PROJECT PERIODIC REPORT

Grant Agreement number: FP7-ICT-2009-248434

Project acronym: MOBISERV

Project title: MOBISERV: An Integrated Intelligent Home Environment for the Provision of Health, Nutrition and Mobility Services to the Elderly

Funding Scheme: Collaborative project

Date of latest version of Annex I against which the assessment will be made: 29/10/2009

Periodic report: **1st x** **2nd** □ **3rd** □ **4th** □

Period covered: **from** 1/12/2009 **to** 30/11/2010

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Declaration by the project coordinator

I, as co-ordinator of this project and in line with my 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):

  √ 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[1];

  ☐ has failed to achieve critical objectives and/or is not at all on schedule.
- The public Website is up to date, if applicable.
- 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 3.6) 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 5 (Project Management) in accordance with Article II.3.f of the Grant Agreement.

Name of Coordinator: Dr. Costas Davarakis

Date: 7/1/2011

Signature of Coordinator:

Name of Project Manager: Ms Maria Nani

Date: 7/1/2011

Signature of Project Manager:

1 *If either of these boxes is ticked, the report should reflect these and any remedial actions taken.*

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1. PUBLISHABLE SUMMARY

1.1 Executive Summary

In the first year of the project end user requirements elicitation and technology feasibility studies have been undertaken with the discrete activity of organizing an experts' Workshop to validate usability criteria and end user scenarios.

The sought project objectives have been addressed in the light of an implementation framework regarding the generation of a platform supporting mobility for the older people. The project succeeded in concluding with requirements set up and technology availability documentation in the related areas.

In the first stage (first six months) partners proceeded to the definition of a comprehensive requirements gathering study which involved user groups in 2 countries (The Netherlands and U.K). Moreover, a detailed consideration of ethical issues for planning and implementation of the requirements gathering study has been undertaken. In the second half of the first year the above requirements were validated with the assistance of external experts.

Furthermore, within first six months of the project the technical details of tools and methods that can be used for fulfilling the objectives of MOBISERV were refined. Specific use-case scenarios for the Nutrition Support and the Well-being monitoring system and the corresponding questionnaires were produced. In the second half of the first year, these have been used in structured interviews in WP2 to validate requirements.

Following the requirements gathering and analysis phase, the technical specifications of the initial system proposal have been investigated in WP3. The initial Validation plan for measuring the performance was examined and an initial report was produced. In the second half of the first year the finalisation of deliverable D3.1 has been completed at the end of July 2010. Though, it is worthwhile mentioning that the MOBISERV specification is considered as a living document; it will be further developed and details will be added during the project into the project wiki pages. The final technical specifications will be published in D3.2

Based on the initial MOBISERV technical specifications, test and implementation scenarios, a development phase of all the individual sub-systems and components have started.
A first version of the multi-sensor embedded system platform for vital signs monitoring has been released.
The development of the initial algorithms for nutrition support and well-being were tested. Moreover the eating/drinking activity recognition using skin color segmentation and applying a well-established technique for human activity recognition was developed. Preliminary results are encouraging on discrimination of eating from drinking and apraxia using privacy preserving representations called dynemes.

First results on facial expression recognition targeted to the aims of MOBISERV have shown that the facial expressions are rather person-dependent and that generic subspace methods cannot solve efficiently the generic problem. Indeed, the results on facial expression using different databases for training and testing indicated a dramatic drop in performance. First approaches that enhance the performance of facial expression recognition algorithms include enrichment of the training database with geometrically distorted training samples. Moreover, the performance is radically improved if the

test person is included in the training dataset. That is, person specific algorithms are more appropriate for the expression recognition task.

MOBISERV invited external experts to participate in the ILAEXP meeting (ILAEXP workshop) in Paris on September 2010 where the refined WP4 scenarios were presented and discussed with the ILAEXP members. The specific scenarios have been further discussed and refined and final decisions have been taken after the ILAEXP workshop held in Paris on September 21-22. Contributions allowed for the finalization of WP8 deliverables at the end of November 2010. Deliverable D4.1 has been finalized on November 2010 and special effort was given to the improvement of the initial algorithms for nutrition support and well-being. Overall, significant achievements were made in the areas of eating/drinking activity recognition using skin color segmentation and applying a well-established technique for human activity recognition. Preliminary results are encouraging.

In addition novel classifiers that are based on Neural Networks and are combined with Self Organizing Maps for privacy preserving representations were investigated. In this direction partners have explored the possibility of using object detection algorithms for nutrition support. Experiments on facial expression recognition targeted to the aims of MOBISERV have been conducted. Moreover, a novel approach that uses subclasses in the discriminant non-negative matrix factorization criterion for facial expression recognition has been proposed and the first results are very promising. Additionally, robust statistics have been combined with novel SVM classifiers to boost their performance in facial expression recognition.

Within the second project semester, and in parallel with the development activities, further analysis and investigation of stakeholder issues has been performed and documented in D2.3 - Volume II.

Overall, in the first year scientific partners (i.e. usability experts, older people carers and evaluation planners) were the main driving force during the definition stage (first six months), while the ICT experts fostered the design activity during the second half of the first year. Technology partners demonstrated a technology validation plan which has been a roadmap during the second stage. The validation plan has determined the MOBISERV evaluation platform design criteria which combined with the user requirements were interpreted to platform functionalities via the ILAEXP Workshop in Paris.

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2. PROJECT OBJECTIVES FOR THE PERIOD

To proceed and reach the targets of developing and validating an open and proactive personal intelligent environment supporting independent living for the ageing population in real-world mobility scenarios, MOBISERV is structured in 4 main phases:

- Phase 1: Functional and Non-Functional Requirements Elicitation (WP2)
- Phase 2: MOBISERV Framework Architecture Design and Specification (WP3)
- Phase 3: MOBISERV subsystems Development and Integration (WP3,4,5,6,7)
- Phase 4: Validation and Evaluation (WP2)

The global goals for year 1 are summarized in milestones MS1 & MS2:

Milestone no.	Milestone name	WP no's	Lead Beneficiary	Delivery date from Annex I[2]	Comments
1	Initial System Requirements Specification	WP2	UWE	M5	COMPLETED
2	Technical Specifications, Test and Implementation Scenarios	WP3	LUT	M8	ILAEXP Committee Workshop took place to feed D3.1. The milestone will be reached when D3.1 is completed and accepted.

Reaching MS2

MOBISERV system technical specifications and test plus implementation scenarios (D3.1) have been produced and cross checked at the ILAEXP Committee Workshop in September 2010.
Endorsement of the prototype scenarios determined the second project milestone (MS2). This set of specifications will be continuously refined as new requirements arise based on evaluation results.

Phase 3: Development and Integration

System specifications will act as guide in the Development and Integration phase. The system development is planned in the following four parallel working tracks (WP 4, 5, 6 and 7) where the partners are more or less working in smaller teams according to their expertise in the different areas:

- Development of the Indoor Context Aware and Nutrition Support System (WP4). This work package will implement the ORU system component and related services including the nutrition support.
- Development of the Multi-sensor embedded system for health status monitoring, recording and analysis (WP5). This work package will implement the WHSU system component and related services.
- Development of the Information Coordination and Communication support system (WP6). This Work Package will implement the SMACU system component and related services.
- System Integration into Robotic Platform (WP7). The PRU will be deployed and separate services and functionalities will be synchronised and coordinated.

[2] Month in which the milestone will be achieved. Month 1 marking the start date of the project, and all delivery dates being relative to this start date.

3. WORK PROGRESS AND ACHIEVEMENTS DURING THE PERIOD

3.1 A summary of progress towards objectives and details for each task-significant results

Work Package 2 outline of results

- Definition of a comprehensive requirements gathering study which involves user groups in 2 countries. Detailed consideration of ethical issues for planning and implementation of the requirements gathering study.

- Refining the requirements from 2.3 and working in collaboration with technical partners and ILAEXP for selection of strategic functionality for the MOBISERV system.

- Updating D2.3 as per recommendations of the review panel.

- Developing of an evaluation framework for MOBISERV components and overall system – Deliverable 2.4.

- Beginning initial field trials of the Kompai robot.

- Planning and implementing initial field trials of the Kompai robot.

- Planning and organizing workshops for a user acceptance study.

- Conducting follow up interviews with participants – cultural probe study.

- Updating D2.3 as per recommendations of the review panel as well as incorporating new material.

- Updates to D2.2 and D2.4.

Work Packages 3 outline of results

Partners have been working in the second semester of the project on refining and finalizing the specific contributions as described in the DoW, discussed in detail with the partners and the experts from partner ANNA and concluded in the ILAEXP meeting in Paris. Moreover, MOBISERV has worked on refining the technical specifications for the nutrition support and the well-being monitoring system.
Partners contributed in the finalization of the deliverable D3.1 which has been delivered at the end of July 2010 (MS2), and it is continuously updated though the project wiki.

