The Eleventh Advanced International Conference on Telecommunications (AICT 2015)

June 21 - 26, 2015 - Brussels, Belgium

Panel on

Telecommunications Challenges in Urban Networking

Moderator and Panelists

Moderator: Kevin Daimi, University of Detroit Mercy, USA

Panelists

Christian Jung, Fraunhofer IESE, Germany

Jerker Delsing, Lulea University of Technology, Sweden

Steffen Späthe, Friedrich Schiller University, Germany

Topics Covered

- IT Trend: Integration - from monolithic systems to smart ecosystems (Christian Jung)
- Context-Rich Systems (Christian Jung)
- Smart Rural Areas vs. Smart Cities (Christian Jung)
- The role of telecommunication in very large automation and autonomous systems (Jerker Delsing)
- (Steffen Späthe)

Questions that will be addressed

- How will different system classes be integrated?
- Data introduced by these systems is constantly increasing. How would this huge data be managed?
- How do context-rich systems adapt to the needs of user or business processes?
- How can we embed trust in very large automation and autonomous systems?
- Can very large automation and autonomous systems engineered or self-engineered?

Fraunhofer
IESE

FRAUNHOFER INSTITUTE FOR EXPERIMENTAL SOFTWARE ENGINEERING IESE

Panel Discussion

Christian Jung

MOBILITY2015

June 22, 2015

ABOUT ME

- Fraunhofer IESE
  - Founded in 1996
  - Institutes for software & systems engineering
  - 200+ employees
  - Departments for all phases of software and system development
- About Me

