

Position statement: **Experimental Applications in the domain of Ambient Assisted Living (AAL)**

Proposed by:

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This position statement presents ideas for using the domain of Ambient Assisted Living (AAL) for requirements gathering for the Core Platform of the Future Internet (FI) activity. We propose to build on results from the FP7 projects i2home (<http://www.i2home.org/>), VITAL (<http://www.ist-vital.eu/>) and other related activities (e.g. IP universAAL (<http://www.universaal.org/>)) in running in FP7 to create highly relevant use cases for the FI AAL developer community and FI AAL users.

In this position statement we outline:

- The use case of AAL from the perspectives of I2Home and VITAL projects.
- Which FI functionalities and technologies we consider important for innovative applications in the domain of AAL.
- Functionalities expected from the core platform with respect to AAL
- An experimentation environment that we consider necessary for broad large scale testing of the platform to be developed for AAL.
- The role of DFKI

## **1. The Use Case of Ambient Assisted Living utilising the Projects I2Home and VITAL**

**Ambient Assisted Living (AAL)** includes methods, concepts, (electronic) systems, devices as well as services that provide unobtrusive support for daily life based on the context and the situation of the assisted person. In many cases the assisted person will be elderly and therefore it is most important that the technologies applied for AAL are user-centric and must be adaptable towards the needs and capabilities of the users. They are also integrated with the internet of things constituting the immediate environment of the user (anywhere he or she is). The technology is adapting to the user rather than the other way around, something that needs FI services and the support of the FI core platform. Technologies for AAL need to be interoperable in order to share relevant information between systems, services, and devices. Complex services should be flexibly composed from simpler services. A seamless integration of virtual content and things is desirable. Enabled with semantic descriptions and reasoning technologies this will enable the necessary intelligence in the AAL environment for sophisticated user support.

DFKI has successfully executed several research projects in the area of AAL the two most recent ones in FP7 are: i2home and VITAL. As a consequence, DFKI has established the DFKI Competence Center for AAL, see <http://ccaal.dfki.de> .

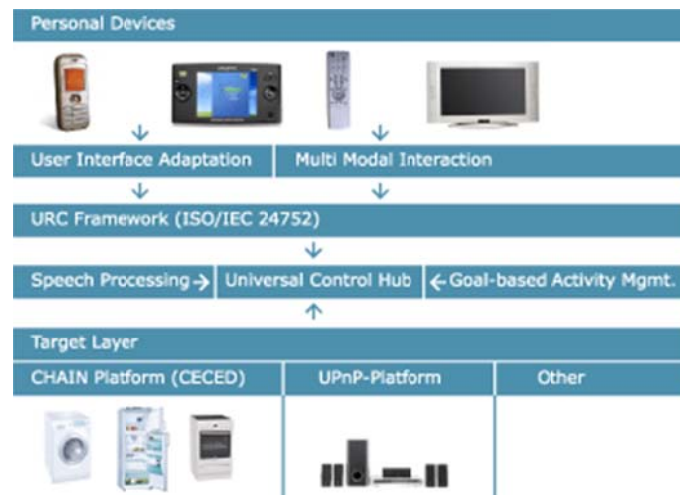
## The i2home project

The scope of i2home is the Intuitive Interaction for Everyone with Home Appliances based on Industry Standards. In this way i2home will make devices and appliances at home more accessible to persons with special needs. I2home focussed on persons with mild cognitive disabilities, older persons and blind or partially sighted persons, using a new mainstream user interface platform for personalized user interfaces – the ISO/IEC 24752 [Universal Remote Console \(URC\) standard](#).

Since the i2home project, the URC technology has received a great acceptance particularly within the research community in Europe and USA, and counts by now for all projects using the technology, an accumulated budget of over 80 Mi€ Therefore, currently the OpenURC Alliance is about to become established with the goal of providing an international platform for the promotion of the URC technology. The roadmap includes moving the alliance into a legal body in early 2011.