Work Packages 4 outline of results

WP4 is a major research task in the need to develop visual information analysis methods for nutrition support and well-being and prepared the deliverable D4.1 that has been delivered on 30 November 2010. This deliverable described in detail the work performed in WP4 in the first year of the project.
Concerning the research on eating/drinking activity, the background techniques that were revised in order to be applied to the eating/drinking recognition task have been tested using different views and trying to deal with the problem of reduced frame rate as well as multiple available cameras. A novel method that is based on Artificial Neural Networks for activity representation as well as classification has been investigated. The proposed approach is enriched with a Bayesian framework for handling multiple cameras in the activity recognition task and a journal paper that describes in detail this approach has been prepared. AUTH has also performed research on eating/drinking activity recognition using object detection techniques. That is, the idea is to detect certain body parts (e.g., hand, head, mouth, etc.) as well as

eating/drinking objects (e.g., glass, spoon, plate, etc.) and use their space-time trajectory and/or relative position in order to recognize the performed activities.

Concerning the well-being monitoring system, AUTH performed a series of experiments using existing technologies for facial image sequences preprocessing. Research has been focused on introducing discriminant subclass information to the NMF decomposition that uses projected gradients, in order to combine this subspace technique with a Support Vectors Machine classifier and develop a framework that will be applied to the facial expressions recognition problem. A criterion that incorporates discriminant subclass information in the NMF decomposition problem has been established. This new cost function is optimized using projected gradients since with this approach certain limitations are being overcome. A preliminary version of this method has been developed in MATLAB which will be integrated with a Support Vector Machine classifier in order to develop a framework that will be applied to the elderly people well being verification problem by monitoring their emotional state through facial expressions recognition. Moreover, robust statistics have been incorporated in the support vector machines to cope with outliers in the training set and provide more efficient classification performance for facial expression recognition. AUTH has also worked on implementing a GUI for incorporating the developed algorithms on facial expression recognition. AUTH has also start working on the initial video data provided by ANANZ and SMH for eating/drinking activity recognition. The video sequences have been preprocessed and annotated in order to be analyzed.

Finally, AUTH, Systema and UWE have participated with researchers (i.e. Mr. Alexandors Iosifidis, Ms. Maria Nani, Mr. Vassilis Klouvatos, Ms. Maria Charalambous and Mr. Daniel Raabe) in a training week for the Kombai robotic unit organized by Robosoft in Bidart, France, between 22 and 26 of November.

Partners have further been working in the third quarter of the project on refining and finalizing the specific contributions as described to the DoW, discussed in detail with the partners and the experts from partner ANNA and concluded in the interim review meeting in Brussels. Moreover, AUTH has worked intensively on finalizing the system specifications for the nutrition support and the well-being monitoring system and cooperated, to this end, with LUT who is the responsible partner for the deliverable D3.1 on technical specifications. AUTH contributed in the finalization of the deliverable D3.1 which has been delivered at the end of July 2010. Furthermore, AUTH has worked on the major research tasks of WP4, that is, to develop visual information analysis methods for nutrition support and well-being.

Technical specifications of the initial system proposal have been investigated in WP3 in finalize the work in D3.1. To this end AUTH has been working in both directions of nutrition support and well-being monitoring providing technical specifications for the functionalities of these sub-systems.

Concerning the nutrition support AUTH has used the gathered databases available for nutrition support in order to initially evaluate the appropriateness of such data for the objectives of MOBISERV. One problem with the nutrition support is that there are no publicly available databases that capture the eating/drinking activity which is more important for MOBISERV according to the initial nutrition support scenarios. Thus, AUTH has cooperated with ANANZ in order to submit a research plan for getting the approval of the ANANZ Ethical committee for recording eating/drinking activity as well as facial expression recognition videos in ANANZ premises in Eindhoven.

Concerning the research on eating/drinking activity, background techniques were revised in order to be applied to the eating/drinking recognition task. An algorithm that preprocesses binary videos was devised and an initial version was implemented in order to be tested. A console application that uses this algorithm to store the preprocessed videos was implemented as well. Furthermore, a console application that implements a continuous function of the existing algorithm for nutrition support task was implemented. Firstly, the algorithm uses face detection to localize the face of the person in each frame. Using the bounding box of the face detected, a trapezoid that contains person's face and hands (palms) is computed. Secondly, the algorithm finds the skin parts of a person considering their color. Finally, the trapezoid computed previously is used to keep only the ROIs that are inside this area. These are most probably the person's head and hands (palms). In succession, these videos are cut up in basic moves

(Apraxia, DrinkUp, DrinkDown, EatUp, EatDown) and normalized using a preprocessing procedure, so as to create an appropriate video database to be used in an action recognition classifier (training and testing). Various tests were executed using these videos (cross validation: Leave One Person Out (LOPO), Leave One Video Out (LOVO), Leave One Day Out (LODO)) to estimate the performance of the action recognition classifier. Initial results are very promising and AUTH continues its work on this direction using different views and trying to deal with the problem of reduced frame rate as well as multiple available cameras.

AUTH has also performed research on eating/drinking activity recognition using object tracking techniques. That is, the idea is to track certain body parts (e.g., hand, head, mouth, etc.) as well as eating/drinking objects (e.g., glass, spoon, plate, etc.) and use their space-time trajectory and/or relative position in order to recognize the performed activities.

Concerning the well-being monitoring system, AUTH performed a series of experiments using existing technologies for facial image sequences preprocessing. AUTH has also developed a graphical user interface program developed in C++ environment. It performs frontal and facial expression recognition by using two different algorithms. Subspace learning techniques, such as PCA, LDA and CDA, for dimensionality reduction, consist the first methods implemented for the facial expression recognition task. PCA is firstly used as a preprocessing step to overcome the potential small sample size problem. The Nearest Centroid classifier was also implemented for the classification task. The second algorithm performs facial expression recognition using the Discriminant Non Negative Matrix Factorization (DNMF) algorithm for dimensionality reduction and the Support Vector Machines (SVMs) for classification. The locations of the face in the video frames are given through user-defined face Regions of Interest (ROIs) or using automatic face detection. To test the efficiency of the facial expressions algorithms on different angle positions, a small database, consisted of two persons, was created. The videos were tested by using the PCA+LDA method trained on the first and last frame of the AIIA LAB Facial Expression database. Additionally, to analyze the distances from the centroids further videos apart from sadness performing gradually the emotions were created.

AUTH has also worked on the face detection problem proposing new computational intelligence techniques for fast and pose invariant face detection. Additionally, initial novel classifiers have been developed to cope with the multiclass classification problem using Error Correcting Output Codes. Research has been also focused on an attempt to introduce discriminant subclass information to the NMF decomposition that uses projected gradients, in order to combine this subspace technique with a Support Vectors Machine classifier and develop a framework that will be applied to the facial expressions recognition problem. A criterion that incorporates discriminant subclass information in the NMF decomposition problem has been established. This new cost function is optimized using projected gradients since with this approach certain limitations are being overcome. Currently, a preliminary version of this method is being developed in MATLAB which will be integrated with a Support Vector Machine classifier in order to develop a framework that will be applied to the elderly people well being verification problem by monitoring their emotional state through facial expressions recognition.

Work Package 5 outline of results

Initial multi-sensor embedded system platform ready to use in first trials. Daily and nightly garments have been designed and are fully compatible with a unique data logger. An application on a Smartphone (Android) as user interface has been developed with the aim at showing the capability of the system.

Work Packages 6 and 7 outline of results

- Preparation and delivery of the first robotic platform for the organisation of trials and user interviews
- Development concerning the HMI in order to obtain a modular architecture allowing consortium to reuse components in a more advanced (functional but also aesthetical and ergonomic) version dedicated to the project objectives.
- Training on programming and personalizing the ROBOSOFT's robotic platform,
- Familiarising with the tools and API's provided by ROBOSOFT.

Work Package 8 outline of results

- Design and production of the MOBISERV Logo.
- Launch of the MOBISERV project website (see D8.1). Content of the static webpages have been translated into all partner's local languages.
- Preparation of the general project presentation (see D8.1) and project presentation template.
- Production of a brochure containing key project features, benefits and added value.
- Production of a poster and flyer in Dutch.
- Participation of the project consortium in numerous conferences/events and production of research papers, newsletter, press releases, press coverage, and other publications.
- Development of the first two issues of the MOBISERV Plan for the Use and Dissemination of Foreground (D8.5 - Issues 1 & 2)
- Development of the initial version of the MOBISERV exploitation plan (D8.2)
- Liaison with working groups and projects relevant to the project.
- Setting up a list of contacts with end-user groups (elderly associations/ networks, associations of gerontology and geriatrics, health care associations, health care institutions, housing associations, individuals, etc.) mainly from the partner's countries.

