PROJECT PERIODIC REPORT

Grant Agreement number: 248730

Project acronym: FLORENCE

Project title: Multi Purpose Mobile Robot for Ambient Assisted Living

Funding Scheme: Small or Medium-scale focussed research project

Date of latest version of Annex I against which the assessment will be made: 18-12-2009

Periodic report: 1st ■ 2nd ☐ 3rd ☐ 4th ☐

Period covered: from 1 February 2010 to 31 January 2011

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[1] Usually the contact person of the coordinator as specified in Art. 8.1. of the Grant Agreement .

[2] The home page of the website should contain the generic European flag and the FP7 logo which are available in electronic format at the Europa website (logo of the European flag: http://europa.eu/abc/symbols/emblem/index_en.htm logo of the 7th FP: http://ec.europa.eu/research/fp7/index_en.cfm?pg=logos). The area of activity of the project should also be mentioned.

Declaration by the scientific representative of the project coordinator

I, as scientific representative of the coordinator of this project and in line with the obligations as stated in Article II.2.3 of the Grant Agreement declare that:

- The attached periodic report represents an accurate description of the work carried out in this project for this reporting period;
- The project (tick as appropriate) [3]:

  ■ has fully achieved its objectives and technical goals for the period;

  ☐ has achieved most of its objectives and technical goals for the period with relatively minor deviations.

  ☐ has failed to achieve critical objectives and/or is not at all on schedule.

- The public website, if applicable

  ■ is up to date

  ☐ is not up to date

- To my best knowledge, the financial statements which are being submitted as part of this report are in line with the actual work carried out and are consistent with the report on the resources used for the project (section 3.4) and if applicable with the certificate on financial statement.
- All beneficiaries, in particular non-profit public bodies, secondary and higher education establishments, research organisations and SMEs, have declared to have verified their legal status. Any changes have been reported under section 3.2.3 (Project Management) in accordance with Article II.3.f of the Grant Agreement.

Name of scientific representative of the Coordinator: Dietwig Lowet

Date: 03 / March / 2011

For most of the projects, the signature of this declaration could be done directly via the IT reporting tool through an adapted IT mechanism.

[3] If either of these boxes below is ticked, the report should reflect these and any remedial actions taken.

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1 Publishable summary

1.1 *Vision and Problem*

The aim of the Florence project is to improve the well-being of elderly (and that of their beloved ones) as well as to improve the efficiency in care through Ambient Assisted Living (AAL) services, supported by a general-purpose mobile robot platform. The Florence project will investigate the use of such robots in delivering new kinds of AAL services to elderly persons and their care providers. Florence will put the robot as *the* connecting element between several stand alone AAL services in a living environment as well as between the AAL services and the elderly person. Through these care, coaching and connectedness services, supported by Florence, the elderly will remain much longer independent.

A key aspect for Florence is user acceptance. Florence aims to improve the acceptance of AAL (robotic) services by providing both assistance and fun oriented lifestyle services via the same means. The ambition of Florence is that the elderly should be proud of having a Florence robot. This increase of user-acceptance will greatly alleviate the need for personal care for elderly, and therefore provide for significant cost-savings.

1.2 *Objectives*

The objective of Florence is to research and investigate the role robots can play for assisting and improving the well-being of elderly and to increase the efficiency in elderly care. More specifically, Florence will investigate and develop the following lifestyle and AAL services for the elderly:

- *Coaching*, by giving feedback on specific activities like physical exercises, and advise on activities of daily living.
- *Social inclusion*, by supporting access to the social networks, including web-2.0 and synchronous communication means.
- *Safety*, by using Florence as additional ears and eyes in comfort or safety situations, controlled by service providers or the elderly themselves (crisis or emergency detection, smoke detection, personal alarm, water-damage …).

For the caregivers, Florence will also develop *care support services*, for example, by maintaining a log of care-related activities at home that can be shared among (professional and volunteer) care-providers.

1 Project objectives for the period

1.1 *Period applicable*

This report refers to the period February 1st 2010 - January 31st 2011. Another report submitted in the first year of the project is the M6 progress report.

1.2 *Objectives Defined*

The objectives for M1-M12 were to:

- Determine the use cases and requirements for the Florence system taking based on focus groups and Wizard of Oz testing (WP1)
- Develop the initial overall Florence architecture (WP2)
- Develop the initial detailed architecture of the components monitoring, decision making components (WP3) and the initial architecture of the interaction framework and its components (WP4)
- Develop the specification and architecture of the Florence AAL services. (WP5)
- Disseminate the initial results of the project. (WP7)

We met all of these objectives:

- Milestone 1 was passed with the delivery of D1.1 Initial Robot based Service Scenarios).
- Milestone 2 was passed with the delivery of
  - D1.2 Requirements for Florence Services and Systems
  - D1.3 Final Robot based Service Scenarios
  - D1.4 Report on Wizard-of-Oz Experiments
  - D2.2 Initial Florence System Architecture
  - D3.2 Initial Specification and Architecture of Monitoring and Decision Enablers
  - D4.2 Initial Specification and Architecture of Interactivity Enablers
  - D5.2 Initial Specification and Architecture of Robot Enabled AAL Services
- Initial results of Florence have been published in three papers and a number of internal and external presentations.

1.3 *Previous recommendations*

The table below provides an overview of the recommendations of the interim review based on the results of the M1-M6 period and the actions that we have taken.

Feedback Interim Review	Actions Florence
(1) A comprehensive plan for the **system integration** should be soon elaborated. A first version of this plan should be included in the deliverable D5.2 and presented at the first periodic review.	A first plan for system integration has been developed and is part of D5.2. This plan is subsequently turned into a separate document. This is a living document that is continuously updated throughout the implementation phase.
(2) Bestow more attention on the **mechanical and industrial design** of the robot. Physical appearance and Human-Robot Interaction should be addressed carefully and since this early stage of the project.	Florence paid specific attention to the mechanical and physical appearance of the robot. During the Wizard-of-Oz tests we dedicated significant time to gather the opinion of the users on the design of the robot and on interactivity aspects. In addition to that the robot manufacturer was evaluating different alternatives for the mechanical and industrial design, the market relevancy

	and potential costs. Results are reported in D1.4 and in D7.5
(3) In WP2, work on the **system architecture** should be anticipated (see details in Annex 2) and intensified. A person (including roles and responsibilities) should be indicated as the individual in charge of the system architecture; these should be presented at the first periodic review.	Florence does have an architecture team in place, which is led by Florian Winkler (NEC) as chief architect. His role is to supervise and coordinate the architecture development, its consistency and a suitable documentation. As task leader of the architecture task 2.2 he also formally has a leading role. The idea is that this team will stay in place during the whole period of the project. With the finalization of D2.2 the focus of the architecture team will gradually shift from conceptual architecture work, to implementation and later integration issues.
(4) A plan for addressing '**safety'** should be developed; this should relate to the designing of robot features as well as the activities involving users (e.g. validation). This plan should be included as appropriate in the relevant deliverables – D5.2 and D6.1 (the latter because 'safety' is also a matter of ethics and several national regulations address it in what concerns the involvement of human samples). According to the accomplished work, the measures and lessons-learned should be reported in the relevant deliverables.	An overview of potential safety issues has been compiled and for each safety issue a number of actions to reduce the risks have been defined. This safety plan is part of D5.2. As a next step this safety plan will be used in a separate living document that will be regularly updated throughout the implementation and testing phase.
(5) The **conceived use-case scenarios** should be analyzed more exhaustively (include potential variations); this would promote a more robust solution.	The use cases have been modified based on the focus group results and the Wizard of Oz tests. The resulting use cases are described in D1.3.
(6) An **internal review procedure** should be implemented for checking the presentation quality of the deliverables and reports. Two deliverables (see Annex 1) assessed in this review should be amended and provided within one month after the receiving of this review report.	The internal review procedure has been followed more strictly to guarantee the quality of the deliverables. The two deliverables in questions have been amended and resubmitted.
(7) The **State-of-Art investigation** should be extended; important relevant issues were not sufficiently addressed. The respective deliverable should be complemented and re-submitted within three months after the receiving of this review report.	The State-of-the-Art investigation of WP2 has been extended and a new updated version of D2.1 has been submitted. More attention has been paid to robot related technologies like positioning and obstacle detection techniques. Also for design and functional aspects like power supply and safety measures a state-of the art analysis has been performed to ensure that robots will have the technology available to fulfill the requirements of the Florence services.
(8) The project website should be **regularly updated**; it should include reports and presentations in workshops. Special attention should be dedicated in making it attractive to relevant stakeholders; **collaboration should be promoted** and outcomes, highlighted (in this context, the presented Links to related & relevant projects should be explained and explored)	The Florence public web site has been updated: • Reports are added • Public presentations are added • Collaboration is explicitly promoted • Link to related and relevant projects is explained • The event section is regularly updated
(9) In WP 2 and 3, issues related to particular technologies (see details in Annex 2) should be comprehensively investigated.	We have investigated the "Complex Event Processing (CEP)" approach and the results of the Astra and TUMCAT projects. The investigation results are described in the appendix of D3.2. The Florence project will follow the EU funded IoT-A project that aims at making the CEP model dependent of the system state, as this dependency is also required for the Florence system.

	The tools provided by the ASTRA project can be used to (a) realize those Florence services that support social relationships and (b) measure how effective these services meet user needs. The TUMCAT project is concerned with user testing methodologies. This project will be investigated when WP6 will be started. The WP6 leader will pick this up in the WP6 context.
(10) The consortium should continue examining projects in similar field (see suggestions in Annex 2); this would contribute to positioning the project within the SoA and create opportunities for dissemination and exploitation	We have addressed recommendation (9) and (10) together. See the actions for recommendations (9).
(11) A **demonstration** of chosen robot platform (or single components) and initial AAL services should be presented at the first periodic review (eventually, a video conference or recording should be arranged)	A demo of the chosen robot platform will be presented at the review on March 18th together with some (mock-ups of) initial services.
(12) The Periodic reports should include more details on the "explanation of the use of resources"; recall complementary guidelines sent on 16/04/2010 per e-mail.	A detailed table and justification about resources is depicted in chapter 6 and 7. Deviations between planned and spent effort is specified by the partners.

Table 1 Overview of the interim review recommendations and the actions that the Florence project has taken.

2 Work progress and achievements during the period

2.1 *WP1 – User Centric Service Definition*

This work package starts with defining the current situation in respect of the robotic based technology take up by the elderly population and specifying the most common identified situations in which robot based technology can improve or solve daily situations. These are evaluated in focus group sessions with the three user communities (Task 1.1), resulting in more refined requirements for robotic services. Based on these requirements, the robotic services will be defined in Task 1.2, taking into account also initial insights of the technical architecture developed in WP2. These services will be evaluated with the user communities using Wizard-of-Oz based evaluation mechanisms in Task 1.3. The final evaluation of the live Florence system will be performed in WP6.
Due to the involvement of users throughout the project, there will also be an assessment of the ethical and regulatory requirements concerning the involvement of elderly people.

2.1.1 Technical Progress

Task 1.1 Requirements from Elderly and Their Carers

Focus group sessions were carried out by professionals at each of the sites in order to obtain relevant feedback with respect to the first version of the developed scenarios. These sessions were undertaken following scientific approved methodologies and selecting the correct users profile appropriate for the nature of the different scenarios.

