



**IoT-A**  
Internet of Things - Architecture

**IOT-i**  
Internet of Things Initiative



**INTERNET OF THINGS**  
EUROPE



WEB OF THINGS

**INTERNET OF THINGS**  
CONNECTED OBJECTS  
REAL WORLD INTERNET  
FUTURE INTERNET

IoT-A-Special Session, IoT 2012, Wuxi,  
China 24-27.10.12



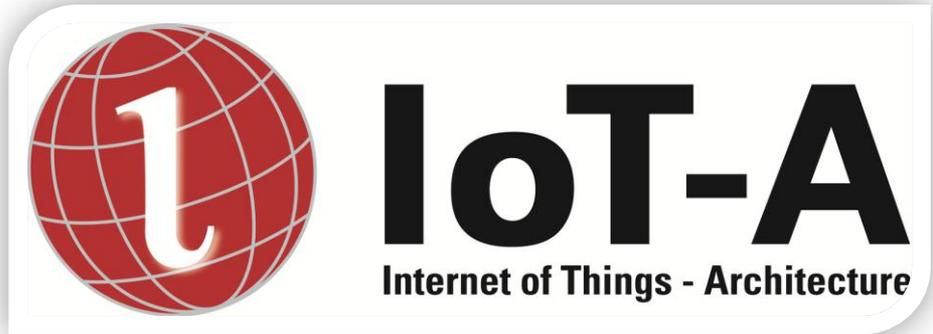
# IoT-A

Internet-of-Things Architecture

*The Internet of Things applied...  
Architecture Reference Model for the IoT*

Dr. Sebastian Lange, VDI/VDE-IT





# FP7 Project: Internet of Things – Architecture (IoT-A)

- IoT-A is the **largest European lighthouse project** (FP7 IP) within the field of **Internet of Things**
- The goal of IoT-A is the establishment of a common **architectural reference model (ARM)** for all applications in the Internet of Things

Find deliverables and public documents here:

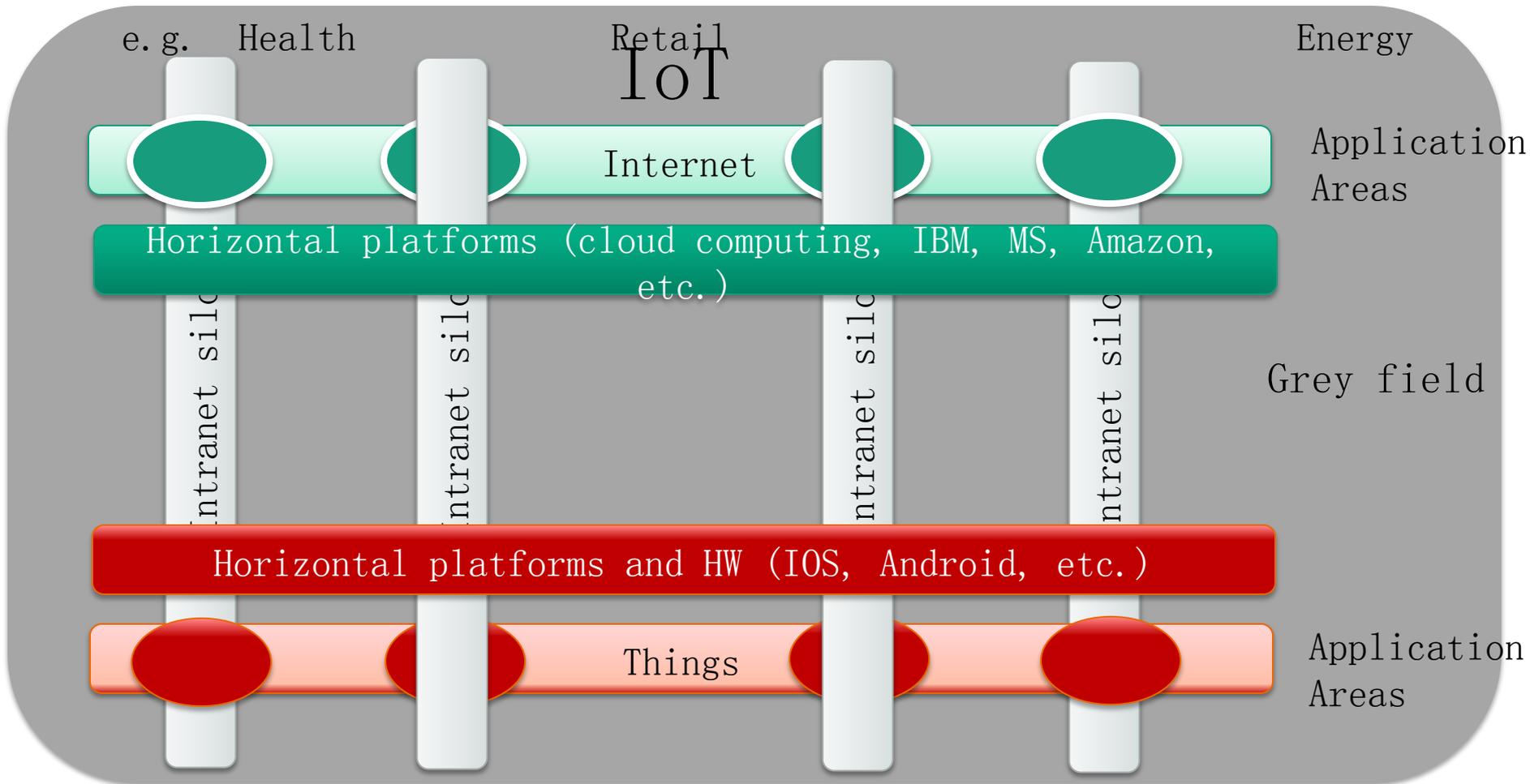
[www.iot-a.eu](http://www.iot-a.eu)