WP2:	**Requirements Elicitation and Usability Evaluation**	
Task id.	Summary of progress	Results achieved
T2.1	Delivered D2.1 which comprised the requirements gathering plan. Describing the requirements elicitation methodologies- Ethical discussions. Contacts for approval of Medical Ethics Committee. Contribution to Task objectives concerning experience in wearable monitoring.	
T2.2	Delivered D2.2 - first version of the validation plan. Contribution to Task objectives bringing smart clothing experience in wearable systems, telemonitoring, user-friendliness and work with older adults. Work on the analysis of users feedback in order to define new MOBISERV platform appearance and embodiment in order to take into account users opinion.	D2.2
T2.3	Completing the Requirements gathering work for D2.3-Initial Requirements Specification. Organizing and conducting observations, interviews, enquetes, focus group and cultural probe with end-users and many stakeholders. Analyzing data and constructing D2.3. Implementation of a comprehensive requirements gathering study which involved 3 main user groups in the UK and 3 in NL. Questionnaires and cultural probing with end-users and stakeholders. Cultural probe with end-users and stakeholders. Updating D2.3. Preparing NL tests of the Kompaï robot prototype. Delivered D2.3 Initial Requirements Specification.	Update to D2.3 Requirements. Updating D2.4
T2.4	Technology validation plan determining the evaluation criteria methodology. All partners contributed to the methodology definition report by providing information about functionalities of the envisaged Kompaï robot platform. Delivered D2.4 Definition of Evaluation Framework.	Update to D2.4 Definition of Evaluation Framework
T2.5	Partners provided illustration and movies for user interviews allowing users to get a better understanding of what assistance robots are. Robosoft provided also a software for advanced dialog to be used for presentation to users. Partners started platform development in order to use real platform in users interviews. Update to D2.2 Preliminary field trials of existing Kompai functionality. Field trials of existing Kompai functionality. Preliminary field trials of existing Kompai functionality. Field trials of existing Kompai functionality.	
T2.6	Updating D2.3 as per recommendations of the review panel. Developing of an evaluation framework for MOBISERV components and overall system – Deliverable 2.4. Beginning initial field trials of the Kompai robot.	Updates to D2.2 and D2.4

	Planning and implementing initial field trials of the Kompai robot. Planning and organizing workshops for a user acceptance study. Conducting follow up interviews with participants – cultural probe study. Contribution with regards to garment design for optimal acceptance. Updating D2.3 as per recommendations of the review panel as well as incorporating new material.	
WP3:	**Framework Architecture Design and Specification and System Integration**	
Task id.	Summary of progress	Results achieved
T3.1	Market watch overview of hardware that will be used in architecture (e.g. wireless cameras) Technology, standards, and market watch overview of Smart Home technology, home automation in the "Smartest Home", features, interfaces, etc.	
T3.2	Template document used in these tasks to produce D3.1 created.. Partners contributed to functional specification of the MOBISERV system by delivering information concerning the Kompaï robot functionalities and architecture in order to design the whole MOBISERV system architecture. Partners contributed to D3.1 by defining robot control architecture and links with other subsystems.	
T3.3	Development of process flow specifications for selected functions.	
T3.4	Functional components for the MOBISERV system identified. Technical requirements for functional components gathered. The outputs of functional components identified. Initial architecture defined. Determination of physical deployment of functional components started. Activities related to the production of Technical Specifications for multi-sensors embedded system.	
T3.5	Development of MOBISERV architecture. Preparation of, contributions to and peer-reviewing of D3.1 Technical specification of MOBISERV.	
T3.6	Information and support on robuBOX and attached development tools in order to help the definition of the global architecture was delivered at a Technology brokerage week organized in ROBOSOFT'S headquarter in November 2010.	
WP4:	**Indoor Context Aware and Nutrition Support System**	
T4.2	Video recordings of older people while eating and drinking.	
T4.2-T4.3	Contacts for approval Medical Ethics Committee. Writing a research proposal on WP 4 for the Medical Ethics Committee. Gained approval of Medical Ethics Committee. Contacts with university for facial expression.	Internal progress status
WP5:	**Multi-sensor embedded system for health status monitoring, recording and analysis**	
T5.1	Developing deliverable D5.1: Design of the Multi-sensor embedded system for	

	vital signs monitoring.	
T5.2	Delivery of a Initial multi-sensor embedded system platform for vital sign monitoring. User manual accompanying the deliverable D5.2.	
T5.3	Continuation activity to allow the integration of sensors in a garment that can be easily accepted by primary end users (older adults). Collection of garments from other partners involved in the requirement elicitation process.	
WP6:	**Development of the Information Coordination and Communication support system**	
T6.1	Collecting the requirements and constraints for communication system. Evaluation of existing communication paradigms. Collecting requirements and constraints for the Information Fusion and channelling component (Interaction Manager). Study existing multimodal interaction systems. Familiarising with the tools provided by ROBOSOFT. Working on the Interaction Flow for each MOBISERV Function.	
T6.4	Analysing and investigating further requirements for the telealarm and health report services. Familiarising with the API provided by ROBOSFT that RobuBOX services exposes to external clients using the HTTP protocol.	
WP7:	**System Integration into Robotic Platform**	
T7.1	Partners started in advance to compare the initial plan of manufacturing 2 robotics platforms. Discussion with WP2 led to the conclusion that using as a baseline an existing programmable robot would help in getting useful information and specification from users in order to build the final MOBISERV setup. Thus 2 platforms will be delivered to UWE and SMH to continue the evaluation. The first has already been delivered to UWE. One platform was delivered in advance to UWE in order to organize trials and user interviews. Development were made concerning the HMI in order to obtain a modular architecture allowing consortium to reuse components in a more advanced (functional but also aesthetical and ergonomic) version dedicated to the project objectives.	
T7.2	First contact with the Robosoft Kompaï robot. Workshop on programming and personalizing the robot. Robosoft provided control architecture software for implementation by partners of project's solution. Training was done at robosoft in order to ease this implementation by working on specific exercises created from the project scenarios. Also, from users information coming from user's interviews, Robosoft started working on MOBISERV prototype by starting definition of new platform shape (mobility and platform kinematics as well as embodiment).	

WP8:	**Dissemination and Exploitation**	
Task id.	Summary of progress	Results achieved
T8.1	Development of www.mobiserv.eu Translation of MOBISERV Web site contents into partners' local languages. Participation to project logo creation.	
T8.2	Preparation of the initial MOBISERV exploitation plan. Liasing with relevant working groups and projects.	

OVERALL ACHIEVEMENTS ANSWERING TO THE REVIEW RECOMMENDATIONS

Main results

Description	Details
Definition of Evaluation Framework	Description of the Evaluation strategy to ensure conformance to project objectives.
Selection of key MOBISERV functions	Comprehensive review of the findings of D2.3 with technical partners and ILAEXP committee. Discussion of functional and non-functional requirements to identify key selection criteria and assessment against these was debated for identifying the key functions and confirming project objectives. The scenarios and personas in D2.3 provided the underlying context for the starting point of the discussions as well as the professional experience and expertise of the experts in the ILAEXP committee.
Further work on Requirements	Resulted in additional analysis and understanding of requirements for implementation of MOBISERV components and functions.
Initial Field Trials with the existing Kompai Robot	Helped to identify qualitative and technical issues in regards to the set-up and operation of the robot in a real environment, as well as end-users' initial responses.
MOBISERV functions process specification	Utilised the findings from the requirements work to identify process flow specifications for the functions prioritized by the ILAEXP committee. These have contributed to D2.2 and will also help with WP3.
Initial version of D8.2 MOBISERV exploitation plan	Development of the initial MOBISERV exploitation plan according to the model of Exploitation Vectors.
Planning for the actual involvement of users and stakeholders throughout the project duration	MOBISERV is currently setting up a list of contacts with end-user groups (elderly associations/ networks, associations of gerontology and geriatrics, health care associations, health care institutions, housing associations, individuals, etc.) mainly from the partner's countries. The main aim is to establish a user group that will be kept up to date with the project development, by sending them out updating letters according to the project results, and will be invited to attend the various MOBISERV showcase and dissemination events providing valuable feedback and experience. The list of contacts with user groups in UK and NL will also help the consortium to organise a panel of users and other stakeholders in both counties. The panel members will be involved in active discussion and debate from now till end of the project. The process will also include active participation of technical members of the consortium to ensure maximal interchange and communication. Furthermore, the MOBISERV evaluation process will include techniques involving user participation (Please see D2.4 chapter 2, Evaluation Methodology.) Furthermore, the established ILAEXP is predominantly aiming at liaising with significant International initiatives in Independent Living and Ageing. This committee is planned to convene in synchrony with WP2 activities.

