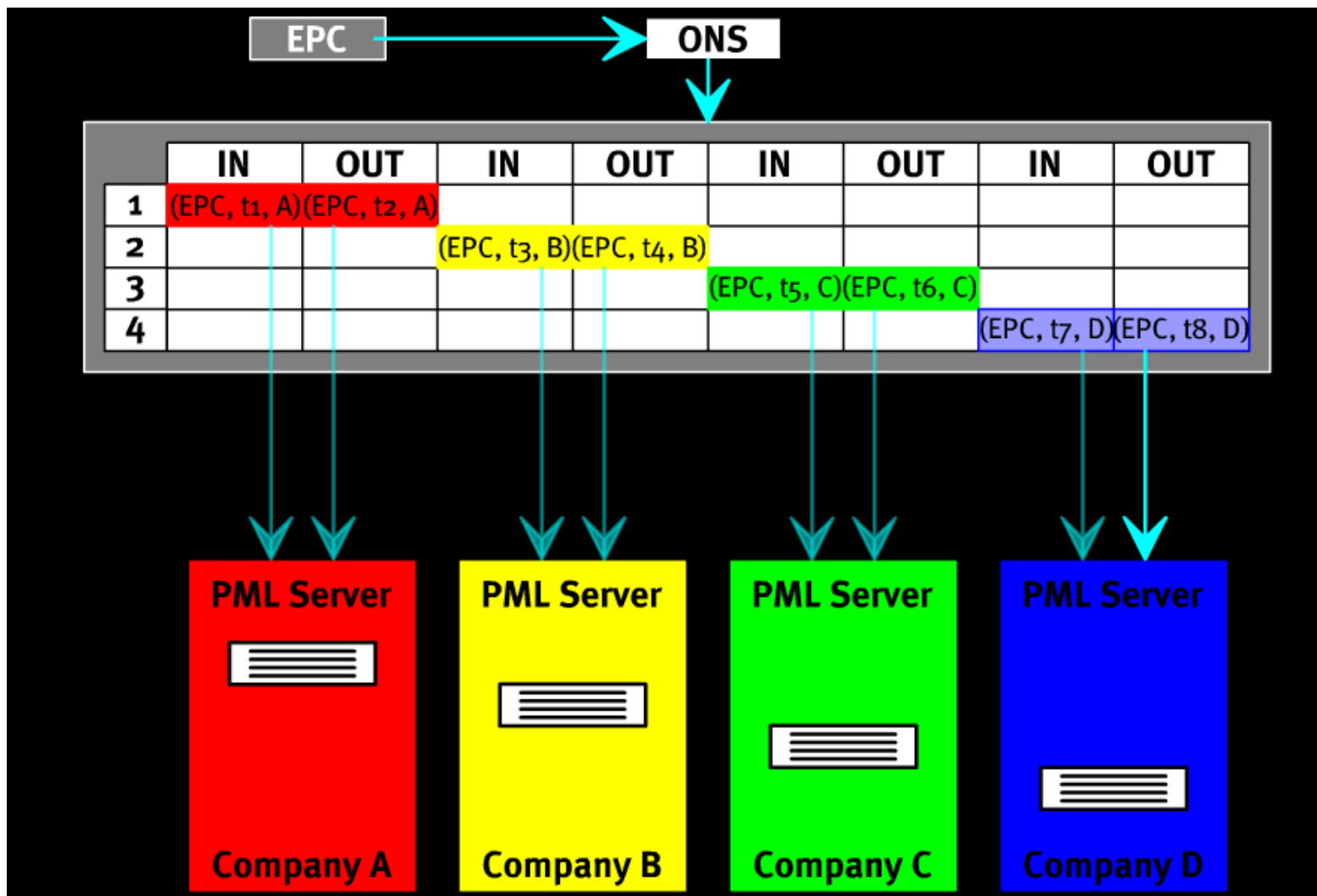
Source: Auto-ID Lab Health Care Initiative

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- The Internet of Things
- The Impact on Telcos

The Telephone of Things emerges

- Who provides the Infrastructure of the Internet of Things?
- What if Things start to call each other?
- The last meter might be RFID
- The rest might start with a Telco Network

