RFID and other AutoID Technologies in Concert – a Global Perspective

Presentation at the RFID Systech Workshop 2008
Freiburg, 10 June 2008

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Germany - Austria – Switzerland

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Data Capture and **M**obile Data Communication

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 www.AIM-D.de   -   www.AIMglobal.org

AIM: Association for Automatic Identification and Mobile Data Communication

❖ **AIM Global**

- International network with more than *900* members in *43* countries
- In the market since more than 30 years
- Entitled to suggest ISO standards

❖ **AIM-Deutschland e.V. (AIM-D)**

- *159* members in Germany, Austria, Switzerland

    Innovative small and medium enterprises (SME) and international companies like

    IBM, Infineon, NXP, Siemens, Texas Instruments, Toshiba

    22 Alliance partners: research institutes and other associations

- Cooperation with EU, BMWi, Informationsforum RFID etc.
- Focused on AutoID and mobile IT infrastructures:
    - Barcode, RFID, sensor technology
    - Mobile data communication
    - Hardware, software, services

❖ **Trade fair activities: Tracking & Tracing Theatre, CeBIT, Euro ID, LogiMAT**

Contents

- ❖ Who is AIM?

- ❖ 12 keywords about the workshop program

- ❖ Reliable signals – key of AutoID technologies

- ❖ The RFID market: history – status – future

- ❖ New developments in the barcode area

- ❖ Clear benefit opportunities

Stand: 9.11.2007

Workshop program in 12 keywords

Topics in keywords	No. of presentations
Aviation	2
CPG supply chain	3
Business value	2
Anti-counterfeiting	2
Privacy	2
NFC	1
Human bodies	1
Intelligent house	1
Metallic objects	1
Antennas and sensors	6
IT	1
Printed RFID	1

Important: RFID in internal processes of suppliers

Added consumer benefits vs. extended privacy threats

Engineering improvements to boost electro-magnetic properties

Innovative technology but no short term substitution of current RFID tags

The generic view: producing reliable signals

Barcode

- ❖ Line of sight to the reader required
- ❖ 1D linear (EAN13): limited capacity
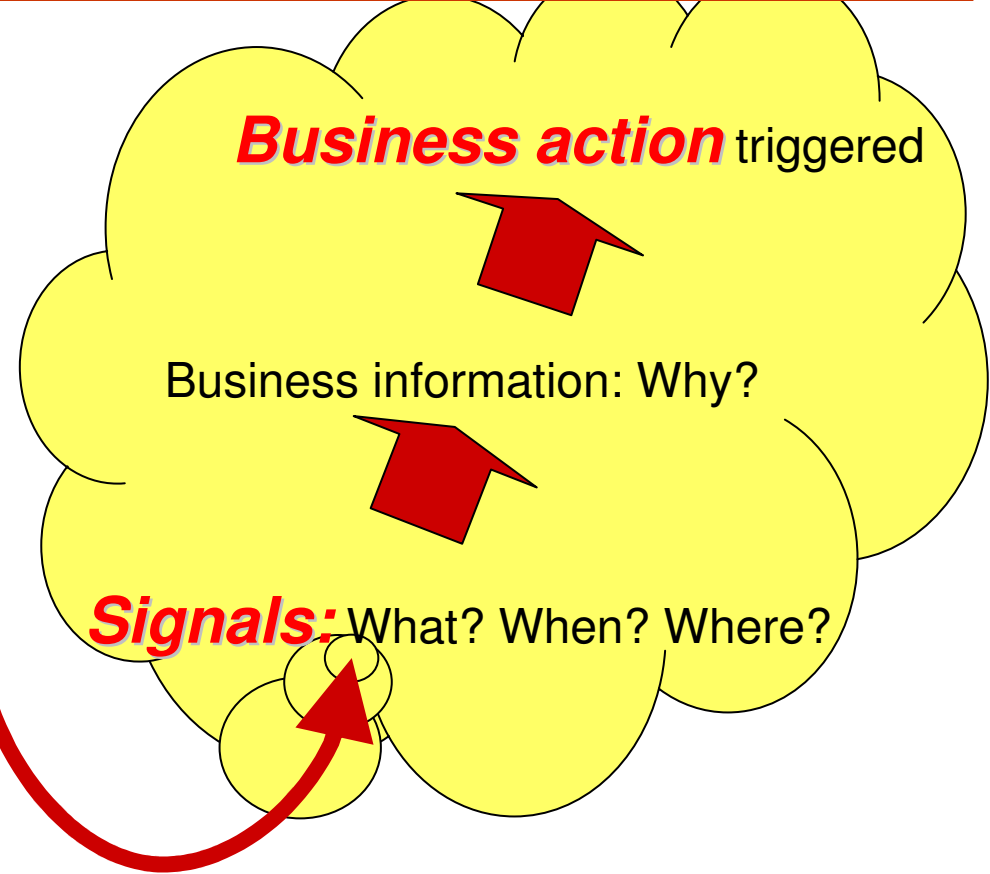- ❖ 2D: Data Matrix etc.: extended data capacity