Four to six users were selected at each of the sites and the scenarios were distributed among the sites according to the availability of resources and settings for a proper development of the scenarios. A common approach was introduced at each of the sites to maintain a coherent pattern during the sessions. The scenarios were distributed as follows:

- FASS: Agenda Reminder, Fall handling, Collaborative gaming, Lifestyle improvement.
- OFFIS: Fall Handling, Logging System, Advanced Home Interface, Lifestyle Improvement.
- NOVAY: Device Coach, Lifestyle improvement, Keeping in touch, Logging system.

The feedback from the focus group session was collected and used to modify the version 1 of the scenarios and generate in this way the input for the wizard of Oz test.

The results and the detailed planning of all sessions have been presented in D 1.2 along with legal and ethical requirements. There were some time-management problems; therefore the final delivery of the documents was postponed for two weeks.

Task 1.2 Definitions of Robotic Service Scenarios

First a set of scenarios were developed based on literature and previous research. These scenarios included a description of the target users and the explanation of the context. These scenarios were used to obtain feedback from the end users when developing the focus group sessions. The generated use cases are the input to the wizard of OZ tests. Finally, the scenarios were modified to reflect the results of the different tests in order to end up with a final iteration conveying the final Service Scenarios.

Task 1.3 User Feedback Analyses

The focus groups were carried out in September and the feedback was used to modify the existing scenarios. Following this, a methodology for the wizard of Oz test was described and analysed. This methodology was developed taking into account the aspects that needed further input from the focus group sessions as well as to the nature of the use cases.

The distribution of uses cases per site was as follows:

- FASS: Agenda Reminder, Fall handling
- OFFIS: Fall Handling, Logging System
- NOVAY: Lifestyle improvement

In D1.4 the Wizard of Oz tests are described. The tests were carried out by three partners, Offis, Novay and FASS. FASS took over the coordination as well as the editing of D 1.4 in order to set common parameters for the methodology, settings and result analysis.

2.1.2 Deviations from the plan

The submission of deliverables D1.2 and D1.4 has been delayed for two weeks. They have been submitted and this has not further consequences for the execution of the project.

2.2 *WP2 – Architecture and Platform for Service-Robot@home*

The objectives of work package 2 are two folded: it is responsible for the design of a Florence Service Framework, and will provide a core infrastructure for Florence.

The service framework shall allow a seamless integration of a mobile robot, a home environment and remote peers of the elderly like family members or the care provider. It provides the skeleton for the service enabling technologies and the Florence services, which are developed in WP3, WP4 and WP5.

The core infrastructure consists of a mobile robot which is based on an existent off the shelf robot, an exemplary home automation system, a communication and service gateway between the home and remote peers, and the control unit. Most important requirements for core infrastructure are the preservation of privacy within the Florence system and the possibility for remote configuration and administration of the system.

The work package consist of four tasks, namely Task 2.1, which was dedicated for a comprehensive state of the art analysis, Task 2.2 has its focus on the service framework, Task 2.3 deals with the robot platform and Task 2.4 provides the core infrastructure beyond the robot. Figure 1 depicts the initial planning of the tasks as defined in the DoW (Description of Work).

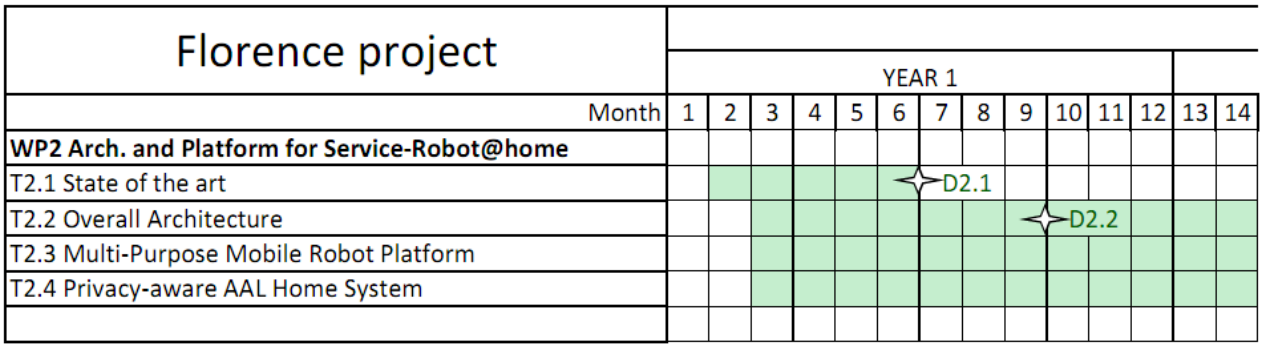

Figure 1: Task execution plan in period 1 for WP 2 according to the DoW

2.2.1 Technical Progress

Work package 2 started like all work packages with the set-up of interaction and communication channels, namely a dedicated section on the document server, regular phone conferences (bi-weekly, in peak activity phases weekly), a mailing list and a secured instant messaging service for quick interaction was provided by NEC.

The designers of the system architecture for Florence have followed an iterative approach where the different views and proposals from the different partners have converged into the achieved

results. Those constitute a solid starting point for the different technical work packages in order to be able to specify and implement the individual modules for the Florence service framework.

The Architecture definition process will end with D2.5, which is expected to be delivered on M24, where the feedback received from the pilots and the technical validation will be used to refine the design.

The first project period the work of WP2 resulted in two deliverables:

1. D2.1 - State of the Art of Multi-Purpose Robots and Privacy-Aware AAL Home Systems and Services
   The interim review resulted in a demand to complement the report with an analysis of Robot related aspects like mechanical design, positioning and obstacle detection. A revision of the report reflecting this demand has been submitted then in M11.
2. D2.2 - Initial Florence System Architecture

In addition the following Milestones have been met:

1. Milestone MS2 (M12): Initial architecture ready
2. Internal Milestone WPMS2.1 (M9): Specification for the robot platform and AAL home system ready
3. Internal Milestone WPMS2.2 (M9): Assessment of potential reuse of components from projects such as SOPRANO, Amigo, and UniversAAL is finished.

In the following, the activities performed in the four tasks are described in detail.

Progress on Task 2.1 – State of the Art in Service-Oriented Frameworks and Context Management for Smart Homes

This task created a state of the art analysis in the areas of service frameworks, technologies for the robot and technologies for home environments. Actual results from different activities have been evaluated regarding their general architectural design, but also regarding their solution for context management and privacy support for smart homes and the integration of different home data-sources. With SOPRANO and AMIGO we exemplarily listed results of projects which developed a high level architecture, with SENSEI we presented newest results of a project with focus on sensor networks and privacy issues and with the ongoing work in ETSI on a generic M2M architecture we took criteria into consideration which have been set by a standardisation body.

For the robot first a market analysis for available service robots has been performed. For a number of robots with similar objectives than in Florence relevant parameters have been collected and compared. Additionally aspects on the appearance of a robot and safety issues have been analysed. For a number of related technologies (like electrical issues, power supply, sensor issues, etc) the state of the art in research have been derived to be sure that the industry will soon be able to fulfil requirements, such as extra battery power. With Companionable and Robocare we also investigated in systems that integrate robots in a larger service environment.

With respect to privacy aware home environments we investigated in different ‘outlet’ devices like home gateways and set-top-boxes and their specific characteristics. We analysed privacy awareness technologies such as identity management and access control for communication with robots and last not least presented solutions for remote administration of the home.

The knowledge gained in this state-of-the art analysis enabled the consortium to benefit from findings and achievements from other activities and to avoid extra effort.

Partners’ contribution: all partners have contributed to this task.

Progress on Task 2.2 – Overall Architecture

This task designed the overall Florence framework and its architecture. Its intention is to bridge the gap between state-of-the-art solutions for smart home environments, tools for context gathering and provisioning, tools for communication and interaction as well as the service robot platform. The

architecture integrates a robot software environment, smart home environment for context handling, common networking services and privacy and data protection technologies.

The framework architecture enables the exposure of Florence Service Enablers which are developed in WP3 and WP4. The Florence overall architecture is based on results that partners bring from earlier work in other projects. An overview of these projects can be found in section B2.2 of the DoW.

In order to achieve all that, we first decided to implement an architecture task force (A-Team) of key architects to discuss architectural options and decisions in a smaller team and make it possible to harmonise different architecture views. Those key architects represented all technical work packages, to ensure a consistent and homogenous design of the architecture throughout the project. This architecture task force was led by a chief architect, who at the same time acted as task leader of T2.2.

This team first analysed requirements from the defined user scenarios that were already available from WP1. The team then clustered those requirements according to functionality, which were the basis for the architecture work carried out consecutively.

To allow partners to jointly develop the architecture and be informed of changes in a more real-time fashion, we have installed a tool infrastructure for UML-based and version controlled modelling. Regular phone conferences were held in order to make sure that partners are up to date with architectural development and to discuss necessary changes.

The result of the joint work was published in D2.2 – Initial Florence System Architecture.

D2.2 was delayed for 4 weeks because at the planned time of delivery, the consistency over all project parts was not completely satisfying and we decided that it would be more beneficial to detail a few more remaining open issues.

D2.2 covers several views on the overall architecture of the Florence system including the Robot Software Execution Environment and the Smart Home as service execution platform. It additionally outlines several optional approaches that exemplify the flexibility of Florence's architecture.

The results were used as additional input to WP3, WP4 and WP5 where enablers and service components are being developed.

As such this task has fulfilled its goals in that it provided the architectural framework and set the boundaries within which the Florence components interact. Its next task will be to review the architecture and revise it according to the results of the actual implementation. This is due at a later stage of the project.

Partners' contribution: all partners have contributed to this task, which was performed by task members as well as the Architecture Team with delegates also from other workpackages, led by the chief architect (NEC).

Progress on Task 2.3 - Multi Purpose Mobile Robot Platform

The objective of this task is to provide a cost effective robot platform which serves the needs of the Florence services. Relevant aspects have been the appearance of the robot, mechanical and electrical capabilities the software platform and core enablers for robot control.

We analyzed the usage scenarios from WP1 and WP5 regarding requirements for the robot. Solutions have been presented to the user and their acceptance has been analyzed. We were able to achieve valuable results in different areas. For example we identified the necessity of a mast and got a very detailed view on the optimal height of a robot. We further identified requirements for the shape of a robot, for additional helper tools like a tray and the potential acceptance of a tablet PC for robot control. Also electrical and mechanical needs had to be considered. As a result the robot manufacturer prototyped a mast, which at the end became already part of its product portfolio. The battery lifetime was extended and different studies for a nice body-case have been made.

Regarding the software platform a layered design has been chosen which reflects the demands on the robot functionality and programmability on one hand and the existing software platform on the other. Lowest level depicts the driver modules for the different sensors and actuators such as bumper, camera, laser and motor. Those are accessible by a low level service API. Newly added was a robot control enabler layer, which deploys robot services like navigation, obstacle avoidance and approaching an object. For a number of those robot services, initial design and specification have been developed. The highest layer realizes access to the robot from the outside or from local applications respectively.

Even if Microsoft Windows was first choose by the consortium for the use of the API of the already existing robot, the consortium finally decide to use ROS (Robot Operating System) which is available for Linux and which offer a lot of feature already developed for mobile robot. So recently we decide to start to develop a bridge between the Linux API of the robot and ROS.

