universAAL – A Open Platform and Reference Specification for Ambient Assisted Living

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universAAL - UNIVERSal open platform and reference Specification for Ambient Assisted Living
Large-scale Integrated Project in EU 7th Framework Programme
(Priority 7.1b: ICT & Aging)

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Main Objective

To make it technically possible and economically feasible to design and deploy innovative AAL services

Providing an open and scalable technological platform that facilitates the development and deployment of a broad range of AAL services

Carrying out support activities promoting widespread acceptance and adoption of the platform.

Approach: Consolidate & extend work of earlier projects

* Duration: 48 months
* Budget: 13.9 M€
* Start: February 2010
* EU Funding: 10.5 M€
universAAL and the AAL Roadmap

domain models that are concepts, functions and qualities for AAL systems to make explicit the demands and contributions;

open-reference architecture that facilitates the efficient integration of diverse assistance devices and services into personalized, trusted and manageable assistance solutions;

standardized solutions for unobtrusive, affordable sensing of context (location, activity, vital data);

advanced user-interfaces that can be adapted to the changing needs of users;

guidelines for privacy and security of data management;

system management and interoperability of heterogeneous components.

Consortium: Building on existing work
Consolidating State-of-the-Art in one platform

AAL developer community

End users
Vertical vs Open AAL solutions

- We can provide **specific applications** for distinct use cases
  - Falling down application, medical dispenser, adaptive kitchen helper
  - But most elderly needs more than one single AAL solution, and in the worst case:
    - Sensors have to be installed twice, thrice or even more often (same holds for other kinds of AAL components)
    - Software is not interoperable
      - Data from medical dispenser is not aware of personal nutrition
      - Telephone not aware of emergency situation
  - The universAAL intent is
    - provide **more general solutions** for enabling an ecosystem of interoperable hardware and software products
Challenge: devices and applications are dynamic

- **Devices** can **come and go**
  Mobile devices – smart phones, body sensors, portable audio players can be switched on and off can fail and be restarted

- **Applications** can **come and go**
  can be installed, updated, uninstalled can fail and be restarted
Challenge: devices and applications are dynamic

- It is **not feasible to restart** the platform for any change in a device/an application.
- **Continuous operation** must be supported.
- The platform and the applications should **adapt** themselves to any change **dynamically**.

Home Scenario 1
Multipart Application deployment

Distributed Multipart Applications

Middleware

Middleware

Middleware

Middleware

Middleware

OSGi

Electrolux/.Net

Siemens/OSGi

Android™

Other
Home Scenario 1
Multipart Application deployment

Assisted Person

Service Provider-Control Center

AAL Application
Semantic Services

Service Requester → Search → Service Interface

Match Making

Service Interface 1 → Register → Service Provider 1

Service Interface 2 → Register → Service Provider 2

Fuzzy Match

No exact matching between requested and provided interfaces is required
Main technical result: universAAL platform
• One-stop shop for **AAL Services**
  • Software
  • Hardware
  • Human Resources

• **Social Commerce**
  • Communication between the communities of customers, developers, hardware manufacturers and service providers
  • Establishing AAL User Community
  • Integration with existing **social networks**
  • Customer generated content
    • **reviews**, blogs, forums, pictures, videos
Association Composition/
Scope of Proposed Open Association

Evaluation

Standardization

End Users

Reference Implementation

AAL Association

Industry

OS Communities

Research Institutions

Advances
Thank You

www.universAAL.org
www.AALOA.org

Further questions:
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Why a Platform?

FP7-ICT-2009-4, objective 7.1b targeted THE ONE (European) platform for AAL; why?

- AAL is socio-politically motivated, its breakthrough, however, is still not in sight

Learn from the development of the PC market since early 80s

- enabling technologies
  - standard interfaces at HW level
  - few popular operating systems
- adopted widely
- lead to mass markets and a full ecosystem of artefacts
Reference Specification and Standards

- Reference Model
- Reference Use Cases/Scenarios
- Reference Requirements
- Reference Architecture
“One Store to save them all, and help the users find them”;

We will create the “universAAL store” (uStore) – akin to Apple’s “App Store”
A single place where users can easily find, download and (maybe) pay for applications matching their needs
More than just “find”: also easily download and deploy
In order to realize reasonable AAL use cases we need ...