## Project facts

- 19 industrial and research partners
- Stakeholder group
- Budget of about 20 Mio. EUR
- Coordinator:  
Dr. Sebastian Lange, VDI/VDE-IT
- Technical Coordinator:  
Alessandro Bassi, Hitachi
- Project term of 3 years (until 2013)



# IoT Today: No interoperability, many vertical and horizontal silos

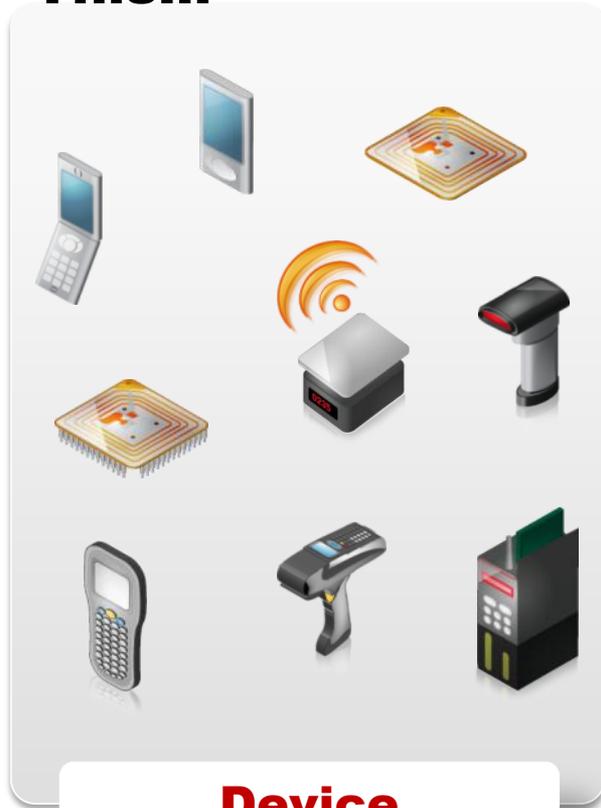


# IoT-A connecting the technologies with the applications



# 1. Step – Understanding the Domain

**This...**



**OR**

**...That?**

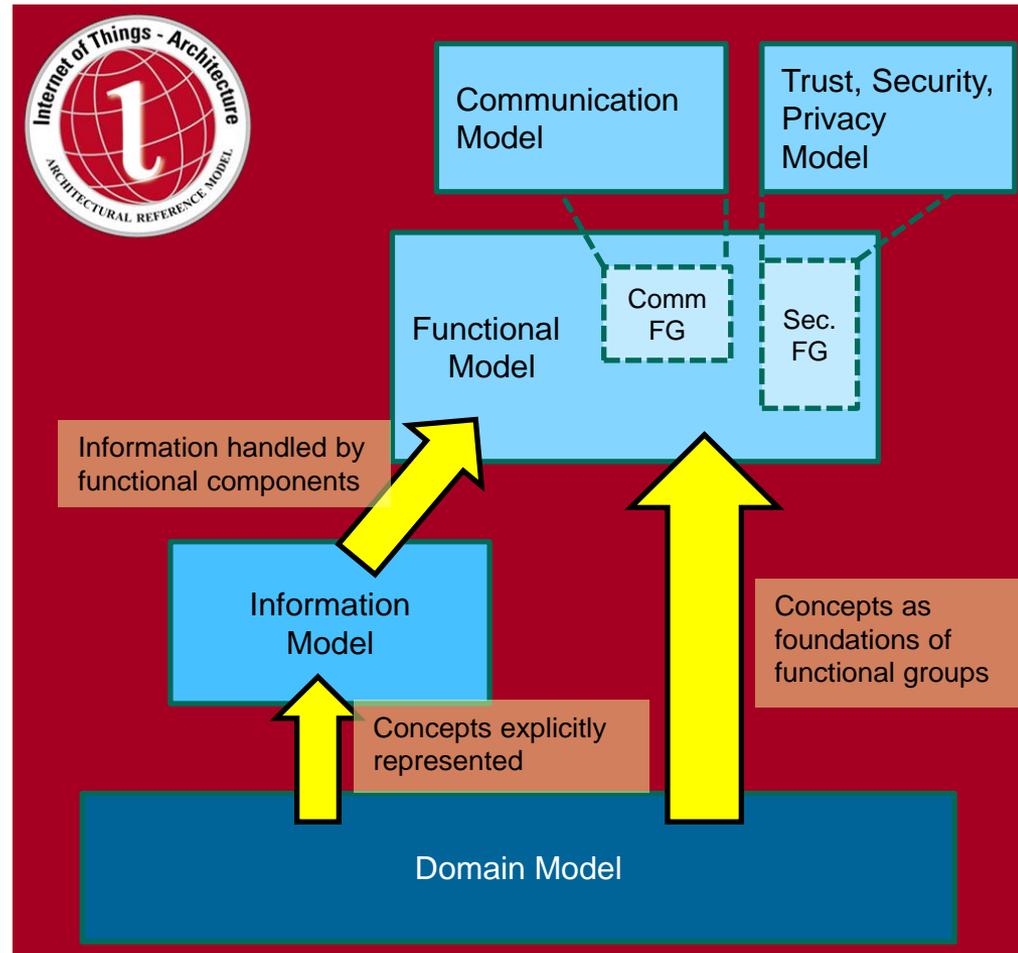


## 2. Step – Establish Architectural Reference