

Identification and Tracking of Individuals and Social Networks using the Electronic Product Code on RFID Tags

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**IFIP Summer School, August 2007
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Workshop on Ethical and Privacy Aspects of RFID**

Who's talking?

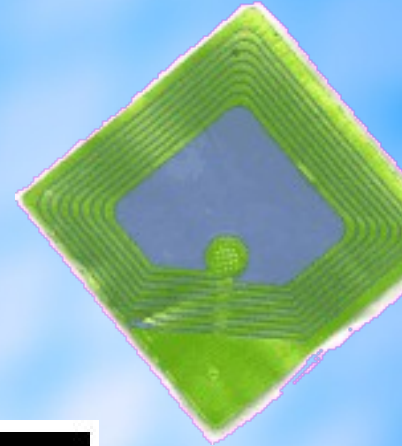
- **Independent Centre for Privacy Protection**
Unabhängiges Landeszentrum für Datenschutz (ULD)
 - **Office of the Privacy Commissioner** of Schleswig-Holstein, Germany's most northern and most beautiful federal state.
 - **Supervisory Authority**
Public administration as well as private sector.
 - **Consultancy**
Technical, legal, and organisational questions on privacy and IT security.
 - **Certification Authority**
Privacy Seal for IT products.
 - **Advanced Education and Training**
Privacy Academy (Datenschutzakademie).

<https://www.datenschutzzentrum.de/>

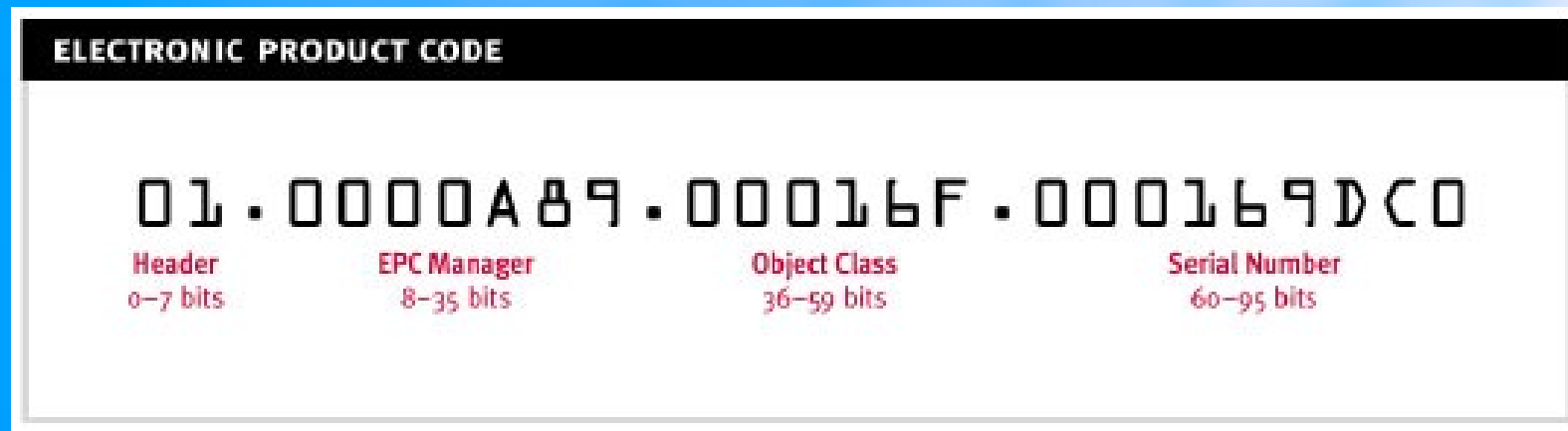
Who's talking?

