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Contributor(s):	All partners

List of Beneficiaries

No	Participant organisation name	Short name	Country	Project entry month	Project exit month
1	Consiglio Nazionale Delle Ricerche	CNR	IT	1	36
2	Università di Pisa	UNIPI	IT	1	36
3	TSB Real Time Location Systems SL	MYSPHERA	ES	1	36
4	AIT Austrian Institute of Technology GmbH	AIT	AT	1	36
5	Fundació per a la Universitat Oberta de Catalunya	UOC	ES	1	36
6	The Extracare Charitable Trust	Extra	UK	1	36
7	Imaginary Srl	IMA	IT	1	36
8	De Montfort University	DMU	UK	1	36
9	Age Platform Europe AISBL	AGE	BE	1	36
10	SI4LIFE – Scienza e impresa insieme per migliorare la qualità della vita scrl	SI4LIFE	IT	1	36
11	Accord Housing Association Ltd	Accord	UK	1	36

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1. PUBLISHABLE SUMMARY

1.1 Summary description of project context and objectives

The DOREMI Project context and Scientific and Technological objectives, for Period 1, were:

- Development of an unobtrusive monitoring environment keeping track of the daily activities of the elderly people at risk of malnutrition, sedentariness and cognitive decline according to the "active ageing lifestyle protocol"(MS1, M8) established by the specialist.

- Final Selection of the sensors (MS2, M9) according to parameters identified in the protocol.

- Preliminary data set collected from the selected sensors available for the data driven model (MS3, M12).

The Scientific and Technological objectives, for Period 2, have been:

- Development of a preliminary version of the WSN environment, of Smart environment for Context awareness and of gamified environment system (MS4, M18) with involvement of WP3, WP4 and WP5.

- Development of sensors prototypes ready for the validation activities, WSN environment and auto configuration system (MS5, M24) under WP3.

- Development of the social and gamified environment ready to be integrated in DOREMI system (MS7, M24) (WP5).

The DOREMI Project context and Scientific and Technological objectives of the first semester of period 3 have been:

- The full validation of DOREMI platform in living lab and its implementation for pilot sites (MS8, M28).

- The clinical trial carried out at UK pilot centers of Extracare and Accord (M27-30)

1.2 Work performed since the beginning of the project and the main results achieved so far

The work performed, in the first year project activities, was strategically directed to the achievement of the first three milestones of the project MS1 (M8), MS2 (M9) and MS3 (M12).

Considering the relevant dependency of the technical development work packages (WP3, WP4 and WP5) with the main scientific model and target user work package (WP2), the scientific and technical coordinators have agreed to follow a WP interaction approach based on an iterative instead of a sequential method.

The main result of this constructive interaction was the common definition and design, agreed by both clinical and technical partners, of the Active Ageing Lifestyle Protocol of the DOREMI project (WP2). The design of the DOREMI protocol and the selection of the main items from the various protocols taken from the literature, had taken in full consideration opportunities and constraints offered by the gamification environment and monitoring environment that will have to finally automate the process of monitoring and assessment of the target user daily improvements compared to the level of impairments registered at the baseline. Work in WP2 has foreseen three main phases:

1. Discussion and agreements on the main protocols to be selected and studied from the literature in the scientific areas of cognitive (main impairment), nutritional, physical activity, social interaction (from real life and virtual perspective). This work was reported in D2.1.

2. Planning and agreement on the DOREMI monitoring environment and the parameters, activities, behaviours and actions to be selected as main representative and useful to monitor the progress and improvements of the target subject. This work was reported in D2.2.

3. Organization and systematization of all the testes and procedures defined in D2.1 and D2.2 and the design of the entire validation process of DOREMI environment. This work was reported in a draft version of D2.3.

WP3 was focused on the development of WSN environment and the auto configuration system. These elements were developed gathering requirements in coordination with WP2 and WP4. In particular, in WP3 it was:

- selected most appropriate sensors and devices and started designing and development of sensors and devises foreseen in the project (bracelet) or integrated in commercial solutions (smart carpet).

- performed a data collection and retrieval layer necessary for data processing and interoperability with the smart environment.

- started the initial design and development of auto configuration system and the integration of sensors in WSN environment.

WP4 worked on the identification of computational learning tasks of Activity Recognition and its requirements investigating machine-learning solutions for both explorative and predictive data analysis.

In particular, WP4 has:

- contributed to the design of high-level DOREMI system architecture throughout a close integrated activity between clinical requirements and technical specifications.

- released a requirement analysis and a specification of the services implemented by the smart environment system, an analysis of the computational methodology adopted for the activity recognition and reasoning components.

- produced a summary of the guidelines for the collection of annotated training data in WP6.

Object of WP5 was the development of the overall gamified active ageing support environment for older users.

In particular, WP5 work was focused on:

- definition of gamified active ageing protocol

- collaboration with medical partners for identification of main structural elements of DOREMI protocol.

- design and development of the game-based environment.

- development of a preliminary set of cognitive games prototypes.

WP7 was focused in this first year to define the communication strategy of the project.

Main activities were:

- development of dissemination plan, with particular attention to the design and development of DOREMI website and portal useful for the on-line engagement of DOREMI stakeholders.

- development of exploitation plan focused on a market analysis to quantify the market segments of DOREMI solution.

- development of IPR strategy of the DOREMI consortium.

During the second year of project, the work was directed to the achievement of the three milestones of the project: MS4 (M18), MS5 (M24) and MS7 (M24).

The progress towards the achievement of these milestones passed through a devised and well-coordinated execution of tasks and sub-tasks under the relevant WPs, namely WP3, WP4 and WP5.

For period 2, WP2 activities were prolonged further on the planned closure (M12) with the main purpose of defining technical and methodological aspects of the Active Ageing Lifestyle Protocol: for this activity a continuous work of information exchange between medical and technical partners was required. The Active Ageing Lifestyle Protocol of the DOREMI project has reorganized and systematized all the tests and procedures described under WP2. For its fundamental role in DOREMI experimentation, Active Ageing Lifestyle Protocol required a deep work of analysis and resolution of three main points:

1. The choice of the most accurate test for measurement of Mild Cognitive Impairment (MCI).

2. The criteria and technical tools to be used to quantify Social Interaction through the DOREMI Gamified environment.

3. The design of the statistical evaluation process that will be applied on the collected data.

This work was described in D2.3; for reasons described above, the planned submission date (October 2014, M12), was delayed until March 2015 (M17).

WP3 was focused on the development of WSN environment and the auto configuration system. These elements were developed gathering requirements in coordination with WP2 and WP4. In particular, WP3 products were:

- DOREMI wristband: device which provides indoor location, step counter, full access to 3-axis accelerometer data and heart rate measurement. This device let to perform caloric consumption assessment, the activity recognition or the pattern detection.

- Smart carpet: a device for an easy and precise measurement of weight and balance.

- Environmental sensor network: a set of presence detector and door contact sensors installed to effectively assess the socialization aspects of the user when is at home.

- Indoor location network: a set of reception devices that enables precise indoor location and a communication infrastructure for the DOREMI wristband.