- Several **sensors**, actuators, & appliances
  (e.g. pressure sensors, location-aware sensors, alarm functions, ...)

- Several **media devices** like displays, microphones, loudspeakers, & cameras

- Several **software components** for controlling the sensors and devices

- Several **computing devices** hosting them
Types of users

Primary Users

End-Users
End-users: sub-groups

- Elderly
- Family members
- Carers
- Medical staff
- Local authorities responsible for care
- Companies providing care
Association as federation of AAL projects

Involving

- Individuals, other Associations & Companies
- Association as common space to share ideas

Diversity

- Do not force monoculture (do not filter ideas)
- Many projects free to organize their governance rules
- Common rules will emerge by practice
Layering as a first level categorization

- AAL Services & Applications
- AAL Platform Plug-ins
- AmI General-purpose Components
- AmI Middleware

Platform Core

AAL Space

Presentation Overview

1. About the project / why a platform
2. The users
3. Community building
universAAL Main Objectives

- Produce a platform providing the necessary technical support, and acting as an open, common basis for both developers and end-users.
- Carry out support activities promoting widespread acceptance and adoption of the platform. These activities form an integral part of the project and will start at an early stage.
“One way to **build** them all, One way to **bind** them”;

Instead of each AAL service being built from scratch for specific needs – establish a single “standard” way to **build** AAL applications

- Make it easy for different vendors to create & sell different components: through a process of **binding** they can be incorporated in multiple AAL services
Primary Users

- Working for companies producing complete AAL solutions
- Working for companies producing AAL components
- Working alone, open source community
- Device Manufacturers

Our work is aimed mostly - but not exclusively - at these primary users
The **uStore** concept

Apple’s “App Store”

**Upload**

Application Developers

**Browse and select**

Users

**Download and run**

iPhone

**Upload**

universAAL **uStore**

**Upload**

Application Developers

**Download and run**

universAAL platform

**Run**

User’s execution platform

*(PC/MAC; devices; network connections etc.)*

**universAAL**
How?

We will achieve this objective by

- **consolidating the state-of-the-art results** from existing projects and initiatives and incorporating them into the UNIVERSAAL platform
- establishing and **running a sustainable community** that utilises the consolidated results
What are the Expectations from a Platform?

For AAL / AmI spaces of near future should apply

• networking-enabled HW nodes should form a dynamically configurable ensemble
  Requirement: self-organizing nodes

• the “operating system” of AAL spaces must enable
  the integration of HW nodes (plug-&-play, seamless connectivity)
  communication & collaboration among SW modules hosted on HW
  While hiding distribution and heterogeneity of the nodes

• given the above, a mass market will emerge that makes it profitable to
  produce HW & SW for AmI / AAL
  acquire know-how for administrative services
• **Bundles** are units of modularization, deployment and execution in OSGi
• Can be started, stopped, installed and uninstalled
• Can **export and import** packages
• Provide **services** one to another
The Application Platform

The challenge – running applications on multiple heterogeneous devices
OSGi: Service Oriented Architecture

- Service Requester
  - Listen to Service Changes
  - Search
  - Register
  - Bind

Service Interface

Service Provider 1

Service Provider 2
OSGi Declarative Services

- **Automatic** handling of Service Dependencies
- Service Providers can be switched **on the fly**
- If no required Service Provider is available
  - the Service Requester bundle will be **deactivated**
  - and **activated** once a Service Provider will become available again
Distributed Environment

• OSGi is originally developed to run in one JVM
• developing applications for distributed environments is difficult
  • Communication between applications in different nodes can be complicated
  • RPC, CORBA, Web Services
• The solution – universAAL Middleware
OSGi Services: the interoperability problem

- The Service Requester and Service Providers have to agree a priori on the exactly same interface
- Problematic in the real world
OSGi: Service Oriented Architecture

- Decoupling between Service Providers and Service Requesters
  Kind of Dependency Injection
- **Dynamically Publish, Find and Bind** service model
- Limited semantic **interoperability** by properties
- Programmatic and Declarative Models
- Services can come and go
Semantic Services

- No a-priori agreement between developers of service requesters and service providers is required
- Better interoperability!
- A mapping can be added later, by a third party
uStore

- Personalized search and recommendations
  - Based on the Customer Profile
- Integration with the platform and with the developer site (Developer Depot)
- Accessibility
- Mobile Commerce
- Software validation and security aspects