Christian Jung

Team Leader »Usage Control«

Department »Security Engineering«

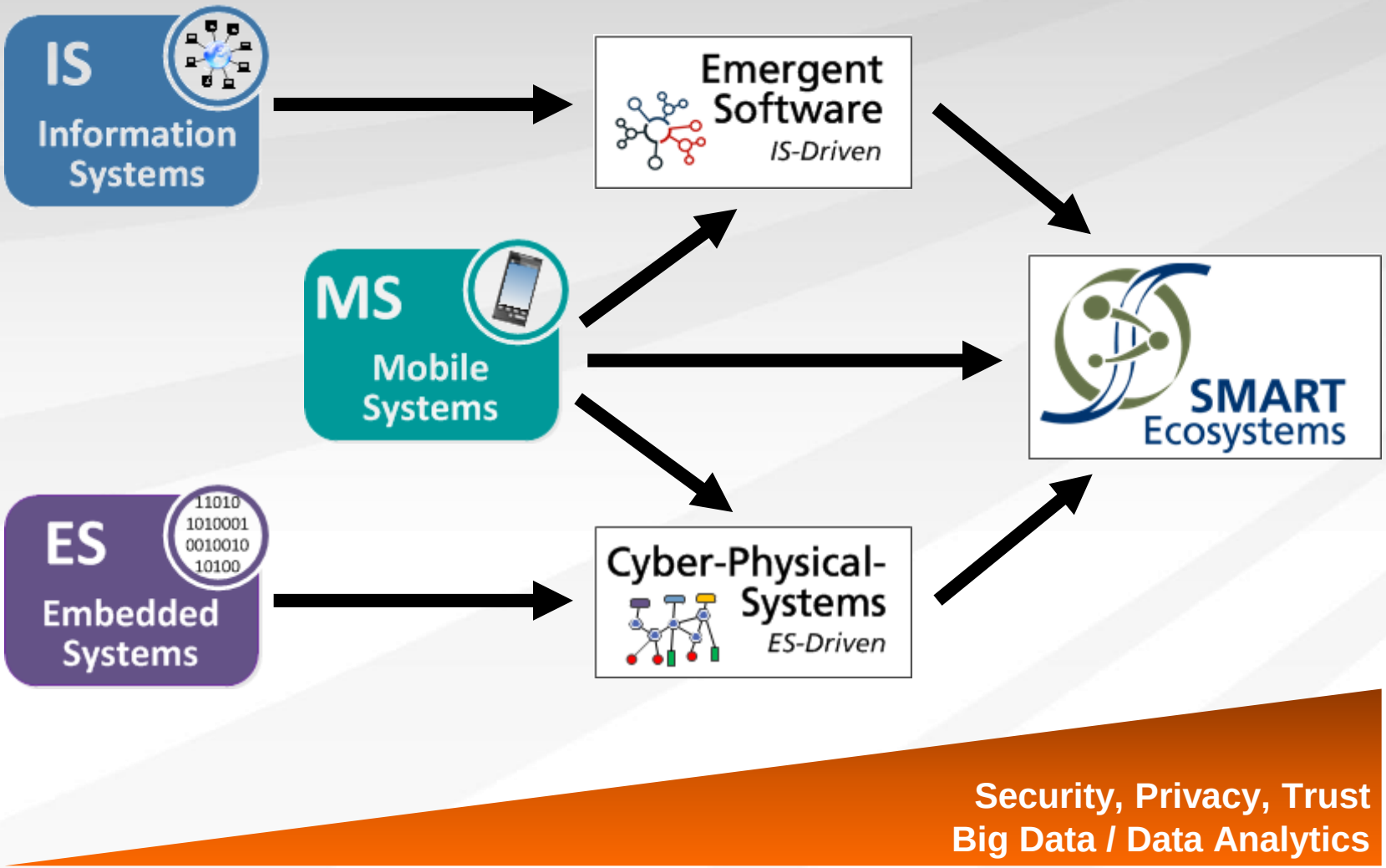
Research Focus: Context-aware Security

Fraunhofer Gesellschaft

- 66 institutes and research units
- 24.000 employees
- €2 billion annual research budget

IT TREND: INTEGRATION

FROM MONOLITHIC SYSTEMS TO SMART ECOSYSTEMS



IT TREND: INTEGRATION

FROM MONOLITHIC SYSTEMS TO SMART ECOSYSTEMS

- Software used **across application domains**
  - Industry 4.0, eEnergy, eHealth, Smart Farming, Finance & Insurance

- Research and development **challenges**
  - **Diversity**: Engineering methods, processes, technologies, tools, etc.
  - **Uncertainty**: Unknown qualities, application context, service availability, etc.
  - **Guaranteed Qualities**: Safety, trust, security, user experience
  - **Complexity**: Integration, big data

➔ Data is constantly increasing

CONTEXT-RICH SYSTEMS

IT TREND FOR 2015

- **Context-awareness** is one answer to increasing system complexity
  → Being alert and responsive to surroundings and adapt accordingly

- **Mobile devices** (smartphones, wearables, etc.) are our daily companion
  → maybe more important than our wallet
  - Capability to collect a lot of data: Location, movements, accelerator, device usages, etc.

- What would be logically the **next step**?
  - Improve context-awareness by **other information sources** such as house automation, vehicle data, work place information, social networks, etc.

CONTEXT-RICH SYSTEMS

IT TREND FOR 2015

- **Open Questions**
  - How to be compliant with **privacy and data protection** law?
  - Who is the **owner of data**?
  - Who can **access data** and for which **purpose**? How often? How long?

- **Access control has to be extended!**
  ➔ What happens after data has been released?

- Research field **data usage control** may be the answer
  - But, how can data usage control be realized across systems?

  ➔ Standardization?