Partners' contribution: in this task all partners have contributed to the requirement analysis and design of the appearance and functional and mechanical design of the robot. Wany has contributed the robot hardware and its adaptation and the layered software platform. Philips, Tecnalia and Wany have been working on specific robot services.

Progress on Task 2.4 - Privacy Aware AAL Home System

Task 2.4 took care about the design of the home infrastructure, privacy and access control and remote configuration capabilities. The Florence home infrastructure describes a server, which acts as control unit for the Florence Services, an outlet device which performs the communication between the home and outside and existing infrastructure artefacts like a home automation system, smart power meter etc. For a cost effective solution, one of the major objectives of the project, the consortium investigated to what extend the functionalities of the control unit and the outlet device can be merged. The ongoing work in this area to port the existing CMF on low performance home gateway and an initial proof-of-concept demonstrator show promising intermediate results.

With respect to provide privacy awareness an existing identity management system has been analysed and the integration with the CMF has started. The Florence service framework access policies foresee a role based authorization. The modifications of the IdM system to fulfil these requirements have been designed and an implementation is ongoing. First ideas on location based policies to assign roles have been identified.

To achieve Zero-configuration management (from the viewpoint of the user, i.e. configuration is completely done from remote) the OSGi Framework has been analysed and a generic bundle management for Florence designed. Florence service components are supposed to be provided as OSGi bundles and integrated into this Zero-configuration management.

Partners' contribution: in this task NEC has worked on the integrated Home-Service-Gateway, and also took care about the privacy awareness solution. OFFIS was working on the Zero-configuration management.

2.2.2 Deviations from the plan

In general WP 2 is on track according to the objectives described in the DoW. However the work package decided to request an extension for the delivery of D2.2 by one month to achieve a good documentation quality and to solve some minor issues on consistency with other WP work.

Milestone M2 (Initial requirements ready, final service scenario's ready and evaluated by "Wizard of Oz" user tests. Initial architecture ready) was split between WP1 and WP2 according to the objectives of the WPs.

2.3 *WP3 – Monitoring and Decision Making*

The main objectives of this work package are

- To integrate a robot into a home environment so that the combination becomes an infrastructure for context sensing and enhancement, and for context-based reasoning and learning.
- To make decisions over Florence system actions and their coordination and prioritisation.
- To fuse the sensory information obtained from different and heterogeneous sources in order to obtain rich contextual information. Learning user preferences and environment settings is a salient aspect of both sensor fusion and decision making.
- To embed seamlessly Florence (robot) actuation triggering into the context infrastructure.

The work packages consist of 5 tasks, namely: State of the Art in Monitoring and Decision Making (Task 3-1), Robot Enhanced Context Management Platform (Task 3-2), Sensor Fusion for Context Enhancement and Monitoring (Task 3-3), Decision Making and Coordination (Task 3-4) and Robot Action and Actuation Triggering (Task3-5). Figure 2-2 illustrates the time plan of the execution of these tasks in the first year of the project according to the DoW.

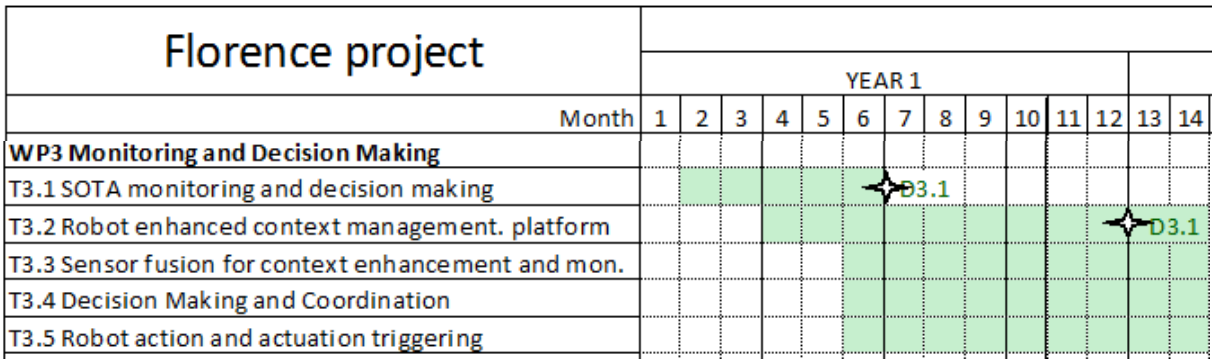

Figure 2-2: Execution time plan of WP3 tasks according to the DoW (until M12).

2.3.1 Technical Progress

The WP3 work started with setting up of WP3 communication channels such as WP3 collection/directory in DocuShare to share documents, WP3 mailing list, and biweekly WP3 phone conferences (on Thursdays from 10:00-11:00). Subsequently the WP3 activities were started, for which Figure 1 illustrates the time plan and sub-activities in the first year of the project execution.

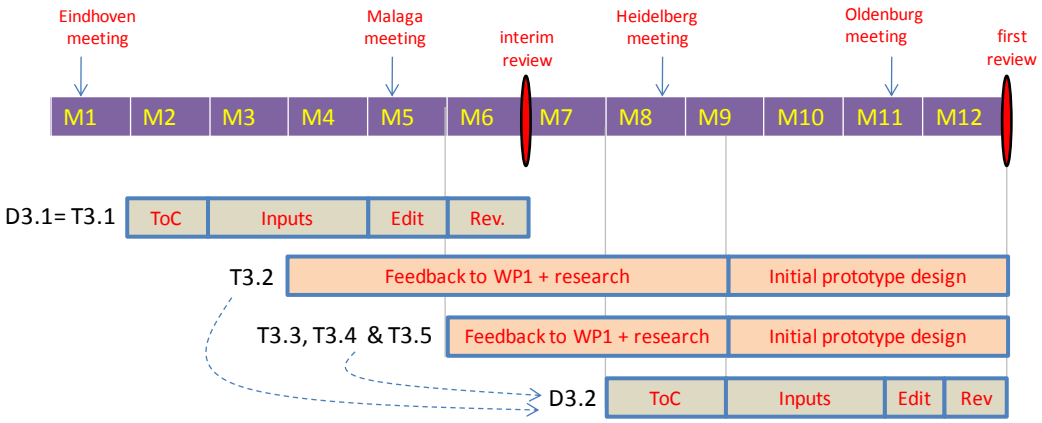

Figure 2-3: the time plan of WP3 sub-activities as carried out till M12.

The work in WP3 has resulted in two deliverables in the first year of the project execution, namely:

- Deliverable D3.1, entitled “State of the Art in Monitoring and Decision Making”, was delivered end of M6. The deliverable is the result of Task 3.1 work.
- Deliverable D3.2, entitled “Initial specification and architecture of Monitoring and Decision Enablers”, was delivered end of M12. The deliverable encompasses the results of Task 3.2-Task 3.5 work.

Task specific results and progress are described in the following subsections.

Progress in Task 3.1 (State of the Art in Monitoring and Decision Making)

The aim of this task is to review and analyze existing state-of-the-art context management solutions, particularly those that were developed in the previous public funded projects by Novay and NEC (as intention has been to reuse available technologies whenever possible). Another objective of this task is to assess the current state of the art in enhancing sensor information and making decisions, with special attention to distribution of the intelligent decision making, approximate and exact reasoning techniques, integration of human intelligence and machine learning algorithms, and learning.

As the output of Task 3.1, Deliverable D3.1 was delivered end of M6 and was approved in the project’s Mid-Period Interim review – Period One (01/02/2010 to 31/08/2010). The deliverable provided detailed information about the WP3 topics from literature and the relevant projects; and concluded that:

- Decision making is application specific and since the Florence scenarios are not fully defined at the time, the presentation of the decision making is aimed at clarifying the various dichotomies that would be beneficial when designing the “decision making subsystem” of the Florence project in the subsequent stage.
- “User activity detection”, “interactive learning”, “indoor localization of users” and “event prediction” are identified as the key enablers of Florence context enhancement functionality (based on the available information about the candidate Florence services). Probabilistic methods are considered to be well suitable for the setting of the Florence project.
- Since there is no robotic specific context management platform to the best of our knowledge, the best approach for the Florence project is to adapt one state of the art platform that fits the best to the needs of the Florence project. There are quite a few platforms developed by project partners as described in the deliverable (e.g., NEC Context Management Platform (CMF), Novay CMF, Xensor, IYOUIT, PERSIST, SHARE-it, Genie of the Net). Hereto the requirements of the Florence system should carefully be taken into consideration.
- Most existing solutions for actuation management are focusing on interfacing actuators and sensors in (wireless) sensor and actuator networks. High level requests like "turn on all lights in living room" are not considered and have to be done by the application on top. In the Florence project a flexible structure can provide the possibility to adjust the environment to the needs of the elderly. The ability to use high level requests with an abstraction layer as proposed in the EU ICT-SENSEI project can also reduce maintenance efforts.

In the project’s Mid-Period Interim review – Period One (01/02/2010 to 31/08/2010) the reviewers recommended us to check event based approaches as described by the Complex Event Processing (CEP) community (recommendation R9) and check the results of the ASTRA[4] and TUMCAT projects that could be of interest for the project (recommendation R10). In the appendix of D3.2 the result of our investigation into the CEP topic and the ASTRA and TUMCAT project results are summarised. In summary, Florence will stay informed on potential results of CEP developments and might be able to adapt the framework accordingly because of the direct involvement of one of Florence partners in CEP developments. Florence will also reuse the results

[4] The ASTRA project webpage: http://www.astra-project.net/about.

of the ASTRA and TUMCAT projects in developing the Florence system and evaluating the Florence services.

Task 3.2: Robot Enhanced Context Management Platform

The objective of the task is to identify a suitable existing context management platform, to expand its scope towards the mobile robot platform by developing a robot side context agent and defining its interfaces and data-models. The context management solution and its robot agent will host the sensor fusion and decision modules to be developed for Florence objectives in Task 3.3 and Task 3.4.

Realisation of WP3 components relies on a distributed Context Management Framework (CMF) to (a) acquire raw sensor and context information from various sources, (b) distribute high level context information to context aware applications and services, and (c) manage user preferences and profile data. The CMF hosts intelligent components for enhancing contextual information and for making intelligent decisions. For the Florence setting it is desirable to communicate with components that dynamically join the setting during runtime. For example, when the Florence robot enters a new home environment it should be able to use the new set of home sensors. The augmented platform should be able to function, possibly with some performance degradation, if the home infrastructure does not have any embedded sensor. Therefore the WP3 system architecture should support loosely coupled components.

Task 3.2 activities and obtained results till M12 are:

- Forming a small technical committee to choose the context management framework of the Florence system, based on the State of the Art study made in Task 3.1. As the result the NEC CMF was adopted as the base platform for the Florence system. The partners may use any other platform and develop their specific components, but they are supposed to implement appropriate interfaces with the chosen base platform. An overview of the chosen NEC CMF, which is OSGi based and originated from the EU Project Magnet Beyond, is described in deliverable D3.2, see Section 3.2. In the following phase of WP3 implementation the NEC CMF will be adapted to the requirements of the Florence project by modifying the existing components and/or developing new components.
- Analysing the potential scenarios which were developed in WP1. The analysis resulted in WP3 feedback given to WP1 about which scenarios are (more) feasible. Hereto a cost model is developed to weigh the candidate scenarios from the viewpoint of WP3 implementation and deployment costs. Furthermore, the analysis resulted in identifying the requirements of the scenarios for WP3 components, which in turn, are used to define the WP3 functional architecture and its relation to the overall Florence architecture. These requirements and functional architecture produced inputs to deliverables D2.2 and D3.2.

