



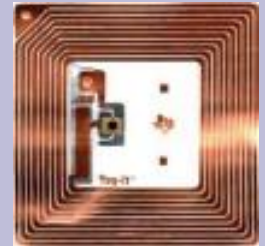
Policy implications of RFID

Research to investigate the need for policy of the government on RFID

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Use of RFID in 'traditional' applications

- Use of RFID in the retail sector for logistics
- Wal-Mart forces suppliers to tag their products
 - From 100 largest suppliers only 4-5 neglected the mandate
- Next step: Scan Based Trading (SBT)
- *New business models arise...*



Use of RFID in 'traditional' applications

- Use of RFID in the retail sector for customer cards
- RFID loyalty card introduced by METRO
- Customers / free market force METRO to retreat
- Negative press: deactivation tags did not work, hidden use of RFID, spy customers?
- *Perceived intrusion on one's privacy ...*

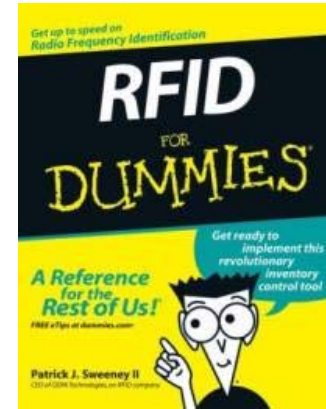
STOP
RFID

BOYCOTT
BENETTON



How to deal with impact on society?

- Anticipate on impact
 - Policy needed
 - Remove barriers
-
- Use of RFID in new application area's
 - Identification
 - Authentication
 - Monitoring / sensor-combinations
 - Data storage & Combinations



Identification

Of goods, animals, people

- VeriChip
- *Integrity of the body*
- Passport
- *Privacy*



Authentication

- Medicines, parts, fiches, counter fighting: are they genuine?
- *Health: Liability?*
- Payment (OV ChipCard)
- *Security and Privacy*



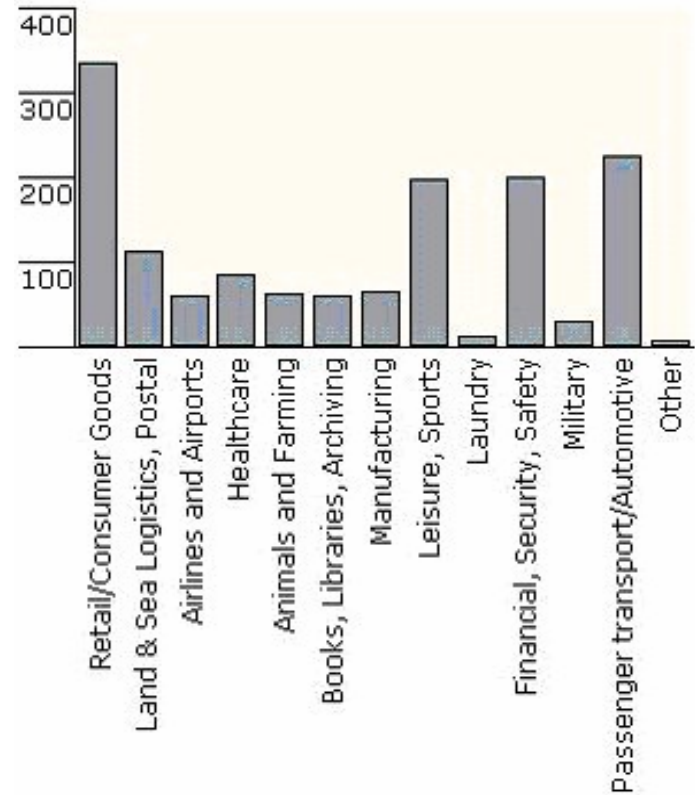
Monitoring

- E.g. Materials in hospital
- *Uniform coding*
- E.g. Container transport
- *Different frequencies (due to different country policies)*
- Buying behaviour
- *Privacy (CASPIAN)*
- Ambient intelligence
- *Let it be known that there is 'surveillance'*