- **Independent Centre for Privacy Protection**
Unabhängiges Landeszentrum für Datenschutz (ULD)
 - **Projects** – Bring privacy into concepts and designs.
 - **PRIME**
Privacy and Identity Management for Europe
 - **FIDIS**
Future of Identity in the Information Society
 - **TAUCIS**
Technology Assessment Ubiquitous Computing and Informational Self-Determination
 - **SPIT-AL**
Countering Spam over Internet Telephony
 - **Current Hot Topic:**
“Online-Durchsuchung”
Remote Search of Computers by Law Enforcement

Electronic Product Code



- Item-**unique** identifier for goods.



- Standardised and issued by EPCglobal Inc., NPO founded by GS1(EAN) and UCC.
- EPC is a set of coding schemes for RFID tags, originally developed by MIT AutoID centre.

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Retrieving Information

- **ONS** – Object Name Service:
 - Works similar to DNS;
 - Locate information on queried EPC.
- **EPCIS** – EPC Information Services:
 - Exchange data (real-time aimed) on certain EPC from members of the
- **EPCglobal Network**:
 - Community, NOT technical network.
 - “*Subscribers*”

Tracking People with EPC?

- “EPC tags do **not** contain **any** personally identifiable information about consumers. [...] The only information that is contained in the EPC tag relates to the product, not the purchaser.”

EPCglobal Public Policy Steering Committee FAQ

- “Licensing agreements for the EPC specifically prohibit its use for tracking or identifying people, **except** in very specific cases and with full transparency relating to patient or troop safety.”

PPSC Fact Sheet: Important Messages About EPC and RFID

Identification: Lessons from Biometrics

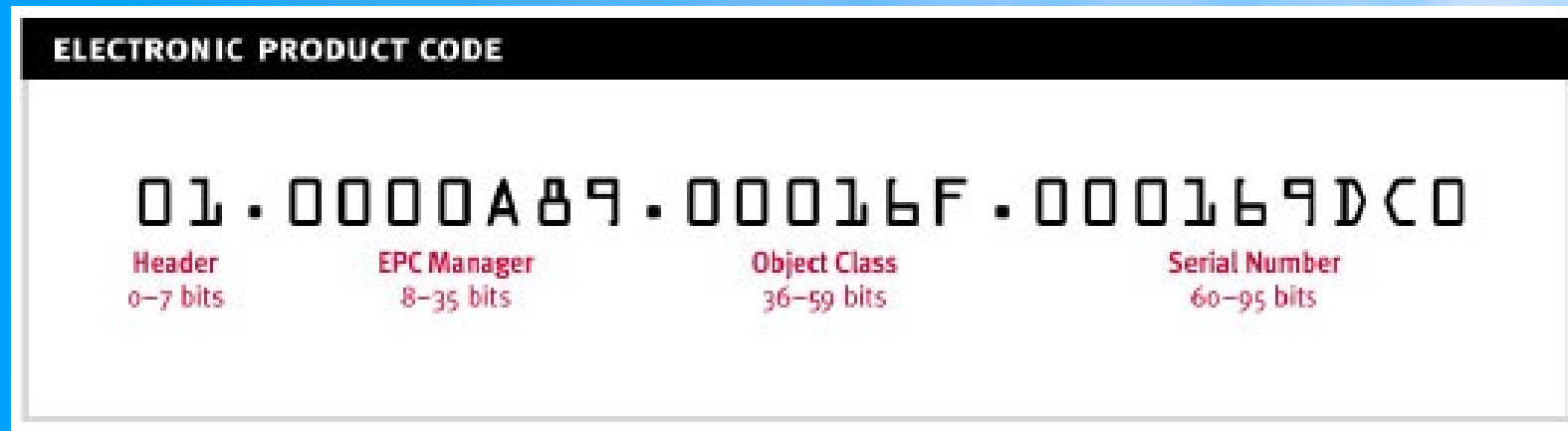
- Characteristic and non-characteristic data.
- Gather set of characteristics.
- Match againsts enrolled set:
 - **Non-binary functions** => true/false by **probability**.
 - **False** acceptance / **false** rejection **rates**.