Model (ARM)

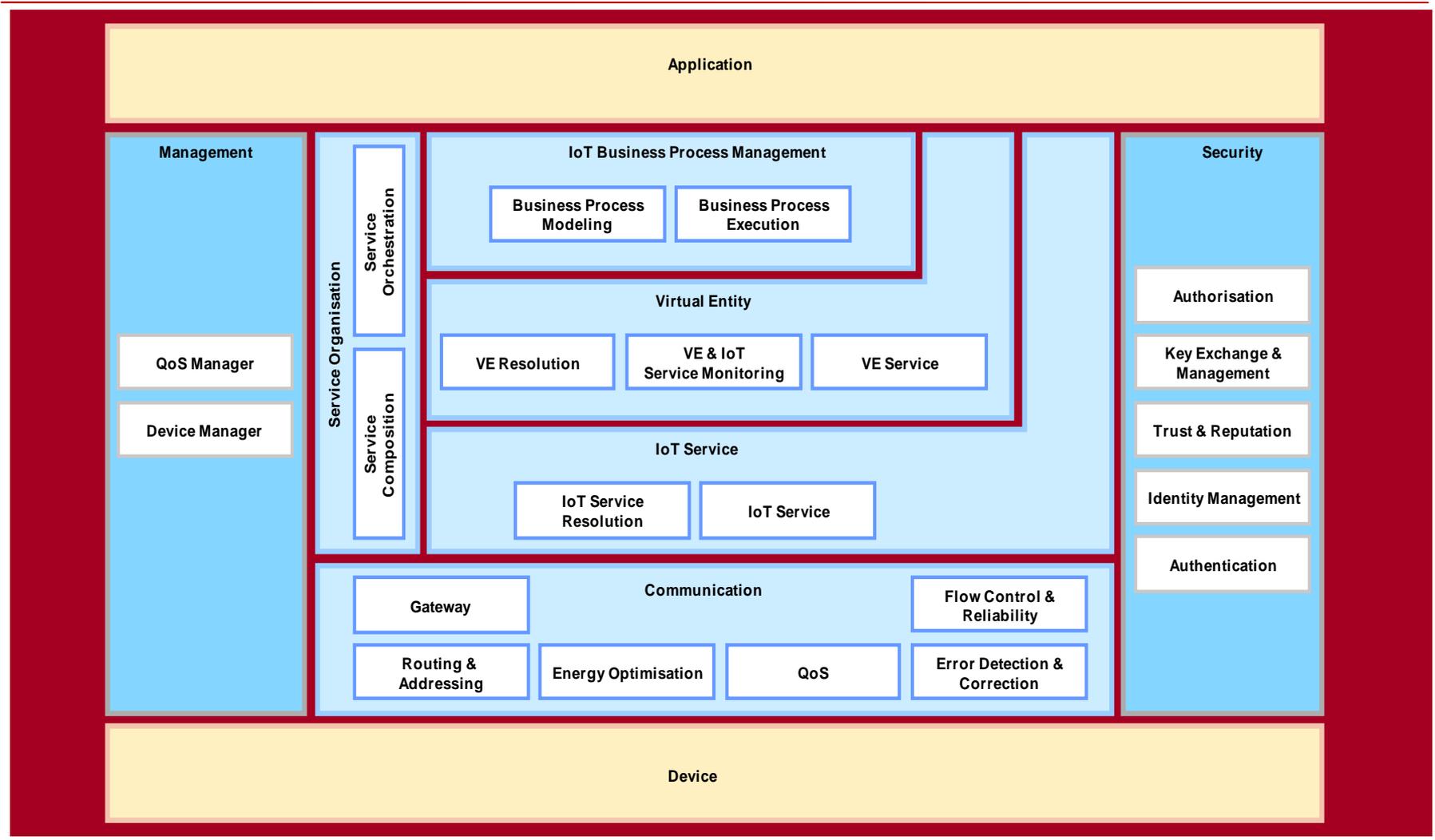
The ARM provides a **common understanding of the IoT domain**

The ARM contains

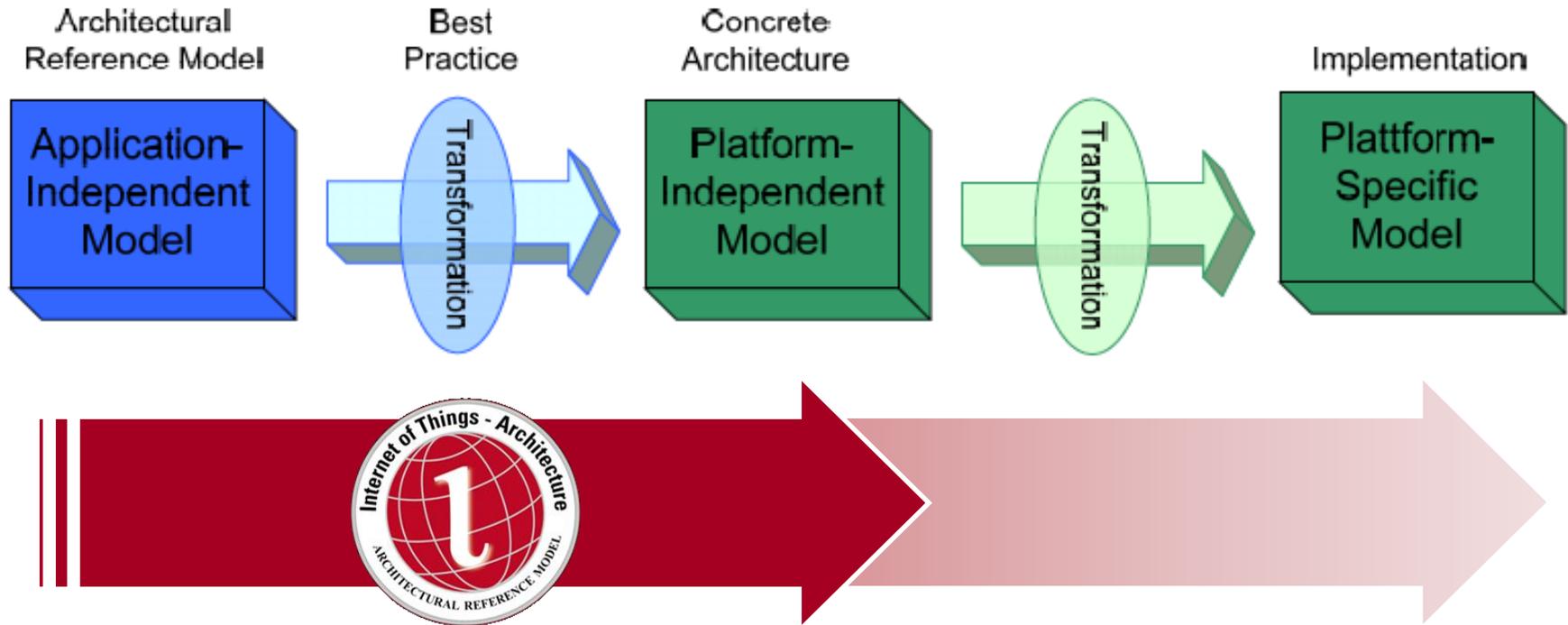
- Domain Model
- Information Model
- Functional Model
- Communication Model
- Trust, Security and Privacy Model



