Web of Things Use Cases and Solutions at FZI

Speaker: Benedikt Kämpgen (FZI)

Location: W3C Web of Things Workshop, Munich

Date: 20.04.2015

Semantic Web vs Web of Things

Semantic Web / Web 3.0	Web of Things
Knowledge representation (OWL) Reasoning about static domains	Subsymbolic data Real-time data Dynamic domains
Linked Data	Devices first-class things Light-weight web servers
Software Agents	Cyber-physical systems

Outline

- FZI
- Web of Things Use Cases
- Possible Contributions

FZI Forschungszentrum Informatik

- Improving the knowledge exchange between academia and industry (~135 scientists)
- Information Process Engineering division (~35 scientists)
- Strong interlinks with Web technologies
  - Knowledge Management (OWL)
  - Complex Event Processing (WebSocket, SSN)
  - Semantic Data Management (Linked Data)

Outline

- FZI
- **Web of Things Use Cases**
- Possible Contributions

Outline

- FZI
- Web of Things Use Cases
  - **Ambient Assisted Living**
  - Digital Enterprise
- Possible Contributions

Ambient Assisted Living Use Case

- Goal
  - Increasing comfort and security for elderly and sensing/acting handicapped people
  - Usage of intelligent sensors for the identification of relevant situations
  - Care- and case-management tools for better therapy
- Challenges
  - Integration of systems and services from different parties and platforms
  - Maintenance, robustness and extensibility
 - Privacy

smartHome/AAL

Ambient Assisted Living Use Case (2)

- Project: AICASys (related projects: universAAL, Ahead, Augment)
- What stakeholders?
  - Sensing or acting handicapped people, nursing staff, relatives, physicians…
- What things?
  - Hearing device with heart frequency sensor and microphone
  - Eye Tracking Glasses
  - Wheel chair
  - Smart phone
  - Medication reminder service
  - Smart home sensors (door, window, lamps)
  - PAUL home automation interface
- What benefits from linking between things?
  - We can estimate, what action user wants to execute (e.g., turn on lamp)
  - We know the current context of the user and can decide how to best contact him (e.g., via phone)
  - We can estimate the background knowledge of the user and adapt the user interface
- What benefits from interactions between things?
  - The medication reminder service and the smart phone of the user could evaluate whether the user needs reminders
  - Privacy is improved since only necessary information is exchanged directly between things
  - Things could communicate their battery status
- What other solutions?
  - Information bus: Difficulty in configuring all systems
  - Centralised knowledge base/data warehouse: Privacy concerns
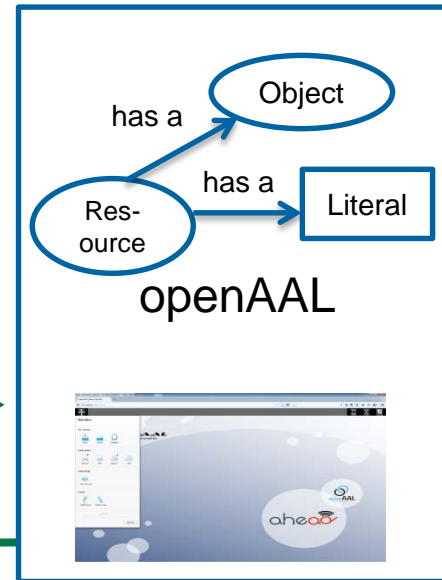
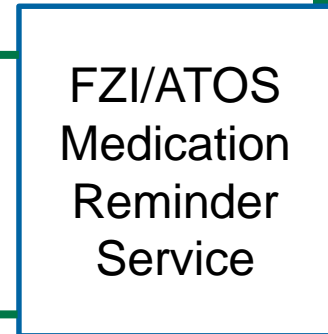# Example AAL Scenario
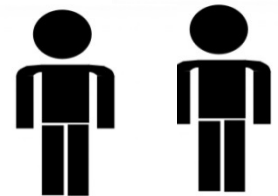