RFID

- ❖ No line of sight connection to the reader required
- ❖ Bulk-reading ability
- ❖ Active and passive forms
- ❖ Frequencies: LF, HF, UHF, Microwave / Wlan

GPS/GPRS

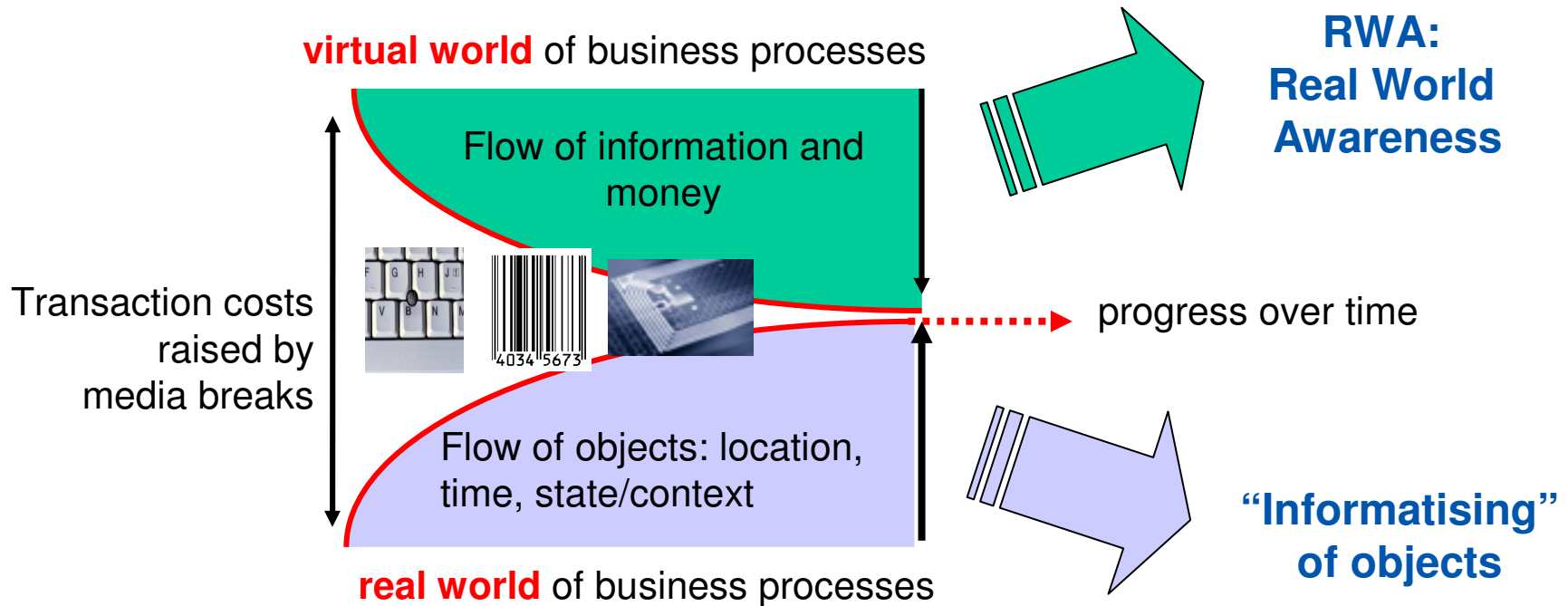- ❖ Global reach
- ❖ No local antennas required

Transforming signals into business information by ERP systems

Business action triggered

Business information: Why?