Partners' contributions to Task 3.2: TID contributed to the provision of sensing components in the mobile phone platform. WANY provided the existing robot with a specific API so that the robot platform (see WP2) can be connected to the enhanced context management platform (in WP3). Based on Wany's WP3 participation, Wany team have already identified various modifications to the standard PekeeII design and to the robot's API in order to couple with WP3 CMF. OFFIS provided information regarding the context sources in the IDEAAL living lab in Oldenburg (to be integrated with the CMF). OFFIS will further develop the existing interfaces for the smart home environment structure at the IDEAAL living lab and will further integrate these into the NEC context management framework. NEC performed an analysis and initial integration of Home Automation Systems into CMF. NEC further investigated in the use of additional data sources for the CMF like web services and an indoor location system. Novay contributed to the evaluation of existing CMFs and choosing the most suitable one, and coordinated the architectural activities. .

Task 3.3: Sensor Fusion for Context Enhancement and Monitoring

The objective of the task is to enhance the semantic and quality of the sensory information obtained from the robot and the home sensors. This is achieved by using sensor fusion techniques to, for example, trace past events, identify current events, or predict upcoming events. These events may correspond to user activities (e.g. the user is working, sleeping, etc) or to system states (e.g., the connectivity is going to be lost, established, etc). The objective of the Context Enhancement functionality is to improve QoC in terms of its precision, accuracy, trustworthy, etc. This functionality must be flexible and robust with respect to available sensors. Hereto the robot may be dispatched to gather live contextual information from the scene if a high QoC (quality of context) is needed.

Task 3.3 activities and obtained results till M12 are:

- Analyzing the potential scenarios developed in WP1 to give WP3 feedback to WP1 over which scenarios are more feasible, define WP3 functional architecture, identify the required raw sensors for realising these scenarios, and identify the required enhanced sensors (i.e., context sources) for realising these scenarios. : Deliverable D3.2 describes the set of raw sensors and provides some detailed information about the identified context sources.
- *Computer Vision (CV):* A high level architecture of a video streaming framework has been defined on which CV trackers and estimators are identified. We have identified face detection, persons tracking and gestures recognition as the most important CV tasks for the Florence project. We have made the first steps towards an implementation using face detection in combination with a robust motion estimator and a colour tracker to follow persons. To improve the robustness of these tasks, we have decided to add a depth sensor from PrimeSense to the Florence platform. Concretely, we have chosen to build the CV applications on top of Gstreamer (video streaming framework), Openni (computational imaging library) and OpenCV (computer vision library) in the ROS environment to implement the CV tasks. This setup, in addition, allows for sufficient flexibility to extract metadata from the video streams (such as light intensity level in a room) that might be required at a later stage.
- *User Localisation:* The architecture for the user localisation component has been designed based on CV and Passive InfraRed (PIR) sensors. The generic problem of locating a user has been split into a home level, using IR sensors, and within room level, using CV. It has been decided to use the camera on the mobile platform to localise persons. The problem of user localisation with CV has been split to finding a person based on face detection and tracking and following the user once a face has been detected.
- *Robot Localization:* The difficulties for a mobile robot to localize itself in real time and in domestic spaces are studied together with the complications associated with human identification (specially determining a lying person whether has fallen due to an accident or not). Currently we are busy with designing new mobility features for the robot (like 2D SLAM, robot Localization system, obstacle avoidance, and going to specific localization).
- *Activity Detection:* The Florence system must be able to recognize several activities that frequently occur in the life of an elderly person. Our focus is on two classes of activities: home visits and activities of daily living (such as preparing a meal, taking medications, taking a shower or bath, dressing, sleeping, using the toilet, shopping for groceries, and watching television). To this end, the information provided by a large number of sensors embedded in the home infrastructure and on the robot will be fused.
- *Home State Detection:* This component will derive the contextual information needed for enabling the Home Interface service and it provides functionalities such as Window State Detection, Temperature Analysis, Light Level Analysis,
- *Physiological User State Analysis:* This component derives the contextual information needed for enabling the Lifestyle Improvement and Logging System scenarios. It provides some useful information derived from its sub-functions like Weight Improvement Analysis, and Gait Velocity Detection.

- *Sub-activity Detection:* This component provides intermediary information needed for the Activity Detection functionality mentioned above. It provides some useful information derived from its sub-functions such as Person Movement Detection, Exercise Detection, Appointment Detection, Presence Detection, and Sleep Detection. It is an important aspect of the Florence system for a number of scenarios including the Lifestyle Improvement and Data Logging services.
- *External (User) Input Acquisition:* This component acquires information directly from the user through an active level of user input. The user may provide input through a number of different means such as the use of a panic button, the robot based user interface or phone based user interface. It provides some useful information derived from its sub-functions like Medicine Intake Detection and Fall Detection.
- *Fall detection:* A fall detection components has been designed that takes different inputs into account to decide whether a fall has taken place. Examples of input are: a panic button device and CV based fall detection. A final decision on the preferred combination of technologies has not been made.
- *Health Status Detection:* This component collects health related information from other components of the Florence system and aggregates this information for use by Florence services that need to know the health status of the elderly. In particular, information is collected from the physiological user state analysis, sleep detection, person movement, exercise detection, medicine intake, fall detection, mental user state analysis and activity detection components.

Partners' contributions to Task 3.3: Wany and OFFIS have brought their expertise over sensors on the robot and home, respectively, that can be used within the Florence system (over e.g. how smart home devices can be connected through FS20 and HomeMatic protocols). Wany has contributed to Robot Localization. OFFIS has contributed to the design of the Fall Detection and Gait Velocity Detection. TID has contributed to the design of Medicine Intake Detection and Person Movement Detection and User Localization. Novay has contributed to coordination of architectural aspects, Health Status Detection, Sub-activity Detection, Physiological User State Analysis, and Activity Detection. Philips has contributed to the CV part and User Localization. NEC has contributed to Home State Detection and Sleep Detection.

Task 3.4: Decision Making and Coordination

The objective of this task is to design a system decision unit in charge of the decision process that maps system inputs to desired system outputs, based on fused sensory information. A key issue to be considered in this task is prioritisation and coordination of the executable tasks to resolve possible conflicts. Another main research issue is to adapt the decision process to individual users and specific environments.

Task 3.4 activities and obtained results till M12 are:

- We have made a design for the decision making and control of the Florence system. The design addresses two main issues: how to design complex intelligent systems and how to make the decision making part flexible enough to support 3rd party services to be added at runtime.
- First a conceptual framework for decision making has been made which is based on hierarchical behaviours and goals.
- In a second step, a translation is made from this conceptual framework to concrete software components.
- In a last step a "Planner" component is designed that has the responsibility to prevent and solve conflicts between different behaviours and (3rd party) applications and which takes into account the user activities and schedule.

Partners' contributions to Task 3.4: Activities in this task have been carried out by Philips and have been actively supported by Novay.

Task 3.5: Robot Action and Actuation Triggering

The context management platform is a complex distributed system for gathering, processing and delivery of sensory and higher level contextual information. The objective of this task is to use the data-model and interaction schemata of the context management system and investigate its usage for initiating robot actions/actuations to create a powerful reactive system control with limited effort.

Task 3.5 activities and obtained results till M12 are:

- Analyzing the potential scenarios developed in WP1 to give WP3 feedback to WP1 over which scenarios are more feasible, define WP3 functional architecture, identify the required raw actuators for realising these scenarios, and identify the required compound actuators for realising these scenarios. The list of actuators is given in D3.2.
- The Actuation Framework that will be developed in Florence is based on concepts from the EU ICT-SENSEI EU project[5]. There is an Actuation Interface which allows users to request Actuation Tasks. There is an Actuation Controller that distributes Actuation Tasks to the Actuators. The Actuators are the wrappers around the API of an actual actuator.
- The Actuation Framework will use OSGi tools to discover new Actuators.
- Like the Context Management Framework, the Actuation Management Framework will also be distributed. The goal here is to interact locally even if you want information from a remote Agent (i.e., an Actuation Task only has to be requested at the local agent)
- Actuation Management Framework will have a strong relationship with the Context Management Framework, as Actuation Controller will forward the corresponding tasks to the responsible Actuators based on the relevant contextual information.
- In Florence we will have two types of Actuators: (a) basic Actuators which just set a device in a certain state or activate a function on a device and (b) advanced Actuators which are able to handle more complex Actuation Tasks. In order to handle those complex tasks the Actuators will generate new (basic) Actuation Tasks. Depending on the task an Actuator will use context information to generate new tasks.

Partners' contributions to Task 3.5: NEC performed the scenario analysis for high level actuators in cooperation with WP1. NEC further analyzed the EU ICT-SENSEI actuation concept, adapted it to the Florence setting and made an initial implementation of the SENSEI concept for Florence using the CMF. Wany and OFFIS have brought their expertise over robot and home actuators, respectively (e.g., over how smart home devices can be connected through FS20 and HomeMatic protocols). TID has studied the provision of actuation components in the mobile phone platform. Tecnalia analyzed the State of the Art on physical actuation triggering. Novay coordinated the architectural activities. OFFIS has developed first robot actuation software and is going to contribute to the general robot actuation layer. At this stage it consists of simple remote control functions. This will be extended to fit to the overall framework

2.3.2 Deviations from the plan

None

2.4 *WP4 – Interactivity*

The objective of this work package is to design and implement the Florence Human-Machine-Interface (HMI) for direct and remote communication. The robot will be the connecting element between several AAL services, home infrastructure and user. It is the single interface for all. Therefore a novel kind of dialog management shall assure a consistent way of communication

[5] The SENSEI project webpage: http://www.sensei-project.eu/

between user and robot independent of the service or technical system behind. Because of the fact that there are high barriers especially for elderly to get in touch with technical systems and to ensure that the robot will be accepted by elderly people, the results of the user studies in work package WP1 are used. So the user robotic interaction will take into account the usability requirements of elderly people. In a later phase, the user evaluations of the controlled home environment tests will also be taken into account. Corresponding to known and proven robot design approaches for service robots, there will be a component-based architecture for the HMI. There will be a general interaction dialog management component to establish a communication infrastructure at a higher level. On this level the different kinds of communications types are managed and passed via defined workflows to according user robotic interaction components. So, on the next lower level there will be specific workflow algorithms and finally on the lowest level the interfaces to each of the user robotic interaction components.

The main aspect of the human robot interface is the dialogue management component. The design of the interaction components highly depends on the users input, though the interaction paradigms are aligned with the results from the user studies (WP1). Appearance of the robot is another important aspect which was also tested within the user studies.

The general timeline of WP 4 is depicted in Figure 2-4. Work started with a state of the art research phase to check which technologies and experiences exist in human robot interaction. The next major step was to design the user robotic interaction framework. This will be the base for any other developed software component in WP 4. This task is currently ongoing but the framework is already sketched. The dialog management is the main component within this framework and the interaction components will be used by the dialog management to establish communication. These tasks will start their major work in year 2.