- DOREMI gateway: a central element to concentrate all the data coming from user's house and forwarding it to remote DOREMI servers.

- DOREMI middleware and integration layers: a software tool to connect all the data sources to a common communication platform and make available these data to all the DOREMI subsystems.

- Auto configuration system: an effective system to manage several DOREMI system working and the same time and a way to declare all the published data and make it accessible by other applications.

WP4 has worked on the identification of computational learning tasks of Activity Recognition and its requirements investigating machine-learning solutions for both explorative and predictive data analysis.

In particular, WP4 has:

- preprocessing, cleaning and segmentation of noisy streams of environmental and personal sensors within DOREMI middleware integration.

- exploratory data analysis to identify patterns of user habits from traces of indoor mobility.

- supervised short-term human activity recognition/estimation for estimation of parameters, such as calorimetric expenditures, balance skills and patterns of social indoor visits.

- aggregation and reasoning over activity recognition and games data across different time-scales to automatically assess compliance of the users with the DOREMI lifestyle protocol.

- visualization of the user parameters of interest for the DOREMI lifestyle protocol to the general practitioner through the Dashboard component.

Objective of WP5 was the development of the overall gamified active ageing support environment for older users.

In particular, WP5 work was focused on:

- final development of the game-based environment.

- development of final version of cognitive games prototypes.

- development of final version of social games prototypes.

- development of final version of exergame prototype.

The focus of the WP6 is the validation of the DOREMI system both at lab and pilot site. The main activities, performed during the second year of project were based on:

- collection of data produced by smart carpet functionalities for evaluation of balance assessment and validation of Activity Recognition models.

- collection of data produced by DOREMI wristband for caloric consumption assessment and first validation of Activity Recognition models.

- validation and testing sessions of game prototypes and gamified environment.

- pilot site preparation, with recruitment and enrolment of participants.

- pilot site preparation, with discussion of technical details for installation of DOREMI system.

- integration of components developed by different partners under WP3-WP4-WP5 and the validation of the context-awareness system at Living Lab (Valencia).

WP7 was focused in this one and a half year to define the communication strategy of the project.

Main activities were:

- development of the competitive analysis of the alternative products to DOREMI and understanding of market positioning for its components and whole solution.

- refinement of tools for dissemination activities.

- participation to events for dissemination and exploitation activities.

The work performed during the first six months of Period 3 project activities has been directed to the achievement of milestone MS8 (Month 28).

Considering the relevant dependency of WP6 with the technical development work packages (WP3, WP4 and WP5) the scientific and technical coordinators have agreed to follow a WP interaction approach based on an iterative instead of a sequential method.

WP4 worked on the completion of the system development, which has been integrated and tested both in isolation as well as integrated within the rest of the DOREMI system by M25 (Valencia integration meeting).

In particular, WP4 activity dealt with:

- preprocessing, cleaning and segmentation of noisy streams of environmental and personal sensors within DOREMI middleware integration;

- exploratory data analysis to identify patterns of user habits from traces of indoor mobility, allowing to detect alterations and anomalies in the user daily behavior, and other aggregated and statistical values of the DOREMI lifestyle protocol;

- supervised short-term human activity recognition/estimation from available temporal streams of sensor data, allowing automatic, un-obtrusive and population-targeted estimation of relevant user parameters, such as calorimetric expenditures, balance skills and patterns of social indoor visits, as part of the DOREMI lifestyle protocol;

- aggregation and reasoning over activity recognition and games data across different time-scales to automatically assess compliance of the users with the DOREMI lifestyle protocol and to implement its progression;

- visualization of the user parameters of interest for the DOREMI lifestyle protocol to the general practitioner through the Dashboard component.

The focus of the WP6 is the validation of the DOREMI system both at lab and pilot sites. The main activities, performed during this period were based on:

- collection of data regarding the activities of interest of elderly target groups, according to the requirements for activity recognition tasks (WP4), serious games (WP5) and sensors (WP3)

- pilot studies preparation activities conducted by all partners involved, both in UK and Italy

- integration and delivering of the WP3 components and deliver the WSN system

- integration and testing of WP5 components,

- integration and testing of WP4 components (Activity Recognition data pre-processing, Exploratory Data Analysis and Activity Recognition components)

- integration and testing of the reasoner and the dashboard components developed under WP4 and the final validation of the system according to the Doremi use cases.

- conduction of experimental studies to validate the Social and Gamified environment developed in the WP5.

- validation and refinement of the integrated system by means of a multicentre longitudinal case control study (UK sites)

Main activities in the first six months of period 3 of WP7 were focused on:

- update of exploitable results and the exploitation plan for the DOREMI components

- discussion on the distribution of IPR among partners.

- update of DOREMI impact assessment on Health Care system and society

- participation to events for dissemination and exploitation activities.

1.3 The expected final results and their potential impact and use (including the socio-economic impact and the wider societal implications of the project so far)

According to the prescription of the EIP AHA working group on the Action Plan A3: "Prevention and early diagnosis of frailty and functional decline, both physical and cognitive, in older people", applying ICT and e-health to services is expected to be effective in the prevention and treatment of

functional/cognitive decline, and to increase the independence and self-reliance of older people. This may result in better quality of life and a reduction in the use of health care services due to increased independent living.

DOREMI expected final result is a platform made of 3 modular building blocks. The modularity includes not only the possibility of a "combination" of all the three building blocks or only two of them (within the monitoring environment the building block n°2, will always have a pivotal and foundational role as explained in the appropriate paragraph), but also a possibility of combination and activation of selected services within each building block, depending on the market segment addressed, the budget availability of the buyer, or the main functional or behavioral aspect that the customer wants to monitor and improve (e.g. giving more relevance to physical activity and socialization or physical activity and diet, or any other possible combination).

DOREMI 'Building Blocks':

1. **Social and gamified environment**: Games whose primary purpose is not necessarily entertainment, but where the goal is to engage, train, motivate, educate users. Games are used to stimulate and encourage compliance with active ageing lifestyle 'protocols', which have been assigned by specialist. The motivational games for physical and social activity are associated to sensors (the monitoring environment) to track daily activities and collect relevant parameters for self-evaluation of lifestyle protocols and reports for specialist. The cognitive games are not associated to any sensor and the score level of the user measures the performance. The diet games are associated to a diet application reported in the monitoring environment (provided by the third party software producer METEDA, together with the DOREMI consortium now pursuing an exploitation alliance). All the games will run in specific tablet applications to increase the level of usability, user experience and interaction thanks to the touch screen.

2. **Monitoring Environment.** The monitoring environment is made up of environmental, wearable sensors, a diet app, a smart carpet aimed at collecting, in the less psychologically and physically intrusive manner in order to respect to the privacy and self-esteem of the subject monitored, either raw data and more elaborated information from a set of sensors (e.g. Internet of Things paradigm) or from applications running on the tablet (Internet of People paradigm), where the user is reminded to enter the data.