Signals: What? When? Where?

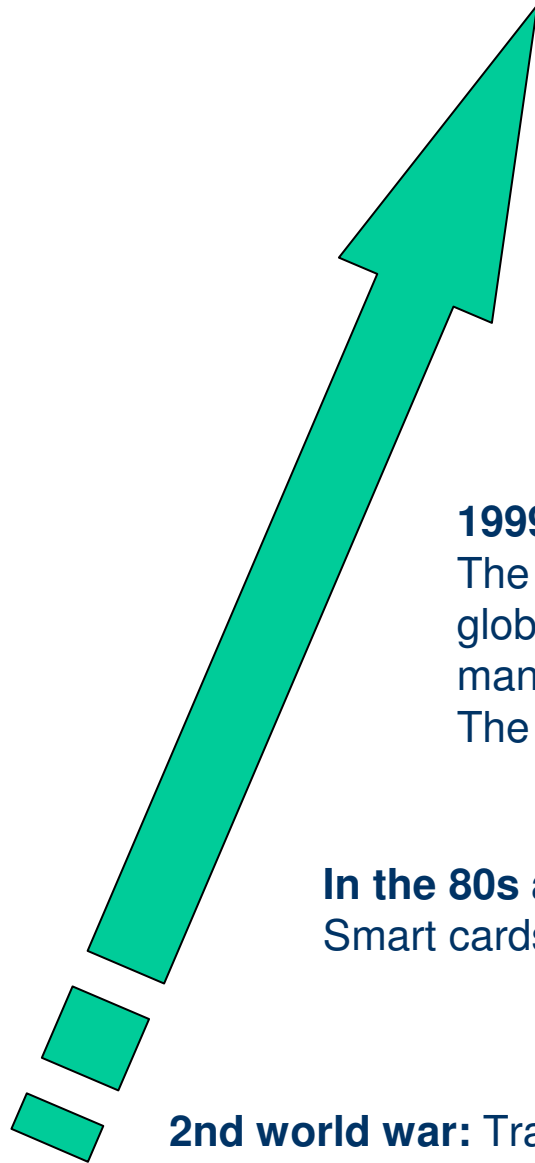# The Global AutoID Perspective

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Towards the Internet of Things with RFID

virtual world of business processes

RWA:
Real World
Awareness

Flow of information and
money

Transaction costs
raised by
media breaks

progress over time

Flow of objects: location,
time, state/context

"Informatising"
of objects

real world of business processes

Source: Prof. Dr. E. Fleisch, USG

History and future of RFID

In the future:
- Complementary use of AutoID technologies
- Deployment of many specific open and closed RFID applications
- Increased effort needed to outline value strategies
- Privacy issues to be settled with a global perspective

