

VAALID IDE Project Proposal

VAALID project aims at creating new tools and methods that facilitate and streamline the process of creation, design, construction and deployment of accessible technological solutions for Ambient Intelligence to face the problem of the aging population.

These tools support the adoption of Human Centered Design methodology to create AAL solutions that are easily accessible for the user, technically and economically viable for the producers, and affordable and sustainable for the welfare system

VAALID project has addressed the development of an **Integrated Development Environment** (IDE) for the designers of AAL solutions. VAALID IDE focuses on the design of the interaction between an elderly (called "*beneficiary*" in VAALID project context) and the AAL solution. Also, VAALID IDE provides the designer with tools to evaluate the accessibility and usability aspects of such interactions.

VAALID IDE consists of two environments that provide tools to the designer:

- An **Authoring Environment** (AE), that allows the designers to create and deploy the components that constitute the interaction structure of an AAL solution.
- An immersive **Simulation Environment** (SE), that allows the designers to simulate previously created AAL solutions; and the beneficiaries to experience the AAL solutions in virtual and augmented reality.

VAALID IDE target users are the professionals who are in charge of the conception, design, testing and validation of the human aspects of AAL solutions. They are collectively defined as *AAL solution designers* (or, in short, *designers*) in VAALID project context.

The major innovation of VAALID IDE consists in the special combination and integration of the Authoring Environment and the Simulation Environment, which makes it possible to progress through a virtuous cycle of design-deployment-testing, that provides a tremendous support in the conception, tuning and implementation of AAL solutions.

In fact, the system allows the dynamic change and fine-tuning of different interaction models within the Authoring Environment and their immediate deployment and testing in the Simulation Environment, thus implementing a rapid application development paradigm within the AAL design process and favouring the application of the HCD approach.

In this way, VAALID IDE help to bridge the gap between the planning phase of AAL solutions and their testing and evaluation in reality (e.g. in a living lab), bringing in several important advantages:

- Possibility of early, "in silico" detection of potentially costly flaws, before resources are actually committed to implementation and production

- Faster decision making, due to the reduction of the time spent in the design-deployment-testing loop
- Improving the research of innovative solutions, through the conduction of efficient “what-if” analysis
- Potential to address the needs of a vast number of senior citizens’ categories, by fast switching among different beneficiaries’ interaction profiles at design time
- Management of new types of information not achievable with traditional means, as for instance information on beneficiaries’ reactions

These advantages foster a significant advancement of the AAL design process, resulting in higher product quality and innovation, reduced time-to-market and decreased implementation costs, in a relatively young industry, the take up of which is crucially dependent on the improvement of the cost/benefit ratio.

Description of the initial code base

The software is part of the results of the EU Project VAALID (<http://www.vaalid-project.org/>), developed by ITACA-TSB, UPM, FhG-IGD, SPIRIT, University of Parma, UID and Centro Volta and released under the GPL License 2.0.

VAALID Authoring Environment groups the development tools that allow the designer to define and describe the individual elements that intervene in the AAL solution. Basically, three editors compose the AE: User Model builder, Environment Model builder, and AAL service compositor.

These tools support the designer in defining the components of the AAL solution. This definition is made making use of models:

- Environment model: describing pervasive technology within a real physical ambient. It includes description of physical spaces as well as of sensors, actuators and any interaction device available to the beneficiary
- User Interaction Model: describing the relevant characteristics of the user or group of users that will interact with the AAL solution. These include physical and sensory attributes, habits, preferences and accessibility capabilities.
- AAL Service Interaction model: defining the interaction between the user and the AAL solution in a certain time and with a shared context. It includes the definition of tasks to be done by the user and by the system, interaction patterns; and sequence and timing of the interaction.

As these models need to be executed during the simulation of the AAL service, they should be defined from two perspectives, one describing the structure and the inner relationships of the concepts, the second describing how different concepts interact with each other when time pass by.