3. **Context-aware smart system.** The context aware smart system is made up by i) Human Activity Recognition (HAR) models needed to recognize and contextualize the user's daily activities monitored by the sensor and their relevance for the DOREMI protocols ii) a reasoning system that aggregates the output from the serious games and activity recognition components, and to predict the most appropriate lifestyle protocol given the specificity of the environment and of the user.

The exploitation of DOREMI will first target Italy, Spain and the UK because these are the countries were the Consortium has more partners and contacts. Italy and Spain belong to the Mediterranean cluster and are the biggest countries in this group, with well-established national and regional wellbeing systems that could facilitate the penetration of the DOREMI solution. Moreover, the need to move forward from the economic crisis has forced especially countries from this cluster to introduce structural changes in the public welfare systems that should give more power to the local communities, closer to the patients' needs and introduce new model of care services based on a public-private partnership that, preserving the basic structure of the national/regional health care systems, should provide an interesting opportunity to implement a new model of long-term care in a mid-term perspective.

UK belongs to the same cluster of the Nordic countries and the Netherlands. This cluster has about 15 millions of individuals aged 65+ years, only considering the most relevant countries that belong to this type of health systems such as UK, The Netherlands, Denmark and Finland. Also for this market the

higher aged persons have a low level of HLY (Healthy Life Years), a significant level of media literacy and a large part of them living alone.

If the appropriate partners are found DOREMI could also be commercialized in other European countries, such as the Netherlands, the Nordic countries and the countries with a continental health care system. From this last group, the most promising markets would be Germany, France and Belgium. Together they represent more that 30% of the overall European population, with about 30 million individuals aged 65+ that constitutes the biggest market for DOREMI products, especially if it is considered that the higher aged population in these countries has a low level of HLY, a significant degree of media literacy and a high percentage living alone.

1.4   The address of the project public website

http://www.doremi-fp7.eu

2. CORE OF THE REPORT FOR THE PERIOD: PROJECT OBJECTIVES, WORK PROGRESS AND ACHIEVEMENTS, PROJECT MANAGEMENT

2.1 Project objectives for the period

The project objectives achieved in the period are reported below and extensively described at WP level in section 2.3.

1. Data analysis of physical activity, balance assessment and indoor socialization automatic recognition, its integration in reasoning system and visualization of user parameters trough the Dashboard component

2. Integration of WP3, WP4 and WP5 components and testing of reasoner and dashboard

3. Data collection in elderly participants involved in UK trial

4. Validation of Social and Gamified environment

5. Update of exploitable results and exploitation plan for the DOREMI components, with competitive analysis for market positioning

2.2 Summary of recommendations from previous reviews (if any)

The second review meeting took place in Brussels on 16th December 2015. Recommendations concerning future work included:

R1 - Since the project trial has not started yet, it is difficult to anticipate that everything will work smoothly. Therefore, an interim monitoring stage just after the completion of the installation for trial is recommended for the end of February. This will ensure that good progress will be reported in the final stage of the project.

R2 - Set reasonable objectives: for example can the system have an impact on obesity over a 60 days trial with 2 weeks introduction? Make sure that all KPI take into account the feasibility within limited time frame.

R3 - Consortium has to make a clear IPR as soon as possible. Patenting the whole system or some parts of it is important. Maybe create a flash-demo of the whole DOREMI system. Study relevant EU projects e.g. eWALL.

R4 - Be more proactive to design the exploitation strategy, which is extremely weak for the moment by
1. Integrating future partners (senior residence, insurance company…), which will help in the development of the platform or by considering global and individual exploitation. As well as help assess needed KPI to develop a commercial strategy.
2. Assessing what would be needed in terms of additional work and resources beyond completion of DOREMI to launch the product in the market: how far will be DOREMI at the end of the project from a marketable offer? What would we further development and commercial efforts needed?
3. Assess to what extend DOREMI will be able to cover the needs of evolving MCI on medium and long term basis (1 to 3 years) beyond the 2 months trial. This long-term perspective will be key for future commercialization.

R5 - An exploitation plan of a basic system with additional service and product packages should be considered. Also create an explicit exploitation plan of for a) the bracelet and b) the gamified environment.

R6 - Reconsider resources allocated for Y3 exploitation plan: as 3 persons/month have been spent, 9.1 person/month are remaining to develop the assessment of the Impact of DOREMI output on Health care system of EU27. This task will only be started once results from trial are analyzed and will not

need 9.1 person month. Reallocating resources to the development of a proper exploitation plan would be more accurate.

The Consortium took into account and addressed all recommendations. In particular:

R1 A checkpoint for the completion of installation for the trial was done at Shenley Wood Village (February, 26th, 2016), where EXTRACARE has delivered the DOREMI Intervention

R2 In accordance with KPIs and final evaluation tests described in D2.2 and D2.3 and supported by preliminary data of UK trial, a list of objectives realistically achievable within the time frame of the project span will be defined in May 2016. Furthermore, to make statistical analysis realistic within the limited sample size of enrolled subjects, very few end-points will be selected within the four areas of intervention, namely cognitive, physical, social and nutritional.

R3 The methodology to handle IPR issues was defined in the update of d7.3.2. A list of exploitable results (ER) was prepared and a chair assigned to each of them. Partners engaged in discussions on the distribution of IPR for each ER and this was finally agreed during the technical meeting in Barcelona (21-22 April 2016). ERs were divided between commercially and non-commercially exploitable. Also, it was agreed that the chair would take care of the exploitation plan of the corresponding ER. With regards to the IPR of the whole solution different options were discussed in the meeting: distribution according to the budget or PM reported in the DoW, assessing the importance of each individual ER in generating IPR, etc. Finally, it was agreed that the Consortium would first decide on the strategy for the exploitation for the whole solution and then, according to this, would decide on how to share IPR.

UOC leaded the process of discussing IPR issues in close collaboration with the Consortium coordinator, CNR-IFC.

On the other hand, AGE has been designing a video for the whole DOREMI solution, which will be soon finalised.

Related EU projects (eWALL, AALIANCE2, ICTechnolage) will be studied when designing the final exploitation plan for DOREMI.

R4

Point 1. As agreed in the Barcelona technical meeting, the Consortium will contact relevant stakeholders in order to investigate their interest in DOREMI solution. UOC will design the guidelines for the questionnaires and partners will distribute the questionnaires among their contacts.

UOC has prepared questions related to exploitation (willingness to use, willingness to pay, preferred pricing model, etc.) to be asked to pilot participants. CNR-IFC and Mysphera provided their inputs to improve the questionnaires. Accord and Extracare have already contacted some UK pilot participants.

Furthermore, in D7.3.2 some KPI related to exploitation were described. These will be constructed using information from the pilots, partners and interviews with stakeholders.

Point 2. The current exploitation plan included in d7.3.2 already outlines some of the changes that will be needed after the completion of DOREMI in order to have marketable products. This will be further defined after the pilots.

During the Barcelona technical meeting, partners agreed that the solution will not be ready to be commercialised just after the completion of DOREMI.

Point 3. The results of the pilots will provide information on the effectiveness of DOREMI and how it can address the needs of elderly with evolving MCI on medium and long term basis. However, some explanation is already provided in D7.3.2.