1999 until 2003:
The MIT story about the Internet of Things and billions of tags needed for global item tagging followed by the business perspective of the chip manufacturers:
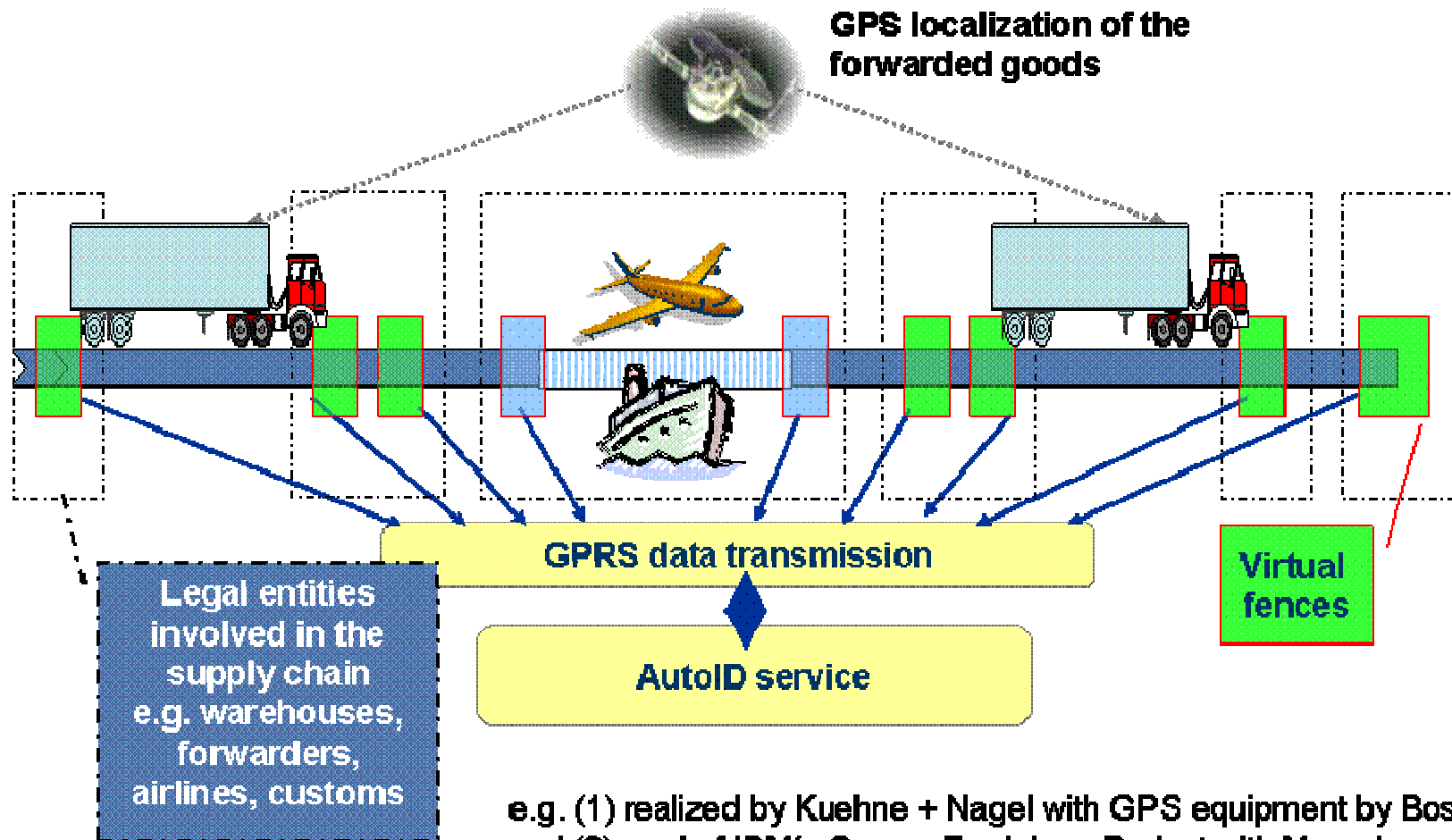The 1 cent tag has – unfortunately - not become true.

In the 80s and 90s:
Smart cards for remote locking of car doors and access of buildings