The results of i2home are applicable in a wide context spread out by topics like Home Automation, Intelligent Environments and Ambience, Intelligent Environments the Automobiles, Energy Efficiency and a series of others. Hence, the project can provide the technological basis for quite a many applications that can be derived from the very flexible concept on which the project bases – the URC.

The approach of i2home is in line with the vision of ambient intelligence and therefore contributes to the opportunity for Europe to reposition itself for the next generation of generic products and services building on a large user industry and service providers.



Figur 1 – Architecture of the I2HOME platform

## The VITAL Project

The objective of the VITAL project is to develop a set of technologies, platforms and applications with the aim to provide remote assistance to elderly users. The VITAL insight presents a new concept of remote assistance that differs from traditional schemes in the sense that

it is concerned not only with elementary subsistence needs but also with the aim to significantly increase the quality of life of the average elderly user. VITAL will intend to put in practice, inside an integrated environment, the concept of Total Assistance; understood as assistance anytime, anywhere, using any terminal and for any type of service. Using existing infrastructures and domestic terminals, VITAL is designed to deliver advice, assistance, information, education, entertainment and inter-personal communications to the users.

VITAL offers a platform for services that can be used before and after retirement so that the users will be able to perform at any time in their already familiar environment by selecting at every moment the services that suit them best without the need to change the vehicle for those services; services that will evolve in time with the user and may range from alarms and supervision to leisure, education and intelligently presented information.

VITAL key innovations require research work in three basic fields: advanced user interfaces over readily available domestic terminals that are specifically designed for the elderly (i.e. TV and mobiles), intelligent systems able to offer personalised information and services in an active way and speech understanding technologies with the aim to provide natural speech dialogue with the machine and automatic summarising capabilities. For this purpose, VITAL will address several state of the art research topics in the IST today: anywhere / anytime computing, intelligent agents technology, true personalisation, mobile and TV applications, active systems, natural speech processing, location sensing, advanced video services.

## **2. Important innovative Internet functionality and technologies**

Applications related to AAL would benefit from the use of a services infrastructure based on a FI platform that support an integration of Internet of Services, Internet of Things (Sensors), Internet of Content and Internet of Media, as illustrated below.

## **3. Future Internet Requirements from the Ambient Assisted Living Use Case**

As defined by the AAL Roadmap from the AALIANCE<sup>1</sup>,: “From a more technological point of view, organisations that develop devices and services suffer in their work from a lack of standards and references for designing the systems. These include:

- 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 the unobtrusive, affordable sensing of context (location, activity, vital data);

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<sup>1</sup> <http://www.aaliance.eu/public/documents/aaliance-roadmap/>

- 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.”

The AAL domain and market has some characteristics that makes it an ideal candidate for the forming requirements and exploring the capabilities of a FI core platform. These include the following application functionalities:

- Alarm, monitoring: Fall detection, identification, access control to buildings, proactive environment sensors, certainty that carers will come if need be.
- Entertainment and education: To live independently people need physical, social and mental stimulation. Integration of digital media, local activities, employment/occupation, life-long learning, and voluntary work is desirable.
- Social life: Seamless and ubiquitous contact with friends, social communities, and family.
- Living Longer at Home: Support people to live on their own in their houses or apartment even when they need more and more medical and physical support.
- Wellbeing: Monitoring (tele-health using sensors); motivation to exercise and to be active; get medical services everywhere at any time.
- Ambience: Services must be non-intrusive and highly user friendly, and end user adaptable.
- Device management: Monitoring of meals through the internet of things, dietary help, automated internet shopping from the refrigerator.
- Tracking: In order to be secure, some people benefit from being monitored (e.g. people with mental deficits, people with serious physical problems (heart attacks, sugar)). This can give people more freedom of movement otherwise impossible.
- Energy efficiency: Sensors for energy efficiency can be used to make sure that the living environment is pleasant.
- Security, privacy, trust: End user data needs to be private and safe. The user has to trust the platform and should be sure about the services providers he or she is interacting with at any time.

#### 4. Expected functionalities of Future Internet core technology platform

**Interoperability:** Platforms developed for AAL (e.g in i2home and VITAL) must be able to inter-connect, inter-operate, and cooperate with each other as well as with platforms for other application domains. Deploying an AAL solution does not happen in isolation, but is provided as a service and platform infrastructure where connecting to other services through common and open APIs is necessary.