Luleå University of Technology

Division of EISLAB

Professor Jerker Delsing

LULEÅ
UNIVERSITY
OF TECHNOLOGY

THE NORTHERNMOST UNIVERSITY
of Technology in Scandinavia

LULEÅ
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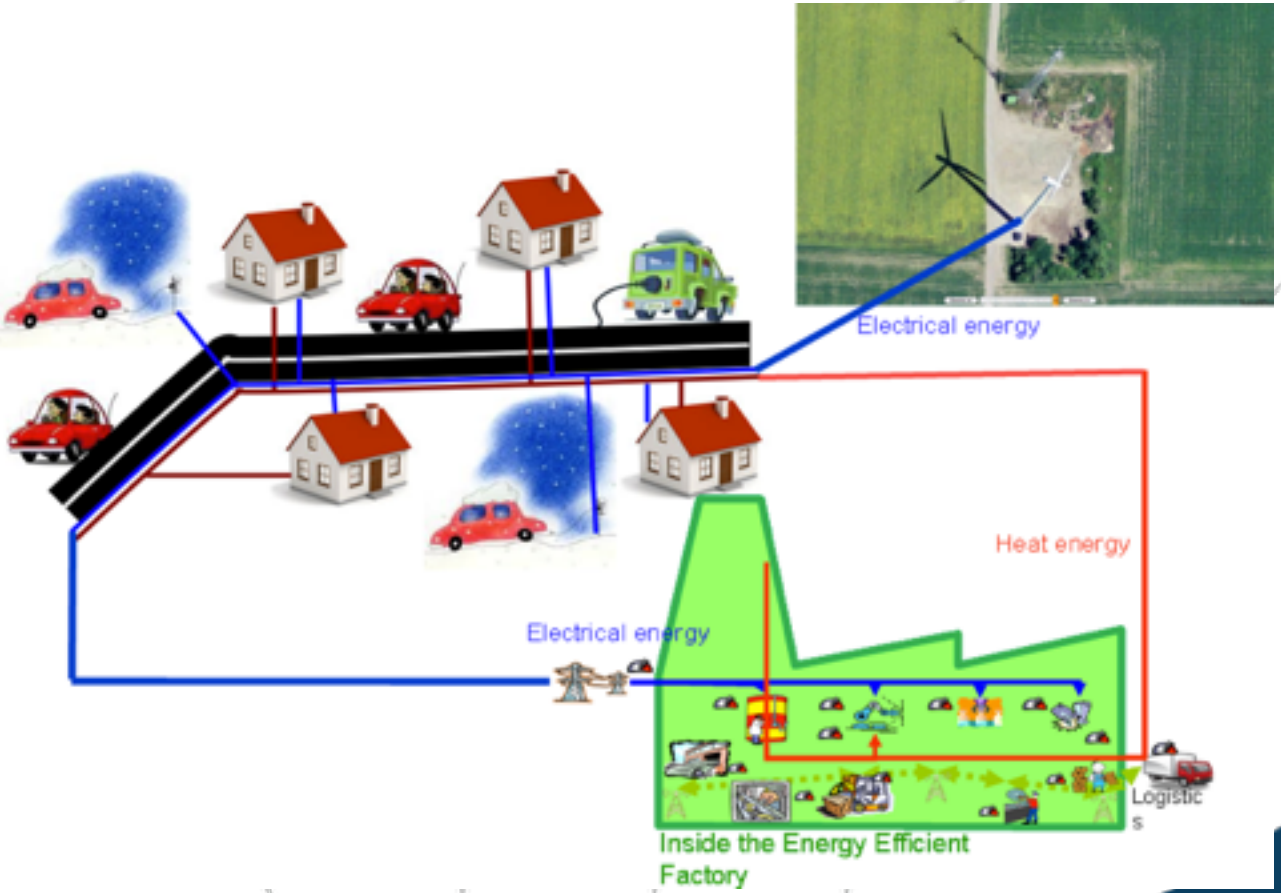
How to build **very** large complex automationssystem?



ARROWHEAD

Heathrow terminal 5

5 million connected points!!

ARROWHEAD

IoT Product Segments

Conveyor (Tier2) Components and Parts (Tier3)

- Drive Heads
- LTU & Winches
- Belt Structure
- Belting
- Pulleys
- Feeder Breakers
- Components (a.u. idlers, motors, etc.)

Suppliers of these Products are:

- Potential partners, and;
- Future Service Providers

One customer, KGHM, one component

- **120 km conveyers**
- **720.000 idler bearings**

ARROWHEAD

What about London railway then?