## 2b. Step - Establish Functional Model



# 4. Step – Provide Best Practices

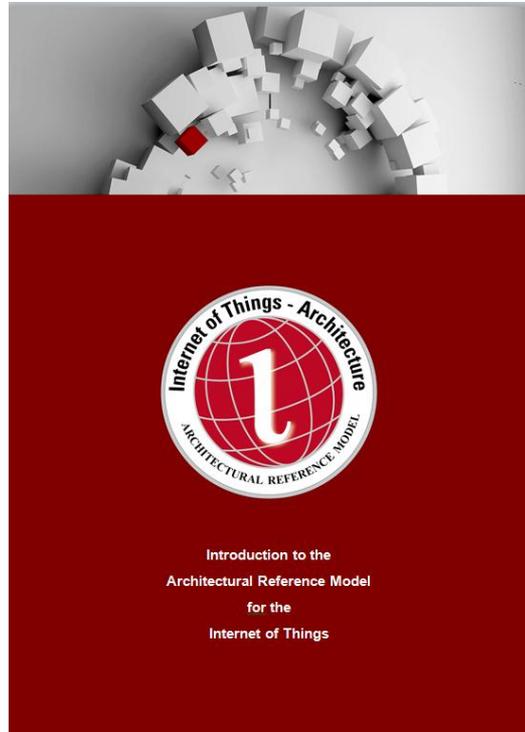


# Introduction and further info

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[www.iot-a.eu/arm](http://www.iot-a.eu/arm)

[info@iot-a.eu](mailto:info@iot-a.eu)



# 5. Step – Show Implementation - Focus on Health and Retail

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Health and Home



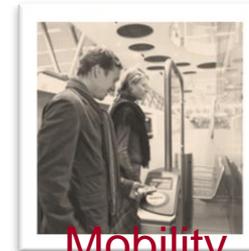
Retail and logistics



Other domains may be addressed in the same way....



