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# WP8 Methodology and Test plan

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## Abstract

This document describes the methodology of the tests that are going to be done on the applications developed by work packages 5, 6 and 7. We present the different testing labs in which the applications will be installed, targeted users, as well as the procedure for the testing.

Two kinds of tests will be carried out. On the one hand, a technical and functional validation to ensure that the applications, Intelligent User Services and Middleware work as they should, and on the other hand, user tests to check the attractiveness and ease of use of the developed applications.

Given the time constraints of the WP8 and the prototype nature of the tested applications, the user tests results that we aim to obtain will be qualitative, rather than quantitative. The results should give us an idea how Amigo-based ambient intelligence systems are perceived. Also they should help us to identify the most attractive applications. This information can then support exploitation of Amigo results,

## Keyword list

Ambient intelligence, application domain, home care and safety, home information and entertainment, extended home, testing lab, integrated demonstrator, functional requirements, technical requirements, user tests, warm-up, structured tryout, unstructured tryout, questionnaire, summarizing discussion

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# 1 Introduction

The networked home, is a home in which several pieces of equipment are connected using an infrastructure, where the traditional separation of activities is no longer valid. This networked home environment leads to many new opportunities. The most important one is Ambient Intelligence, in which technology is completely integrated into our environment so people can freely and interactively use it. However, general user acceptance of home networking is not yet in place. To get broad user acceptance and fast market introduction two elements need to be resolved:

- Installation and use of the networked home system must be simple and user-friendly, that is the usability of the system must be high.
- Attractive applications and services must be present which clearly offer an advantage over what is offered by today's non-networked systems. Many of these applications will use new context and user information services in a way that is not possible in present non-networked systems.

In order to verify the attractiveness of the applications and services developed in the project, user tests will be carried out with real demonstrators.

While the verification of functional and technical aspects of Intelligent User Services and Middleware components will be done in WP3 and WP4 as part of the development process, in WP8 Amigo software will be tested in integrated demonstrators. In other words, we will test whether they work as they claim they do, even when they are all working together.

This document describes briefly the labs where the demonstrator will be installed as well as the applications of each domain. Furthermore it describes how the technical and functional verification and user tests will be done.

Given the time constraints of the WP8 and the prototype nature of the tested applications, the user tests results that we aim to obtain will be qualitative, rather than quantitative. The results should give us an idea how Amigo-based ambient intelligence systems are perceived. Also they should help us to identify the most attractive applications. This information can then support exploitation of Amigo results.

## 2 Testing Labs

The Demonstrators will be installed in 5 different labs from different companies. Each domain will be tested in one lab, except the Extended Home that will be tested in 3. A description of the labs that are going to be used to do the verification and user tests, in each domain, is presented below.

### 2.1.1 Home Care and Safety

The home care and safety demonstrator will be installed in Domolab.



*Figure 1: General View of Domolab*

DomoLab is a laboratory for experimenting with home automation and energy technologies in the home of the future. It is an initiative of the Enerlan Foundation and the IKERLAN Technological Research Centre.

The Domolab building, which is located next to IKERLAN-Energy in the Miñano Technology Park, has two stories occupying a surface area of 183 m<sup>2</sup> divided into seven rooms (kitchen, dining room, two lounges, one bedroom and two bathrooms) and is equipped with a number of installations among which the following stand out:

- Data communication with the outside and the two IKERLAN centres, multimedia wiring, wiring structured for video, audio and data in all rooms, enabling work stations to be installed and monitoring to be carried out in communication with the two IKERLAN centres.
- Three heating and cooling systems (underfloor heating, air ducts and hydronic installation for radiators and/or fan-coils) to enable tests to be carried out with a wide range of control and heating and cooling systems.
- Home automation system to control domestic appliances, safety aspects like water leaks, gas leaks, etc., presence simulation and consumption, task automation, etc.

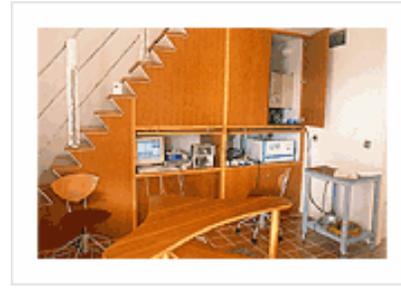


*Figure 2: Kitchen of the future*

- Ventilation system controlled on the basis of the relative humidity in the home.