R5 D7.3.2 included a preliminary exploitation plan for the bracelet and the gamified environment. This will be updated and further defined in the following months. As agreed in Barcelona, the chairs will be in charge of this, namely Mysphera and IMA.

D7.3.2 also included a preliminary exploitation plan for the whole solution. During the Barcelona technical meeting, different options for exploitation were discussed, including both the option of commercialising the whole solution and more simplified versions. All these options will be assessed. Among the options to be considered for the pricing mechanisms, one will the Premium Model. This implies offering a basic version of the product for a cheaper price and to provide additional elements and features for an extra fee.

R6 In accordance with AGE, a re-distribution of their PMs between IMA, MYSPHERA, CNR-IFC and UOC was proposed and approved. Details are provided in the management section 2.4.

2.3 Work progress and achievements during the period

In the section below a detailed description of work progress and achievements by work package is provided.

2.3.1 WP1 Project Coordination and Management (Leader CNR-IFC)

Please see section 2.4

2.3.2 WP2 End user profile and Active Ageing Lifestyle protocol development (Leader CNR-IFC)

Completed

2.3.3 WP3 Development of WSN environment and auto configuration system (Leader MYSPHERA)

Completed

2.3.4 WP4 Development of a Smart Environment for Context Awareness (Leader UNIPI)

The main goal of WP4 is to define and implement the DOREMI Context Awareness and Activity Recognition system. During the reference period, WP4 partners have completed the major development efforts on the system, which has been integrated and tested both in isolation as well as integrated within the rest of the DOREMI system by M25 (Valencia integration meeting). The Smart Environment for Context Awareness system has been successfully installed for pilot studies in M26 and it is currently in operation in the aforementioned pilots, providing functionalities for

- preprocessing, cleaning and segmentation of noisy streams of environmental and personal sensors within DOREMI middleware integration (Task4.2);

- exploratory data analysis to identify patterns of user habits from traces of indoor mobility, allowing to detect alterations and anomalies in the user daily behavior, and other aggregated and statistical values of the DOREMI lifestyle protocol (Task4.2);

- supervised short-term human activity recognition/estimation from available temporal streams of sensor data, allowing automatic, un-obtrusive and population-targeted estimation of relevant user parameters, such as calorimetric expenditures, balance skills and patterns of social indoor visits, as part of the DOREMI lifestyle protocol (Task4.3);

- aggregation and reasoning over activity recognition and games data across different time-scales to automatically assess compliance of the users with the DOREMI lifestyle protocol and to implement its progression (Task4.4);

- visualization of the user parameters of interest for the DOREMI lifestyle protocol to the general practitioner through the Dashboard component (Task4.4).

The software implementing the Context Awareness and Activity Recognition system has been released at M30 as part of deliverable D4.2, together with an un-to-date architectural view of the system as well as a description of the implementation level details of the developed software (system deployment information, programming libraries, interfaces and design choices).

Deliverable 4.2 also includes a revised description of the preprocessing, activity recognition and Reasoning tasks that has been produced as part of T4.1 activities.

▪ Objectives

This WP investigates statistical analysis based solutions for explorative data analysis tasks (Task 4.2) and machine-learning solutions for predictive data analysis (Task 4.3). Explorative approaches typically rely on unsupervised learning models and are useful both as a preliminary pre-processing step, e.g. to filter, segment and cluster relevant sensor data, as well to discover some informative grouping of the sensor data, when little supervised expert information exists. Predictive approaches, on the other hand, usually rely on supervised learning models, and are tailored to acquire robust predictive models of a process for which there is insufficient background knowledge to set up a procedural algorithmic solution, but a sufficient set of real-life supervised example data is available. These latter models are used, in Task 4.3, to learn a short-term activity recognition/classification system from expert labelled data that supports a higher level reasoning service on long-term user data in Task 4.4.

▪ Summary of progress towards objectives and details for each task

Task 4.1: Data preparation and models assessment specification (UNIPI) – M1-M8/M20-M30

The final part of Task 4.1 (M25-M30) has been successfully completed. In the reference period, the Task 4.1 activities dealt with the revision of the requirements and the specification of the "Smart Environment for Context Awareness" system, following changes in the clinical and technical requirements of the DOREMI pilot studies. The outcomes of these activities are documented in deliverable D4.2, released jointly with this semester report at M30. Further, Task 4.1 dealt with the design and coordination of the process for selecting the most appropriate computational learning methodologies/configurations to implement the DOREMI Activity Recognition components: the results of this experimental validation performed on data collected by WP6 will be documented in Deliverable D4.3 at M33.

The key outcomes of Task 4.1 during the period of interest are

- A revision of the requirements and specifications for the functionalities developed within WP4, according to the variations based on clinical expert requests (coordinated by CNR-IFC), resulting in new data-flow diagrams describing the information consumed and produced by each of the component of the "Smart Environment for Context Awareness" system. The outcome of this revision process is documented in Section 4.1 of Deliverable D4.2.

- The identification of most suitable computational methodologies/configurations to be deployed on the DOREMI pilots based on an experimental validation exploiting WP6 data. The outcome of this process will be documented in detail in D4.3 at M33; however, a summary

of the performed experimental validation to the aim of model selection is also anticipated in D4.2, i.e. at the end of Sections 5.2 (explorative activity recognition models), 5.3 (supervised activity recognition models) and 5.4 (Reasoner)

- A revision of the data format, interfaces and synchronization mechanisms between WP4 components as well as with WP3 components. This specific aspect has led to the final consolidated architecture of the "Smart Environment for Context Awareness" system, which is documented in Section 4 of D4.2. Slight deviations from the original design in D4.1 are discussed in detail in Section 4.1.1.

UNIPI has lead Task 4.1 activities, coordinating requirements revision and refinement of the WP4 system design and has led the writing of Deliverable D4.2.

Task 4.2: Activity recognition: explorative data analysis (CNR ISTI) – M6-M33

During the reference period, CNR-ISTI consolidated and finalized the modules related to the pre-processing and Explorative Data Analysis (EDA), supported by the integration testing camp held at the Mysphera living lab in November 2015 (M25). During this event, the fully developed pre-processing components were tuned and tested to validate the produced results.

In particular, the pre-processing phase regarding the data coming from the wristband (heartbeat and steps performed), the balance board, and the environmental sensors have been segmented (in order to produce meaningful sequences of data to be processed by the HAR modules), normalized in the time domain (data present variable frequencies and offsets), processed to extract pertinent features (e.g. mean, median, standard deviation), and augmented with contextual information (e.g. daily weight, age, sex).