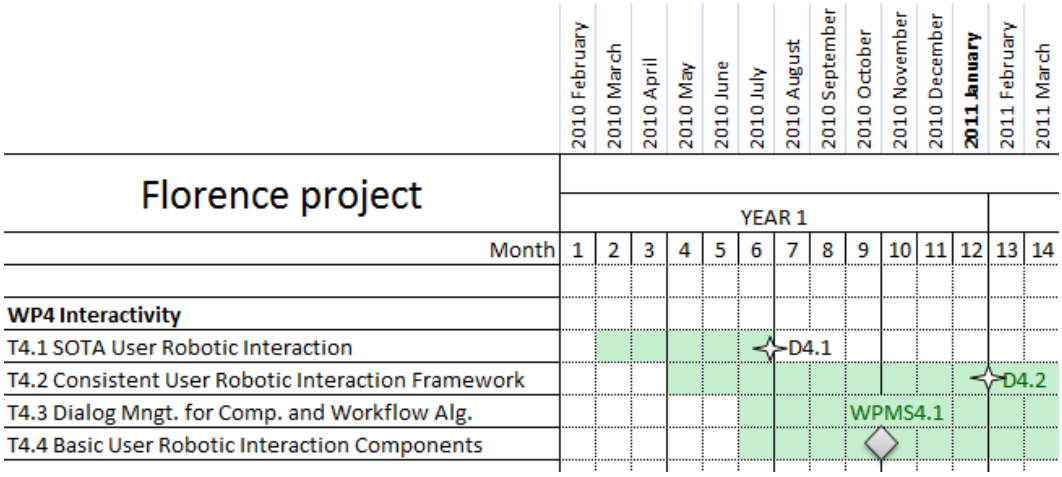

Figure 2-4: Timeline WP4 Year 1

2.4.1 Technical Progress

The working plan of WP 4 is shown in Figure 2-5. Task 4.1 was closed in M6 with delivering D4.1 the state of the art overview. Task 4.2 designed the initial robot interaction framework which has been presented in D4.2. Task 4.3 provided input for Task 4.2 at this stage. Implementation of dialog management components will start by M15. Task 4.4 selected the basic interaction components based on the user studies from WP1 and published the results in WPMS 4.1.

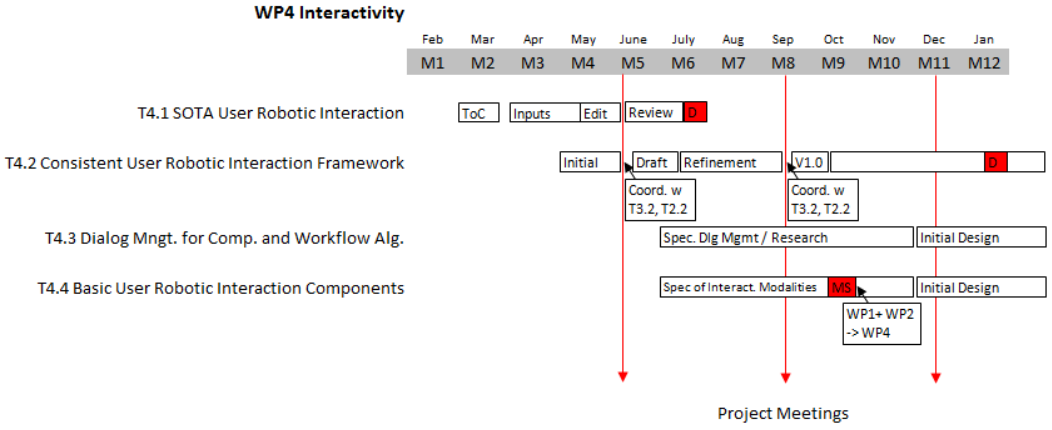

Figure 2-5: Executed timeline for WP4 Year 1, per Task

Despite some sub-level goals, the **main goals** of year 1 period for WP4 have been:

- Architectural design of “interaction framework” (-> dialogue management component). This design has been published in D4.2 (M12).
- Select and design the interaction modalities based on the WP1 user studies. The selection of the interaction modalities was done before M9, and, this resulted in passing the internal mile stone WPMS4.1 (M9).

Task 4.1: State of the Art in Human-Robotic Interaction

As noted in the DoW, this task will assess the current state of the art and the envisaged added value in human-robot interaction, more specifically, in the combination of vocal commanding, light and sounds and use of gesture, suitable timing for user notifications, and interruptibility based on context management and dialog management.

The results of the state of the art research are delivered in D4.1. Main aspects have been:

- Comparison of human robotic interaction / feedback mechanisms, which were divided into sub categories such as visual, acoustic and tactile mechanisms.
- Dialog management principles that also includes planning problems which are of strong importance for dialog event chains.
- Interaction / Relation or Acceptance based on appearance. The design of a robot substantially influences the interaction with it, since the user establishes a relation to the machine. Different concepts and design possibilities are checked here.

Partners’ contribution: OFFIS has been the editor of this deliverable and concentrated on the appearance aspects within the document. Tecnalia provided an analysis of the SotA on gesture based human robotic interaction. Novay contributed to the state of the art in particular on the user-interruptability part of the deliverable and dialogue management. For dialogue management Novay provided inputs about the subcomponents of a generic dialogue management, an overview of the main dialogue models, some important aspects related to managing a dialogue under uncertainty (namely, describing the POPMD model). These are closely related to its WP3 activities (decision making). Philips provided content for dialog management and planning technologies.

Task 4.2: Consistent User Robotic Interaction Framework

This task will develop and provide the user robotic interaction and communication framework for the Florence system. It defines the structure of having a top-level controller component for the dialog management, an intermediate workflow algorithms component and the basic user robotic interaction components. To do so, generic communication application programming interfaces (APIs) will be developed to handle different communications types on an abstract level as well as

the remote interaction. This APIs will be used to implement concrete communication interfaces in Task 4.3 and Task 4.4.

Within this task, the existing Olympus framework for spoken dialog systems has been selected (see D4.2). This framework will be the base for further developments, e.g. the integration of new interaction modalities to the framework. The Olympus framework is a modular structured framework which will be expandable to the Florence needs. The dialog management component from Task 4.3 and the interaction components from Task 4.4 can be integrated here.

Partners' contribution: OFFIS did first tests with the Olympus framework to test if it could fit into the Florence system. First results are promising. In terms of consistency of the user-robot interactions, Novay contributed to the architecture (as laid down in D4.2) on the modality-selection. This has, among others, to do with information coming from user-profiles and current context. The work has been documented in D4.2. Tecnalia worked on design and specification of the gesture interaction enablers.

Task 4.3: Dialog Management Component and Workflow Algorithms

In this task, the in Task 4.2 developed user robotic interaction and communication framework will be used to implement the dialog management component and workflow algorithms. According to the original planning from the DoW this should be supported by an OSGi based approach. Due to the selection of the Olympus framework, this will partly change to C++ code development. There will be interfaces to the Florence OSGi system. A dialog control unit enables invocation and coordination of interaction sessions of the following types:

- Direct interaction between the robot and the user
- Remote interaction between the remote family members, care takers, trainer and the user at home via the robot of the Florence system.

The controller will handle the incoming dialog request of the higher level overall control unit of the Florence system. Depending on the service, actual situation and context information the dialog management will initiate the correct communication workflow which will invoke a sequence of the according user robotic interaction components.

The component of the Olympus framework that is responsible for dialog management is called RavenClaw. We will use this dialog manager to implement a first version of a task based dialog system. As the Olympus framework is modular, we will be able to exchange this dialog manager with different approaches (like partially observable Markov decision processes).

Partners' contributions: OFFIS has taken care of the integration of the dialog manager into the interaction framework and did first tests with Olympus and RavenClaw. Dialog management is the central component in WP4. It is one of the areas that Novay wants to build up new knowledge. In January Novay assigned a BEng and MSc assignment to a group of students to study acceptability by elderly of combinations of modalities, in particular voice and gestures (the latter based on the Kinect sensor). In addition, Novay studied the selected dialog management component (RavenClaw), and contributed significant parts to D4.2.

Task 4.4: Basic User Robotic Interaction Components adapted to Requirements of Elderly People

In this task, the basic user robotic interaction components will be developed and implemented. They will be reused by the dialog management component. This task therefore investigates and implements:

- *Feedback mechanisms and components*, based on advanced interfaces, for concrete bilateral communication are investigated and implemented. The results of the initial user study of work package WP1 are used to determine the right way of communication. Thus the special user requirements of elderly persons will be met. The basic user robotic interaction components will use

- Simple user interfaces touch screen
- Voice commands and speech output
- Gesture recognition
- Light interaction functions according to the identified requirements

- *User interruptability*. All kind of feedback requires interrupting users. Having these interruptions at appropriate situations (time, location, activity state, etc.) gives users a pleasant service experience and thus improves their service acceptance.

Firstly, the basic user interaction modalities have been selected. This includes gesture based input based on computer vision, for which a basic software framework has been specified and designed. A specification and design has been made for "user interruptability", which allows the Florence system to select the right moment and interaction modality for interrupting the user, taking into account the (expected) schedule of the user and his/her current activity.

Partners' contributions: Tecnalia is developing simple gesture detection (yes and no using head movement or thumb position). Philips, Novay and OFFIS made first tests with voice interaction. Philips has designed the interruptability framework.

2.4.2 Deviations from the plan

So far, no outstanding deviations are reported. Some aspects of the tasks 4.3 and 4.4 from WP4 are slightly delayed which comes from dependencies with other work packages (mainly user requirements results from WP1) which have not been considered during the planning phase. At the moment, the dependencies are solved so the work is continuing.

2.5 WP5 – AAL Robotic Services and System Integration

The objective of this work package is to design and prototype a set of AAL oriented services that enable elderly to lead a more independent and healthy life and eases the burden on care givers. In addition the work package is also responsible for integrating the complete Florence system, i.e. the implementation results of WP2,3,4 and 5.

2.5.1 Technical Progress

Task 5.1 State of the Art in AAL Robotic Services

The state of the art with respect to AAL robotic services has been investigated. An extensive overview has been made of service robotics, tele-care services for elderly, services for safety, social connectedness, coaching and collaboration. Task 5.1 finished at the end of month 6 with the delivery of D5.1.

Task 5.2 System Integration

To prepare the implementation and integration phase, a "Software Integration Plan" has been developed. The software integration plan relies on a progressive implementation of the different software components. In addition, a set of guidelines to be followed during implementation, a time plan for the different integration steps is made. This plan can be found back in the D5.2. Also a risk analysis has been made of the Robot system. For every risk that was identified, actions have been defined that reduce the risk to an acceptable level. This has resulted in a "safety plan", whicht has been integrated into deliverable D5.2. Both system integration plan and safety plan will continue to be updated as separate, living documents during the implementation phase of the Florence project.

Task 5.3, 5.4, 5.5 and 5.6

The work in with respect to T5.3, T5.4, T5.5 and T5.6 has been restructured along the lines of the developed services and we will describe the progress with respect to each service.

Keeping in Touch Service

The design of the keeping in touch service has been finalised. The design takes into account the results of the user focus groups and Wizard of Tests executed in WP1. This design includes:

- An analysis of the different options for implementing the service and a reasoning of why we have design the service in a particular way.
- A detailed state machine of the service
- A protocol of remotely controlling the service
- A description of all components and a description of their APIs.
- A deployment model

A first simple implementation of the telepresence service has been implemented using Skype for Audio/Video communication and a real-time remote control protocol to remotely control the robot.