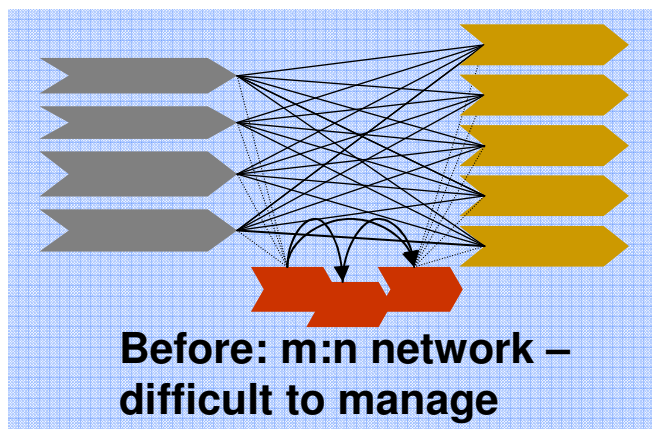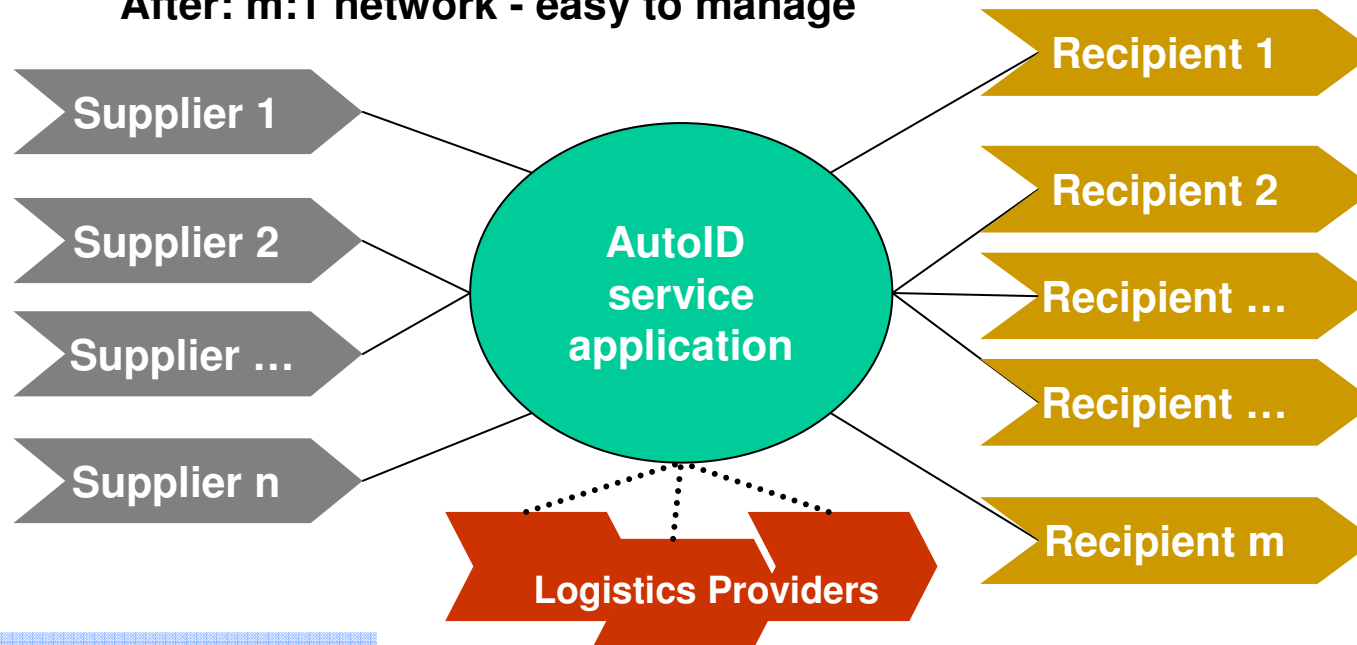**2nd world war:** Transponders to distinguish own planes from others

A global supply chain

GPS localization of the forwarded goods

GPRS data transmission

AutoID service

Legal entities involved in the supply chain e.g. warehouses, forwarders, airlines, customs

Virtual fences

e.g. (1) realized by Kuehne + Nagel with GPS equipment by Bosch and (2) goal of IBM's Secure Tradelane Project with Maersk

Simplifying network structures based on managed services

After: m:1 network - easy to manage

Supplier 1

Supplier 2

Supplier ...

Supplier n

AutoID service application

Recipient 1

Recipient 2

Recipient ...

Recipient ...

Recipient m

Logistics Providers

Before: m:n network – difficult to manage

Concept: The services provider as a middleman between a multitude of communication partners in global supply chains

Required: Agreement about **shared cost/benefit models** across the supply chain partners and about **standards** to be implemented.

RFID development in the CPG sector

Successes achieved

✓ **Globally coordinated effort:**

  MIT / Auto-ID Labs / EPCglobal / GS1

✓ **Innovation driven by the CPG companies**

  - Metro Future Store Initiative and
  - EECC: European EPC Competence Center: Reference laboratory for producers and users of RFID equipment

✓ **Fostering the global image as innovative company**

  - See PR award for Metro´s presentation at CeBIT 2006

Obstacles to be mastered

➢ **Deployment delayed because of the obstacles against RFID technology:**

  - UHF frequency for item tagging limited
  - Escape: complementary use of HF, UHF and barcode
  - RFID tags still to expensive
  - Lack of RFID and EDI competencies on the suppliers side