Concerning the explorative data analysis, the following user statistics are extracted:
- *daily weight* - the daily weight trace of the balance board is filtered through a threshold (10kg) in order to remove the possible samples clearly not related to a human body mass. After that, a series of statistical operation are performed in order to obtain the average weight exerted by the user while performing activities on the board
- *daily heartrate* - basic statistical data is computed from the heartrate traces obtained from the wristband: daily minimum/maximum and hourly average bpm, together with an alert whenever the rate exceeds a given threshold that is individually set by the medical team for each user
- *daily indoor time statistics* - the user rooms occupation time is computed thanks to the indoor localization system by processing the samples produced by the beacons inside the apartment. These samples allow to understand when a user change room or goes inside/ouside of the house. The aggregated daily indoor time is computed as well.
- *daily steps* - The daily user steps are computed by using the counter provided by the wristband
- *daily outdoor time and walked distance* - The daily outdoor time spent and the walked distance are computed by processing the GPS traces. Whenever the GPS is active means the user is outside his/her home. This information is used to compute the time span during which the user is outdoor. For estimating the walked distance, further processing is required, such as removing all the periods in which the user is still but the gps data is oscillating due to localization impairments or moving by bike/car.
- *daily outdoor socialization* - Exploiting the gps traces of multiple users, and combining the time and space information, the events representing an encounter between two or more users, together with its time duration is detected on a daily basis

The developed pre-processing and EDA modules have been highly optimized for multi-threading execution, exploiting the multi-core architecture of the runtime system. Automatic overnight data processing has been setup through a system scheduled job. Detailed logging and managing strategy allow to monitor and quickly react in case of technical issues.

Task 4.3: Activity recognition: predictive machine learning approach (UNIPI) – M6-M33

The activities of Task 4.3 during M25-M30 have focused on the experimental assessment, the finalization, the final testing and the release of the supervised Human Activity Recognition (HAR) system as well as on its deployment within the integrated DOREMI platform as part of the pilot experiments.

UNIPI has implemented the HAR system through a Java API, referred to as the *doremi.har* API, comprising four packages and whose implementation-level details and design choices are documented in Section 5.2 of Deliverable D4.2. The developed software has now been released and is available in the WP4 software repository as described in Section 3.2.1 of D4.2.

During the reference period, UNIPI has put into operation the *doremi.har* API to support the DOREMI pilot experiments in the UK sites. In particular, the HAR system has been integrated with the other components of the DOREMI platform that include both the pre-processing and Reasoning components developed respectively as part of Task 4.2 and 4.4, as well as the Middleware system responsible for sensor data gathering and storage developed by WP3. Since M25, UNIPI has been collaborating with other WP3 and WP4 partners to the deployment and maintenance of the integrated system at the AIT computing facilities.

This process has also involved the deepening and final refining of the specification of the supervised computational learning tasks under consideration. Specifically, by interacting with members of CNR ISTI, MYSPHERA and CNR IFC, UNIPI has extended the *doremi.har* API in order to include estimations (by means of ad-hoc equations) of the physical activity level (in terms of Kcal consumption) also during indoor and outdoor daily life activities that are not part of the DOREMI exercises protocol, providing an integrated system for daily estimation.

In addition to HAR system development, Task 4.3 has progressed with data analysis and model assessment activities to identify the best performing learning model /configuration for each of the activity recognition tasks. The resulting comparative experimental analysis will be integrated with the preliminary results from the UK pilots and released as part of D4.3 in M33.

In addition the configuration and feature design, UNIPI has conducted thorough process of model selection among the pool of candidate computational methodologies for supervised activity recognition, comprising different forms of time-delay and recurrent neural network models based on the common characteristics of the considered supervised computational tasks, including the models discussed in D4.1§5.2, and making use of the real-world data gathered in the DOREMI laboratory sites, as part of WP6 activities. Although the results of this experimental analysis will be released as part of the D4.3, it is possible to anticipate that as a general result of such process the approaches within the Reservoir Computing paradigm resulted in the most suitable methods for the DOREMI purposes.

In particular, for what concerns the "Balance Assessment" task, the experimental analysis involved various aspects of task design, considering different types of input data normalization, rescaling, the use of different statistical features and clinical data in input. Moreover, different aspects of learning models design has been taken into consideration, showing the effective advantage in terms of generalization performance of the adoption of a weight sharing technique. Experimental results also allowed us to properly select exercise #10 of the BBS test as the exercise to be performed by DOREMI patient for balance assessment. Overall, the achieved results showed an excellent predictive performance, which is also solid with respect to clinical literature. Finally, the experimental assessment process on this task allowed us to develop an automatic, easy-to-use, unobtrusive and safe system for BBS score estimation from the temporal streams of measurements recorded during the patient's execution of a simple BBS exercise on top of a Nintendo Wii balance board.

Concerning the "Physical Activity Level" task, the experimental analysis resulted in a successful validation of the proposed automatic system for estimating calories consumption from heart rate (HR) measurements. In particular, such analysis has taken into consideration various aspects of task design,

including different sources of heart rate data streams used for estimating the caloric consumption, the frequency of input data sampling as well as the normalization and smoothing of training data. The performance results achieved on this task are very good, and compare extremely well with respect to both literature and commercial solutions. The thorough comparative experimental assessment on this task has been also of a great value in the process of validation and refinement of the physical devices for heart rate monitoring developed by WP3.

Regarding the "Person meeting the user at home" task, the experimental analysis involved, among the others, different configurations of the sensors deployment setting (within the limits of the real deployment of the DOREMI sensors setting), different patterns of guests visiting the user as well as more challenging situations pertaining to negative cases, showing a very good predictive performance in all the considered cases by adopting a step-by-step approach. The experimental assessment on this task resulted in a successful validation of the proposed automatic system for detecting the events of guests entering or leaving the user's house, thereby representing a useful indicator of social inclusion within the DOREMI setting.

Finally, refinement of HAR deployment has been conducted during the Valencia integration tests and the UK pilot according to the Task 4.1 results to include variations on protocols and installation issues. These actions allowed us to provide into the HAR system, for instance, news bounds on range of admissible data and specialized trial protocols and schedules (e.g. for the balance assessment task).

During the reference period, it has been held a series of meetings of WP4 coordination team with CNR IFC and ISTI, which have been focused on defining the hardware and software setup of DOREMI pilot sites (WP6, T6.4) (December 1st, 2015, Pisa) as well as on discussing the preliminary results and findings of activity recognition analysis on the experimental training data (February 17th, 2016, Pisa).

Task 4.4: Reasoning system and Personalization (AIT) – M10-M33

During the period of interest we implemented the data model specified, implemented all defined and requested reasoning rules and implemented the dashboard which serves as the basic interface to the experts. The dashboard has been implemented as defined and also been adapted depending on end-user request and requests made during the trials/pilots.

We implemented the reasoning rules and visualization for the defined categories medical, cognitive and social domain.

Additionally the implementation and the connection with the third party software Metadieta has been completed.

The reasoning system provides decision support for clinical experts and psychologists in the area of exercise progression, cognitive game progression, detecting missing data and exercise compliance based on both: rule-based and statistical approaches. The reasoning system can be personalized by clinical experts (using the dashboard) through setting individual parameters. (e.g. maximum heart rate during exercising).

CNR-IFC has worked at definition of specific rules for progression of Physical Activity and adherence to diet, data detection and compliance to DOREMI protocols (Skype call with AIT on November 03rd, Vienna Plenary meeting, Skype call on December 10th 2015) as also to definition and set-up of clinical dashboard.