Leisure

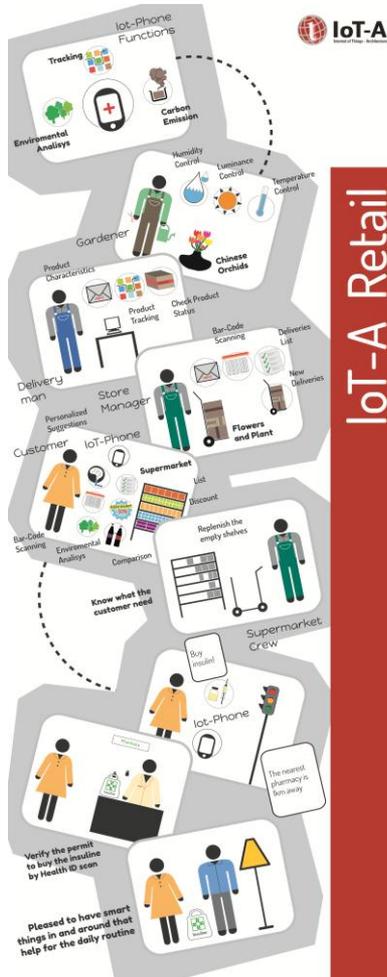


Mobility

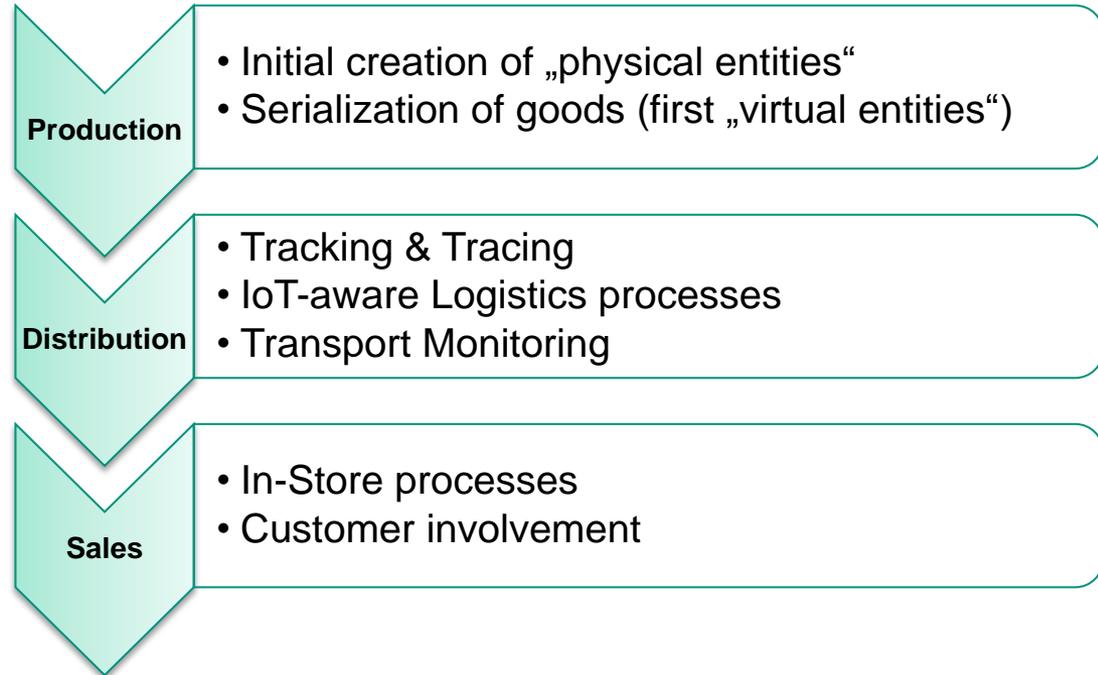


Office

# IoT-A Retail use case



Retail UC covers parts of a **product lifecycle** process



Definition and demonstration of different scenes (e.g. “mini” use case) within the lifecycle.

# Retail Scene - Transport monitoring with Smart Containers



## Location

- Road

## Covered topics

- Smart transport item
- Monitoring environmental features

Driver transports tagged goods using smart load carriers



Pallet/container sensors detect rising temperature and alert driver



Driver may directly intervene, e.g. check climate

# Retail Demo: Handover to Store / Sensor Based Quality Control (SAP / IBM)



## Location

- Retail Store

## Covered topics

- Sensor Networks Measuring Environmental Parameters
- Campaign Management for Dynamic Pricing
- Electronic Shelf Labels updated in Real-Time