*Figure 3: Living room*



*Figure 4: Safety and control unit*

### 2.1.2 Home Information and Entertainment

The Home Information and Entertainment demonstrator will be located in the Telefónica I+D premises in the Walqa Technological Park in Huesca, Spain. It is a 5.3 x 5.45 m room that simulates a living room in a house where all the applications developed under this demonstrator will be integrated. Some pictures are shown in the following figure.



*Figure 5: View of the Home Information and Entertainment demonstrator*

A WIFI connection and a LAN network (with twelve Ethernet ports) are available in the demonstrator. The following devices are also available:

- UPnP renderers (audio and video)
- Two barebones, one with Windows XP operative system and the other one with Linux (Ubuntu 6.0) to get all the applications in the demonstrator running inside.
- Gesture recognizer
- RFID receiver and tags
- 2 TVs (one of 20" and the other one of 32")

- Nokia N93 (UpnP compliant)
- Nokia 770

### 2.1.3 Extended Home

In the case of the extended home, three different labs are going to be used for demonstration purposes.

#### 2.1.3.1 Philips ExperienceLab

The ExperienceLab began as just one laboratory – HomeLab – in 2001. At first glance it looks just like an ordinary home. This home, however, is equipped with a high-tech infrastructure. It presents “a vision of fully integrated, user-friendly smart surroundings that promote well-being, self-expression and productivity”.

Many of the concepts that are currently being demonstrated in the ExperienceLab will need, if proven promising and viable, the Amigo networked environment in one way or the other. Examples of such applications in the ExperienceLab are: smartBed (fig.6), AmbiLight (fig 7), amBX (fig8), IILA (fig.9).



Figure 6 smartBed The smartBed monitors an elderly person while sleeping. It monitors vital signs with sensors integrated into the mattress. A bed is an ideal place for monitoring people's cardiovascular and respiratory performance and, of course, their sleep. It can tell you if you've had enough sleep, how much of it was good quality sleep, or if you need to get more sleep. By monitoring people in their familiar surroundings like their own home it can actually help save lives. It can encourage a person to stay fit, and it can also help improve the quality of life for people with heart disease.

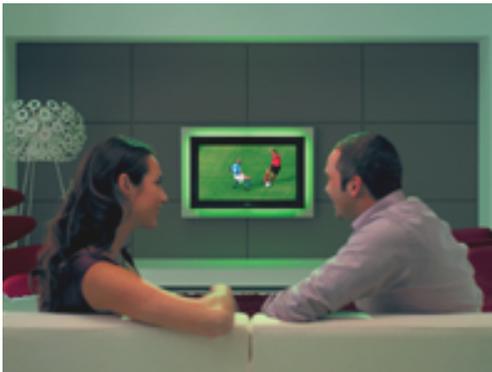


Figure 7 Ambilight. Ambilight produces ambient light around the TV screen to complement the colors and light intensity of the on-screen image. It adds a new dimension to the viewing experience, completely immersing you in the content you are watching.



Figure 8 amBX. Using amBX technology, multiple peripherals in the room around you work in harmony with the game to deliver a new sensory experience: surround lighting, sound, vibration, airflow and other effects.



Figure 9 IILA - Intuitive Interaction for Lighting Atmospheres. The IILA project has a host of sensors and lighting innovations that react to people as they move around a shop. Dynamic spotlights light individual clothes on the racks as they're moved to give people the feeling of being noticed and appreciated. Reactive spotlights subtly change the light beam on a display to bring it into focus as someone moves in for a closer look. It also includes technologies to make the visual merchandiser's job easier. For example, a LightWand can sample color from a piece of clothing and beam it magically to display around the item.

The relation between Amigo deliverables and the user and consumer tests in the ExperienceLab consist of:

- a) The Amigo results for the user studies in WP1 provide a valid source of input for projects that are currently running and being demonstrated in the ExperienceLab.
- b) The Amigo OSS and the Amigo interoperable middleware provide a promising base for elaborating the conceptual studies and especially for scaling and implementing the complex networks in real environments.
- c) Subsets of Amigo concepts can be tested in the ExperienceLab.

### 2.1.3.2 France Telecom VisionLab

The France Telecom VisionLab emulates a small apartment, see Figure 10. It has a living room equipped with a TV and a kitchen. In all rooms computer displays are present.