Research network — Email — WWW — Mobile Internet — Embedded Internet Services

people to people — people to machines — machines to machines

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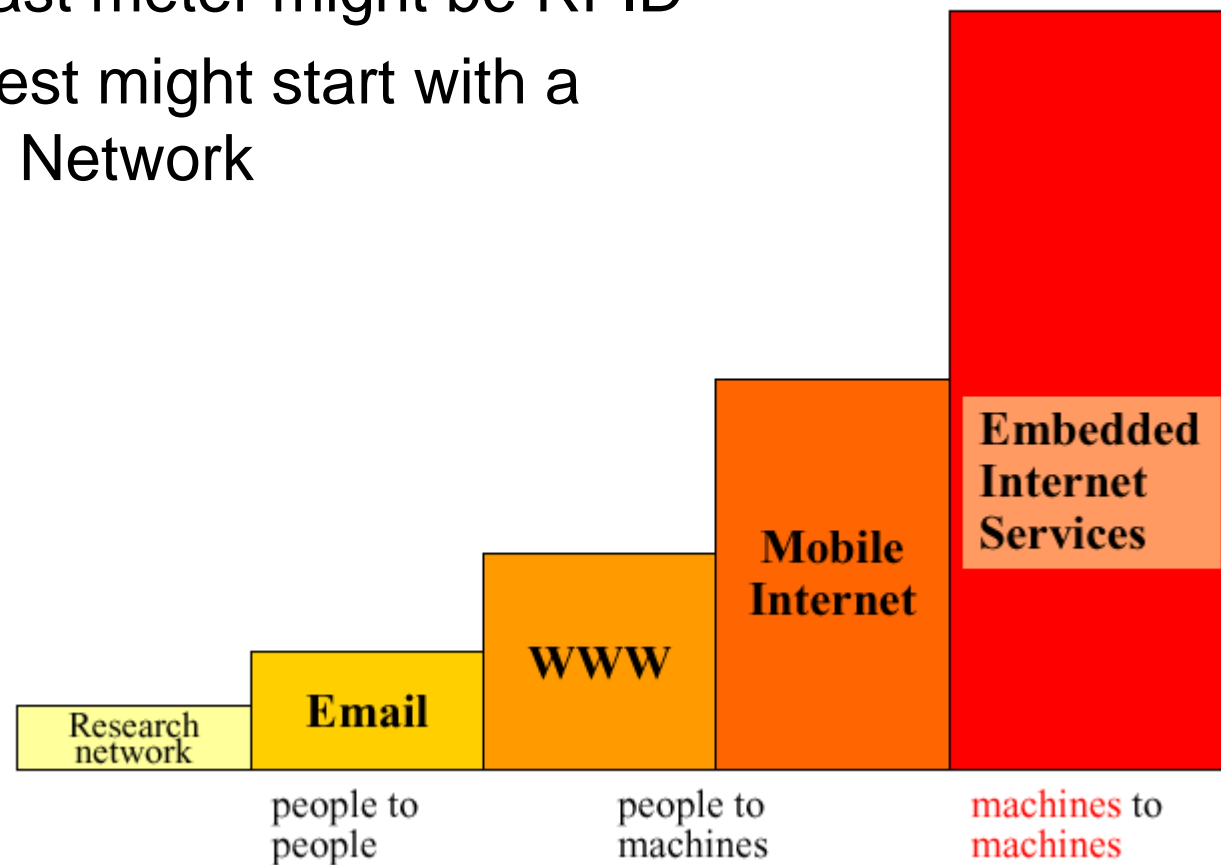
Good products want to communicate.