Classification of Products

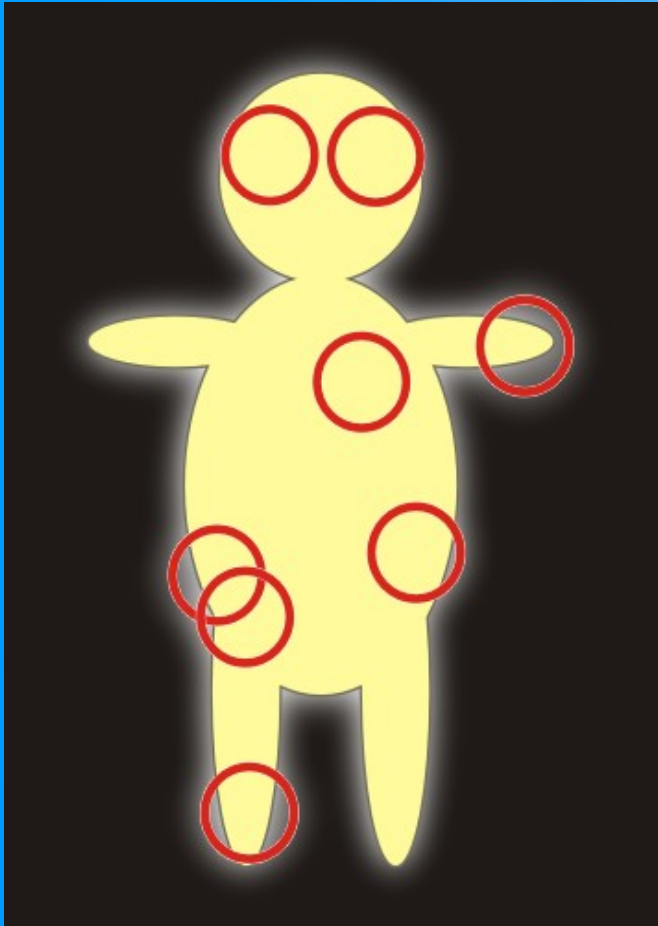
- By probability of being used by a single person only.
Shoes Glasses frame Underwear
(Implants?)
- Others used once only or often by different individuals (chocolate bar, refillable bottles).
- “Shades of grey”
- Classification scheme?

Map Classification to EPCs



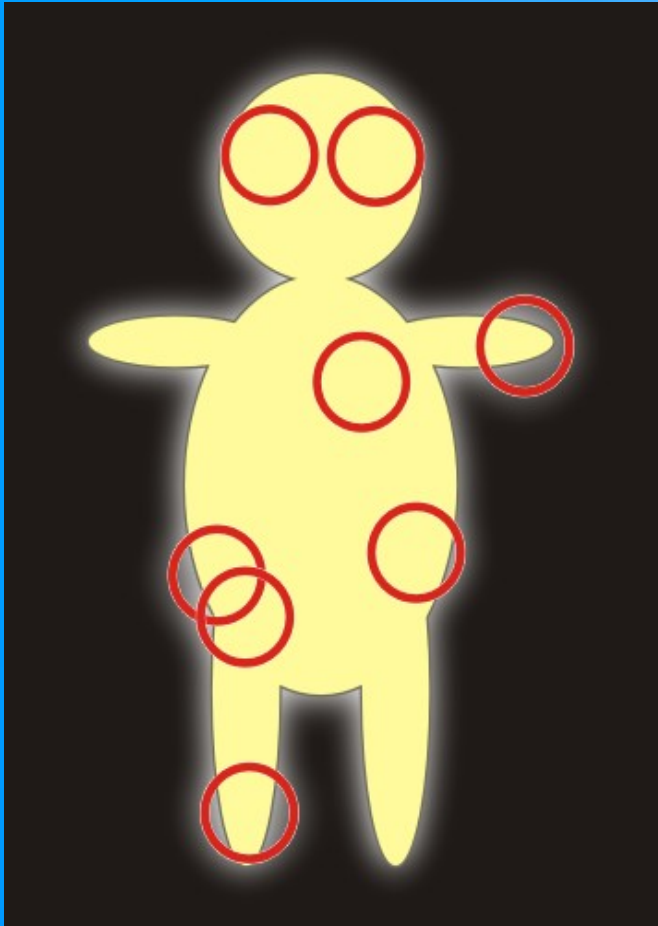
- **Create database mapping product classification to object classes.**
- **Remember:**
Serial number allows for unique identification.