Lifestyle Improvement Service

Based on the feedback of user workshops and Wizard of Oz tests executed in WP1, the design of the lifestyle improvement service has been finalized. This involved the following steps:

- Scenario and feedback analysis leading to functional requirements
- Identification of components and embedding of these components in the Florence architecture
- Detailed design of subcomponents and component dependencies, including component interfaces and state machines that describe the behaviour of each subcomponent.
- Identification hardware that is required to implement the service
- In preparation of the implementation phase, we have started the detailed design of the user interface by creating mock-ups

The Logging Service

The design of the logging service has been finalised. The design takes into account the results of the user focus groups and Wizard of Tests executed in WP1. This design includes:

- An analysis of the different options for implementing the service and a reasoning of why we have design the service in a particular way.
- A first state machine of the service
- A description of all components and a first description of their APIs.

Fall Handling Service

The design of the logging service has been finalised. The design takes into account the results of the user focus groups and Wizard of Tests executed in WP1. A lot of feedback has been collected for this service, underlining that this functionality is strongly desired by elderly.

The design includes:

- An analysis of the different options for implementing the service and a reasoning of why we have design the service in a particular way.
- A first state machine of the service
- A description of all components and a first description of their APIs.

Agenda Reminder Service

In deliverable D5.2 the design of the agenda reminder service (AGEREM) was defined. The design was conceived through consideration for the requirements identified by the development of the scenario and use cases and the feedback from WP1. The design includes

- Scenario description and use case
- High Level Design
- Detailed Design including component interface definitions
- Sequence Diagrams

Advanced Home Interface Service

The design of the Advanced Home Interface Service has been finalised. The design takes into account the results of the user focus groups and Wizard of Oz tests executed in WP1. This design includes:

- Use Case definitions for specific user aspects of the service
- Requirements analysis based on the use cases
- Software designs and descriptions for the individual components of the service
- State machines for selected functionality of the service

Additionally the descriptions of the service include a scenario description that outlines the typical system behaviour in response to user actions and events. A real-life environment with different home automation technologies, intelligent devices and the robot has been set up and will serve for test- and demonstration purposes during the upcoming implementation of the described user scenario.

Collaborative Gaming Service

Initial definition of the Collaborative Gaming (COLGAM) service and initial analysis of the requirements from the other technical WPs was done. The starting point of the service was set in WP1 with the COLGAM scenario in which several focus groups and wizard of oz helped define the service requirements. In order to define the service a *service analysis* was done were the different use cases were briefly described (use cases are thoroughly described in D1.3 Final robot based scenarios) and UML diagrams were included for the ‘start’, ‘play’ and ‘close’ phases of the activity service. COLGAM service’s different building blocks and components were defined and described including class models and an initial set of methods definition. Within the identified building blocks, components from other WPs were also found and coordination with the other technical WPs (WP2, WP3 and WP4) was done.

Partners’ contributions in WP5: Philips, Novay, TID, Tecnalia and OFFIS have contributed to the state of the art overview on Robotic AAL services (D5.1). The design of the different services has been done by the each “service owner” as indicated in the following table:

AAL Service	Service Owner
Keeping In Touch	Philips
Lifestyle Improvement	Novay
Safety Handling	OFFIS
Logging Service	OFFIS
Agenda Reminder	TID
Home Interface	NEC
Collaborative Gaming	Tecnalia

Table 2 Overview Services and Service Owners

2.5.2 Deviations from the plan

None

2.6 *WP6 Evaluation*

As it is stated in the Document of Work, the main objective of this work package is to evaluate – in real scenarios with real users – the use of the Florence robot platform (WP2), how it integrates in the home context (WP3), interacts with the users and environments (WP4) and finally how the services are delivered to the user (WP5).
With this purpose the designed case studies will be tested with volunteers, adopting a Living Lab methodology, which begins in WP1 during the requirements stage, and goes through all the development phases. Therefore, an important part of this work package is the implementation of the pilot platforms robust enough to be used by actual users during the case studies and the integration of the Florence system in the different test environments. The Florence team will draw on results of the user model (WP1) to establish the scope of the final case study scenarios. Target places are in Germany, Netherlands and Spain:

- IDEAAL Demo Flat (Germany) and Experience Lab (Netherlands): both OFFIS and Philips have a user experience lab, in which Florence will test the projects results in a closed and controlled environment. The usability aspects of the project will be tested in this world and will be done previously to the next Living Lab test.
- Living Lab Salud Andalucía and FASS users: a set of volunteers will be selected from the LLSA staff and the FASS users, in a total number of 5 persons, to have the robot and services around it working in their homes, in real environments, and attended by their relatives or the FASS call center, in order to analyze the system performance in real life.

2.6.1 Technical progress

Though the WP has not started officially yet, initial work has been focused on the extraction of constraints related to national regulations (related to D6.1) and information coming from other WPs which has to be considered to plan all the tasks in WP6. Besides, and in order to meet WP6MS6.1, preliminary works have already been started in The Netherlands.

2.6.2 Deviations from the plan

In order to have everything ready for the official starting point of this WP, the coordinator of the WP has been performing a set of preliminary tasks, as described above. This deviation from the the plan is already reflected in the Description of Work, where B1.3.3 table indicated M10 as starting month for this WP, while the WP description indicated M13.

2.7 *WP7 Knowledge Management*

The objectives of this work package are:

- To exchange information within the project consortium
- To exploit and disseminate the results of the project
- To generate intellectual property and to contribute to standardization activities

2.7.1 Technical progress

Task 7.1 Dissemination

All partners disseminate the results of the project in order to strengthen their reputation, attract potential customers, attract high potential personnel and students and stimulate the exchange of valuable research results and standardization. All project partners (especially academic partners and research centers) publish scientific papers at high-tier conferences and workshops, as well as present research results in premium journals and magazines. Industrial partners complement dissemination of results through, realizing proof-of-concept prototypes, field tests, and demonstrations at professional exhibitions.
The dissemination of the results is supported by a web site (http://www.florence-project.eu) dedicated to the project, which contains the latest news, activities, and results of the project. The dissemination of the results is supported by producing a project flyer as well. The dissemination levels of all deliverables were fixed in the description of work. Most of them are public and will be therefore published on the Florence project's website.

In the beginning of the project, we set up a number of services to facilitate efficient collaboration between the project partners:

- A file server for exchanging documents within the project;
- A file server for sharing source code within the project;
- Mailing lists to facilitate communications within the project.
- A "yellow pages" document with names and telephone numbers of project members;
- A schedule for four-monthly project meetings (dates and locations) for the entire duration of the project.

As for dissemination outside the project:

- A web site has been set up.
- A number of papers have been written and published.
- A number of presentations have been given.
- A project flyer has been made.

OFFIS, TECNALIA, TID, and Philips will disseminate the project via the Living Lab at four different locations in Europe: Philips Eindhoven, Netherlands, OFFIS Oldenburg, Germany, Tecnalia San Sebastián, Spain, and TID Granada, Spain. Integration, evaluation, and demonstration of interim states and results will be done at different Living Labs, which are visited by interested parties, partners, and the open society. Also NEC and Novay are setting up a lab environment which emulates an elderly home to evaluate, demonstrate and promote Florence results. Thus the project will be shown to a broad range of people from several disciplines. The demonstration of the Florence project in a more or less realistic home environment could be a good starting point for fruitful discussion and following research / exploitation activities. A more detailed overview of the external dissemination results is available in Chapter 5.

Task 7.2 Exploitation

During the first year, two iterations of the Florence exploitation plan have been made (D7.3 and D7.5. Those reports describe exploitation opportunities and channels in general, the individual exploitation plans of the different partners, and performed exploitation activities and results. The first version (D7.3) is focussed on a promising analysis of the proposed extensions for low-cost robots towards a commercial exploitation by the robot manufacturer (Wany). This second one is dedicated to an analysis of exploitation options for research centres (Novay, OFFIS, Tecnalia).

Looking at the activities, Florence could pick up comparably early initial results and feed them into exploitation activities. As a result the robot manufacturer already complemented its business and

product portfolio and industrial partners have started exploiting Florence findings towards business units.

Task 7.3 Standardisation

An overview has been made of the standardisation bodies that are most suited and promising for Florence technologies and in which Florence partners are involved. This description is part of D7.5. The option for a pre-standardisation activity using the ETSI instrument of Industry Specification Groups (ISG) has been identified. Here Florence proposes a joint approach with other projects in the area of ICT for Ageing Well, maybe driven by UniversAAL, the lighthouse project for AAL Systems Architecture. Florence is in contact with UniversAAL on that issue.

Task 7.4 Intellectual property

IP issues are handled and agreed in the consortium agreement. Other information sharing, dissemination and confidentiality of documents and knowledge is written down in the DoW.

2.7.2 Deviations from the plan

The editorship for the series of exploitation reports (M6, M12, M24 and M36) has been shifted from Wany to NEC to free resources for the robot related developments on Wany side.

The plan of the project partners was to perform exploitation of the results at a late stage in the project or even after project end, when all results are available. Florence is proud to report substantial success in exploitation of project results already now: Wany has leveraged its product portfolio already in providing a mast, improved battery technology, developed a ROS bridge and adapted a Fast 2D SLAM, all those results of the requirements analysis in Florence. Industry partners already have established promising links to product divisions and are in talks on future product capabilities.

3 Deliverables and milestones tables

TABLE 1. DELIVERABLES[6]

Del. no.	Deliverable name	WP no.	Lead participant	Nature	Dissemination level	Due delivery date from Annex I	Delivered Yes/No	Actual / Forecast delivery date	Comments
D7.1	Communication Portal Twiki	7	Novay	O	PP	1	Yes	1	
D8.1	Public Summary of Project	8	Philips	R	PU	1	Yes	1	
D7.2	Project Public Web Site	7	Philips	O	PU	3	Yes	3	
D7.3	Initial Draft Exploitation Report	7	NEC	R	RE	6	Yes	6	
D7.4	Initial Draft Dissemination Report	7	OFFIS	R	RE	6	Yes	6	
D1.1	Initial Robot based Service Scenarios	1	Tecnalia	R	PU	6	Yes	6	Rejected
D1.1	Resubmission	1	Tecnalia	R	PU	6	Yes	9	Resubmit
D2.1	State of the art of multi-purpose robots and privacy-aware AAL home systems and services	2	Novay	R	PU	6	Yes	6	Rejected
D2.1	Resubmission	2	Novay	R	PU	6	Yes	11	Resubmit
D3.1	State of the art in monitoring and decision making	3	Novay	R	PU	6	Yes	6	
D4.1	State of the art in human- robot interactivity	4	OFFIS	R	PU	6	Yes	6	
D5.1	State of the art in robotic AAL services	5	Philips	R	PU	6	Yes	6	Rejected
D5.1	Resubmission	5	Philips	R	PU	6	Yes	9	Resubmit
D2.2	Initial Florence System Architecture	2	TID	R	RE	9	Yes	10	Delayed
D1.2	Requirements for Florence Services	1	FASS	R	RE	12	Yes	12	Delayed

	and Systems								
D1.3	Final Robot based Service Scenarios	1	Fatronik	R	PU	12	Yes	12	
D1.4	Report on Wizard-of-Oz Experiments	1	FASS	R	PU	12	Yes	12	Delayed
D3.2	Initial specification and architecture of Monitoring and Decision Enablers	3	TID	R	RE	12	Yes	12	
D4.2	Initial specification and architecture of Interactivity Enablers	4	Philips	R	RE	12	Yes	12	
D5.2	Initial Specification and Architecture of Robot enabled AAL-Services	5	Philips	R	RE	12	Yes	12	
D7.5	Second Draft Exploitation Report	7	NEC	R	RE	12	Yes	12	
D7.6	Second draft dissemination report	7	OFFIS	R	RE	12	Yes	12	

TABLE 2. MILESTONES

Milestone no.	Milestone name	Due achievement date from Annex I	Achieved Yes/No	Actual / Forecast achievement date	Comments
M1	Draft version of service scenarios is available	M6	Yes	M6	
M2	Initial requirements ready, final service scenarios ready and evaluated by user tests. Initial architecture ready	M12	Yes	M12	Milestone responsibility was split between WP1 and WP2 according to the objectives in the Work packages
M3					
M4					
M5					
M6					

4 Project management

4.1 *Consortium Management*

4.1.1 Tasks and Achievements

The Florence PMT met regularly, at least once a month by means of a conference call. In addition, we had face-to-face meetings co-located with the Florence workshops. Other management activities involved day-to-day contact with project members on various operational issues and writing and submitting the 6-month progress reports.