Ontologies will be used to provide the specification of the concepts involved in the simulation, and Workflows will be used to specify the way the user, the environment and the AAL solution will interact.

VAALID Simulation Environment includes the tools for simulating and validating the AAL Services. It is composed by the following components:

- The simulation control, it is the main interface of the designer to the simulations tools.
- 3D simulation browser, it is the component that provides the visualization of the simulation. Both beneficiaries and designers will interact with this component.
- The living lab verifier, this component will allow the integration of real devices and/or developed components of the AAL Solution into the VAALID SE, it can be seen as a set of drivers to connect external devices to the SE.
- The workflow engine, it is the component in charge of executing the workflows defined for all elements participating in the AAL solution.
- The choreographer, it is the central point of the SE. This component allows the communication among all SE components.

From the point of view of the beneficiaries, the SE provides an immersive virtual environment that will allow them to experience the living in an Ambient Intelligence environment, allowing the solution designers to get feedback about accessibility, usability and users' acceptance of AAL Services interaction modalities.

From the point of view of the designer, the SE provides the functionalities to test the accessibility capabilities of the different elements interacting within the AAL solution. These tests can be done at various stages of the design process, allowing the designer to address accessibility and usability issues using a rapid design-prototype-test process.

VAALID IDE software structure is based on RCP Architecture and its design uses an Eclipse-oriented look and feel. All elements have been developed as Eclipse plug-ins.

The source code is organized into different plug-ins:

- `org.vaalid.platform`: the main integration plug-in that links the rest of packages under the Authoring Framework;
- `org.vaalid.platform.filemanager`: It includes those capabilities required for handling the VAALID library as well as the file storage process (File and Library Manager);
- `org.vaalid.platform.flow`: it carries out all tasks concerning workflow management and presentation (Workflow Manager, Workflow Parser);
- `org.vaalid.platform.gui`: It concentrates the user interface components (views and editors) of the overall tool, integrating those coming from the different plug-ins (GUI Component Palette). This plug-in also implements the logic related to the management of simulations (start, stop, listeners and handlers) and the logic related to the loggers used during the simulation, by subscribing to the messages coming from the choreographer and the messages passed among the devices.

- org.vaalid.platform.interface3D: It handles the functionalities regarding VRML management (3D Model Manager, 3D Preview Renderer, VRML/X3D Parser);
- org.vaalid.platform.ontology: This plug-in collects all functionalities related to ontology management and presentation (Ontology Manager, Ontology Parser);
- org.vaalid.platform.project: It allows the creation of a VAALID project, as conjunction of different elements that will create the simulation scene.
- org.vaalid.choreography: This plug-in contains the development of the Choreographer of VAALID IDE and also implements the logic to work with the VAALID workflows and connect them to the JBPM Workflow engine