The EPC Cloud



- Read RFIDs: Set of EPCs.
- Look up EPCs in ONS.
- Retrieve information via EPCIS.
- Map product classes against classification.
- Select subset of (high probability of) individuality.
- “Continuous Enrollment”

The EPC Cloud – What do we know?



- **What? => Who?**
Unique identifiers
- **Where?**
Reader ID etc. from EPCIS
- **When?**
Time Stamp
- **What => Profiling:**
Consumption habits ...
- **When&Where => Tracking**

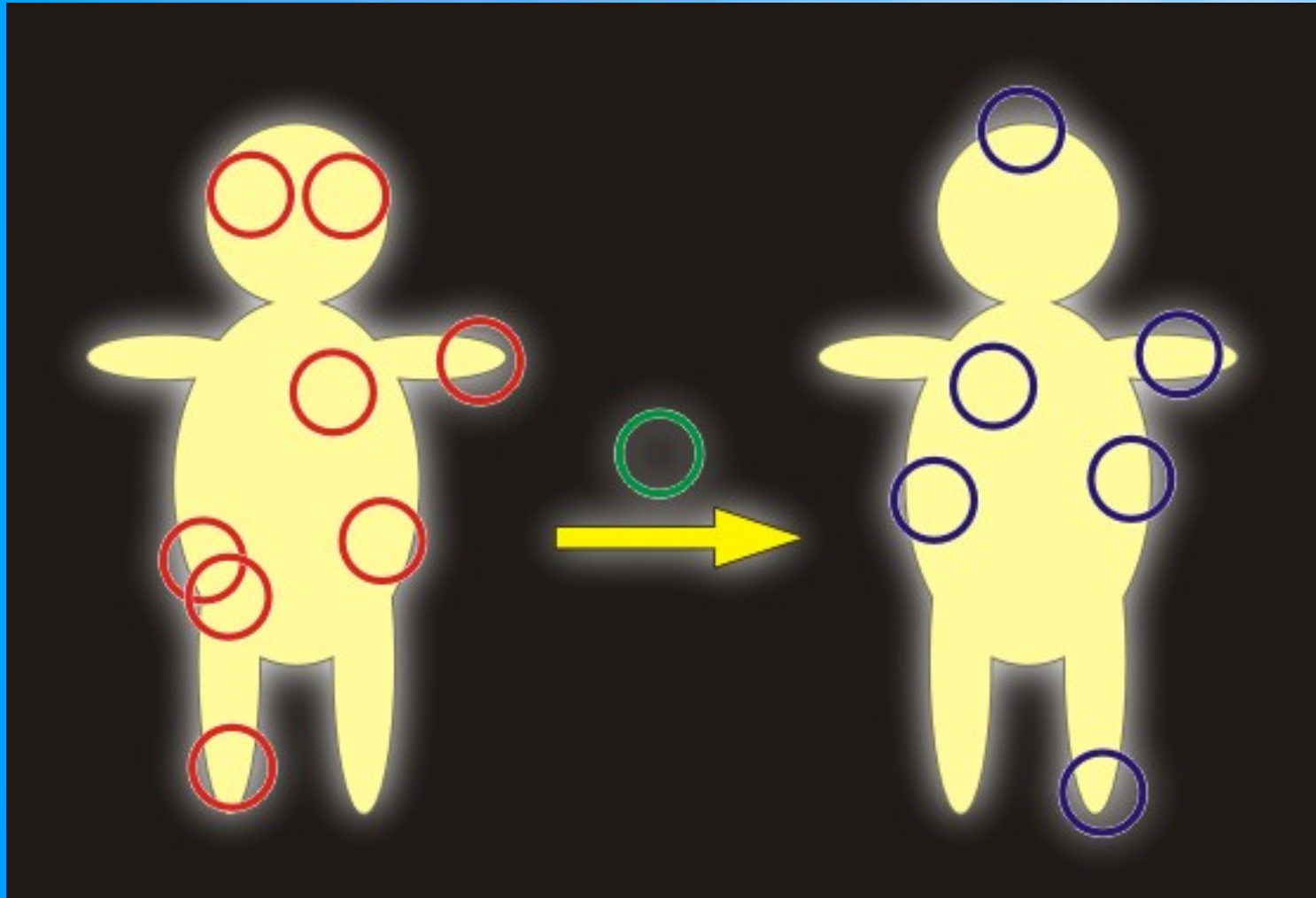
The EPC Cloud – Follow the Clouds!