4.1.2 Changes in Legal Status

Fundacion Fatronik has merged into Fundacion Tecnalia Research & Innovation. Therefore, Fundacion Fatronik has modified its legal details as follows:

FUNDACIÓN TECNALIA RESEARCH & INNOVATION, established in Parque Tecnologico de Bizkaia, Calle Geldo, Edifìcio 700, 48160 Derio - Spain, represented by Mr Ignacio MANZANARES, Head of Health and Quality of Life Division or his authorised representative as of 1/1/2010.

This information has been updated in the Commission databases.

The legal status of the other Florence beneficiaries did not change during M1-M12.

4.2 *Project Meetings*

4.2.1 General project team meetings

When	Where	Subject	Organising Partner or Work Package
9 – 11 February	Philips (Eindhoven)	Kick off meeting	WP8
8 - 10 June	FASS (Malaga)	Scenarios workshop	WP8
21 – 23 September	NEC (Heidelberg)	Architecture workshop	WP8
14 – 16 Dec	OFFIS (Oldenburg)	Services Architecture workshop	WP8

4.2.2 Project Management Team Meetings

When	Where	Organising Partner or Work Package	Participants
Every second Friday of the month	Conference call	Philips	PMT Members

4.2.3 Work Packages Meetings

When	Where	Subject	Organising Partner or Work Package	Participating Partners
Every two-weeks on Wednesday from 10h:00 to 11h:00	Conference call	WP1 meetings	FASS	WP1 members
Every two weeks on Tuesday from 11h:15 to 12h:15 / Thursday 14:30-16:00	Conference call	WP2 meetings / Architecture team meetings	NEC	WP2 members / Architecture-team

When	Where	Subject	Organising Partner or Work Package	Participating Partners
Every two weeks on Thursday from 10h:00 to 11h00	Conference call	WP3 meetings	Novay	WP3 members
Every two weeks on Tuesday from 11h:15 to 12h:15	Conference call	WP4 meetings	OFFIS	WP4 members
Every two weeks on Wednesday from 14h:00 to 15h:00	Conference call	WP5 meetings	Philips	WP5 members
April 19th and May 25th	Conference call	WP7 meetings	Philips	WP7 members[7]

4.3 *Project Planning and status*

The project is running according to plan and there are no significant deviations from the planning in the DoW. During this first phase of the project, we developed user scenario's, investigated state of the art and developed both the overall architecture of the Florence system as well as detailed architecture of the enabling components and AAL services. This work forms the basis for the first implementation phase which has started in M13. The implementation work in the project has just started as planned. A robot hardware platform has been selected and extended with a number of sensors and interaction modalities (e.g., screen). Initial implementation of services and platform components has started.

Further the project keeps an active eye on the continuous and rapid progress made in the robotics area and does the necessary steps to include the latest developments into the Florence system. Two examples are our choice for using the Robotic Operating System (ROS) framework and the kinect/Openni framework for "3D vision".

As for internal cooperation, the partners in the project have been very active, collaborated well, and showed a high level of commitment. All partners actively contributed to the deliverables that were due in M1-M12 and the project results are true team efforts. The Florence workshops have also been attended well. Meetings were well prepared before the workshop. Between works shops all work packages had regular (two-weekly) contact via telco's to discuss and synchronize their work.

With respect to external cooperation, contact has been taken with the related robotics for elderly projects, like KSERA and CompanionAble and with the UniversAAL project which aims to make a generic framework for AAL services.

Most deliverables were delivered according to schedule, except for D1.2, D1.4, and D2.2. We asked for an extension for D2.2 (System Architecture) to allow a better alignment with the other architecture documents which were due only in M12. D1.2 and D1.4 only had a minor delay, which did not have a negative effect on the progress of the project.

Finally, the Florence partners have been involved in a number of dissemination activities. Three papers have been written and presented. In addition the Florence project has been presented at around eight more public meetings, like workshops, conferences and forums.

With respect to legal changes, one partner "Fundacion Fatronik" has merged into "Fundacion Tecnalia Research & Innovation".

[7] Note that WP7 topics are also discussed in the PMT telco's.

4.4 *Use of Foreground*

Philips

Philips aims to develop products and services that improve people's health and wellbeing. We believe that the results of the Florence project will not only be beneficial to elderly but also for people in general that want to lead a more healthy life. The results of Florence will contribute to improve these services, both in gaining insights in user needs as well as technical robust solutions that integrate well with in-home networked device. Philips Research will use the results of the Florence project in contract research for providing consultation to the Philips businesses. In a first step, we have identified the different aspects of the Florence project that can potentially be exploited by Philips research. This includes robotic tele-presence, lifestyle improvement coaching, emergency detection, emergency situation handling, computational intelligence and context awareness.

NEC

NEC is frequently presenting Florence with its objectives and results to business units and potential customers. NEC could already attract some business units with Florence results, namely with the architecture concept for services in the area of ICT for AAL, as well as the design of one single device serving as home control, service and communication gateway. Talks on a take-up of these results are ongoing. Proof-of-concept demonstrations have been well received.

OFFIS

The OFFIS Institute uses the results produced in Florence in several ways. One is internal circulation of knowledge, so other projects and colleagues will profit from knowledge gained in Florence. For example an internal workshop on Human-Robot Interaction with OFFIS' Intelligent User Interfaces group was conducted in September 2010 to exchange results. Further, OFFIS will expand its engagement in AAL and robotic technologies based on the Florence project outcomes. In October 2010, the Senioren Union Edewecht was invited to a tour through OFFIS and was introduced to the Florence vision as an end user group. This group is now actively contributing to Florence evaluation. This connection will be used for further robotic projects. OFFIS also published a series of papers integrating Florence related topics to strengthen its rank within the robotics research community.

Novay

Novay has a long-term interest in service-robotics. We do not expect to exploit the robot-based services over the next few years. The knowledge about multimodal dialog management (WP4) will be exploited in new releases of our public-screen roadmaps. The WP3 results on context fusion and decision making will be reused as well. The Lifestyle Improvement service (WP5) is rather independent from the Florence robotic platform, and will be used as a basis for commercial services in this area.

TID

Telefonica I+D is developing new services and products, (e.g. agenda reminder) in the area of telecare and tele-health which may be introduced as part of the Telefonica Group portfolio of services in the future. In this sense, Telefonica I+D participation in Florence will allow gaining knowledge in the innovative area of service robotics, which can then be introduced into new marketable products in this area.

Tecnalia

Tecnalia's Health and Quality of Life division aims at designing and developing new services and products for elderly people and people with disabilities to live longer independently and enjoy an enhanced quality of life. Tecnalia expects to use final collaborative activity demonstrator as a tool to attract new innovative research contracts with other customers. Gesture recognition for communication module will be exploited in future projects related with intuitive and natural interaction with elderly population. Especially in circumstances in which voice might not be a good option (noisy environments, crowded care-centres or day centres).

FASS

FASS has produced two main internal guidelines generalized from Florence Project, one regarding focus groups and the other about the Wizard of Oz experiment. FASS wants to develop further the use of human-computer interaction for new technological solutions applied to social services.
Moreover Florence Project has played an important role on our prospective studies since it enabled to generate content for High-Tech acceptance among users. At the same time Florence Project has updated our internal study of needs and user requirements.

Wany

As robot Manufacturer, Wany takes many advantages in the use of foreground coming from the Florence consortium. First, because the members of the consortium expect to use the robot in a different way than the way for which the robot is designed for. Then, Wany has to adapt or to modify the PekeeII robot itself. Those hardware modifications (like the multiple batteries, the stand option, the tablet PC, etc) and those software modifications (like the robot services defined for the consortium or the Pekee - ROS bridge on Linux and the implementation of 2D SLAM) increase a lot the quality and the available features of the already existing robot. When it is possible, each of those robot's improvements, coming from the participation of Wany at the Florence consortium, is quickly proposed for sales or for the other PekeeII users after a first intensive internal test session. Secondly, because the huge software architecture defined in Florence will be developed using robots like PekeeII, then it will allow to transform the PekeeII robot and its dedicated internal API, and to make it compliant to many other standard software. This is also very interesting for the product as the Pekee API is also used for other mobile robots built by Wany.

At the end of the project, Wany expects to use its development for the consortium to design a new robot especially dedicated for the AAL services, according to all the PekeeII modifications and knowledge coming from this R&D experience.

4.5 *Dissemination activities*

4.5.1 Presentations

When	Where	Presentation Title	Presenting Person(s)	Presenting Partner(s)
14/06/2010	International Conference on Active Aging, Seville, Spain	*"Active Aging: An NEC Perspective"*	Guy Londsdale	NEC
23-25/ 06/2010	The 3rd International Conference on Pervasive Technologies Related to Assistive Environments (PETRA'10) 2010, Crete, Greece	*"A Mobile Robot for Self-selected Gait Velocity Assessments in Assistive Environments"*	Melina Brell	OFFIS
25-26/ 01/2011	AAL Congress - 4th German congress on AAL, 2011, Berlin, Germany	*"Enhancing Mobile Robots' Navigation through Mobility Assessment in Domestic Environments"*	Thomas Frenken	OFFIS
(scheduled) 14-17/ 02/2011	Mobile World Congress 2011, Barcelona; Mobile Cloud Forum	*"Processing Real World Information in the mobile Cloud"*	Heiner Stuettgen	NEC
(scheduled) 23-25/ 03/2011	INNO-ROBO Service Robotics Innovation Summit,(http://www.innorobo.com) Lyon, France	"Florence - Robots at home for the elderly comfort and assistance services »	Nguyen Cybelle	WANY
02/12/2009	IoPTS workshop, Brussels	*"Personal Assistive Robots for AAL at Home - The Florence Point of View",*	Jochen Meyer	OFFIS, NEC
02/12/2009	FP7 consultation meeting on Service and Social Robotics for the Ageing Population	*"Service and Social Robotics for Ageing Well"*	Dietwig Lowet	Philips