▪ Significant results of WP4

WP4 has developed, integrated, tested and ultimately deployed a Smart Environment for Context Awareness system that is currently in use for the UK pilots. The developed system provides an integrated solution for patient activity monitoring and lifestyle protocol enforcement and control; for the automated assessment of physical, social and dietary skills and behaviours; for the visualization of

aggregated statistics on user behaviour. The system has been operating and providing such services throughout the pilot experiments since M26.

As result of the Task 4.2 activities, the complete source code produced is released under a completely free software licence (Apache 2.0) and hosted on a public repository, available for scientific research activities and future usage.

The preliminary results regarding the outdoor and indoor socialization events, obtained by the application of EDA techniques (Task 4.2) together with the supervised modules produced in the Task 4.3, have been submitted to an international conference on Intelligent Environments [4].

As part of Task 4.3, UNIPI has completed the deployment of the supervised activity recognition system which has been released as a JAVA API as part of Deliverable D4.2. Such system, based on novel intelligent models, allows the automated, un-obtrusive assessment and monitoring of personal, daily activity and clinical/physiological parameters through short-term estimations that are specifically targeted to the elderly population and have been experimentally validated on real world data.

In particular, supervised machine learning approaches fed by sensor streams have been developed and experimentally validated on real-world data for the analysis of Balance Assessment, Physical Activity Expenditure and Socialization Assessment.

The UNIPI team has brought forward the joint work, with CNR IFC and CNR ISTI, on automated Berg Balance Scale assessment using sensor information from the Wii balance board. The data gathered in earlier phases of the project has been used to develop and train the activity recognition module for automatically computing the Berg Balance Scale score that is currently deployed for the UK pilot phase. A work [2] that discusses the experimental analysis of RC learning models on balance assessment, preliminary presented in [1], has been submitted for publication in the Lecture Notes in Artificial Intelligence special volume containing a selection of contributions presented at the AALTD 2015 conference, co-located with ECML-PKDD 2015 and held in Porto on 7-11 September 2015. Furthermore, UNIPI and the involved project partners have are preparing a journal paper [3] to disseminate a complete in-depth analysis of the scientific results of this part of WP4 work.

Additionally, UNIPI, CNR ISTI, CNR IFC and MYSPHERA have submitted a conference paper [4] discussing the use of exploratory and predictive activity recognition approaches to the automated assessment of socialization-related events, both indoor and outdoor, in elderly people.

A journal paper on a preliminary experimental assessment of learning models on human activity recognition benchmark data (developed in the early phase of the DOREMI project) have been published in the period of interest [5].

As part of Task 4.4, the final version of the DOREMI dashboard has been deployed. The first phase of the trial has been carried out in the United Kingdom. From February 2016 to April 2016 16 participants collected more than 349,000 data items in the area of physical, cognitive, diet-related and the social domain. Based on the data models in these areas 229 unique data types were defined. Throughout the trial the dashboard was supervised by clinical specialists. A total of 28 different visualizations were available to the specialists providing an insight into the performance of each participant.

The final version of the DOREMI reasoning system has been deployed and was applied from February 2016 to April 2016. A total of 7,758 reasoner events have been fired during this period. Reasoning rules included personalized training plans for physical exercising, automatic setting of difficulty of cognitive games, reminders and alarms if data was out of certain thresholds or data was missing. Reasoner events were presented to specialists supervising the trial on the dashboard.

AIT has also provided the server infrastructure for running the trials. Beyond two virtual machines, a server for collection and analysis of the activity data in a mongo database has been set up and

maintained. Data safety and security has a strong focus and privacy issues have been ensured by a very strict user access and data connection policies.

AIT's HOMER system has been extended by an interface to the KIOLA platform and the ability to integrate the activity recognition directly instead of the current distributed architecture which will have an impact on future exploitation activities.

[1] C. Gallicchio, A. Micheli, L. Pedrelli, F. Vozzi, O. Parodi, "Preliminary Experimental Analysis of Reservoir Computing Approach for Balance Assessment", Proceedings of the 1st International Workshop on Advanced Analytics and Learning on Temporal Data co-located with The European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML PKDD 2015), Porto, Portugal, September 11, 2015, CEUR Workshop Proceedings, vol. 1425, pages. 57-62, 2015.

[2] C. Gallicchio, A. Micheli, L. Pedrelli, L. Fortunati, F. Vozzi, O. Parodi, "A Reservoir Computing Approach for Balance Assessment", Submitted for publication on a special volume of Lecture Notes in Artificial Intelligence, 2016.

[3] D. Bacciu, S. Chessa, C. Gallicchio, A. Micheli, L. Pedrelli, L Fortunati, F. Palumbo, E. Ferro, F. Vozzi, O. Parodi, "A Learning System for Automatic Berg Balance Scale Score Estimation", In preparation, 2016.

[4] D. Bacciu, S. Chessa, E. Ferro, L. Fortunati, C. Gallicchio, D. La Rosa, M. Llorente, A. Micheli, F. Palumbo, O. Parodi, A. Valenti, F. Vozzi, "Detecting Socialization Events in Ageing People: the Experience of the DOREMI Project", Submitted to the 12th International Conference on Intelligent Environments (IE'16), 2016.

[5] F. Palumbo, C. Gallicchio, R. Pucci and A. Micheli, "Human activity recognition using multisensor data fusion based on Reservoir Computing", Journal of Ambient Intelligence and Smart Environments, vol. 8, no. 2, pp. 87-107, IOS Press, Published 15 March 2016, DOI 10.3233/AIS-160372

- Deviations from Annex I and their impact on other tasks as well as on available resources and planning (if applicable)

Not applicable

- Reasons for failing to achieve critical objectives and/or not being on schedule and explain the impact on other tasks as well as on available resources and planning (if applicable)

- Not applicable

- Explain deviations (if any) between actual and planned person-months (per beneficiary)

- Not applicable

- Corrective actions

- Not applicable

2.3.5 WP5 Development of Social and gamified environment (Leader

Completed

2.3.6 WP6 Validation driven system integration at lab and pilot site (Leader SI4LIFE)

WP6 has the main aim to validate the driven system integration both at lab and pilot site. The activities will permit a progressive integration and validation of the sensors developed in WP3, the serious games in WP5 and components developed in WP4. The data collected have been annotated using data base/datasets during the lab activities according to the ground truth.

Task 6.1 (M14-27) includes two sections of activities: (1) collection of data regarding the activities of interest of elderly target groups. according to the requirements for activity recognition tasks developed in WP4 and by exploiting serious games in WP5 and the sensors developed in WP3 (2) pilot studies preparation activities conducted by pilot partners in UK and Italy.

Task 6.2 (M18-25) activities have the aim to integrate WSN and Context aware system and validate in the CIAMI living lab in Spain. The activities have been divided and conducted following a three-phased plan, including (1) integration and delivering of the WP3 components and deliver the WSN system (2) integration and testing of WP5 components, and part of WP4 components (Activity Recognition data pre-processing, Exploratory Data Analysis and Activity Recognition components) (3) the integration and testing of the reasoner and the dashboard components developed under WP4 and the final validation of the system according to the Doremi use cases.