➢ **Benefits for suppliers unclear. Needed:**

  - More readiness for cross-enterprise process transparency
  - Cost/benefit sharing models in the supply chains
  - Cross-enterprise tracking & tracing services for pallets and other assets
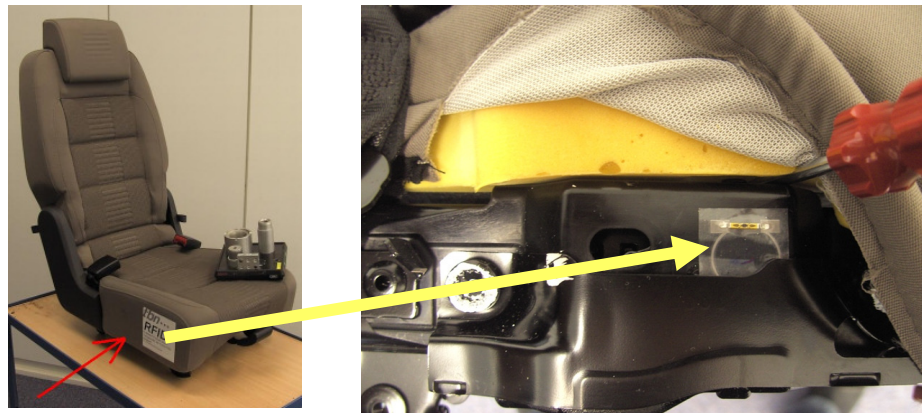
RFID innovation

Slot   RFID Tag
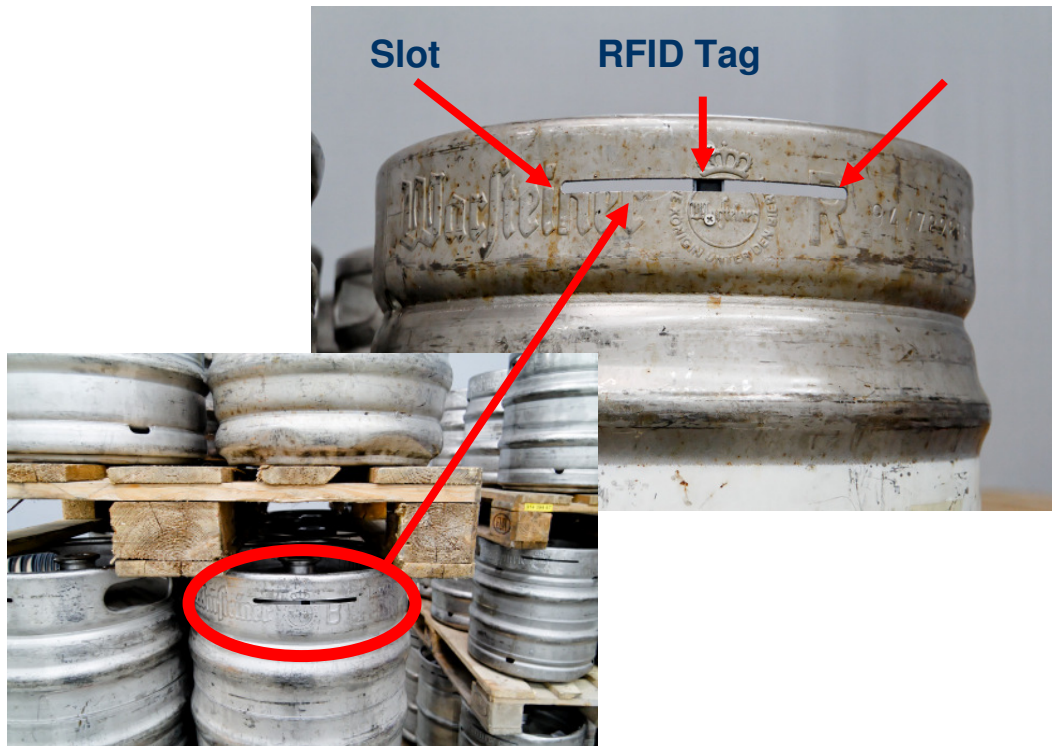
Solution to the beer keg problem:

- ❖ Before: only six kegs readable in an RFID gate
- ❖ After: Three pallets with 18 kegs readable simultaneously.
- ❖ Achieved by using the keg as amplifier for the RFID tag antenna