When	Where	Presentation Title	Presenting Person(s)	Presenting Partner(s)
22-26/ 03/2010	Spring School on Social Interaction Computing organized by SSPNET http://sspnet.eu/2010/01/spring-school-on-social-interaction-computing/	*"Florence – multipurpose robot platform for AAL services"*	Dietwig Lowet	Philips
24/08/2010	ECCE 2010 Workshop: Robots That Care http://sites.google.com/site/robotsthatcare/	*"Florence – multipurpose robot platform for AAL services"*	Dietwig Lowet, Mortaza Bargh	Novay, Philips
30/09/2010	Companionable 4th workshop at Brussels organized by companionable project http://www.companionable.net/index.php?option=com_content&view=category&layout=blog&id=17&Itemid=26	*"Florence – multipurpose robot platform for AAL services"*	Dietwig Lowet	Philips

4.5.2 Publications

When	Where	Publication Title	Author(s)	Publishing Partner(s)
Under review	Special issue of the UBICC journal; web link: www.ubicc.org	"Personal Assistive Robots for AAL Services at Home - The Florence Point of View";	Jochen Meyer, Melina Brell, Andreas Hein, Stefan Gessler	OFFIS, NEC
23-25/ 06/2010	The 3rd International Conference on Pervasive Technologies Related to Assistive Environments (PETRA'10) 2010	"A Mobile Robot for Self-selected Gait Velocity Assessments in Assistive Environments"	Brell, Melina; Frenken, Thomas; Meyer, Jochen; Hein, Andreas	OFFIS
25-26/ 01/2011	AAL Congress - 4th German congress on AAL,2011, Berlin, Germany	"Enhancing Mobile Robots' Navigation through Mobility Assessment in Domestic Environments";	Isken, Melvin; Vester, Björn; Frenken, Thomas; Steen, Enno-E.; Brell, Melina; Hein, Andreas	OFFIS

4.5.3 Project web-site

The public website is located at http://www.florence-project.eu/

The following screen shots provide an overview of the public web site and internal document sharing service.

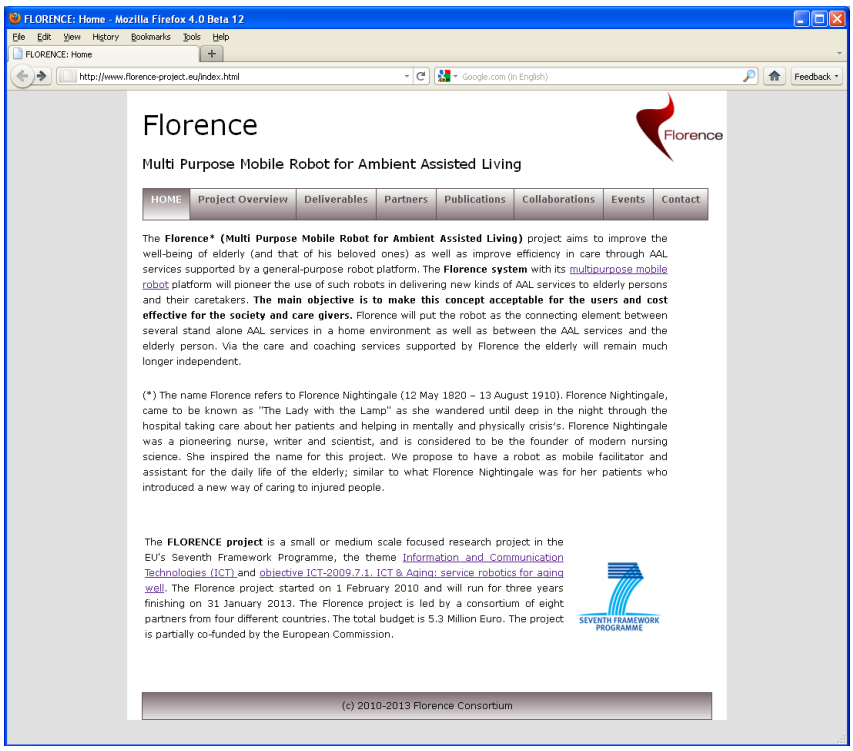

Figure 4-1 Florence Home Page

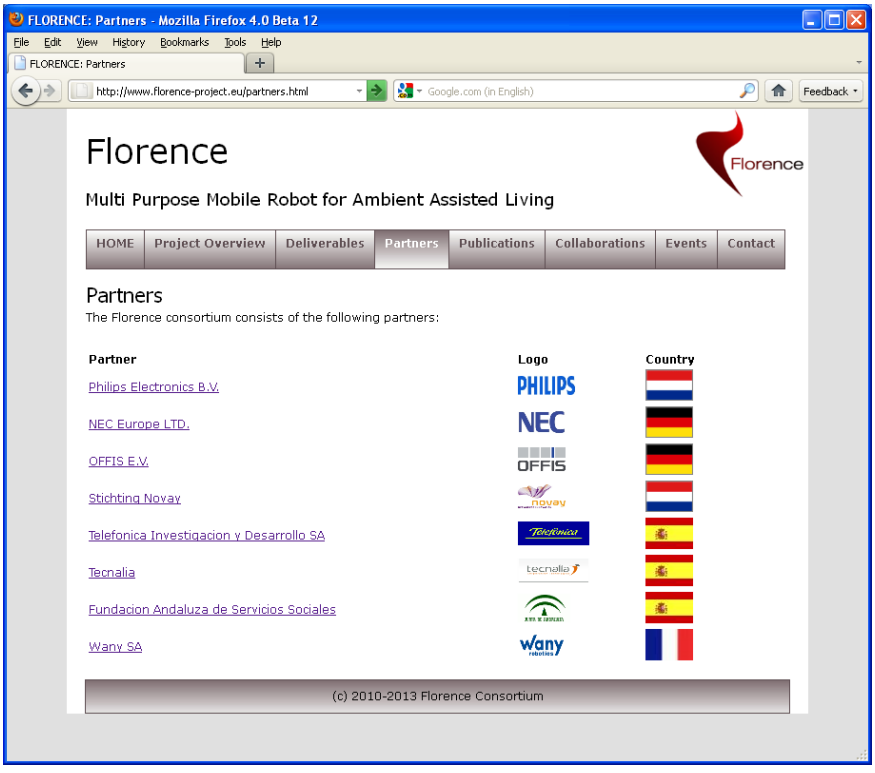

Figure 4-2 Partners Introduction Page

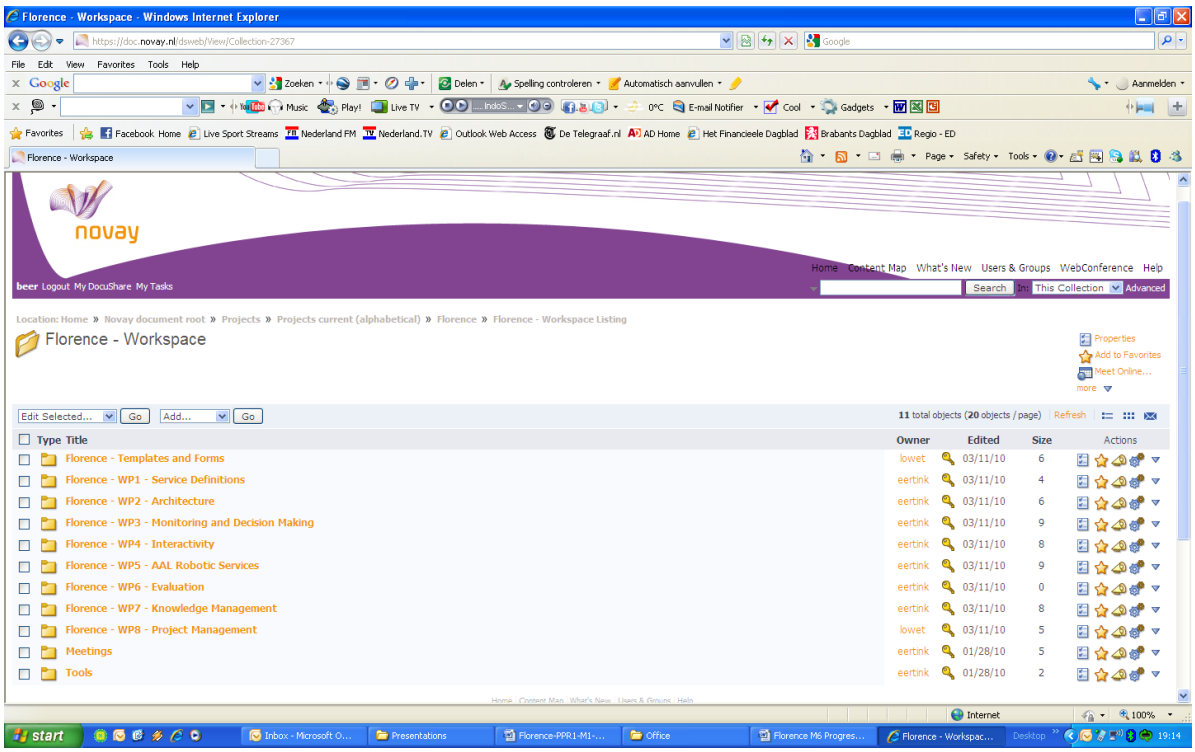

Figure 4-3 Florence Internal Workspace

5 Manpower overview

Actually Spent Human Resource Allocation Year 1

The numbers in the column 'planned' reflect the average distribution of the resources over the lifetime of a work package. They do not reflect phases of high activity like implementation periods or low activity like Florence had at the beginning of the project (ramp-up).

Partner	WP1		WP2		WP3		WP4		WP5		WP6		WP7		WP8		*Total*	
	Planned	spent	Planned	spent	Planned	spent	Planned	spent	planned	spent	planned	spent	Planned	spent	planned	spent	planned	spent
Philips	2.4	2	3.53	5	2.9	4	2.61	2.5	5.81	7.5	0.0	0	1.0	1	3.67	3.5	22	*25.5*
NEC	3.2	1,4	8.53	10,9	6.39	3,2	2.32	2,6	4.35	2,7	0.0	0	1.17	0,7	3.0	1,25	29	*22.75*
OFFIS	5.6	6	6.47	8	2.32	2.5	3.77	6	4.06	5	0.0	0	0.67	1	0.33	0.5	23.2	*29*
NOVAY	4.8	6.1	1.76	3.3	5.23	7.3	3.19	2.4	5.81	3.9	0.0	0	0.83	0.3	0.33	0.3	22	*23.6*
TID	3.2	1.83	5.88	5.38	2.90	3.5	0.0	0.0	3.48	3.7	0.0	1.4	0.83	0.8	0.33	0.34	16.6	*16.95*
Tec-nalia	8.0	9	5.29	6.5	0.87	0.9	1.16	1.5	2.90	3.5	0.0	0	0.5	0.4	0.0	0	18.7	*21.8*
FASS	5.2	5.69	1.18	1.65	0.58	0.96	0.58	0.77	0.0	0.0	0.0	0	0.17	0.2	0.17	0.28	7.9	*9.55*
WANY	1.6	1.5	8.82	13	1.16	1.5	0.58	0.5	1.16	1.5	0.0	0	0.17	0.25	0.0	0	13.5	*18.25*
Total WP	*34.00*	*33.02*	*41.47*	*53.73*	*22.35*	*23.86*	*14.23*	*16.27*	*27.6*	*27.8*	*0.0*	*1.4*	*5.33*	*4.65*	*7.83*	*6.17*	*152.8*	*167.4*