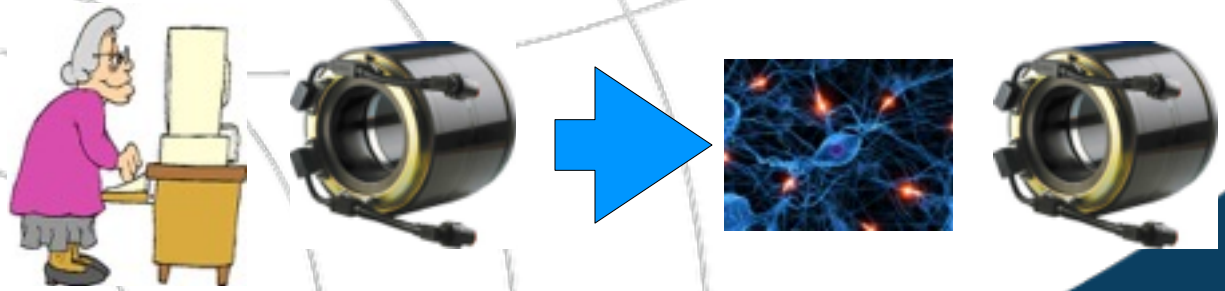
X.XXX.XXX number of bearings

- Connected bearings will support
  - Bearing condition monitoring
  - Railway wagon condition monitoring