Quality Manager

- *Process optimization*
- *Benchmarking*
- *Quality management*

Producer

- *Usage*
- *Used functionality*
- *Operations data*

- *Production management*
- *Online services*
- *Leasing*

Smart Product

Customer

- *Handling*
- *Downtime*
- *Damage event*

- *Productivity control*
- *Alert*
- *Localization*

- *Inventory*
- *Amortization*
- *Loss rating*
- *Risk rating*

Controller Insurer

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Manage the privilege of privacy.
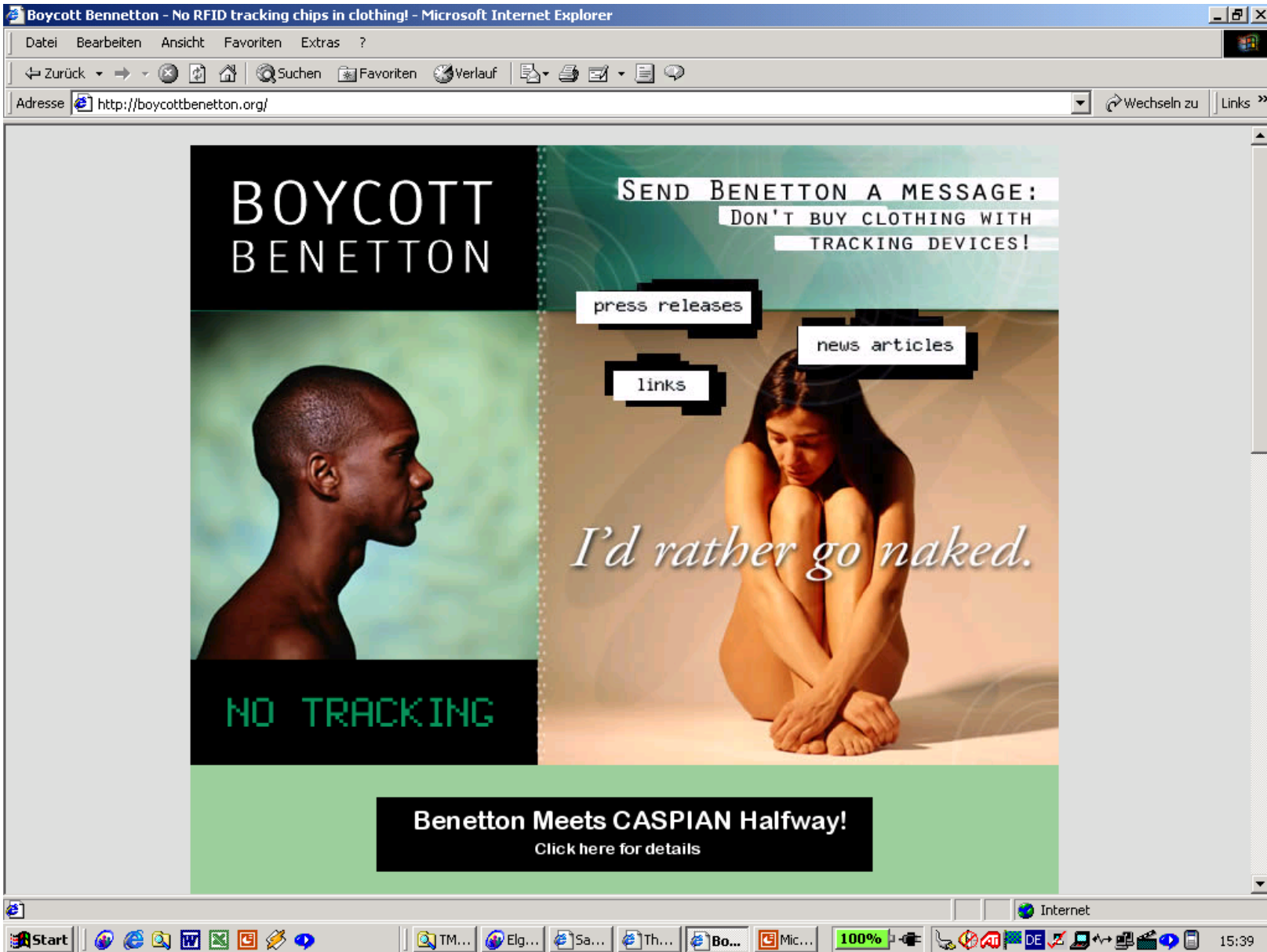
Who will make the money?

- In theory:
  - There is many more things than humans
  - Things are often mobil: thing-communication must be mobile
  - Telcos can help integrating the real with the virtual world
- In practice:
  - There is not so much going on
  - Telcos still sell bandwidth – they relay on their service partners
  - Where is the business case?
  - Is the infrastructure already there?
  - Do the pricing models fit?

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Progress has no alternative.

For questions please contact:

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