The experimentation space can be viewed from an adjacent office.

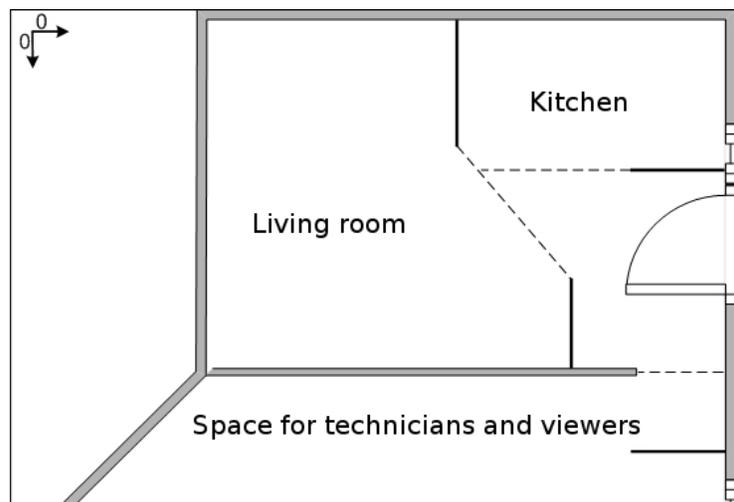


Figure 10 VisionLab at France Telecom

**2.1.3.3 IDG Labs**

Italdesign application, Feeling@, involves two different domains: Office and Home. The first domain will be simulated in the Lab1, the second in the Lab2. Users will experience the Feeling@ functionalities and see the counterpart of the scenario by means of audio video communication.

The following figures show the map of the two labs.