Task 6.3 (M20-30) activities include the conduction of experimental studies to validate the Social and Gamified environment developed in the WP5. The experiments will involve older adults monitoring behaviors and engagement of participants. During these experiments information about the behavior style and behavioral change will be collected.

During Task 6.4 take place the validation and the refinement of the integrated system by means of a multicentre longitudinal case control study. In the three enrolling centres (SI4life, Extracare and Accord) around 40 subjects will be involved according to the inclusion and exclusion criteria defined in D2.3. All the collected data will be organized in a database suitable for statistical analysis. During the study, data collection of parameters related with cardiovascular performance has been performed, as well as cognitive abilities, social functioning, nutrition and physical activities have been collected, to test the efficacy and the impact of the DOREMI Active and Healthy Protocol.

- Objectives

  - The collection of annotated data base/datasets during the lab activities needed by WP4 to sustain and improve the quality level of the activity recognition and behavioural analysis system development.

  - Perform lab validation of the WSN and smart environment enabling their integration and preparing to include the data provided by the validated serious games

  - A virtual lab validation of the serious games performed by exploiting the community of users involved though the dissemination activities

  - Set up the pilot site in Italy and UK for proof the concept of the fully integrated system in a real scenario of use

▪ Summary of progress towards objectives and details for each task

Task 6.1 Data Collection and pilot site preparation (CNR IFC) – M14-M27

The activities of the task include 2 distinct sections: data collection and pilot site preparation that has been conducted in parallel. Due to the decision to split the timing of the pilot studies, Italy and UK, to permit to enlarge the duration of the intervention phase and collect more data from a real environment respect to the one planned in the DoW, the recruitment activities of the Italian pilot goes on after the M27. All the other activities of the task were concluded as planned at M27.

The first section details the activity performed in Task T6.1 within the month 30 regarding preliminary data collection prior to the pilot phase. The data collected within Task 6.1 is needed for the training and performance assessment phases of the learning models for activity recognition. In this concern, the primary goal of data collection is to gather a large and representative set of data samples and expert-annotated ground-truth data (from sensors) for each different user activity and behaviour of interest, under clinician control. In particular, a representative set of data samples have been collected for each computational task (detailed in D4.1) and regarding accessibility and usability of the social and gamified environment and of the serious games developed in the WP5 in parallel with the development process and the refinement of the serious games.

CNR-IFC has dedicated its effort in this task to two main activities: the Physical Activity (PA) data collection for PA environment and pilot site preparation.

For the first, the work has foreseen a strong integration and collaboration with UNIPI and CNR ISTI. During the reference period, a deep analysis of data collected during previous PA test sessions was performed in order to quantify the levels of physical activity, in terms of caloric consumption, during the execution of the DOREMI physical activity protocol and develop the PA activity recognition system for PA. In particular, caloric consumption was correlated to heart rate evaluated trough bracelets, both commercial and MYSPHERA one. Ground-truth data consist, for metabolic rate, in a series of measurements (calories per minute) over the execution of each exercise collected using a professional metabolic measurement system (COSMED K5); for heart rate, a GARMIN chest band was used as gold standard. The experimental setting and data analysis were presented in D6.3.

For pilot site preparation, CNR-IFC has collaborated with SI4LIFE on definition of final versions of both Case Report Form (CRF) and its electronic version (eCRF) to permit uniformity in the pilot sites studies data collection. CNR-IFC have refined the design of the baseline and training phase, based on user requirements collected by pilot sites partners. CNR-IFC has prepared all the material that was used during the training phase, including written guidance on physical activity and correct dietary habit, for control and treated groups. CNR-IFC also wrote the manual for users on Metadieta application, which was provided to all participants at UK trial.

CNR-IFC has organized meetings with CNR-ISTI, UNIPI (01/12/2015, 17/02/2016, Pisa) and SI4LIFE (23/02/2016, Pisa) for data analysis and pilot site preparation.

Data pertaining to Socialization assessment has been collected following the specification of the computational learning task "Person meeting the user at home" described in D4.1. During the period from M24 to M25 2 distinct focus group rounds have been conducted: one in UK and one in Italy. Despite the end of the WP5 (M24), the data collected about accessibility and usability have been included in the last refinement of the gamified environment and serious games, to have an improved version of serious games and gamified environment before the starting date of the pilot studies (M27). The details of the data collection processes, methodologies and results during this period of activities are detailed in the Deliverable 6.3 Annotated Data available and easy accessible (M27). In November several minor data collection activities were performed both by MYSPHERA and CNR-ISTI to collect data in order to validate several sensor data aggregation tasks being developed by CNR-ISTI. Most of these activities were performed during the system integration event held in Valencia in the second and

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third week of November 2015. Data was collected using the tools and system developed by WP3 during the previous months, directly outputting the data on the sensor database. The list of aggregation to be validated and for which data was required is: Weight Evaluator; Heart Rate Aggregator; Heart Rate Activity Alert; Steps Aggregator; Outdoor daily activity evaluator; Outdoor socialization evaluator; Indoor time aggregation; Room type aggregation.

During the Task 6.1 DMU, IMA, ACCORD, EXTRACARE and SI4LIFE have performed testing sessions of the games prototypes and the gamified environment. In the reference period SI4LIFE and IMA have been conducted one final focus group data collection involving older adults people to verify the final accessibility and usability level of the serious games and of the Social and Gamified Environment The results of this last data collection are included in the D6.3. Based on data collected and feedback from users, several modifications have been implemented in the refinement of the Doremi Social and Gamified environment and games.

SI4LIFE have designed the Case Report Form (CRF) and eCRF to permit uniformity in the pilot sites studies data collection; these formats have been designed with the contribution of all the clinical partners and shared before the starting date of the UK pilot study. DMU, Accord, Extracare, CNR IFC and SI4life have refined the design of the training phase, based on user requirements collected by pilot sites partners and on contribution of all technical and clinical partners.

SI4LIFE with all technical and clinical parts collaborated to design and deliver three distinct training activities to permit to start the activities of the pilot studies, that include (1) training design and material for end users (2) training design and delivery of pilot partner's clinical staff (3) training design, materials and delivery for pilot partner's technical staff.

Regarding the training of the end users have been conducted the following activities (1.a) design of the training intervention (1.b) design of the training materials (1.c) design of the user's manuals. (1.a)UK pilot partners, EXTRACARE and Accord, coordinated by DMU and with the collaboration of SI4life and CNR IFC worked to define in detail the training intervention for end users. In parallel with the design of the training intervention DMU coordinated the development of the training materials (1.b) that have been used in UK and will be used in Italy. SI4LIFE coordinated the activities of the developments of the users manuals and guidelines (1.c); in particular to permit to the subject to be fully supported and independent in daily living of the intervention have been designed Guidelines for Active and Healthy Aging for each of the interventions sections, including Physical Health, Nutrition, Cognitive and Social activities. The clinical partners, SI4LIFE, CNR-IFC, Accord, Extracare and DMU collaborated to design and deliver 3 different, Cognitive and Social, Physical and Nutrition Active and Healthy Aging Lifestyle Guidelines that have been designed to permit to the subject assigned to the control group to receive benefits from the study, as requested by the Ethical Committee. Moreover SI4LIFE coordinated the design and delivery of a User Manual for the technical components of the DOREMI intervention. CNR-IFC wrote the manual for users on Metadieta application, which was provided to all participants at UK trial during the baseline phase.