The temperatures of products are sensed by mobile sensors

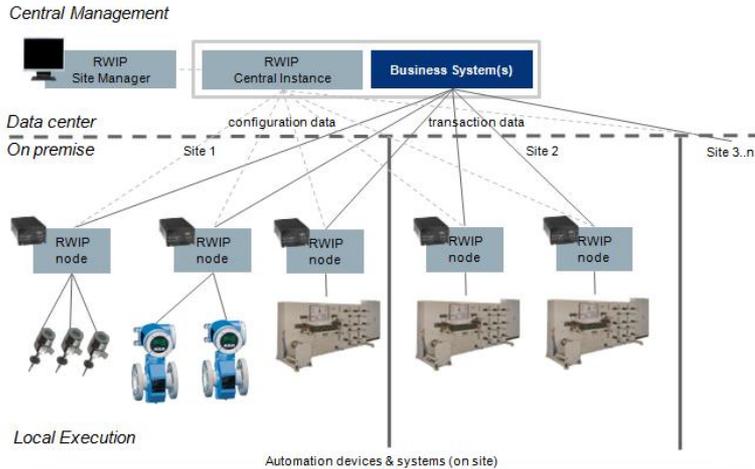


Based on the temperature history of the oranges, prices are dynamically adjusted in order to ensure selling the oranges before the quality deteriorates



A campaign management system updates prices in real-time and lets electronic shelf labels display updated price information.

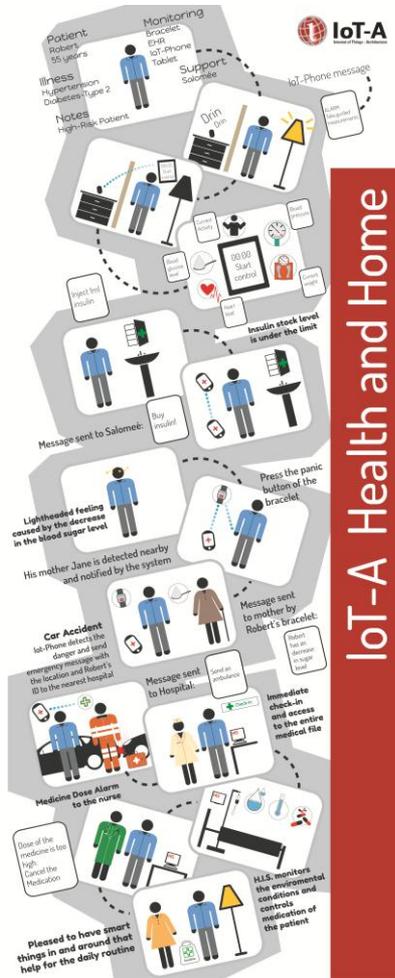
# In the Store: Middleware for Device Integration manages Dynamic Pricing based on sensor values



- Agent based IoT device connectors
- Highly scalable through multi-instance deployment
- Central management
- 100-1000 messages/sec
- Hot deployment using OSGi, small footprint
- Support for occasionally connected scenarios
- Elaborated Web- and Eclipse based management components
- SAP for Retail connection through custom JSON interface



# IoT-A Health Use Case



Health use case covers

- **Home care** (e.g. for the elderly)
- **Hospital** processes
  - Check-In
  - Medication control
- Emergency situation

Definition and demonstration of different scenes (e.g. “mini” use case).

→ More Human-centric

# Health storyline summary: „A day in a life enabled by IoT“



- 1 Robert is notified by his Remote Care program to take measurements
- 2 Robert is guided through his daily remote measurements
- 3 Robert takes measurements as shown by an application and takes medicine
- 4 Robert uses last ampule of insulin (Notification of Salomé)
- 5 Robert feels light headed and uses the panic button (Notification of nearby Jane)
- 6 Robert has a car accident
- 7 Robert is checked into a hospital
- 9 Hospital Information System checks correct medication and dose is given to Robert

# Health & Home: Scene 1 – Robert wakes up

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## Location

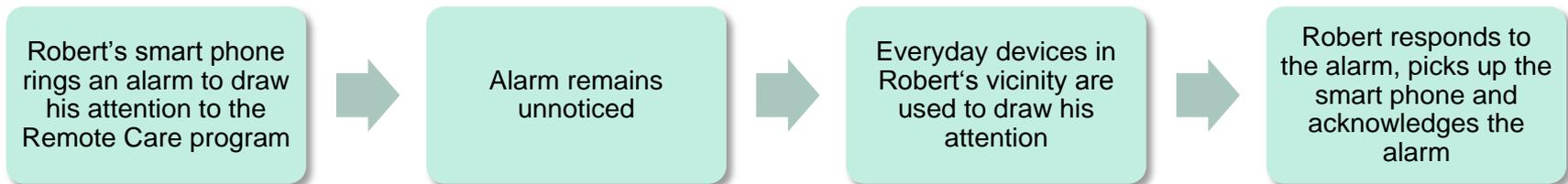
- Home

## Covered topics

- Home care
- Remote health assistance
- Remote health monitoring
- Smart objects
- Service Discovery

## Key benefit

By using IoT-A enabled devices, everyday objects, not part of a particular application domain can be seamlessly integrated and used by an application.