Source: Dematic GmbH

www.dematic.de

Same solution idea with car seats:

- ❖ RFID tags on car seats use frame as antenna amplifier

Source: Laendmarks project

www.laendmarks.de

Future of RFID

RFID

- ❖ Improved antennas and readers, better read rates,
  … but always threat of electromagnetic disturbances
- ❖ Therefore: deployment under way on garments, books
  … but not on the majority of CPG items (e.g. yoghurt cup)
- ❖ Growing on tag data storage – eg. for (MRO) parts
- ❖ Agent networks (Meshed networks)::
  - ▪ "self-directing packets" (Prof. Dr. M. ten Hompel)
  - ▪ Self control of dangerous goods
  - ▪ Communication of ship containers
- ❖ NFC: RFID dialect of mobile telephones – application scenario demonstrated at CeBIT 2008: www.ALLITouch.de

Sensors

- ❖ Temperature, shock, humidity
- ❖ Control of electronic seals

GPS/GPRS

- ❖ Global reach for container tracking without local antennas
- ❖ Communication with ship infrastructure

ISO Standards

ISO 14443 A/B	Proximity cards: contactless smart cards (10cm)	HF: 13.56 MHz
ISO 15693	Vicinity cards: contactless smart cards (>1.5 m)	HF: 13.56 MHz

Neue Familie ISO 18000

ISO 18000-1	General air interface specification	Various
ISO 18000-2	Reading distance of a few centimetres	LF: <135 kHz
ISO 18000-3	Successor to ISO 15693 (up to 1.5m)	HF: 13.56 MHz
ISO 18000-4	Reading distance greater than 100m	Microwave: 2.45 GHz
ISO 18000-5	Withdrawn	5.8 GHz
ISO 18000-6c	(> 4 m) Including version **EPC Generation 2 (if bit 17 is "0")**	UHF: 860–960 MHz
ISO 18000-7	Reading distance up to 100 m	433 MHz
ISO 18047-6	RFID conformity tests	UHF: 860–960 MHz

To be released in 2009

Available since summer 2006

NFC for the mobile „prosumer"

NFC is the RFID dialect of mobile phones.

Example:
All-I-Touch application created by Nitro Snowboards, servtag, TU Munich, CDTM (Institute of the University of Munich) and demonstrated at CeBIT 2008.

Source:
www.allitouch.de
www.servtag.de
www.cdtm.de

■■■■■ sehr gut

61% 39%

Gesamtpunktzahl: 96 (v. 100)
Telefonfunktionen: 96
Multimedia: 100
Daten/Messaging: 99
Praxis: 94

**Now also available:
Bar code reading facility of mobile phones via their camera.**

The RFID market is developing

❖ **Towards economical strength**

as projected by the Bundesministerium für Wirtschaft und Technologie, Berlin:

In Germany „the RFID-influenced share of the Gross National Product will grow until the year 2010 to about 62 Billion Euro from 3 Billion Euro in 2004", i.e. within six years by the factor of 20.

(Source: European Outlook RFID, July 2007)

❖ **More than 10% growth p.a**

are the reader manufacturers reporting, e.g. Frithjof Walk, Feig Electronic, Weilburg, and member of the board of AIM-D:

„The RFID market is developing very positively with revenues increasing by two digit rates…"

❖ **Billions of chips delivered for the smartcard production**

are the chip producers reporting, e.g. Infineon and NXP

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Tickets with 2D bar code

- ❖ **RFID Tags at the tickets of the World Football Championship in Germany were successfully equipped with RFID tags but**
- ❖ **there is an increasing deployment of 2D bar codes in the ticket market**

Future of AutoID: Barcode

- ❖ **Increasing deployment of 2D forms (e.g. Data Matrix):**
  - On pharmaceuticals
  - On documents
  - On tickets: railway, airlines, movies
  - On metal parts: Direct Part Marking (DPM)
- ❖ **Complementary usage in the CPG sector**
  - Pallets and cases with RFID, items with barcode