Response to the reviewer's recommendations from the previous (mid-term) review

R1.	The project should clarify the mechanisms that they will use to translate user needs into system requirements and specifications for application by system designers and technologists. This should be included in the deliverable in the living document D2.3 (see also R5 below). The updated version of D2.3 (D2.3: MOBISERV System Requirements Specification Volume II) describes the mechanisms used for translating user needs into system requirements and specifications for application by system designers and technologies (see subsection 3.1 of the aforementioned deliverable). Furthermore, it is also recommended that a prioritisation system be applied to user and stakeholder requirements in order to ensure that key requirements drive the system design. These requirements should also be used to drive the validation process. Prioritisation of user and stakeholders requirements has been performed with the support of the Independent Living & Ageing & cross-industrial committee of experts (ILAEXP), in a requirements prioritisation workshop organized on September 21, 2010 in Paris, France. The methodology used and the outcomes of this workshop are presented in the updated version of D2.3 (S2.3 - Volume II).
R2.	The project is advised to consider the reuse of existing technologies and platforms/components. This recommendation is reflecting in D3.1 (e.g. reuse of existing technologies and platform components developed by ROBS, interfacing with existing smart home infrastructure in the smartest home in the Netherlands, reuse technologies for vital signs monitoring) but also into RTD activities carried out into WP4-WP7.
R3.	The consortium is advised to consider the already identified user resistance to video observation as a risk for WP 4. Alternatives should be considered in the functional specifications, and necessary actions should be included accordingly in the next periodic report and in the relevant deliverables of this WP and/or D3.1. Resistance to video observation will be taken into consideration and the proposed actions are the following: 1. The functionalities developed in WP4 have already been refocused in order to give a companion functionality to the MOBISERV system and not a monitoring one. This will be clearly stated to the users. 2. The video analysis methods to be developed have already certain privacy preserving capabilities. E.g. only binary person silhouettes or binary templates will be extracted from video. It will be made clear to the users by demonstration that such data cannot endanger their privacy, since no meaningful person id or status can be extracted from them. 3. The algorithms developed by AUTH will take care of the privacy concerns and Privacy Preserving Technologies (PPT) are already used in a certain extent. 4. An on/off functionality is foreseen for the use of video cameras. Thus the user is fully responsible for using the camera if he wants to. Alternatively, a dialogue using the touch screen of the robot or voice responses may be developed. 5. No video-storage or video transmission outside the house is going to be used enhancing the privacy preserving nature of the proposed approaches. Novel privacy preserving technologies will be investigated depending on the available resources.
R4.	A well-elaborated overall system integration plan, considering identified services, is required as

	soon as possible. A person/team responsible for the overall system integration should be designated and reported in the next management report (periodic report for period one). The MOBISERV consortium is preparing a detailed integration plan, the outline of which will be presented in the upcoming review meeting. All technical partners have assigned at least one person to serve as member of the integration team. ROBS, leading WP7 (where the integration activities will take place) has assigned the role of the coordinator of this team to Joseph Canou. 1. Joseph Canou, ROBS: Leader of integration activities 2. Maria Nani, ST: Integrating InteractionManager and TeleAlarm components 3. Anastasios Tefas, AUTH: Integrating "Eating Recognition", "Dinking Recognition" and "Expression Recognition" Components 4. Marc Correvon, CSEM: Integrating WHSU components 5. Herjan van den Heuvel, SMH: Integrating smart home automation components 6. Petri Heinila, LUT: Integrating communication & smart home automation components 7. Tommaso Faetti, SMARTEX: Integrating WHSU into PRU
R5.	D2.3: The review team recommends that this deliverable be re-designated as a living document. Recognising that a complete set of requirements cannot be established at the start of the project and that the initial set of requirements must be refined as the work progresses and evaluation of prototypes clarifies and identifies emergent issues and generates valuable feedback, the consortium decided - prior to the project start - that D2.3 would be a living document. An updated version should be presented at each review meeting. The project team agrees with this recommendation.
R6.	The actual involvement of users and stakeholders should be ensured throughout the project duration and the resulting advice made available to project decision makers. MOBISERV is currently setting up a list of contacts with end-user groups (elderly associations/ networks, associations of gerontology and geriatrics, health care associations, health care institutions, housing associations, individuals, etc.) mainly from the partner's countries. The main aim is to establish a user group that will be kept up to date with the project development, by sending them out updating letters according to the project results, and will be invited to attend the various MOBISERV showcase and dissemination events providing valuable feedback and experience. The list of contacts with user groups in UK and NL will also help the consortium to organise a panel of users and other stakeholders in both counties. The panel members will be involved in active discussion and debate from now till end of the project. The process will also include active participation of technical members of the consortium to ensure maximal interchange and communication. Furthermore, the MOBISERV evaluation process will include techniques involving user participation (Please see D2.4 chapter 2, Evaluation Methodology.) Furthermore, the established ILAEXP is predominantly aiming at liaising with significant International initiatives in Independent Living and Ageing. This committee is planned to convene in synchrony with WP2 activities.
R7.	The consortium needs to decide who will be the target group(s) and which particular services will be developed/used. Specific target groups and services will then be considered in an adequate exploitation concept. From the scenarios and functions identified in D2.3 (Volume I) of the requirements specification, nine of them gained high ranking in the Independent Living & Ageing & cross-industrial committee of experts (ILAEXP) workshop (on prioritising MOBISERV requirements) held on September 21, 2010 in Paris, France. For each one of these, the groups of people targeted (see personas) are presented in D2.3 (Volume I).
R8.	A change of the robotic platform (different from the one specific in the DoW) has been reported. This decision should be fully justified in D3.1, and the consortium should detail the implications (costs, technical implementation, exploitation, etc) in the periodic report for period

	one. Robulab10 Healthcare as described in the technical annex was the first release of this platform and needed improvements both in terms of mechanical and software robustness. The new robulab10 and its Healtcare version called Kompaï shall be seen as industrialized version of the robulab10 Healthcare described in technical annex. The evolution concern the mechanical structure with a new evolution of the motor/drives, laser sensor but also customized electronic boards were designed and new sensors were added to improve safety aspects (infrared and floor detection to avoid the robot falling in stairs for example). Also the outside shape was redesigned to allow easy access for maintenance. The whole control architecture was also redesigned, for example all the low level control initially managed using x86 CPU and Windows XPe is now running on microcontrolled board running WinCE and a Robosoft proprietary framework called PURE. From a cost point of view it does not change anything for the project, the cost remains the same. The only change for the project is a positive one: the technical implementation will be eased and the exploitation will be directly facilitated by having a robust and professional platform. The decision to change platform is justified in the current version of D3.1 and the consortium details the implications (costs, technical implementation, exploitation, etc) in the periodic report for period one.
R9.	An initial version of D8.2 MOBISERV exploitation plan should be provided for the next review meeting. The consortium developed the initial MOBISERV exploitation plan, which has been provided for the upcoming review meeting.

Deviations from Annex I-Description of Work

No deviation can be identified and therefore nothing to report.

3.2 A statement on the use of resources, in particular highlighting and explaining deviations between actual and planned man-months per work package and per beneficiary in Annex 1 (Description of Work)

Cumulative Effort to-date (person months)
(preferably presented as an Excel sheet with one row per person)

Contractor designation	WP 01		WP 02		WP 03		WP 04		WP 05		WP 06		WP 07		WP 08		Total	Total
	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A
SYSTEMA	6,00	4,78	1,00	1,61	2,50	3,61	0,00	0,00	0,00	0,00	4,20	7	0,61	1	2,00	2	16,31	20
ROBS	0,67	0,00	1,00	1,00	1,50	1,00	0,00	0,00	0,00	0,00	1,12	0,00	3,00	10,00	0,67	0,00	7,96	12,00
UWE	0,17	0,262	8,67	9,588	1,25	0,519	0,45	0,00	0,56	0,00	0,00	0,00	1,23	0,00	1,00	0,028	13,33	10,397
AUTH	0,17	0,00	1,00	2,936	3,00	7,87	6,32	15,896	0,00	0,00	0,00	0,00	1,23	0,00	1,00	2,30	12,72	29,002
CSEM	0,17	0,00	0,67	0,60	2,00	0,30	0,00	0,00	5,32	3,80	0,00	0,00	0,55	0,00	0,33	0,20	9,04	4,90
SMH	0,17	0,30	4,00	5,80	3,00	1,70	0,00	0,20	0,00	0,00	0,00	0,00	0,55	0,10	1,00	0,50	8,72	8,60
LUT	0,17	0,20	0,00	0,00	5,00	8,00	0,45	0,00	0,84	0,00	3,92	3,00	0,68	0,00	0,67	1,00	11,73	12,20
SMARTEX	0,17	0,00	1,33	1,02	2,50	1,42	0,00	0,00	5,04	6,90	0,00	0,00	0,41	0,00	2,00	1,62	11,45	10,96
ANNA	0,17	0,30	3,33	5,10	0,00	0,00	1,81	2,00	0,00	0,00	0,00	0,00	0,41	0,00	1,33	1,10	7,05	8,50
Total	**7,86**	**5,842**	**21,00**	**27,654**	**20,750**	**24,419**	**9,030**	**18,096**	**11,760**	**10,70**	**9,240**	**10,00**	**8,670**	**11,10**	**10,00**	**8,748**	**98,310**	**116,559**

