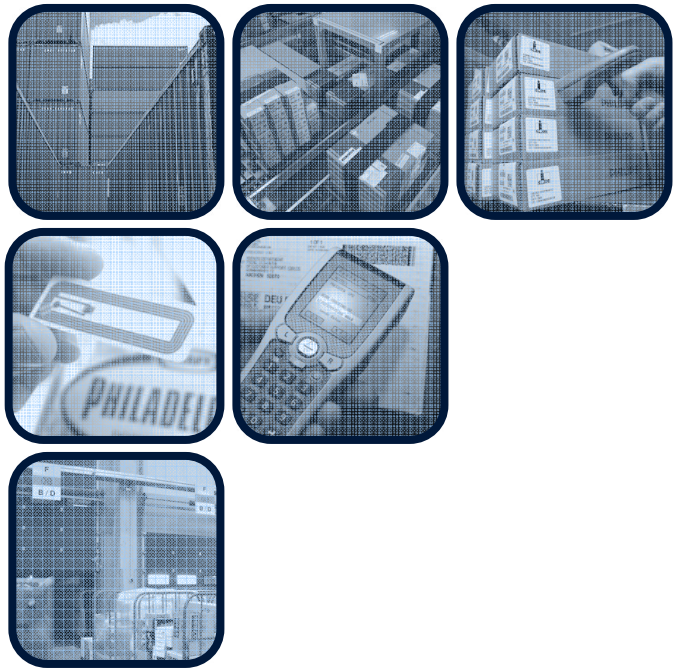

LogDynamics

Utilizing application- and data fact identifiers for structured, RFID-based data communication

Dieter Uckelmann
Email: uck@biba.uni-bremen.de

Basics – data on tag

- Advantages of RFID compared to optical identification
  - No line of sight required
  - Bulk reading
  - **Large memory possible**
  - **Data can be changed and added**

Not a focus of the EPC network as it is today

„Based on a research by IDC, 2/3 of the companies already using RFID or planning to do so only want to store a product identification number. Therewith, the advantages of this marking method (RFID) above traditional barcode are not utilized at all.“

(*Computerwoche* 16.06.2005)

What kind of data may be stored on a tag?

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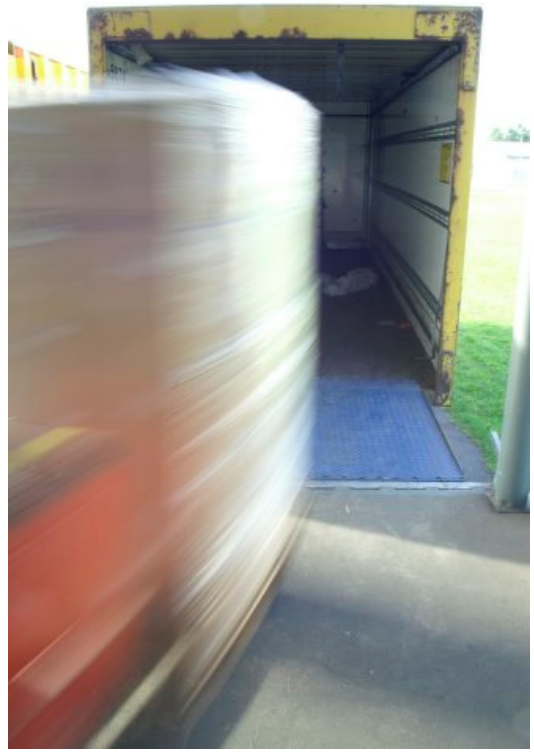
- Existing company or branch-specific identification numbering schemes in addition to international identification number schemes
- Level indicator (e.g. level 1 – product, level 2 – packaging, level 3 – case,…)
- Structured static data (e.g. lot, production line, addresses…),
- Add and change data throughout the logistic process (e.g. path and routing information),
- Add and change data throughout product life-cycle (e.g. recycling data, software revision levels),
- Collect sensor data (e.g. temperature),
- Store processed data (e.g. throughput data, remaining shelf life)



Obstacles concerning the „Internet of Things“

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Level	Obstacle
Cross supply chain business and legal issues	▪ Competition instead of cooperation (reluctance to share data across the supply chain) ▪ Limited availability of compliant partners ▪ Regional legal requirements
Technical integration	▪ Complexity and cost of infrastructure (as well as investment in existing infrastructure) ▪ Vulnerable to change
Semantics	▪ Branch- and company specific needs
Syntax	▪ Fragmentation of standards
ONS, PML, …	▪ Missing dissemination
Data transmission and security	▪ Complexity and cost of trusted transmission for business relevant data