Annegret Müller
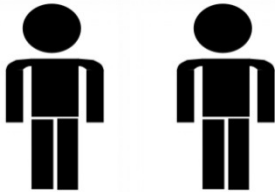
Max Mustermann

Context Management

openAAL

has a → Object

Res-ource — has a → Literal

Login Messages as XML

Action Message as XML to appropriate User

AHEAD Devices

Service Description JSON

Medication reminder

FZI/ATOS Medication Reminder Service

Administrator
Adds Max Mustermann
And Annegret Müller to openAAL

Medical Professional

Outline

- FZI
- Web of Things Use Cases
  - Ambient Assisted Living
  - **Digital Enterprise**
- Possible Contributions
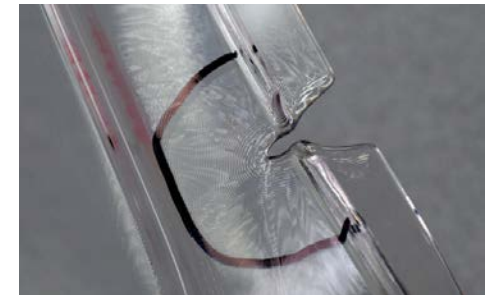
Digital Enterprise Use Case

- Goal
  - Transition from sensing enterprises to proactive enterprises
  - Go from search, sensing, anticipating, to proacting.
  - Knowing "what might happen" and doing "what should be the best action"
- Challenges
  - Identify current situation / process and system behaviour and deviations from ideal
  - Scalable, distributed architecture for management and processing of IoT big data
  - Extensibility (new sensors, KPIs, contextual information)

Digital Enterprise Use Case (2)

- Project: ProaSense
- What stakeholders?
  - Decision Makers, Business Analysts, Workers and Developers
- What things?
  - Workers (do initial work in production process)
  - Transport or production machines/roboters
  - Products
  - Materials (60 different raw plastic materials)
  - Production/Equipment/Staff training plan
- What benefits from linking between things?
  - Understanding relationship between behaviour of things and KPIs downtime and scrap rate
  - Holistic assessment of product quality
- What benefits from interactions between things?
  - - (currently, centralised)
- What other solutions?
  - Tipco

Outline

- FZI
- Web of Things Use Cases
- **Possible Contributions**

Possible Contributions

- Describing things
  - **Semantic MediaWiki** for human in the loop

- Linking things
  - **openAAL** centralised system for registering, discovering, connecting devices
  - **Linked APIs** for automatic composition of services
  - **OLAP4LD** for automatic numeric dataset integration with QB vocabulary

- Interaction between things
  - **Linked-Data-Fu / ETALIS** rule-based language and system for event processing
  - **Semantic Event Processing Pipelines** modelling language for big data applications based on KAFKA, STORM
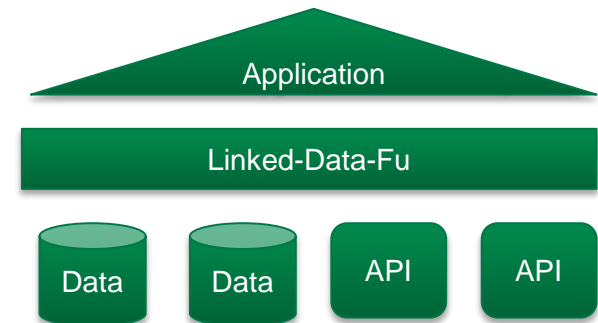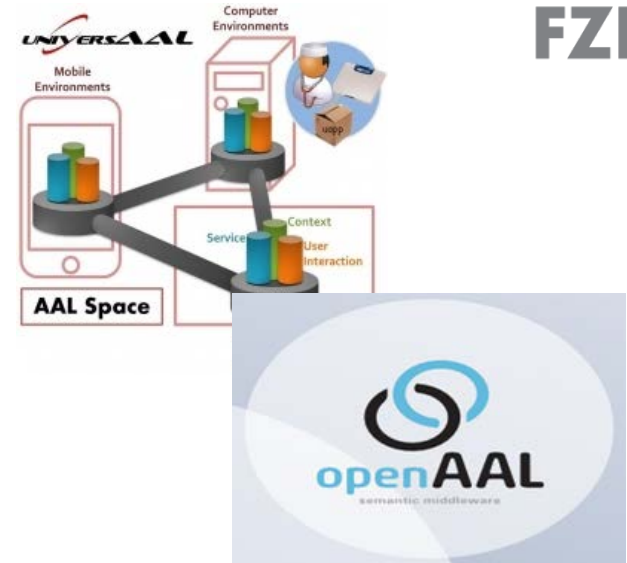
Conclusions

- Interested in following goals of WoT
  - Interoperability
  - Flexibility (adding new types of sensors, replacing sensors…)
  - Privacy
- Interested in following technologies
  - Stream data protocols
  - Rule engines
  - Service description languages

Thanks!

- Interested in following goals of WoT
  - Interoperability
  - Flexibility (adding new types of sensors, replacing sensors…)
  - Privacy
- Interested in following technologies
  - Stream data protocols
  - Rule engines
  - Service description languages