

# **Semantic Interoperability for Ambient Assisted Living**

OASIS Symposium  
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## ENS

- R&D Institute in the Metropolregion Hamburg
- SME Status
- Start in 2011

## Industrial oriented Research

- Semantic Technologies
- Data Mining

## Business Units

- AAL
- Health
- Information Analysis
- Process Automation

### Technology Clusters

#### Semantic technologies

- Semantic Visualization
- Ontology Engineering

#### Semantic Integration

#### Data Mining

- Stochastic Processes

#### Integration of data sources

- Signal processing
- Information retrieval
- Identification of data sources

### Daten sources

Sensors

Internet

Text

Mobile ICT

## TG „Semantic Interoperability“

- Part of the Working Group *Schnittstellen und Interoperabilität der BMBF/VDE Innovationspartnerschaft*
- Part of the VDE/DKE STD1811.0.1 WG *Interoperabilität und Terminologie*
- Supported by the BMBF-Project RAALI (Roadmap AAL Interoperability, 2011-2013)
- Supported by the DKE/INS Project sLs (Standardisierung eines semantischen Laufzeitsystems zur Förderung der Interoperabilität von AAL-Komponenten, 2011-2012)

## Work Packages

- Four „Semantic Interoperability“ work packages (WP) are open for participation
- Kickoff: September 2011 in Frankfurt

### **WP 1: Scientific focus: Semantic Technologies (in progress)**

- WP 2: Industrial focus: building automation
- WP 3: Industrial focus: telemedical devices
- WP 4: Industrial focus: high level services

## The demographic change: a challenge

- Europe is facing a demographic and social change
- Due to an ageing population, low birth rates and changing family structures the Federal Statistical Office predicts a significant shift of the age pyramid by the year 2050 .
- Against the background of the demographic trends, the number of older people who want / or better must live alone in their home environment continues to rise significantly.
- Health care and care of an increasing number of people whose mobility is restricted can not be guaranteed in the future by the current health system.

## Requirements

- Seamless integration of people living alone at home in a family, nursing and medical care environment
- Technical support to older people allowing an independent living at home by **AAL-Systems**
- Innovative High Level Services: Recognition of domestic and medical emergencies, support a needs-based care and health care at home, supporting people with dementia in their own living space, maximum comfort and safety for users in their own home at any age

## Lack of an AAL market

- An AAL market is missing pointing developers the way offering reliable standards.

## Lack of interoperability at system and component level

- Lack of interoperability at component level: AAL intends to base on quite different, proprietary and particularly existing basic technology components and brings them together (e.g. building automation and telemedical devices) offering powerful services ; but components are not interoperable to each other.
- Lack of interoperability at system level: Even current, innovative AAL systems are mostly proprietary and not interoperable with each other on service level
- Standardized abstraction layers (run-time systems) are missing allowing out of the box integration of basic technologies (in terms of self configuration); at the moment integration problems have to be solved again and again

## AAL does not offer its own technology profile

- Which technology aspects are unique for AAL?

## At first: Defining AAL?

- AAL is an ICT-based technology approach enabling the integration of existing base technology components at lower levels
- AAL stands for cooperation of components and services in order to form innovative, powerful services at higher levels
- AAL should offer a technology profile enabling SELF-X characteristics of systems (self configuration, self management, ...); Focus: semantic interoperability

## AAL needs standards

- Development of standards at system / service level in order to allow cooperation of future AAL Systems of different developers
- Development of standards at component level in order to advance the migration of existing basic technologies towards easy to use AAL components.
- Development of standards for SELF-X

## AAL needs industrial partners

- Industrial partners should be involved in the development of standards

## Four steps towards a semantic interoperability

- I. Standardization of semantic self descriptions of components (AAL-ontology)
- II. Standardization of component-oriented Meta services to provide for
  - Exchange of semantic descriptions of components
  - Semantic search for sub components
- III. Semantic runtime system for the execution of the Meta services, unless the services are integrated into AAL components themselves
- IV. Open source modeling of devices of different manufacturers; strong integration of up to five manufacturers (early adopters)

## I. Standardization of semantic descriptions of components

- Modeling of knowledge about systems, components and services in the AAL field using a modular ontology approach (formal self-description)
  - Each module is a self-description of the meaning of the AAL component (eg, 3-point ECG, GLT-light sensor data point, emergency detection service, ...)
  - Description of the (de-) installation and access of/to the component
  - Description of the meaning of the data provided by the component
- Modules of formal self-descriptions extend existing components
- Focus on modeling building automation, telemedical devices and high level services

### Related work

- DOLCE Hyperontology
- and many other existing approaches

## Step 2: Semantic Meta Services

### Standardization of semantic meta services

- Extending existing components
- Provide for mechanisms for distributing and exchanging self-descriptions of components
- Provide for queries to search for mandatory subcomponents

### Related work

- FhGs Semantic RPC
- Uni Lgs OWL Discovery
- and many others

# Step 3: Semantic Run-Time-System

## Standardization of a Semantic Run-Time-System

- Execution environment for semantic Meta Services
- Temporary Run-Time-System which is part of a residential gateway(settop box, ...) ; requisite as long as Semantic Meta Services will not be integrated into components
- Essential for offering SELF-X-capabilities

## Related work

- UniversAAL
- and many others

## Step 4: Integration of industrial players

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### Focus on three classes of descriptions

- Building automation devices
- Telemedical devices
- High level services

### Basic condition

- Strong integration of industrial players

# Call for participation

ENS

Freies Institut für  
Technische Informatik

TG „Semantic Interoperability“ part of VDE/DKE STD1811.0.1 WG *Interoperabilität und Terminologie*

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## Please feel free to contact

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