Automation level vs. need of collaboration and trust

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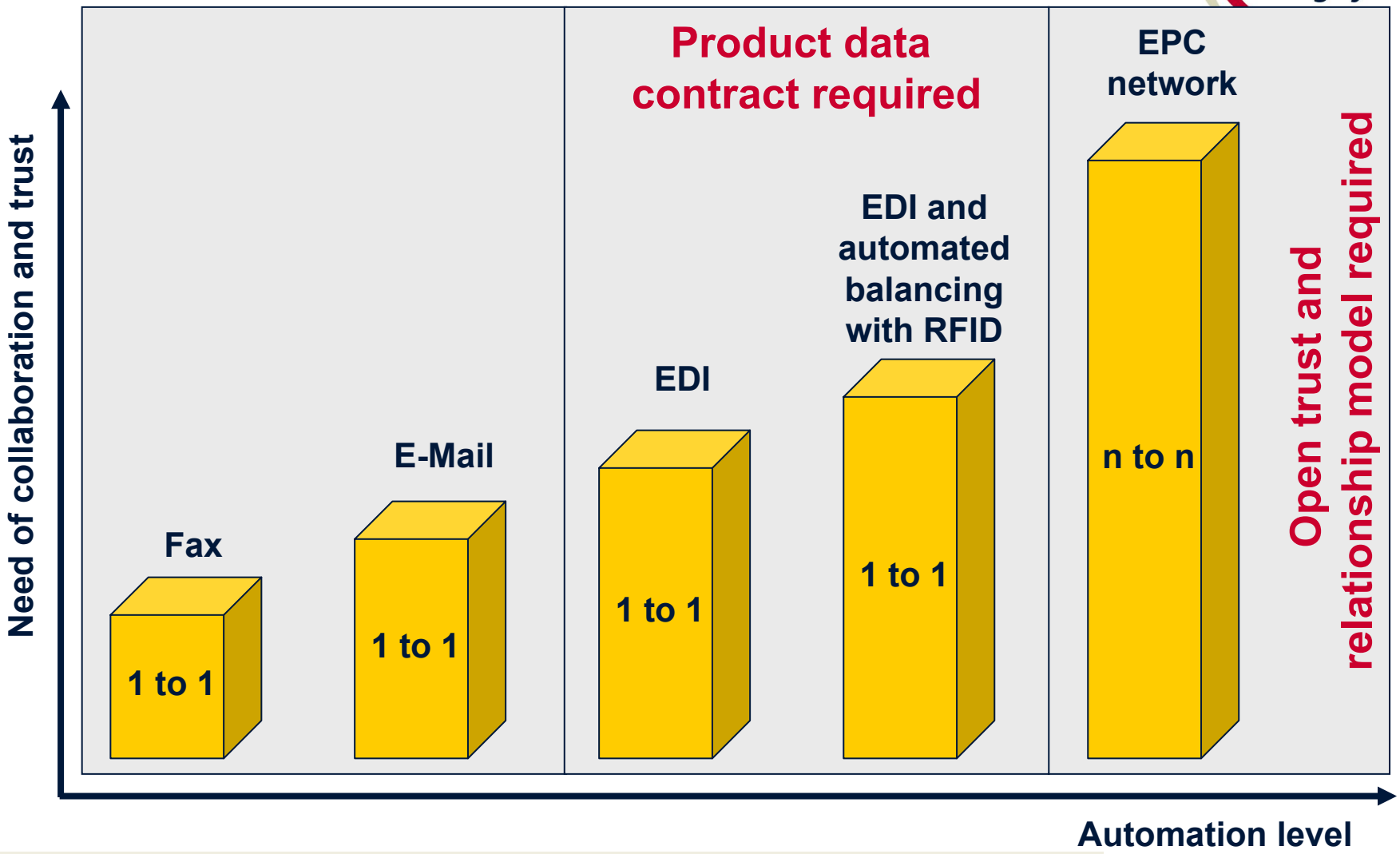
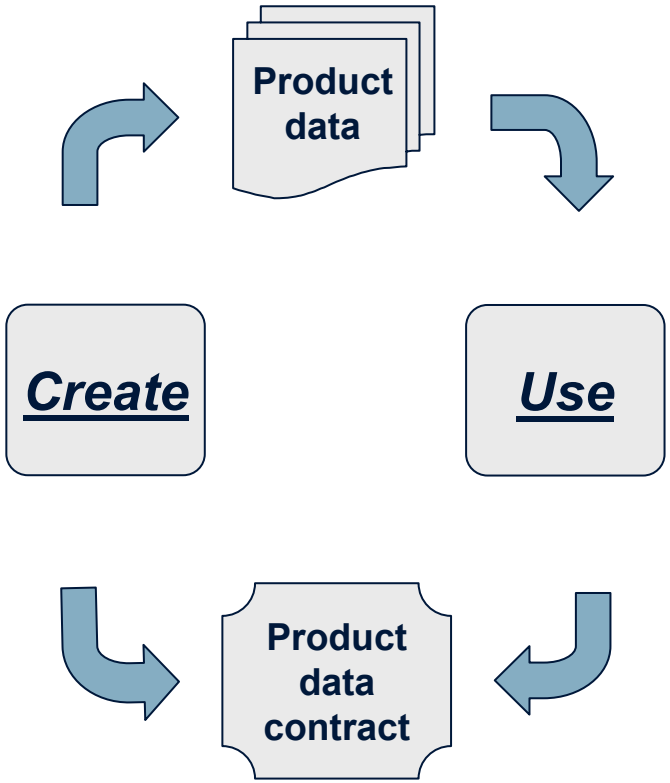