Roadmap and invitation to contribute

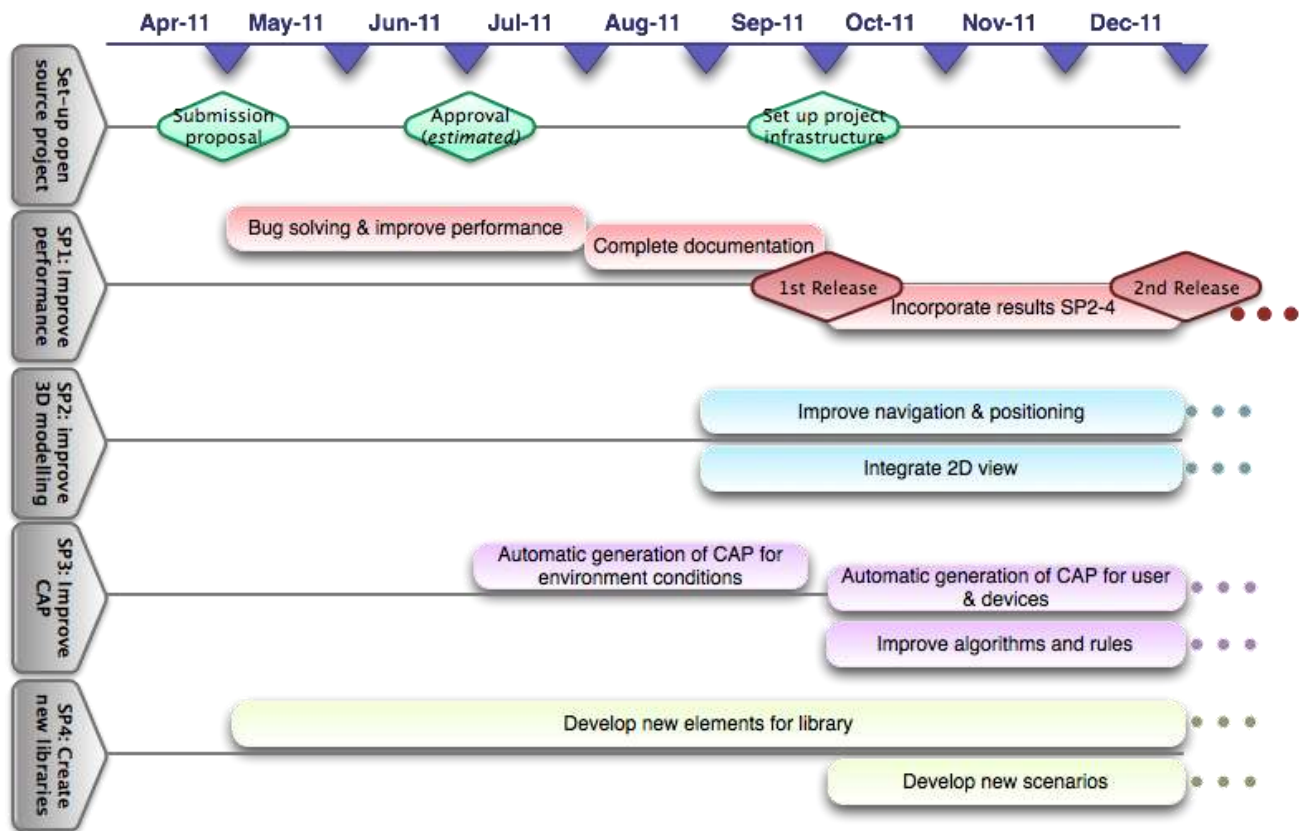
Both Authoring Environment and Simulation Environment will be released as open source, except the Instant Reality player that is licensed by FhG-IGD (<http://instantreality.org>), so any interested party will be able to use it as well as to contribute to the further improvements.

VAALID partners responsible for the development of VAALID IDE are fully committed to participate in this open source project, and we have agreed in the lines of work and roadmap that we would like to put in practice.

According to the results from the different evaluations carried out in the last phase of the project, the following subprojects will be created:

- SP1: Improvement of software performance. The goal being to further stabilised and make bug-free the current prototype in order to be used by anyone interested in it. Basically,
 - Resolution of bugs and errors detected in evaluation phase
 - Improve time needed for loading simulation
- SP2: Improvement of environment and element editors, in particular, the management of the 3D modelling. That will comprise initially:
 - Improvement of navigation in 3D preview
 - Improvement of positioning of elements and devices
 - Integration of 2D view
 - Development of importing modules to work with other formats (3DS, CAD...)
- SP3: Improvement of CAP-based accessibility check, that at the beginning will deal with:
 - Make stronger integration between user model and the accessibility profile, to be used also during simulation
 - Implement automatic generation of CAP for environment conditions, user and elements
 - Improve the rules and algorithms for the automatic accessibility check
- SP4: Development of new libraries, in order to enrich the VAALID ecosystem with new scenarios and devices.

The following picture gives an idea of the time-plan foreseen to set-up and start running this project:



Involved people

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