P: planned (budgeted) input

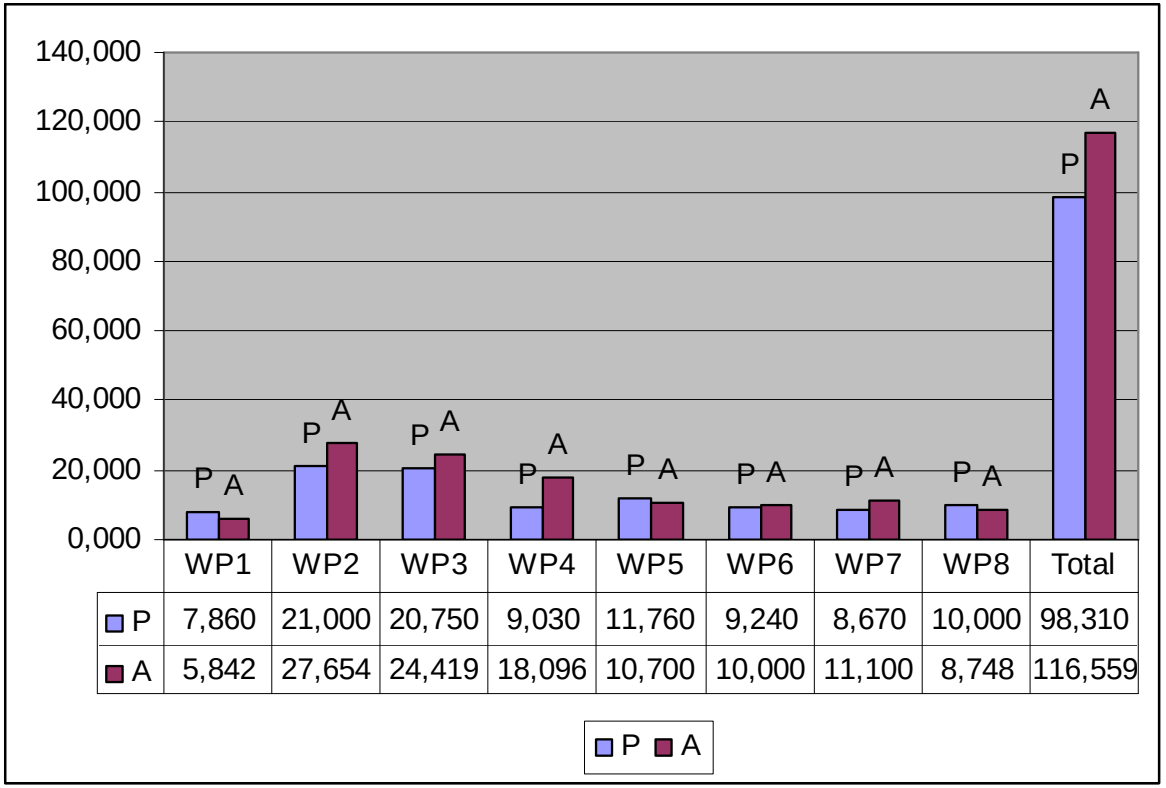
A: actual input

Reported issues on behalf of development partners' teams

During the 1st year of the project, UWE has experienced personnel problems due to a researcher who was recruited in August having serious performance and personal issues. As a result a considerable amount of time has been spent on communicating with the human resources department regarding these issues. In addition, the work that the researcher had attempted had to be re-done due to the inadequacy of the work. The researcher resigned in October giving one month's notice after taking long periods of unpaid leave and sick leave. As a result new researchers had to be quickly taken on board to prevent WP2 from stalling. However, as with all new recruitment in the middle of a project, this has involved in an initial period of them gaining familiarity with the project before they can start making significant contributions.

The currently researcher has been employed on a temporary basis as part of a probationary period. We hope that we will have a more stable situation regarding personnel from now on.

Bar chart
(planned versus actual effort)



	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	Total
P	7,860	21,000	20,750	9,030	11,760	9,240	8,670	10,000	98,310
A	5,842	27,654	24,419	18,096	10,700	10,000	11,100	8,748	116,559

3.3 Corrective actions

No corrective actions.

4. DELIVERABLES AND MILESTONES TABLES

Deliverables

TABLE 1. DELIVERABLES[3]

Del. no.	Deliverable name	WP no.	Lead participant	Nature	Dissemination level	Due delivery date from Annex I	Delivered Yes/No	Actual / Updates delivery date	Comments
D2.1	Requirements Capture Methodology	2	UWE	R	RE	M2	yes	1/6/2010	Accepted
D2.2	MOBISERV Validation Plan (M3)	2	UWE	R	RE	M3	yes	1/6/2010	Accepted
D8.1	MOBISERV Project Presentation and Web site deployment	8	ST	P	PU	M4	yes	1/6/2010	Accepted
D2.3	Initial System Requirements Specification	2	UWE	R	PU	M5	yes	1/6/2010	Accepted
D1.4	Interim Report for period 1	1	ST	R	PU	M6	yes	1/6/2010	Accepted
D8.5	Plan for the Use and Dissemination of Foreground (Issue 1)	8	ST	R	RE	M36	Yes (Issue 1)	1/6/2010	1st Issue of D8.5. This deliverable will have an open status and it will be updated in every review period (annual and interim). The final version is scheduled for month 36.
D1.1	Periodic Report for period 1 (year 1)	1	ST	R	PU	M12	yes	10/1/2011	Submitted for 1st year Review
D2.4	Definition of evaluation framework	2	UWE	R	PU	M7	yes	10/1/2011	Submitted for 1st year Review

[3] For Security Projects the template for the deliverables list in Annex A1 has to be used.

D3.1	Technical Specifications, Test and Implementation Scenarios	3	LUT	R	RE	M8	yes	10/1/2011	Submitted for 1st year Review
D4.1	1st visual information analysis and ontologies for indoor context aware and nutrition support	4	AUTH	R	RE	M12	yes	10/1/2011	Submitted for 1st year Review
D5.1	Design of the multi-sensor embedded system for vital signs monitoring	5	CSEM	R	RE	M7	Yes	10/1/2011	Submitted for 1st year Review
D5.2	Initial multi-sensor embedded system platform for vital signs monitoring	5	CSEM	P	RE	M12	Yes	10/1/2011	Submitted for 1st year Review
D2.3	MOBISERV System Requirements Specification Volume II	2	UWE	R	PU	M5	Yes (Volume II)	10/1/2011	This document, D2.3: MOBISERV Initial System Requirements Specification, Volume II presents further analysis and investigation of stakeholder issues, following on from the last submitted deliverable – MOBISERV D2.3 v8. This report is seen as a continuation of the previous deliverable, which will be referred to as Volume I, and as such, is seen a living document with a new volume being compiled for each review (as requested on the Mid-period Interim Review), which will build on and extend the previous findings as more issues are identified.
D8.5	Plan for the Use and	8	ST	R	RE	M36	Yes (Issue 2)	10/1/2011	2nd Issue of D8.5. This

	Dissemination of Foreground (Issue 2)								deliverable will have an open status and it will be updated in every review period (annual and interim). The final version is scheduled for month 36.
D8.2	Exploitation plan (Initial Version)	8	ST	R	CO	M28	Yes (Initial version)	10/1/2011	Initial Version of D8.2, as requested on the Mid-period Interim Review. The final version of the MOBISERV Exploitation Plan will be presented in M28.