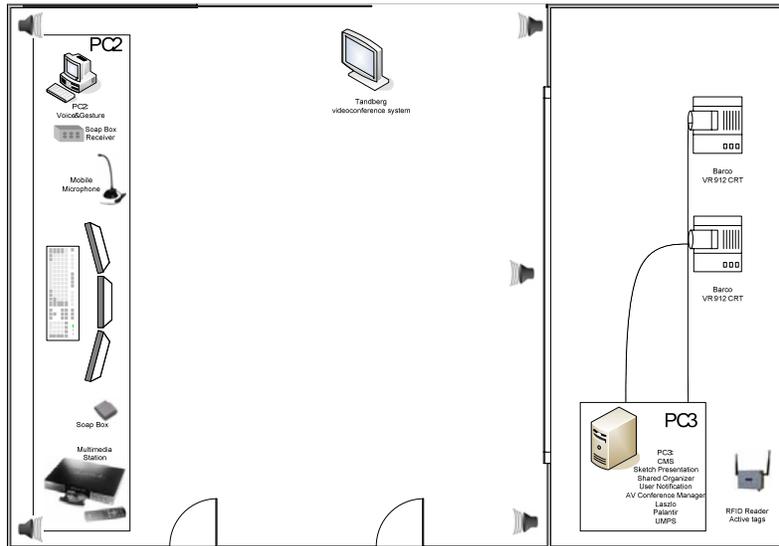


Figure 11: IDG Lab1 - (Office) map

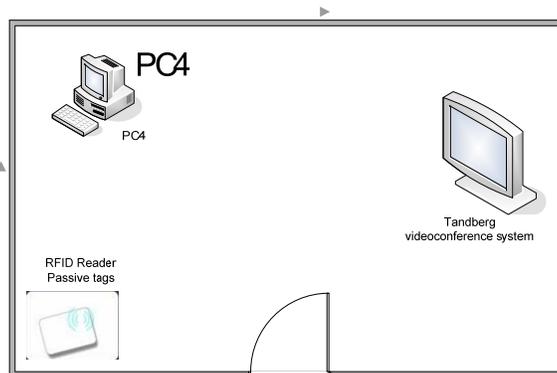


Figure 12: IDG Privacy Bubble – (Office) map

## Home: Lab 2

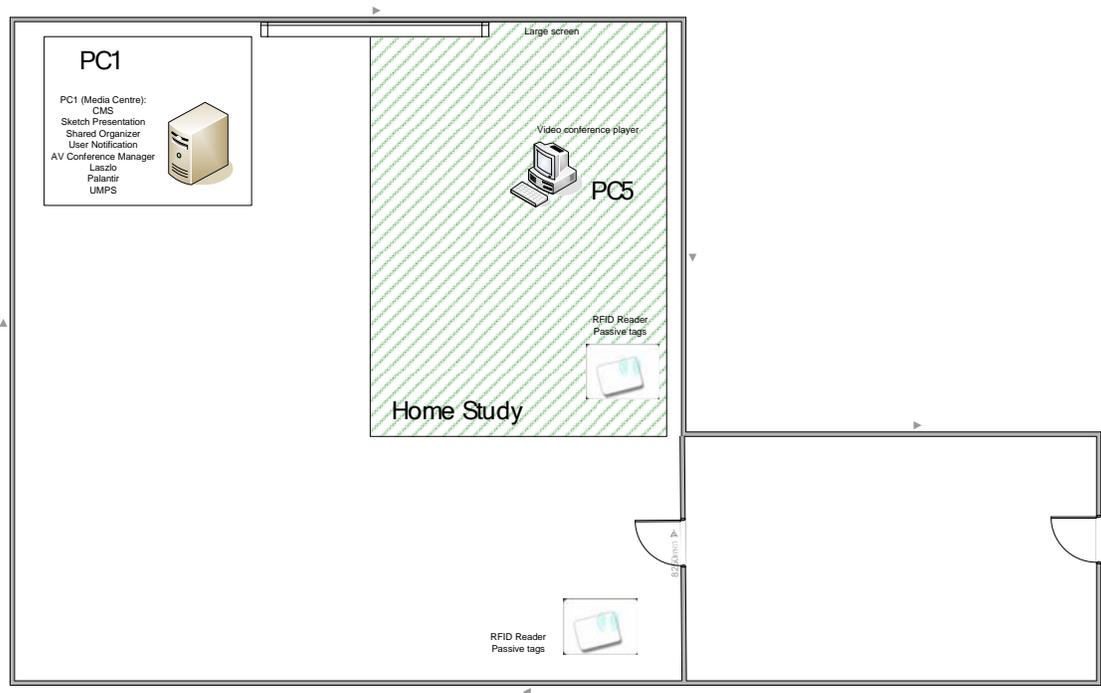


Figure 13: IDG Lab2 – (Home) map

As for involved devices, Feeling@ will provide location sensor support using RFID technology, audio-video conferencing deploying best-of-breed off the shelf products, large screen displays with touch screen options, wearable microphones for voice recognition and gesture interaction supporting VTT's SoapBox solution. All devices will be integrated in the Amigo software stack.

## 3 Brief Application Description

The applications of each domain that are going to be installed in the demonstrator labs mentioned above are described briefly below. Two kinds of tests are going to be carried out with these applications. On the one hand a technical and functional verification, and on the other hand user tests to obtain qualitative results on the acceptability of the demonstrated systems.

### 3.1.1 Home Care and Safety domain

The Home Care and Safety demonstrator integrates 8 applications that are related with this domain. A brief description of each application is enclosed below:

- Health Manager

The health manager application provides a personal health data record for each user, where context is associated to information objects use and storage, such as the weight and blood pressure.

- Daily Life Cycle Monitor

The Daily Life Cycle Monitor (DLCM) will exploit data gathered from different sensors as well as information provided by the Amigo middleware services to monitor the behavior of the habitants. Significant deviations from the normal behavior will be detected and an appropriate action will be taken depending on a rule set. Goal of the system is to maintain safety of the habitant. As a result, DLCM may be used to assist elderly people while they stay alone at their home.

There are several events the system will be capable of detecting: detecting if the habitant does not leave the bathroom for a long time. Further, it will be able to discover if user activity is missing for a long period of time. As a result, an alarm may be raised and an emergency message may be sent to a care provider.

- Food Management

The Food Management application gives recipe suggestions that takes profit of the context information (taken from the MW and IUS) related to the user. The Food Management can access to any kind of data related to the user and from them. It will be able to define specific alimentary daily routines. In the same way, and taking always into account the user's health and weight needs, it could recommend some recipes for a specific moment and as the fridge's content suggests. It will also manage the shopping list or give alerts if the food on the fridge is going to expire.

- Appliance Manager

The Appliance Manager application, can inform on appliance status on user request, allow to interact with the appliances remotely, notify the user on appliance task finish or malfunction, it also manages power and money saving elements, schedules, etc.