# Health & Home: Scene 4 – Robert uses last box of insulin



## Location

- Home (Robert) and mobile location (Salomé)

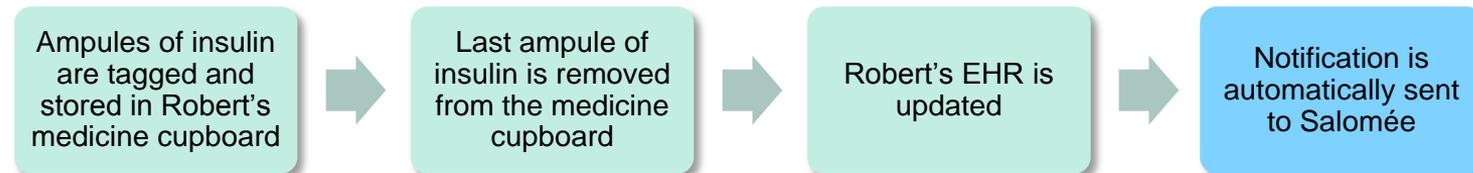
## Covered topics

- Home Care
- Remote health assistance
- Smart objects

Link to Retail use case

## Key benefit

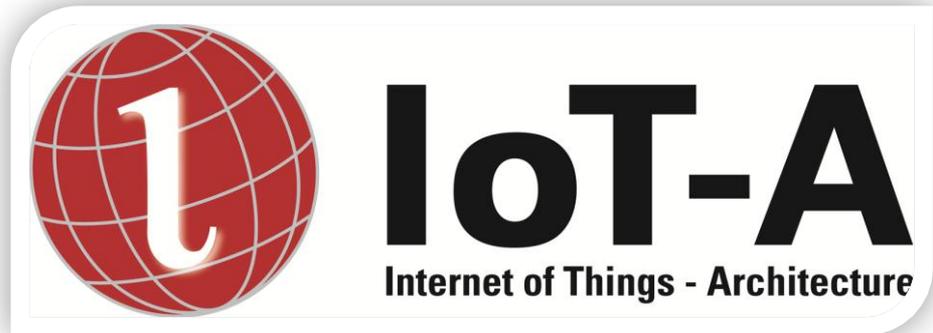
With IoT-A technology, it is easy to have cross application domain use cases, something that is extremely difficult to obtain with a traditional approach.



# In a nutshell...

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# IoT Week 2012



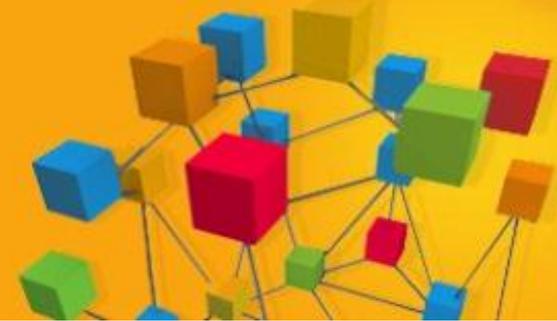
- 2<sup>nd</sup> IoT-Week 2012, Venice
- > 20 projects as joint organisers
- 300 + participants
- 40 sessions on 5 days
- Topics: technology, privacy & security , IoT Cognitive technologies, IoT Architecture. IoT for Energy Efficient Buildings, IoT Exploitation, IoT Ethics / Privacy, Benchmarking, IPv6, international cooperation, ...



# IoT Week 2013

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- **3rd IoT week**
- Helsinki, 16-20 June 2013
- Any IoT (M2M) related project is welcome to join
- Focus on demonstration and implementation
- → **[www.iot-week.eu](http://www.iot-week.eu)**



# Thank you!

To find out more on IoT-A, check [www.iot-a.eu](http://www.iot-a.eu)

Dr. Sebastian Lange  
VDI/VDE Innovation + Technik GmbH  
10119 Berlin  
Sebastian.Lange@vdivde-it.de