Milestones

TABLE 2. MILESTONES

Milestone no.	Milestone name	Due achievement date from Annex I	Achieved Yes/No	Actual / Forecast achievement date	Comments
MS1	Initial System Requirements Specification	M5	yes	1/6/2010	Delivery of D2.3
MS2	Technical Specifications, Test and Implementation Scenarios	M8	yes	3/8/2010	Delivery of D3.1

5. PROJECT MANAGEMENT

Project Management (WP1)

During the first Year Project Management has been established and the internal rules of engagement have been conveyed and agreed in consensus. A Quality Plan has been agreed and the management structure freezed.

Frequent technical meetings either electronic (teleconferences) or physical have been planned. A six months roadmap for meetings is being maintained by the Project Support Office.

Quality and dissemination activities are undertaken with the maximum collaboration among partners.

The project management is being handled by Ms Maria Nani.

5.1 Problems which have occurred and how they were solved or envisaged solutions

Nothing to report.

5.2 Changes in the consortium

Nothing to report.

5.3 List of project meetings, dates and venues

Regular e-meetings 3-4 times per month.

Project Meetings

Title	*Date and Place*	*Main conclusions*
Kick-off meeting PTP-01 plenary	18-19 January 2010, Athens, Greece	Partners acquiring ownership of responsibilities
PTP-02 plenary and technical	1-2 March 2010, Eindhoven, The Netherlands	User requirements workshop
Rehearsal meeting for the Interim Review meeting	17June 2010, Brussels, Belgium	
Interim Review Meeting	18 June 2010, Brussels	
PTP-04 Plenary meeting and & ILAEXP Workshop	21-22 September 2010, Paris, France	Plenary meeting & ILAEXP workshop
Technical Meeting	15 November, Pisa, Italy	Technical meeting between CSEM and SMARTEX
Training meeting	22-26 November 2010, Bidart, France	

Articles Published, Press coverage etc.

Date and Type	Details
March 24, 2010 – UWE Press Release	http://info.uwe.ac.uk/news/UWENews/article.asp?item=1711&year=2010
May 2010 – UWE Bulletin	Printed article on the project – university wide circulation.
August 23-26, 2010 ICPR 2010Research article	Nikolaos Arvanitopoulos, Dimitrios Bouzas, Anastasios Tefas, "Subclass Error Correcting Output Codes using Fisher's Linear Discriminant Ratio", 20th International Conference on Pattern Recognition, August 23-26, 2010, Istanbul, Turkey.
September 15-18, 2010 ICANN'10Research article	Anastasios Maronidis, Anastasios Tefas and Ioannis Pitas "Frontal view recognition using Spectral Clustering and Subspace Learning methods" , 20th Int. Conf. on Artificial Neural Networks, September 15-18, 2010, Thessaloniki, Greece.
September 30, 2010 4th companion robotics workshop Research article	Maria Nani, Praminda Caleb-Solly, Sanja Dogramadzi, Christine Fear, Herjan van den Heuvel, "MOBISERV: An Integrated Intelligent Home Environment for the Provision of Health, Nutrition and Mobility Services to the Elderly", 4th Companion Robotics Workshop, September 30, 2010, Brussels, Belgium
November 9-12, 2010 8th Fruct conference Research Article	Petri Heinilä, "Aspects of a messages-bus based communications framework in multi-modal and multi-device environment to support independent living of elder people", 8th Finish-Russian University Cooperation in Telecommunications (FRUCT) Conference, 9-12 November, 2010, Lappeenranta, Finland
November, 2010 - Press Coverage (SMH)	During its participation to the "De Beurs Domotica & Slim Wonen 2010" (a large fair of Home Automation and Smart Homes held in Eindhoven, the Netherlands), MOBISERV got coverage by Omroep Brabant, a regional broadcaster in the southern part of the Netherlands.

Conferences and/or Workshops organised/foreseen by the project

Date	Title	Number of persons attended + other information
4-7 May, 2010	6th Hellenic Conference on Artificial Intelligence (SETN 2010)	The MOBISERV project coordinator, Systema Technologies S.A., was one of the sponsors of the conference. During the event, MOBISERV brochures have been disseminated (by the coordinator, Dr. Costas Davarakis) to raise awareness about the project and its activities. Furthermore, AUTH has presented the work "Face detection using Particle Swarm Optimization and Support Vector Machines", which has been conducted in the framework of MOBISERV. Face detection is an important step towards automatic facial expression analysis needed in WP4
July 18-23, 2010	2010 IEEE World Congress on Computational Intelligence (WCCI2010)	AUTH presented research work conducted within MOBISERV on "Using Particle Swarm Optimization for Scaling and Rotation invariant Face Detection".
August 23-26, 2010	20th International Conference on Pattern Recognition (ICPR 2010)	AUTH presented research work conducted within MOBISERV on "Subclass Error Correcting Output Codes using Fisher's Linear Discriminant Ratio".
September 15-18, 2010	20th International Conference on Artificial Neural Networks (ICANN 2010)	AUTH presented research work conducted within MOBISERV on "Frontal view recognition using Spectral Clustering and Subspace Learning methods" and on "Improving the Robustness of

		Subspace Learning Techniques for Facial Expression Recognition".
September 27-29, 2010	ICT Event 2010	During this event MOBISERV brochures have been disseminated to raise public awareness about the project and its activities. Furthermore, the project has been presented in the networking session on "E-Inclusion Companion-Robots (EI-CR) Networking Session Focus: Companion Robotics for e-Inclusion & Ambient Assisted Living", along with other related projects.
September 2010, Department Research Seminar at Bristol Robotics Lab UWE	Seminar - Dissemination of current outcomes of WP2	TBD
October 7-10, 2010	3rd International Symposium on Applied Sciences in Biomedical and Communication Technologies (ISABEL 2010)	2 MOBISERV project members from SMARTEX (Rita Paradiso and Laura Caldani) participated in this event; Project leaflets (about 50 pieces) at have been distributed in the SMARTEX booth.
November 9-12, 2010	8th Finish-Russian University Cooperation in Telecommunications (FRUCT) Conference	During the event, Petri Heinila (LUT) presented an abstract paper on "Aspects of a messages-bus based communications framework in multi-modal and multi-device environment to support independent living of elder people".

5.4 Use of foreground and dissemination activities during this period

A brochure has been published and is available at the project web site:
http://www.mobiserv.eu/index.php?option=com_docman&Itemid=54&lang=en

Project leaflet distributed at SETN 2010, Athens.

Project flyer of MOBISERV 1st year distributed at Home Automation and Smart Living, 2010, Eindhoven Netherlands.

Presenting poster of MOBISERV results 1st year at Home Automation and Smart Living, 2010, Eindhoven Netherlands.

Also, a first year newsletter has been prepared. This is available at the project site.

5.5 Impact of possible deviations from the planned milestones and deliverables

Nothing to report.

5.6 Risks management and contingency measurements

CONSIDERATION OF GENDER ASPECTS - INTERIM REPORT

1. Statistics on Project Stuffing (Workforce Statistics)

It is widely known that Europe suffers from a lack of female engineers. Fortunately, in the past, topics addressed in MOBISERV (such as care for older citizens and healthcare) have attracted higher proportions of female researchers than other domains of computer science. A number of female researchers participated in the preparation of the MOBISERV proposal and the consortium is committed to keeping female researchers strongly involved throughout the project.

SCIENTIFIC LEADERSHIP AND MANAGEMENT, AND WORKFORCE STATISTICS FOR THE PROJECT TO BE COMPLETED BY CONTRACTORS

Statistics on Project Staffing (Workforce Statistics)

Type of Position	Number of Women	Number of Men	Total	% Women	% Men
Scientific manager	1	5	6	17%	83%
Scientific team leader / work package manager	6	3	9	67%	33%
Experienced researcher (> 4 years)	5	5	10	50%	50%
Early researcher (<= 4 years)	4 + 2(temporary)	7	13	46%	54%
PhD students	1(temporary)	4	5	20%	80%
Technical staff	1	3	4	25%	75%
Other	2 + 1(placement student)	0	3	100%	0%

2. Statistics on non-project Members (end-users) participated in Project Activities, where Gender Aspects have been considered

Within MOBISERV, particular attention will be paid to the fact that requirements of both genders are taken into account in the application test sites.

The project aims at the development of assistive technology for old (and disabled) persons. Hence, the preferences and needs of both genders have to be taken into account in a balanced manner. Due to the higher life expectancy of the female population the percentage of old and very old women significantly exceeds the quota of the male population. Therefore, the project will especially take care that the needs and preferences of the female population will be taken into account accordingly. It is also recognized, that some aspects of user interface design might be preferred differently by men and women. Therefore, the testing and evaluation of the system's user interfaces will be carried out with sufficient representation of both genders.