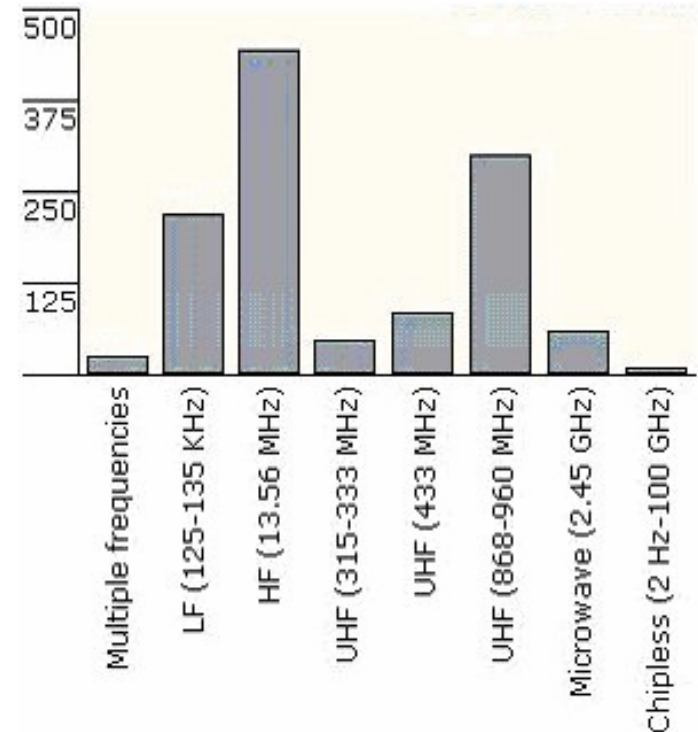
Data Storage

- Blood temperature
- *Data integrity / responsibility*
- Object Name Server
- *Liability (e.g. theft) / Security / Availability / Integrity*



With RFID, new ways of working arise

- RFID exists for many years
 - LF (125 – 135 kHz) and HF (13.56 MHz)
- New: development of UHF chips
 - Larger scan distances (meters)
 - Higher data rates
 - Often used in the 860 – 960 MHz frequency area
- New: combination with sensors
 - Temperature, pressure, moisture
 - Biosensors
 - Often used in the 433 MHz frequency area
- Internet and wireless networks
 - Better data communication



Policy of the government seems desired

Potential policy areas:

- Economic rules
 - Treat Dutch companies fair w.r.t. other countries
 - Stimulate innovation
- Privacy rules (to prevent misuse, identity theft, ...)
 - Current legislation seems sufficient (ECP.NL)
 - Bill of rights
- Frequencies
 - Harmonisation
- Social rules
 - Enforce the availability of alternatives
- Health and environment
 - Radiation
 - Pollution (make and throw away many chips)
- Rules w.r.t. tracing misuse / criminals
- Security: rules w.r.t. technical requirements



However, makes it any sense to regulate?

- International issue
- Market will arrange itself (not to be influenced)

harmonisation important

think in creating challenges, instead of regulating threats

Always a balance: security – convenience – efficiency



Security barriers

- Skimming (interception RFID transmission)
 - Possible from large distance
- Jamming (disorder reader by sending radio signals)
 - Compare with radar detector in cars
- Unauthorized access to data (including virus threat)
 - Not specific for RFID
- Cloning tags
 - Even SIM cards have been cloned

**Concrete actions: Penalization misuse of RFID /
disorder of frequency usage**



Privacy barriers

- Many 'tall stories' on which the consumer founds its opinion
- Technologically seen there are many ways to harm privacy – but often difficult in practice
 - Theoretical discussions – but how in the future?
- Generic problem: management of personal digital information
 - PETs, 6^{de} framework programme EU
- Current legislation sufficient (ECP.NL research)