- ***“A fundamental principle of the EPCglobal Network Architecture is the assignment of a unique identity to physical objects, loads, locations, assets, and other entities whose use is to be tracked.”***

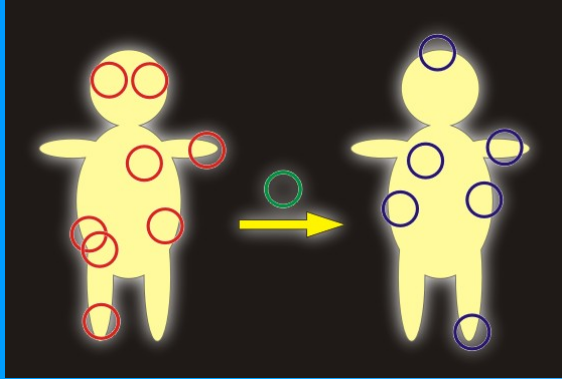
EPCglobal Architecture Framework Final Version

- **EPC is not just a number:
=>Privacy implications arise from RFID tags
and even more from EPC data processing
systems.**

Cloud Hopping



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Cloud Hopping

- **Unique ID appears with different EPC cloud.**
 - ⇒ **Social interaction probable,**
 - ⇒ **Link between individuals.**

“Social Networks” (nodes, ties)
- **Find patterns of Cloud Hopping.**
 - ⇒ **Mappable to types of social interaction?**
 - ⇒ **Mappable to types of social relation?**

Father <> Daughter, Employer <> Employee, ...

Infrastructure Requirements

- **Vision:** RFID with EPC as barcode replacement on any goods and everyday items.
- Readers at shops, in cupboards, fridges, washing machines, TV set-top boxes ... just everywhere.
- Readers connected to ONS & EPCIS.

Security? Privacy?

- **Security precautions as found in EPCglobal documents have their main focus on authentication and authorisation when using EPCIS and therefore are probably not intended to secure consumer privacy, but the business model of EPCglobal.**
- **“Subscribers”**

Security? Privacy?

- ***“The EPCglobal Architecture Framework does not currently discuss how these features affect the architecture above the level of the Reader Protocol, nor is there any architectural discussion of how the goals of security and privacy are addressed through these or other features.”***

EPCglobal: EPCglobal Architecture Framework Final Version

Legal Aspects

- **Identification of customers by personal profiles created from consumption and interest data, location data and data about social links.**
- **Person might be identifiable even though no traditional identifiers are available:
=> Items of high probability of individual use.**
- **EPC item-unique tagging usually will entail a processing of personal data.**

***C.f. Art. 29 Data Protection Working Party:
Working Documents WP 105, 136.***

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Conclusion

- **EPCs on RFIDs are personally identifiable data, allow new type of privacy invasion.**
- **Legal regulation inherently can not prevent misuse, just sanction it:
Technical designs of systems have to provide precautions to protect privacy of individuals by enforcing e.g. purpose-binding and deletion of collected data.**
- **As of now, license agreements seem to be the only – insufficient – protection against the described scenario.**

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Thanks for Listening!

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