**Federated Open Trusted Platforms (FOTs):** Security, privacy, and trust are important aspects when it comes to end-user requirements. Assisted persons need the certainty that the data they provide to the platform is safe and that the information that they get from the platform is reliable. In many cases the user but also a provided service needs to be sure with whom he or she is interacting. All this has to be solved in a manner that allows easy but safe access.

**Internet of Services:** As seen from the requirement list in Section 3 above, we see that several services from different verticals need to seamlessly inter-connect and inter-work in order to provide a suitable AAL service. Flexibility, adaptability and configurability of services is important to ensure adaptation to individual needs. The concept of Software as Services (SaaS) is also central to AAL, as costs and flexibility is crucial for sustainable deployment strategies. Services in the domain of AAL, especially safety and security services rely on an infrastructure provided by a core platform that is dependable, reliable, and secure.

**Internet of Things:** AAL solutions need standardised mechanisms for manageable sensors and actuators, networks of sensors and actuator, sensor data storage and fusion in order to provide the necessary quality of service. Availability through a core platform would ensure deployment in highly fragmented domains and environment, in a secure and stable manner.

**Ambient Networks:** AAL solutions need to be omnipresent. To provide the necessary assistance at the time of need, the user should have access to services wherever he or she goes. This requires networks with sufficient capacity and stability available everywhere.

**Internet of Media:** AAL should support most aspects of every day's life. Smart and context aware media is needed to ensure adaptability to a divergent user groups and application contexts.

**Cost Efficiency:** AAL should be affordable by everybody. Therefore a cost effective design, implementation and provisioning of services is crucial.

## 5. Requirements for an experimentation environment and prototype platform

Different kinds of stakeholders in the AAL domain would need different kinds of experimentation environments. The main idea of the AAL is to establish a link among the different stakeholder in order to reach relevant ICT industry, service providers and end users. To reach the ICT industry and developers of AAL services we foresee to utilise the concept of AAL competitions where core platform functionalities would be used and experimented with. We will liaison with projects in AAL Joint Programme and evaluate the platform in living labs (members of the European Network of Living Labs - ENoLL).

## 6. The Role of DFKI

The German Research Center for Artificial Intelligence (DFKI), with facilities in Kaiserslautern, Saarbrücken, Bremen, and a project office in Berlin, is the country's leading research centre in the area of innovative software technology for commercial application. In the international scientific community, DFKI is recognized as one of the most important „Centers of Excellence“ in the world for its proven ability to rapidly bring leading edge research to commercially relevant application solutions. DFKI was founded in 1988 as a non-profit organization by several renowned German IT companies and two research facilities. Since then, DFKI has established a reputation for proactive and customer oriented work and is known both nationally and

internationally as a competent and reliable partner for commercial innovation. Because of the increasingly short cycles of innovation in the field of information technology, the lines between research, application-related development, and conversion to products are becoming blurred. This is why DFKI projects typically include the entire spectrum from basic application-based research to market- and customer-oriented development of product functions.

Infrastructure and partnerships DFKI can bring into an AAL Use Case:

- Coordinating and participating in several European eHealth/eInclusion projects
- Established cooperation with leading industry in the domain
- Established cooperation with public authorities, regions and clinical expertise for real-life tests and evaluations of AAL technologies
- Established cooperation with end user organizations and domain experts.
- Participation in standardisation activities
- Active partner of the OpenURC Alliance
- Established partnerships with Living Labs in the European Network of Living Labs (ENoLL).

What we concretely can offer of results that is of value for a Use Case scenario:

- Knowledge base of end user and developer needs and requirements in an eHealth/eInclusion setting
- Knowledge base of the use of standards (OMG, HL7, IEEE11073/Continua) and contributing to such standards
- Open source service platform based on accepted standards for the development of eHealth/eInclusion services
- Experience from developing eHealth/eInclusion applications
- Results from empirically evaluating usefulness of technologies for end users