Product data contract (1 to 1)



What would an open trust and relationship model look like?

- Data contract contains:
  - Process information
  - Relevant people
  - Appoint data producer and data user
  - Define data quality
  - Define data exchange intervals
  - Push- or pull of information
  - Specify data exchange infrastructure
    - Used soft- and hardware
    - Interface definition
    - Data security
  - Complexity and cost estimation

Possible solution – go back one step

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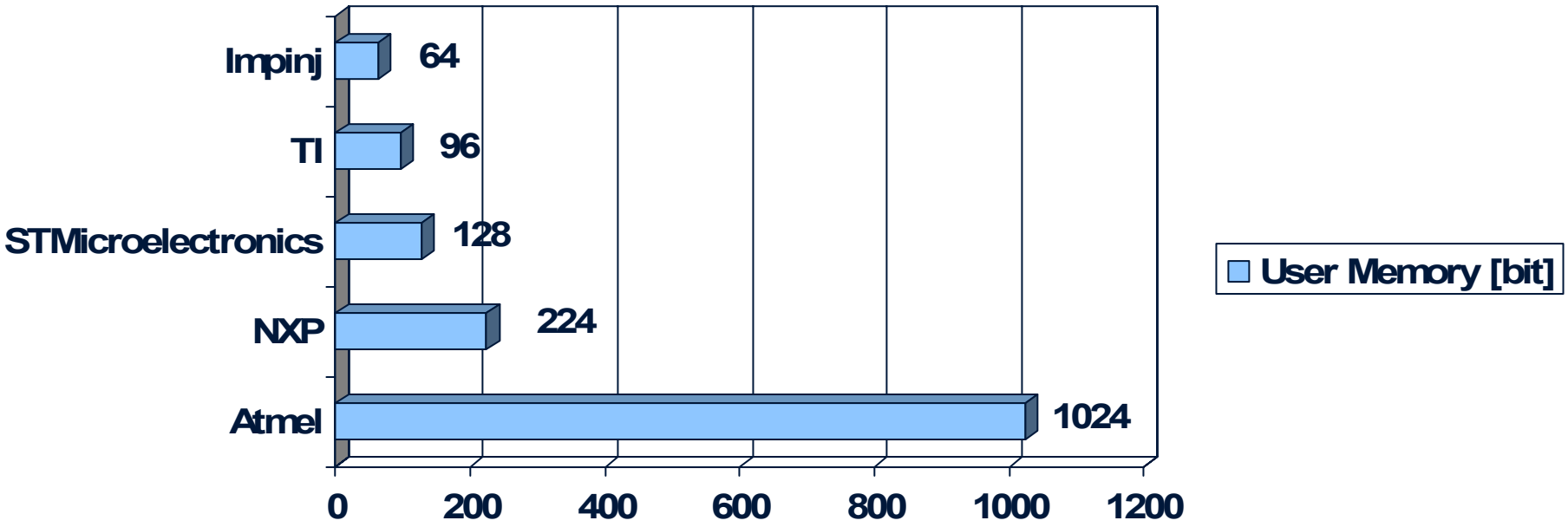
- Make use of the data storage capacity of RFID
- Adopt existing standards
  - ISO / IEC 15434 Information technology — Automatic identification and data capture techniques — Syntax for high-capacity ADC media
  - Example: [)>RS05GS00**3901234567890123 45**GS11**310107**GS13**010207**-GS3121**11**GS3131**22**GS3202**3300**RSEOT
  - EAN/UCC application identifier, Fact data identifier or text element identifier (ISO / IEC 15418)
- Utilize existing infrastructure (EDI)
- Stick to *1 to 1* relationship models and corresponding product data contracts