ARROWHEAD

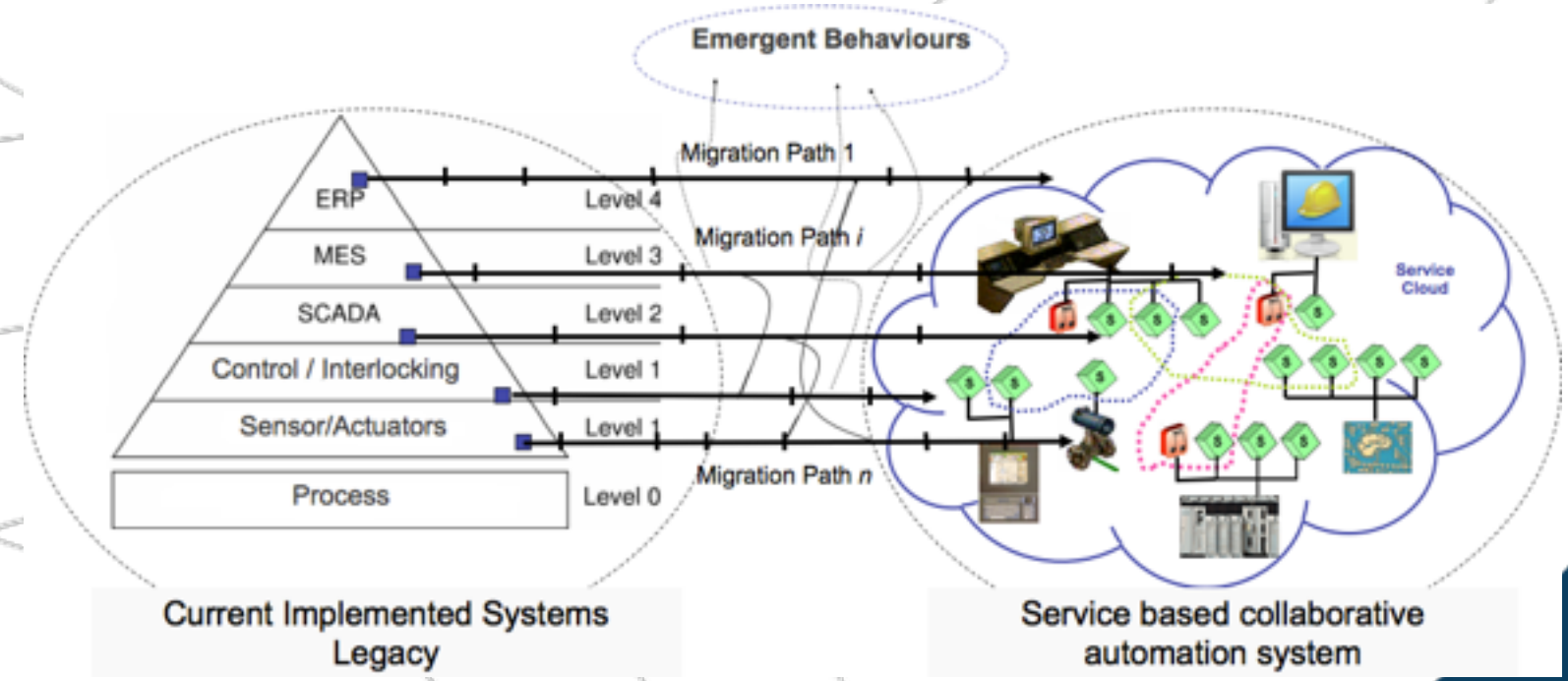
The automation challenge

- Annual growths more than 10% and over 500 billion connected devices are expected worldwide by 2025. - Cisco 2013
- Massive automation systems not possible with current technologies
- Not enough many engineers on the globe to do the job with current technology



ARROWHEAD

ISA-95 systems in to the cloud?

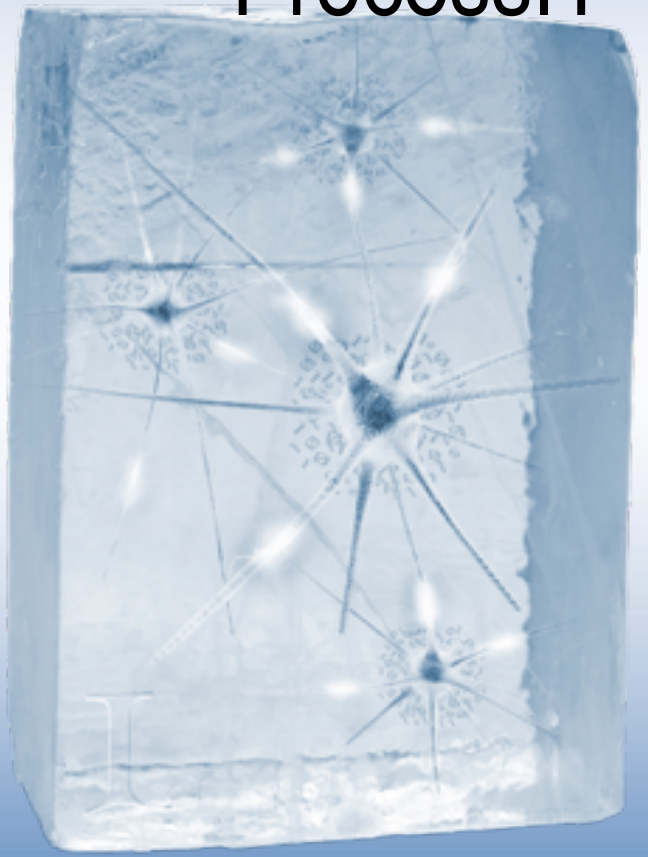


ARROWHEAD

Important questions for the future

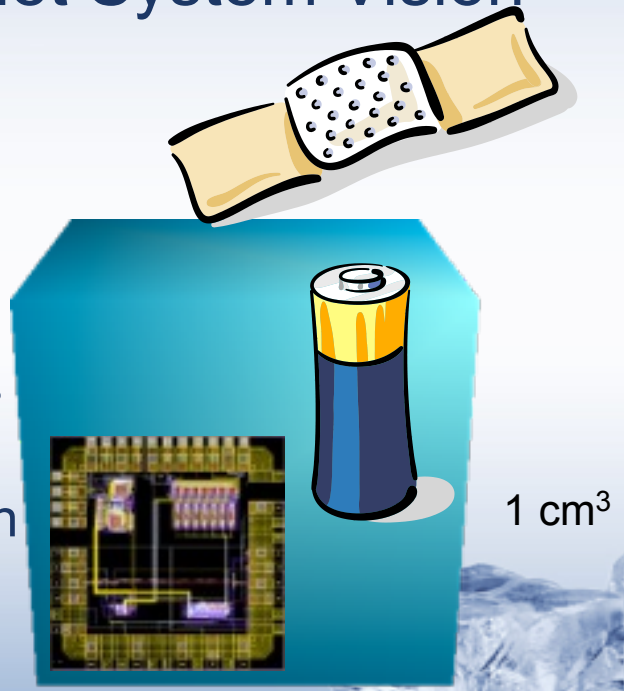
- How to build trust?
  - Security
  - Safety
  - Personnel integrity
- How to engineer these super large system?
- Approaches?

