Ubiquitous Networks and Their Impact on the Traditional Telecommunication Industry

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Agenda

• Technology Trends
• Business Drivers
• The Internet of Things
• Management Agenda
Recent advances in miniaturization, …
... 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
Low cost minicomputers ...
... with mobile communication capabilities ...
… finally help to implement the vision of ubiquitous computing.
But what is it good for? No technology for technologies sake.
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• The Telephone of Things
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
... causes many tough business problems

Source: Koblischke, Lüpke, MBA Thesis, HSG
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

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
- Dell
- UCC/EAN
- Accenture
- IBM
- Coca-Cola
- Pepsi
- Kodak
- NCR
- SAP
- Symbol

Over 100 in total!
So, we started to number the world …

<table>
<thead>
<tr>
<th>ELECTRONIC PRODUCT CODE TYPE 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.0000A89.00016F.000169DC0</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Header</th>
<th>EPC Manager</th>
<th>Object Class</th>
<th>Serial Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-bits</td>
<td>28-bits</td>
<td>24-bits</td>
<td>36-bits</td>
</tr>
</tbody>
</table>
... and built the infrastructure for the Internet of Things ...

Digital world (=bits)

ERP
IP 130.82.102.55

CAD
IP 130.82.130.57

PML
IP 130.82.102.71

(Object) Name Service

Real world (=atoms)

EPC 01.0003452.000456.000000015E1
IP-Number
SIM-Number

RFID Chip
IP-Service
GSM-Module
… 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.
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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- Technology Trends
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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

![Diagram showing the evolution from research networks to embedded internet services](image-url)
Good products want to communicate.

- **Smart Product**
  - Handling
  - Downtime
  - Damage event
  - Productivity control
  - Alert
  - Localization

- **Producer**
  - Usage
  - Used functionality
  - Operations data
  - Production management
  - Online services
  - Leasing

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

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

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

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**Quality Manager**

- Process optimization
- Benchmarking
- Quality management

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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?
Progress has no alternative.

For questions please contact:

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