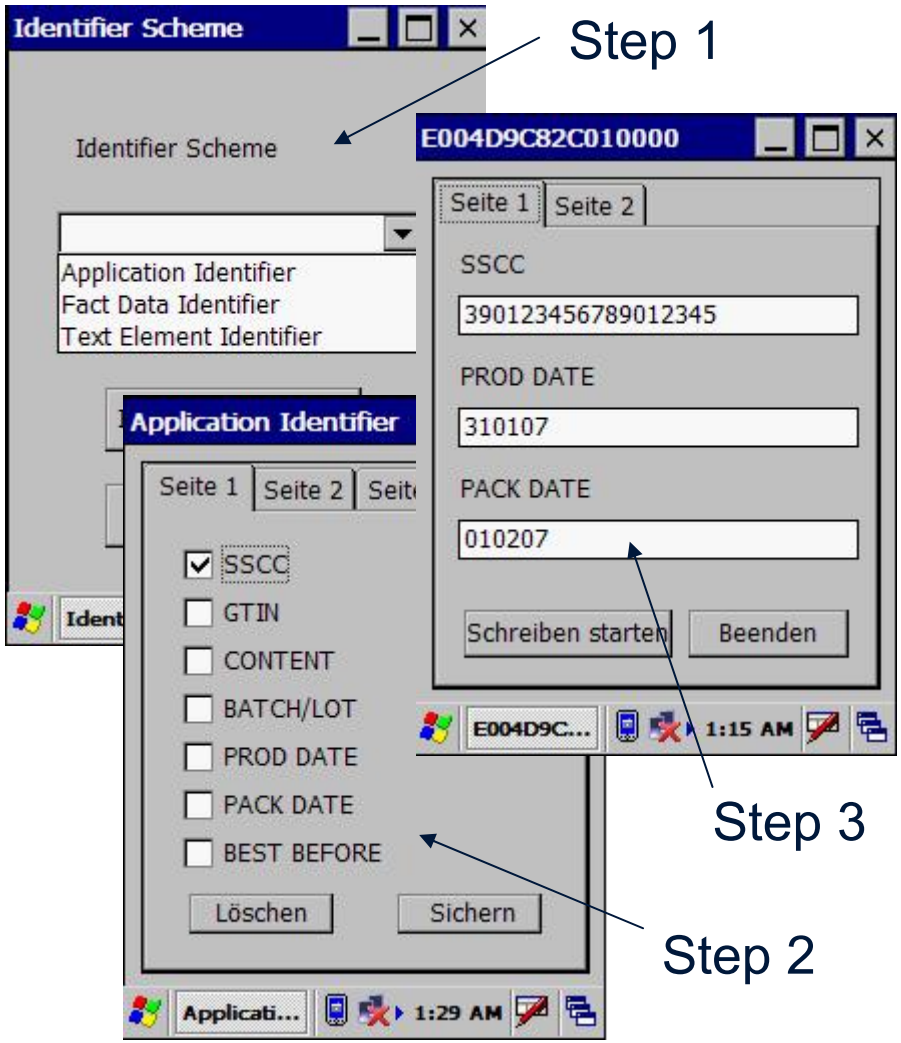
Market offerings



HF-Tags: up to 10 kBit
Intelleflex: 64 kBit

If you consider Moore's law, this is just the beginning!

Our approach



- Writing:
  - Step 1- Choose identifier scheme
  - Step 2 - Select wanted identifiers / data fields
  - Step 3 - Enter data
  - Step 4 - Structure data string according to ISO 15434
  - Step 5 - Write data to tag
- Reading
  - Automated interpretation of used identifiers

Advantages

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- No online connection needed to access data
- Readable by anyone using the same standards
- Compatible to barcodes license plates / shipping labels
- Branch- and company specific data may be stored on tag
- Existing EDI-infrastructure may be used
- No EPCIS integration required
- Data access (tag) is limited to the supply-chain stakeholders in close proximity to the logistic objects
- No open trust and relationship model needed

Challenges and solution approaches

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1. Read / write times (easily 3 to 5 seconds with a handheld reader)

   Adjust processes?!

2. Limited user memory (only NXP with Gen2 available) / data overhead

   Compression?!

Uncompressed	Compressed
32 Byte	57 Byte
52 Byte	60 Byte
62 Byte	60 Byte
72 Byte	59 Byte
132 Byte	62 Byte
272 Byte	64 Byte

3. Incomplete transmission

   Read check?!

What‘s missing?

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- Indicator for user memory
- Standardized structure for Gen2 user memory (now vendor defined)
- Data standards for sensor data / dynamic data
- Data standards for processed data (e.g. remaining shelf life)

Thank you for your attention

Dieter Uckelmann
Phone: ++49 421 218 5550
uck@biba.uni-bremen.de

http://www.logdynamics.de/