Intelligent industrial processes
ProcessIT



The Embedded Internet System Vision

- Sensors on the Internet
  - Minimal size < 1 cm^3
  - Power life time > 2 year
  - Wireless connection
  - TCP/IP and web-services
  - Ad-hoc communication
  - Ad-hoc system integration
  - Secure
  - Simple application
  - Roughed packaging



Great ideas grow better below zero!

LULEÅ UNIVERSITY OF TECHNOLOGY

SMART HOME

Steffen Spaethe, steffen.spaethe@uni-jena.de

- What roles do security, energy, comfort, and healthcare play in smart home settings?
- What are the main barriers to adopting smart home?
- Do we need smart homes to realize 'Energiewende'?
- In a mass market, who will be responsible to maintain smart home installations - residents or 3rd party service provider like telcos?

TODAYS QUESTIONS

Security

- Monitoring
- Alerts
- Video, Audio

Healthcare / Ambient Assisted Living

- Monitoring of resident, resident´s behavior, and life signal
- Support self organized, self controlled living in individuals home place
- Enable remote supervision and emergency communication with relatives and health care service provider

Energy

- Integration of homes into the smart grid
- Automated control of home appliances in respect to current and future energy availability and costs
- Measurement off individual energy consumption of home devices
- Improve autarcy and/or usage of self product

Comfort

- Automation of common tasks
- Based on resident´s behavior
- Adapt classic power connections with ICT support, e.g. Light on house stairs

Other Domains

Multimedia, gardening,

SMART HOME DOMAINS - security, energy, comfort, healthcare, ...

Steffen Spaethe, steffen.spaethe@uni-jena.de

- Energy, comfort, healthcare, security - the key domains in smart home discussion

- But different domain have different requirements to
  - Reliability
  - Flexibility
  - Bandwith
  - Privacy/Data security

- Smart home installations are not motivatable/justifiable/un-arguable with only one domain in mind

What roles do security, energy, comfort, and healthcare play in smart home settings?

- No killer application
- No real pain or psychological strain
- It is to expansive
- Much to complex
- No interoperability between domains, vendors, device series
  - To much standards ;)

- To do „it right“, you need many specialists
  - Electrician, HVAC security service, installation service, OEMs of home appliances, content provider, ICT experts, ...
  - There is not „plug-and-play“ and not „smart home guide“

WHAT ARE THE MAIN BARRIERS TO ADOPTING SMART HOME? (END USER PERSPECTIVE)

Energiewende – The german way to transform power supply from conventional to renewable energy sources

- Establish communication between Smart Home and Smart Grid
- Enable „demand side management“/ „demand side response“
- Enable dynamic energy pricing (topic in law and regulation)
- Improve production and consumption forecast
- Adjust consumption to production forecast
  - By any idea of a dynamic market
  - E.g. „Energy Flat Rates“ (within a certain power profile)

- **In my eyes, THE main topic in bringing Smart Home to mass market.**
- Still missing some economic electrical power storage systems

DO WE NEED SMART HOMES TO REALIZE ‘ENERGIEWENDE’ ?

Why 3rd party service providers ?

- Administrative complexity
- Security (update, patches, etc.)
- „Infrastructur as a service“

Which player?

- Network providers (TelCo)
  - e.g. Deutsche Telekom
- Content providers
  - Google, Apple
- Device Manufacturers
  - Samsung
- Power Supplier
  - e.g. RWE

In a mass market, who will be responsible to maintain smart home installations - residents or 3rd party service provider?