STATISTICS ON NON-PROJECT MEMBERS (END-USERS) PARTICIPATED IN PROJECT ACTIVITIES, WHERE GENDER ASPECTS HAVE BEEN CONSIDERED

Non-project members participated to project relating activities	**Number of Women**	**Number of Men**	**Total**	**% Women**	**% Men**
Non-project members / users participated in requirement gathering activities in UK	A1 9 A2 5 B1 9 C1 12 C2 3 C3 1 C4 7 TOTAL: 46	A2 1 B1 3 C2 1 C4 4 TOTAL: 9	55	84%	16%
Non-project members / users participated in requirement gathering activities in the Netherlands	41	9	50	82%	18%

3. Other Gender Equality Actions

Any other all the Gender Equality Action undertaken in MOBISERV should be listed here.

RISK MANAGEMENT - INTERIM REPORT

Risk management and contingency measurements are considered on a consortium and individual WP level, and should be updated and reported on a regular basis in the annual periodic reports.

Risk Management Table

The following table depicts initial scenario thinking for the MOBISERV risk management.

It lists risks identified before the start of the project but also new risks identified within the first project period.

Risk no	Identified Risk	Type	Mitigation	Partner responsible for mitigation	Timescale BY -WHEN
1.	Lack of acceptability of the system by some of the end-users	Concept	1) Iterative development of a comprehensive user needs and requirements analysis. 2) The validation strategy would warn us if a system component lacks acceptability by end users. 3) Primary and secondary research is being done on robot embodiment which also directly addresses acceptability issues. 4) Provide flexibility and customisation of system and functionality 5) Seek view of end-user advisory panel.	UWE/ANNA/SmH	M2-M24
2.	Miss important requirements	Concept	Iterate on requirements and refine them during the project. Make two rounds of prototyping and tests. Participatory design sessions with end-users and carer to verify process flow specifications for each function.	UWE/ANNA/SmH	M2-M24
3.	Users resist to video observation	Concept / Development	Resistance to video observation will be taken into consideration and the proposed actions are the following: 1. The functionalities developed in WP4 have already been refocused in order to give companion functionality to the MOBISERV system and not a monitoring one. This will be clearly stated to the users. 2. The video analysis methods to be developed have already certain privacy preserving capabilities. E.g. only binary person silhouettes or binary templates will be extracted from video. It will be made clear to the users by demonstration that such data cannot endanger their privacy, since no meaningful person id or status can be extracted from them. 3. The algorithms developed by AUTH will take care of the privacy concerns and Privacy Preserving Technologies (PPT) are already used in a certain extent. 4. An on/off functionality is foreseen for the use of video cameras. Thus the user is fully responsible for using the camera if	AUTH	M6 - M24

			he wants to. 5. The status of the cameras will be made clearly visible to the user – whether or not they are in the record mode or not. 6. No video-storage or video transmission outside the house is going to be used enhancing the privacy preserving nature of the proposed approaches. 7. Novel privacy preserving technologies will be investigated depending on the available resources.		
4.	Difficulty to miniaturize wearable system	Development	Identify large parts during the requirements Partition prototype if needed during the design phase	CSEM (sensors, electronics, integration)	M6-M10
5.	Difficulty for the robot to locate user in his environment	Development	The project will follow a strategy using several sub functionalities and sensors data (person detection, face detection and recognition, laser scanner data, possibly other sensors like thermic sensors). Indeed there is no robust solution for finding a person only using camera and unique algorithm for that. Our strategy will use robot movement and sensors data processing. The main idea is first to define 2 specific locations for the robot when entering in a room. This specific location must place the robot in a situation where its field of view is maximized (the robot can see highest percentage of the room space). In this situation we increase at maximum the possibility to have the user in the robot field of view. Once the robot is at this location then we will use several algorithms: detection of the person, detection and/or recognition of face, detection of legs in laser scan, use of thermic sensor (detect angular position of a heat source). Based on the output of these sensors we should have at least one information about presence or not of the user. Thanks to at least one information the robot will try to move in order to focus on place corresponding to the information we have, and we will again try detection algorithms fusion in order to validate the presence or not of the user. If no information is delivered by algorithms, then the robot will move to the second predefined location and the process will start again.	ROBS / SMH	M10-M30
6.	Difficulty for the speech recognition algorithm to recognise the voice of the specific user		Use training and speaker identification.		
7.	Difficulty in integration of different sensors and making proper use of the available information	Integration	Early design of the decision flow Design of a fall back solution requiring less sensors (but still acceptable in terms of performance)	CSEM/ AUTH /LUT/ SYSTEMA	M1-M8

8.	Difficulty in integrated individual components	Integration	Architecture is based on SOA model to ease integration; implementation uses standard technologies and APIs. An integration plan will be prepared.	All technical partners	M10-M30
9.	Difficulty in setting-up a meaningful exploitation plan due to too expensive technical solution	Exploitation	Check usage scenarios during the requirements elicitation and conformance testing. Identify and study several market segments, from complete solution to simplified version. Seek advice of the ILAPLEX committee.	SYSTEMA/ ROBOSOFT/ SMARTEX	M24
10.	Difficulty to connect the datalogger to the PRU	Integration	Data stored in the data logger and downloadable when battery is recharging	CSEM	M20
11.	Size of the garment does not fit the user	Exploitation	Use of Velcro to adjust the garment with the user	SMARTEX	M20
12.	Use of the data logger too complex	Exploitation	Automatic detection of the skin contact, only one button as user interface	CSEM	M20
13.	Quality of the ECG to be measured to low due to a bad fitting of the garment	Exploitation	Indication of the ECG quality between 0% to 100% on the display of the Smartphone	CSEM	M20
14.	Handling of the data logger too complex	Exploitation	Development of a cradle for the battery charge and data download	CSEM	M20
15.	Exploitation of the data too complex	Exploitation	PC software application very easy to use. Automatic database generation	CSEM	M20

Table 1: MOBISERV risk management

Risk Analysis Table & Contingency Plan

For each risk identified and listed in Table 1, a contingency plan is suggested and presented in Table 2.

Risk no	Description of the risk	Related WP	Risk Mitigation	Milestone expected to clear Risk	Contingency plan
	Lack of acceptability of the system by some of the end-users. This risk could affect objectives OS1 and OS2.	WP2	1) Iterative development of a comprehensive user needs and requirements analysis. 2) The validation strategy would warn us if a system component lacks acceptability by end users. 3) Primary and secondary research is being done on robot embodiment which also directly addresses acceptability issues. 4) Provide flexibility and customisation of system and functionality 5) Seek views of end-user advisory panel.	MS4 (mainly), MS2, MS1	The validation plan will give us a first identification of the degree of the acceptability of the system components by the end users. In case a system component lacks acceptability by the end users, we will perform a new round of requirements elicitation before we start the activities in the corresponding integration tasks.
2.	Miss important requirements. This risk could affect the project outcomes.	WP2	Iterate on requirements and refine them during the project Make two rounds of prototyping and tests. Participatory design sessions with end-users and carer to verify process flow specifications for each function.	MS4	Redefinition of user/functional/technical requirements of the MOBISERV system. Make a more efficient transition from user requirements to functional/technical requirements in D3.2
3.	Users resist to video observation	WP4	Resistance to video observation will be taken into consideration and the proposed actions are the following: 1. The functionalities developed in WP4 have already been refocused in order to give companion functionality to the MOBISERV system and not a monitoring one. This will be clearly stated to the users. 2. The video analysis methods to be developed have already certain privacy preserving capabilities. E.g. only binary person silhouettes or binary templates will be extracted from video. It will be made clear to the users by	MS4	Alternatively, a dialogue using the touch screen of the robot or voice responses may be developed to ask older persons if they have eaten or drunk.

			demonstration that such data cannot endanger their privacy, since no meaningful person id or status can be extracted from them. 3. The algorithms developed by AUTH will take care of the privacy concerns and Privacy Preserving Technologies (PPT) are already used in a certain extent. 4. An on/off functionality is foreseen for the use of video cameras. Thus the user is fully responsible for using the camera if he wants to. 5. No video-storage or video transmission outside the house is going to be used enhancing the privacy preserving nature of the proposed approaches. 6. Novel privacy preserving technologies will be investigated depending on the available resources.		
4.	Difficulty to miniaturize wearable system. This risk could affect objectives OT2	WP5	Identify large parts during the requirements Partition prototype if needed during the design phase	MS3	Search for alternative methods for real time monitoring of bio-signal data always in accordance with the user requirements. The system should be non intrusive.
5.	Difficulty for the robot to locate user in his environment	WP7	The project will follow a strategy using several sub functionalities and sensors data (person detection, face detection and recognition, laser scanner data, possibly other sensors like thermic sensors).	MS3, MS4	Use of specific sensors distributed in the environment like IR sensors for detection of presence.
6.	Difficulty in integration of different sensors and making proper use of the available information. This risk could affect OS1, OS2, OS3, OT1, OT5	WP7	Early design of the decision flow Design of a fall back solution requiring less sensors (but still acceptable in terms of performance)	MS3	Reduce the functionality of the components that are facing integration difficulties and integrate them with limited but acceptable functionality by the users. Refine D2.4 and D2.7 and delay the evaluation procedure of the first prototype.
7.	Difficulty in integrated individual components	WP7	Architecture is based on SOA model to ease integration; implementation uses standard technologies and APIs. An integration plan will be prepared.	MS4	The integration will done step by step as the solutions are progressing which will ensure the low chance of problem occurring. Organise dedicated technical boot camps.