Different profiles will exist, not all the users at home can access to all the functionalities of the appliances, and not all the inhabitants need to be notified when a related event occurs.

- Entrance Manager

The Entrance Manager manages the front door events. Entrance Manager is responsible for recognizing people at the front and patio doors of the house and

opening the door(s) for them depending on their authorization for such action. Like a real professional doorkeeper can notify the inhabitants, can take visiting cards or record messages from visitors when no inhabitants are in the house and show personalized marks of the people that are present in the house for example, a picture, a note, light or a colour code.

- Comfort system

The Comfort system application interacting with the context manager can monitor the temperature, CO2 and humidity levels of the house and adapt them to the user's preferences.

The Amigo home is divided in different zones, each room could be a zone. The environmental features of each zone can be managed individually. Each user has his/her preferences of temperature/CO2/Humidity in each zone. The system sets the environment of each zone depending on the people already in the zone, or the people that will be next.

- Technical alarms

The appliances can make a self-diagnosis and inform the user and/or a technical assistance about any fault that occurs in the appliance.

The system is able to detect any gas or water leakage. That is, if an incidence is detected and in order to avoid bigger disasters, the system automatically cuts down the appropriate supply of water or gas. The user is notified as soon as any leakage is detected.

- Crisis Response Application

The Crisis Response Application (CRA) is responsible to act whenever an emergency situation is detected. The CRA will be made aware of any crisis situation in the home by subscribing to a number of alarm services. Furthermore, when an alarm is activated, the CRA may operate differently depending upon whether a family member is at home or not.

### 3.1.2 Home Information and Entertainment domain

The Home Information and Entertainment demonstrator is subdivided in two scenarios:

Home Information that includes the following sub-applications:

- Home Agenda

Home Agenda, is the main application where the rest of applications in Home Information will be integrated. The main functionality is to manage the user's agenda data. This is done using an ontology based on the iCalendar standard that models these data. The model created is exported as a context source, so then other applications can benefit from the information stored in Home Agenda.

- MyNews

MyNews, is responsible of selecting and offering news to the users according to their preferences that must be stored in their profile in UMPS. News is obtained from different resources in Internet and has to be analyzed to determine their type.

- Monitoring Manager

Monitoring Manager, which goal is to monitor entities such as objects or children and then to notify Amigo users in a relevant way by using a particular entities' location. The demonstrator is coupled with a user agenda to anticipate users' needs. Besides this, Amigo users can easily design their own scenarios and define

their preferences to reach particular needs. More particularly, entities such as objects and people are used in a common way: the user defines zones in the house where the entity is allowed and then chooses how he wants to be notified if the situation does not match the defined preferences any more. Actual uses are quite various: ensuring that each entity is in the right place (namely to avoid stealing, home disorder or dangers to a child), locating objects, etc.

This demonstrator is illustrated by two applications. The first scenario aims at preventing users from forgetting objects when going outside their home. The second scenario implies the monitoring of a child. It helps the supervisor to make sure the child is safe even if he is in another room of the house. Both use a common framework and are only a variation of this framework. However, these two applications use distinct editors:

- The Reminder Scenario Editor and
- The Entities Monitoring Scenario Editor

After rules edition, rules are made uniform and stored in a common database (Monitoring Rules) to be checked and to alert users when needed.

- Messaging Board

Messaging Board is responsible for recording, storing, retrieving and presenting messages for home inhabitants left by other family members or friends, relatives... The message can be left from inside the house or outside using the Entrance Manager or the phone. The system recognizes the message recipient and stores the message in their associated "message box".

- Personal Context Diary

Personal Context Diary provides a personal home experience record for each user, where context is associated to information objects use and storage. It first provides the basis for more enjoyable diary writing in terms of having a rich set of remembrance cues automatically available. Second, searching in Percodi is enhanced to include not only content of the diary written, but also context parameters to formulate search queries. Third, content and context data within Percodi will be used in order to try to get to know a user over time and if possible do predictions based on patterns found.