Concrete actions: Take away social unrest by providing true information





Technology barriers

- Reader collisions
 - Too many readers close to each other
 - Related to the available bandwidth:
 - Too small is a disadvantage
- Tag collisions
 - Too many tags answering simultaneously
 - Anti-collision solutions available (privacy sensitive)
- Bad performance in humid environments
 - Absorption of RF energy
- or in the neighbourhood of metal
 - Reflections

Concrete actions: Broader UHF RFID bandwidth



Frequency barriers

- Frequency band not harmonised
 - In the USA a larger scan throughput is possible
- Frequencies harmonised
 - In the USA scanning is possible from a larger distance
 - Readers can handle diversity in frequencies
- Diversity in RFID capacity
 - In the USA scanning is possible from a larger distance

Concrete actions: Harmonise RFID frequencies and corresponding capacity (power)



Lack of standards

- For security
- For applications
 - Which tag/frequency to use?
- Identifiers and coding
- Data models
- Communication protocols

- Trend toward industry-specific (de facto) RFID standards (retail, IATA, ...)



Concrete actions: None, will de facto be arranged by the market





Economic barriers

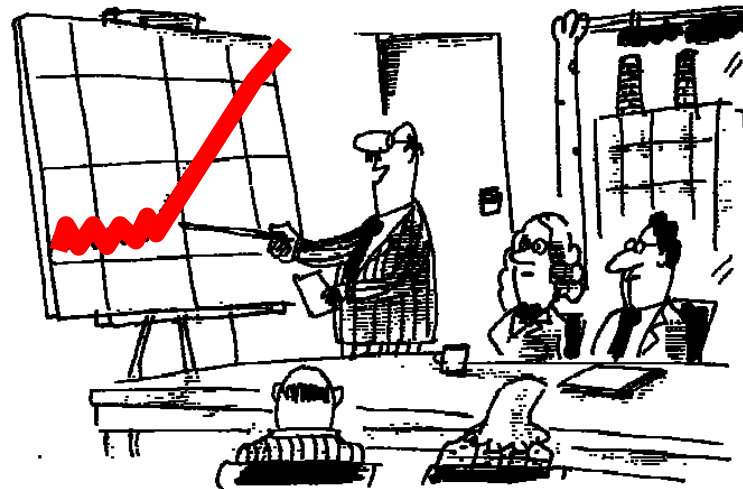
- Uncertain ROI
 - In particular hesitations for suppliers (MKB)
 - Expensive tags
 - Many applications can be realised by barcodes
- Efficient solutions go beyond the scope of a single company
 - Sharing data
 - Access control
- Spying
- Integration with existing systems
 - ERP, CRM, ...

Concrete actions: Government as launching customer?



Lack of best practices

- Where to place tags/readers?
- Which tag is best for which application?



“...at this point in time we started with RFID”

Concrete actions: Set up an RFID test centre?





Barriers on health, well-being and environmental issues

- Production of tags
- Destruction of tags (including a possible battery)
- Radiation
- Swallow tags

Concrete actions: Map potential risks in an early stage (investigations needed).



Other barriers

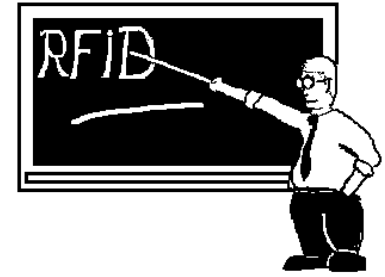
- Processing RFID data
 - Large amounts of data
 - Sharing data
 - Data mining



Concrete actions: None (business issues).



Conclusions



- No specific Dutch barriers
 - Possible exceptions privacy (culture specific)
- Netherlands en Europe are at a disadvantage with respect to RFID scan throughput, scan distance en capacity
- International cooperation and harmonisation required
- Accumulation of technical, organisational, social and economic barriers: deadlocks a real breakthrough
- Involvement of many stakeholders
 - Government, business, system integrators, standardisation bodies, users, suppliers of technology