8.	Difficulty in setting-up a meaningful exploitation plan due to too expensive technical solution. This risk could affect the project outcomes.	WP8	Check usage scenarios during the requirements elicitation and conformance testing Identify and study several market segments, from complete solution to simplified version. Seek advice of the ILAPLEX committee.	-	Reduce the functionality of the most expensive components that the market analysis report will indicate taking into account the user acceptance (D2.7) assuring that the final products will support the basic functionalities of the MOBISERV system. Redefine the exploitation plan.
9.	Difficulty to connect the datalogger to the PRU (Bluetooth link)	WP5	Data stored in the data logger and downloadable when battery is recharging	MS5	Use the Smartphone in case of emergency situation
10.	Size of the garment does not fit the user	WP5	Use of Velcro to adjust the garment with the user	MS3	Modification of the garment design.
11.	Use of the data logger too complex	WP5	Automatic detection of the skin contact, only one button as user interface	MS3	Start and stop of the data logger one a day by healthcare personal
12.	Quality of the ECG to be measured to low due to a bad fitting of the garment	WP5	Indication of the ECG quality between 0% to 100% on the display of the Smartphone	MS3	Modification of the garment to be adjustable within a range of size
13.	Handling of the data logger too complex	WP5	Development of a cradle for the battery charge and data download	MS5	Handling by the healthcare personal
14.	Exploitation of the data too complex	WP5	PC software application very easy to use. Automatic database generation	MS5	Automatic data presentation in a simple way.

Table 2: MOBISERV Risk Analysis Table

6. EXPLANATION OF THE USE OF THE RESOURCES

TABLE 6.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR SYSTEMA FOR THE PERIOD 1.12.09-30.11.10

Work Package	Item description	Amount	Explanations
1, 2, 3, 6, 7, 8	Personnel direct costs	101.699,00	Salaries of five company engineers
	Subcontracting		
	Other direct costs	7.000,00	Travel and other costs
	Major cost item 'Y'		
	Remaining costs		
TOTAL **DIRECT COSTS** AS CLAIMED ON FORM C		**108.699,00**	

TABLE 6.2 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR ROBS FOR THE PERIOD 1.12.09-30.11.10 *

***** Financial data were not delivered as yet (10/1/2011)**

Work Package	Item description		Explanations
	Personnel costs		
	Subcontracting		
	Other direct costs		
	Major cost item 'Y'		
	Remaining costs		
TOTAL **DIRECT COSTS** AS CLAIMED ON FORM C			

TABLE 6.3 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR UWE FOR THE PERIOD 1.12.09-30.11.10

Work Package	Item description	**Amount**	Explanations
1, 2, 3, 8	Personnel costs	1.484,46 43.575,65 1.790,41 174,27	Staff costs
	Subcontracting		
2	Other direct costs	6.028,00	Consumables; Travel & Subsistence
	Major cost item 'Y' ……..		
	Remaining costs		
TOTAL **DIRECT COSTS** AS CLAIMED ON FORM C		**53.052,79**	

TABLE 6.4 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR AUTH FOR THE PERIOD 1.12.09-30.11.10

Work Package	Item description	Amount	Explanations
	Personnel costs	112.262,66	Personnel costs for the first year
	Subcontracting		
	Other direct costs	10.285,50	Mainly travel costs for Project Meetings and Conferences
	Major cost item 'Y' ……..		
	Remaining costs	275.636,20	
TOTAL **DIRECT COSTS** AS CLAIMED ON FORM C		**122.548,16**	

TABLE 6.5 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR CSEM FOR THE PERIOD 1.12.09-30.11.10

Work Package	Item description	Amount	Explanations
WP5	Personnel costs	31.458,68	Development of the embedded electronics, application on Smartphone
	Subcontracting		
	Other direct costs	5.491,28	Meeting, EEE components, Smartphone
	Major cost item 'Y' ……..		
	Remaining costs	**36.949,96**	

TABLE 6.6 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR SMH FOR THE PERIOD 1.12.09-30.11.10

Work Package	Item description	Amount	Explanations
WP1, WP2, WP3, WP4, WP7, WP8	Personnel costs	48.160,00	WP1: Management and meetings WP2: User/stakeholder requirements gathering, analysis of data, persona / scenarios / concepts generation, validation and evaluation plans, robot prototype user tests WP3: Market watch, overview of smart environment WP4: Video recording of eating/drinking activities WP7: Workshop on the Kompaï robot WP8: Review of WP8 deliverables, website, posters, flyers, home automation event
	Subcontracting		
	Other direct costs		
WP1, WP2, WP8	Major cost item 'Travel'	7.037,00	WP1: Consortium meetings WP2: User testing in England WP8: Dissemination event in Brussels
	Remaining costs		
TOTAL **DIRECT COSTS** AS CLAIMED ON FORM C		**55.197,00**	

TABLE 6.7 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR LUT FOR THE PERIOD 1.12.09-30.11.10

Work Package	Item description	Amount	Explanations
1,3,6,8	Personnel costs	57.209,00	Management (876), preparation of first specification, development of communication system and system architecture.
	Subcontracting		
	Other direct costs	8.719,00	Travelling to project meetings and reviews.
	Major cost item 'Y'		
	Remaining costs		
TOTAL **DIRECT COSTS** AS CLAIMED ON FORM C		**65.928,00**	

TABLE 6.8 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR SMARTEX FOR THE PERIOD 1.12.09-30.11.10

Work Package	Item description	Amount	Explanations
	Personnel costs	49.789,75	10,75 PMs
	Subcontracting	0	
	Other direct costs	3.934,54	Most costs (€ 3.356,97) are due to participation to project meetings
	Major cost item 'Y'	0	
	Remaining costs		
TOTAL **DIRECT COSTS** AS CLAIMED ON FORM C		**53.724,29**	

TABLE 6.9 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR ANNA FOR THE PERIOD 1.12.09-30.11.10

Work Package	Item description	Amount	Explanations
01/02/04/07/08	Personnel costs	87.975,00	8,5 person months
	Subcontracting		
	Other direct costs	3.206,00	Travelling, pr and communication + organization meeting Veldhoven
	Major cost item 'Y'		
	Remaining costs		
TOTAL **DIRECT COSTS** AS CLAIMED ON FORM C		**91.181,00**	

7. FINANCIAL STATEMENTS – FORM C AND SUMMARY FINANCIAL REPORT

Original signed Forms C from all partners are being delivered to the Commission.

The independent partners' data will be uploaded at the online NEF system, where a summary financial report will also be created.

8. CERTIFICATES

Beneficiary	Organisation short name	Certificate on the financial statements provided? yes / no	Any useful comment, in particular if a certificate is not provided
SYSTEMA TEKNOLOTZIS ANONYMI ETAIREIA EFARMOGON ILEKTRONIKIS KAI PLIROFORIKIS	SYSTEMA TECHNOLOGIES	No	Overall funding for this period does not exceed 375.000 €.
ROBOSOFT SA	ROBOSOFT	No	Overall funding does not exceed 375.000 €.
UNIVERSITY OF THE WEST OF ENGLAND	UWE	No	Overall funding does not exceed 375.000 €.
ARISTOTELIO PANEPISTIMIO THESSALONIKIS	AUTH	No	Overall funding for this period does not exceed 375.000 €.
CSEM CENTRE SUISSE D'ELECTRONIQUE ET DE MICROTECHNIQUE SA - RECHERCHE ET DEVELOPPEMENT	CSEM	No	Overall funding for this period does not exceed 375.000 €.
STICHTING SMART HOMES	SMH	No	Overall funding does not exceed 375.000 €.
LAPPEENRANNAN TEKNILLINEN YLIOPISTO	LUT	No	Overall funding does not exceed 375.000 €.
SMARTEX S.R.L.	SMARTEX	No	Overall funding does not exceed 375.000 €.
STICHTING ST ANNA ZORGGROEP	ANNA	No	Overall funding does not exceed 375.000 €.