Home Entertainment that includes the following sub-applications:

- Media Manager Core

Media Manger Core is the main application that hosts the rest of applications in Home Entertainment. MMC takes the responsibility for browsing the content desired by the users depending on their profiles and context, and for adapting and later serving and playing the content on the most suitable renderer, such as a TV or a PDA. Hence, the application manages all activities related to content, browsing, description, repository and playback options like play, forward or pause following user preferences and profile and context information. The application directly interacts with the voice and gesture support shared services as well as background applications like Context-Dependent Personalization of Multimedia, Parental Control and Privacy Enforcement, which will be running at the same time the content is about to be rendered. It may indirectly interact with any other application requiring playback of content.

- Privacy Enforcement

Privacy Enforcement is introduced to ensure privacy aware personalized content provisioning. When an Amigo user views content and does not want others to be aware that he/she is being provided with the specific content under the current circumstances, the system is able to configure this content view based on the user context. Thus, the system detects the presence of other humans in the area where the content delivery service is used and adjusts the view of the provided content accordingly. When the user is alone, the selected devices simply display the content requested. Whenever the presence of another person is detected in the same area, the system applies the privacy rules specified by the user turning the devices to stand-by mode for example. This way, the Amigo user keeps the usage of the specified content delivery private.

- Parental Control

Parental Control is responsible for checking whether an Amigo User is authorized to access media that is available only under parental permission. Parental control over content delivery services focuses on restricting a (usually juvenile) user's access to inappropriate content. This task is achieved by consulting the parents of the child on this matter. If the parents allow their child to access the specific content, then the Amigo system proceeds with the service delivery. Thus, the Amigo system initially retrieves information about the user (child) who wishes to access the specific content as well as information about the specific content. If no rules have been established for the specific user and content or no explicit parental permission to access the content is in place, then the Amigo System attempts to reach one of his parents. Thus, it selects the device to be used in order to communicate with the parent and uses the selected device to send him/her a message requesting permission to deliver the specified content to the child. When the parent notices the message he/she replies to the system, which processes the reply and either starts the content delivery through the Media Manager Core or informs the Amigo User about not being authorized to access the specific content.

- Context Dependent Personalization of Multimedia

Context Dependent Personalization of Multimedia shows personalized selection of multimedia and/or home media based on user context. Suggestions about what to watch are personalized by using user profile information and user context information. For example: selection of photos and videos which people watch depends on whom with they watch the video and what are they currently interested in.

Ability of Amigo system to present personalized suggestions to the users depends on available user context, user profile and home agenda. For example, if Amigo system is not capable to recognize some context type which affects user's interests (e.g., if Amigo system can not recognize which people are going to watch photos or videos together), it might provide wrong suggestions, e.g., to ignore somebody's interests.

Apart from ability to recognize users' contexts, Amigo system should be able to learn user preferences from the history of multimedia retrieval cases. This is a challenging task because users are not willing to explicitly rank the videos, that is, to express how did they like the actors, the video plot, how suitable they consider the video for watching together with children or with guests and so on. Thus, Amigo system should not only acquire user's preferences explicitly, but also infer them from indirect clues. For example, if users never watch some video together with children, or even switch off the playback when the children enter a room, this means that they consider this particular video as unsuitable for children.

The demonstrator will be aiming to show how an intelligent home system can personalize suggestions to the users, based on the available contextual information and on application history.

- **Board Game**

Board Game consists of a traditional, physical board game that uses ambient intelligence methods for enhancing the game experience. The board game can be controlled via physical figures, gestures, and speech and adapts the ambient atmosphere in the room (light, music, eventually wall displays) to the state of the game. The demonstrator uses and greatly simplifies the game mechanics of typical fantasy tabletop/role playing games. Figures representing fantasy creatures such as knights, ghosts, orcs etc. are placed on a physical game board and engage in a fierce battle. The goal of the game is to overcome the other players' figures and thus earn a higher score than the other figures that have lost. Figures are moved turnwise and perform actions such as casting magic spells, attacking other figures, or using enchanted artefacts.

Figures can be moved on the physical game board or on a graphical user interface as in a traditional video game. Speech can be used to issue game commands such as attacking another figure. Gesture control is used for "magic wand" functionality, i.e. casting spells. The more powerful the magic spell is, the more complex becomes the gesture to perform. Therefore, it requires a bit of training with the gestures in order to use them most effectively.

The application integrates with the Media Manager Core (MMC) from which it can be started and terminated.