DPM: Direct Part Marking with Data Matrix
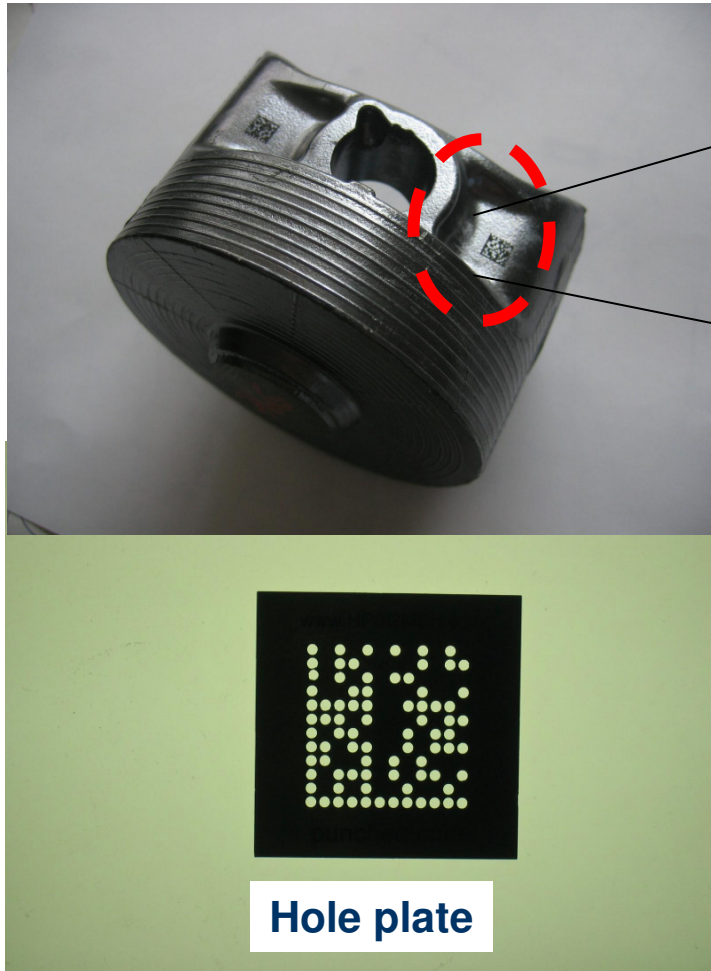

Composite form

Hole plate

Data Matrix

- ❖ Various form factors: label, print, hole plate, DPM
- ❖ Cheap printers
- ❖ High storage ability
- ❖ High fault tolerance

The variety of marking technologies

RFID EPC Gen2

EAN 13

Data Matrix with HIBC

GS1 Databar

Pharmaceutical products marked with various ID technologies demonstrated at the pharmacy as part of the

"Tracking & Tracing Theatre" at the trade fairs
CeBIT (Hanover) and Euro ID (Cologne)

Conclusion: clear benefit opportunities possible (I)

Increased revenue

❖ Less out-of-stock situations

❖ Improved promotion process

❖ Improved market release of new products

❖ Less shrinkage

❖ Less counterfeited products

Decreased cost

❖ Less complaints towards suppliers because of wrong shipments

❖ Improved efficiency at distribution centers

Less capital allocation

❖ Decreased stock volumes

❖ Less return shipments and less unsellable items

❖ Less transport items because of a higher degree of usage

Conclusion: clear benefit opportunities (II)

Advanced transport security

❖ Electronic seal (eSeal)

❖ Compliance with Homeland Security

❖ Less damage by counterfeited products: aviation, automotive, pharmaceuticals

Increased transparency

❖ For the enterprise financial reporting

❖ Compliance with SOX (Sarbanes Oxley)

Improved company image

❖ More reliable shipments

❖ Less public recalls

❖ Improved image as innovator

Enhanced consumer service

❖ Better protection against counterfeited products

❖ More and faster information about products

RFID – the global view

- ❖ **Thank you for your attention.**

- ❖ **Be free to put questions now.**

- ❖ **We at AIM are ready to assist you in your projects.**

- ❖ **… and - if you like - some reading stuff in German or English**

  **Hansen/Gillert:
  „RFID for the Optimization of Business Processes"
  John Wiley & Sons, England, 2008, ISBN 978-0-470-72422-4**

  (Auch in Deutsch im Carl Hanser Verlag, München)