### **3.1.3 Extended Home domain**

The Extended Home demonstrator integrates a number of applications of person-to-person ambient communication, facilitating sharing presence and activities between persons in different homes and extending the usage of classical remote communication towards more informal, sparse and unfocused communication modes. A variant in a home to workplace configuration is also demonstrated.

This ambient communication demonstrator aims at extending the home environment for interpersonal communication on top of the generic ambient intelligence platform developed in the project. For this, it uses the home environment as a unified interface, moving interactive services transparently to the closest and best-adapted devices present in this environment. Scenario variants are included in which people move in and out of the home, while retaining some of the facilities of their home base for communication. This can be in office environments where they wish to stay in touch with home, or remote homes where they substitute the local context for their usual one.

The ambient communication applications use both explicit interaction with conventional interaction devices such as TV remote control, and implicit context-adaptive interaction for unobtrusive communication modes as means to overcome the saturation of the users' attention time and foreground cognitive bandwidth.

The Extended Home demonstrator is composed of the following applications:

- **Palantir**

Palantir is the presence and availability management system. Its main purpose is to provide the user with information on availability and presence status of her/his buddies. The Palantir also estimates the users' status. The estimated presence status can be corrected by the user with one of the developed GUIs (Palantir GUI

by FT and AwarenessGlobe2 by PHI). Both GUIs allow also starting other ambient communication applications.

- Activity Sharing

Activity Sharing is a set of applications designed to run on a TV. They allow remote users to share photo albums and play arcade games while maintaining an audio-visual communication link.

- Feeling@

Feeling@ aims at providing a feeling of being together while in a distant place; either at work (Feeling@office) or at home (Feeling@home). The user is alerted about important events that are happening in distant environments and when necessary can start an AV connection to these places.

- Ambience Sharing

Ambience Sharing application may, at its most basic level, be considered as a context-adaptive extension of traditional person to person visual communication services such as videoconference. The application is not tied to special-purpose devices communication adapts to activities and recedes into the background as much as possible. The home environment is used as a unified interface that moves services transparently to the closest human interface devices present in this environment.

- Social Radio

Social Radio enables friends to stay connected to each other. Social Radio enables an intimate group of persons to share their presence and mood with each other. The application consists of multiple smart artefacts that use ambient light and music in order to unobtrusively communicate information to remote users. One remote friend is represented by one artefact. Each person has several artefacts at home that represent their circle of friends.

- Board Game

Board Game is an adaptation of the WP6 Board Game for a distributed setup. In WP7 demonstrator the Board Game can be played between people in distant homes.

- Personal Amigo Device

Personal Amigo Device (PAD) gives access to resources and services located in a guest domain. The PAD is based upon the core idea of "bridging" two Amigo home domains by making home services available wherever the user goes.

## 4 Verification of technical and functional aspects

### 4.1.1 Aim

The main objective behind the technical and functional validation is to ensure that once all the middleware, Intelligent User Services and applications are deployed all together in the demonstrator of each domain, all the system is working as it should.

### 4.1.2 Scope

The verification and validation of the technical and functional aspects will be performed over the demonstrators built for each application domain. Using the demonstrators, the applications will be tested and the usage of Intelligent User Services and Middleware components in them. The analysis of the performance, robustness and other relevant parameters for each application, service and middleware component on its own, is out of the scope of this verification.

### 4.1.3 Participants

The verification of technical and functional aspects will be carried out by Amigo consortium members rather than by end users.

### 4.1.4 Procedure

The verification of technical and functional aspects will consist of checking that applications implemented in the demonstrators meet the requirements.

To do this verification, the first step is the structured compilation of the specific technical and functional requirements, described abstractly in previous documents, for each application domain.

There is no common standard testing procedure for the requirements. Some requirements will be tested by observing the system's response to typical interaction end users are supposed to do. Others will require verifying some logs of the middleware to see how applications and the middleware are interacting. Some of them will be as simple as seeing that the user interface of an application is shown properly, other will be far more complex. So, as a conclusion we can say that each requirement will have its own way of being tested.

As there is no common testing procedure, each specific test needs to be described for each requirement. This will be done in the result report, where the results will be presented in the form of a table similar to the following one:

Requirement	How it has been tested	Results	Comments

*Table 1: Verification Results table*

## 5 User Tests

### 5.1 Aim

The last objective of user tests is to know the acceptance of the applications developed within Amigo, and to gather feedback about possible changes and improvements for them.

### 5.2 Scope

The main purpose of these tests is to see if the applications showed in the demonstrators fit people's needs and daily behavioral patterns. This will be done paying special attention to the usefulness of the application and the ease of interaction.

Given the time constraints of the WP8 and the prototype nature of the tested applications, the user tests results that we aim to obtain will be qualitative, rather than quantitative. The results should give us an idea how ambient intelligence systems are perceived.

### 5.3 Participants

A group of potential users will be formed following the guidelines and profiles defined in WP1. This group will cover different ranges of age, civil states, life styles and work conditions.

In some application domains some particular criteria at the time of selecting people may be applied if the tested application needs so.

The idea is to form a small user group (no more than 6 people) to carry each testing session.

### 5.4 Procedure

User tests will be composed of four different parts. A "Warm-Up" to introduce the system to users, a "Structured Tryout" to show users which are the kind of things that can be done, a "Unstructured Tryout" to let the users command the system and a "Feedback Gathering" phase composed of a questionnaire and a summarizing discussion, to explicitly collect feedback. Following this procedure, several testing sessions will be organized in each of the testing labs.

In the following table it is shown how a testing session will be structured:

Activity
Arrival, introduction and explanation
1. Warm up
2. Structured Tryout
3. Unstructured Tryout
<i>Coffee Break</i>
4. Questionnaire
5. Summarizing Discussion
<i>Unwinding; cooling down, debriefing</i>

Table 2: User testing procedure

All the user tests are going to follow the same procedure, but as they are going to be performed with demonstrators from different domains, this procedure will be personalized to fill the needs of each concrete domain.

#### 5.4.1 Warm Up

During this phase, all participants will be received in the labs, and a brief Amigo explanation will be given. With the help of the different dissemination material available and a specific description of the domain to be tested, we will give a superficial explanation of what the participant could expect. We will try to tell them as little as possible, while still explaining enough so that they would be able to discover the exact functions and applications of the Amigo demonstrators by themselves. This way we try to maximize their experiences later in the session when actually interacting with the Amigo applications.

#### 5.4.2 Structured Tryout

In this phase users will be in contact with the prototypes for the first time. The participants and the interviewer will go into the area where the demonstrator is placed. Based on the applications described in the bullet 3 of this document, the interviewer will command the applications following a script in a smooth story telling way.

The interviewer will ask participants to speak out their first reaction and impression. We will also pay careful attention to their comments and non verbal behavior.

#### 5.4.3 Unstructured Tryout

Once that the users start knowing how the system works, and what they can do with it, they will be encouraged to try the applications by themselves.

In order to get an idea of what aspects of the demonstrators they liked best we will ask them to just try out some applications for a few minutes without any guidance of an expert.

The interviewer will set back and pay attention to the comments and observe the non verbal behavior of the participant. Paying special attention to the ease of interaction and helping the users whenever they ask for help.

This phase will very much depend on the robustness of the applications installed in the demonstrators. As these will be prototypes, it is likely that only a few of them are robust enough to be tested by users.

#### **5.4.4 Feedback Gathering phase**

In order to get as much feedback as possible, we will annotate participants' overall impression and experiences during all the testing phases, but especially we will get this point of view in this last phase.

In the feedback gathering phase we will try to get users' point of view about overall aspects of the system as well as some specific aspects of each application. To do so, we will follow carefully a guideline that will be composed of two parts, a pen-and-pencil questionnaire and a general summarizing discussion.

##### **5.4.4.1 Questionnaire**

The goal of the questionnaire is to test, in a reliable way, application attractiveness and usability in everyday life, both in a domestic and working environment.

Questionnaire results are a reliable measure of the concepts and development, because a pen-and-pencil questionnaire gives the user time to reflect and weigh up his/her answers. The possibility of asking questions and receiving answers about interesting topics will give the user the possibility to interact and solve all the possible misunderstandings.

This questionnaire will have one part that will gather general information from the user and another that will focus more on specific feedback from the different applications shown in each domain.

##### **5.4.4.2 Summarizing Discussion**

Once that each user has filled the questionnaire on its own, all the users of a testing session will participate in a summarizing discussion moderated by the person in charge of the demonstrators testing.

In this phase all the personal experiences will be shared between all the users promoting an open discussion about good and bad points of the demonstrators seen and possible ways of improvement.