The user manuals have been reviewed by clinical staff of SI4life to be accessible and usable for the DOREMI target users. These documents have been concluded in M26 and have been delivered during the training phase.

Regarding the training of pilot partner's clinical staff (2), SI4LIFE have conducted a knowledge skills analysis to map the competencies in administering tests that will be conducted during the Sample selection, Baseline and Post intervention Phase of the pilot studies of the pilot sites partner's staff. CNR IFC conducted training activities for the IT and UK pilot partner's staff, to fill the gap.

MYSPHERA contributed to train the technical staff of the pilot partners in UK (M26) and in Italy (M29). During the training test analysis has been conducted to verify the correct installation and fully functioning of one DOREMI fully integrated unit. MYPSHERA and CNR ISTI designed a detailed Manual for the Installation of the DOREMI kit. A first apartment was installed and tested in Shenley

Wood Village and Showell Court. Installation check in UK (9/1-->11/1). In the first days of January, MYSPHERA was back again in UK in order to fix some bugs and problems detected during the first installations and giving additional training to the UK partners. It was given onsite support to other partners working remotely.

Included in this task the activities related to the recruitment and enrolment of participants have been conducted. In EXTRACARE letters were sent to all residents at Shenley Wood Village that briefly explained about the project and invited the residents to attend a meeting to talk about it. Posters were put up around the village to raise awareness of the project. Around 25 residents attended the initially meeting. Following this, a second letter was sent out to all Shenley Wood Village residents who fit within the age range and lived alone, inviting them to a second meeting. Around 20 residents attending this meeting and many agreed to move on to the screening phase. Onsite staff also called residents who they thought would be suitable to see if they were interested in taking part. All residents who had shown interest were then sent a letter with an appointment to complete the MOCA to see if they could move to the next stage of the screening. All residents who scored appropriately on the MOCA then moved to the next stage of screening. Then have been administered the MNA, PASE and BERG tests. A letter was sent to each resident GP who had passed the screening. This explained the project and asked the GP to give consent for their patient to take part. This took longer than expected, especially as it was over the Christmas period, with some GPs taking weeks to reply. Once full consent was received EXTRACARE began installing the equipment in the apartment. Finally in Extracare pilot sites, including S.Crispin Village, 14 subjects have been recruited.

At the pilot site of Accord's extensive recruitment activity resulted in a pool of 10 potential participants who were interested in participating in the initial screening phase of the DOREMI Trial. The composition of these can be seen in the table below:

Table 1: ACCORD potential participants characteristics: site, sex, age

Site	Interested Participants	Male/Female	Age
Showell Court	2	1 x M	67
		1 x F	78
Bournville House	3	1 x M	77
		2 x F	74/71
Swallowfields	2	1 x M	73
		1 x F	77
The Old Rectory	1	1 x F	79
Fairview Court	2	1 X M	68
		1 x F	72

All 10 potential participants above consented to and undertook the initial Demographics questionnaire and MoCA test in order to determine qualification for progressing onto the rest of the screening tests. 9 potential participants scored within the required range of 18-25 on the MoCA

Of the 9 qualifying potential participants, 5 consented to continue to further screening to include BMI, MNA, PASE, BERG and GP consent. The 4 potential participants who decided not to continue to further screening tests gave similar reasons for not participating further and felt that the ongoing commitment would be too much and cause too much worry.

The outcome of the further screening tests for the remaining 5 consenting participants can be seen below in Table 2:

Table 2: Screening test results for ACCORD consenting partcipants

Site	Male/Female	Age	BMI	MNA	PASE	BERG	GP Consent
Showell Court	M	67	28	20.5	100.6	47	Y
Bournville House	M	77	27	14	95.75	56	N
Swallowfields	M	73	27		33.6		N/A*
	F	77	34	12	85.82	55	N/A*
Fairview Court	M	68	32	14	141.5	55	N/A*

*N/A due to screening test scores falling outside of required parameters

All 5 participants appeared to enjoy each of the screening tests and were enthusiastic throughout. Unfortunately 3 of them didn't receive the approval from the GP to the participation in the DOREMI study. Accord finally recruited 1 participant who satisfied all required criteria to the full DOREMI trial, referred to as participant AC01.

The final recruitment process permitted to collect 14 subjects from Extracare and 1 from Accord.

Randomisation – The 15 UK DOREMI participants were randomised to either the intervention or control group. Based on the proposed validation sample distribution figures outlined in the DOW, 70% of participants (11) were allocated to the intervention group and 30% (4) were assigned to the control group. Accords participant A01 was allocated to the control group.

Task 6.2 Living lab validation and integration of WSN and Context aware system (CNR ISTI) – M18-M25

During November 2015 final system integration event was held in Valencia (10-20 November 2015), Spain. During the event, Mysphera, CNR, UNIPI, Imaginary and AIT collaborated on the system functional validation activities, verifying the integration of developed components, and checking their compliance with the system requirements by effectively testing the DOREMI system use cases in the living lab. WP3 partners prepared the testing environment of the CIAMI living lab by setting up the DOREMI WSN devices, backend services and needed configuration, validating the entire data collection process. Data processing tasks and DOREMI users applications (Kiola, tablet applications, Metadieta) were also made available in the testing environment and validated in the living lab. All the activities performed during the system integration event are reported in detail in deliverable D6.4. After the DOREMI system validation activities, the set of hardware/software components and their configuration, needed for the trial, were prepared during the second half of November 2015.

CNR-ISTI, Mysphera and Imaginary collaborated in November on writing a manual on the setup and maintenance of the WSN in pilot sites, also comprising the tablet setup procedure. The same partners also worked with SI4Life in November on writing instructional material regarding limitations and the correct usage of the equipment provided to the DOREMI user.

Task 6.3 - Validation of Social and gamified environment through behavioural analysis (UOC) - (M20–M30)

The main aim of the Task is to validate the DOREMI Social and Gamified Environment and the serious games through the conduction of experimental studies. We decided to split the task activities into 2 separate studies. The first one to perform an online validation and the second one to perform a validation in a real environment.

The online validation has been conducted through a cross-sectional pilot study. To increase the statistical significance of the study UOC in agreement with partners involved in the Task decided to increase the number of participant respect the total number described in the DoW involving 800 participants (400 from Italy and 400 from UK). Before starting the studies IMA had to prepare the platform for the online panel adapting the Tablet version of the DOREMI games to an online version. The subjects were equally distributed in the four experimental conditions (not presence of social nudges; social nudge 1: "share your experience"; social nudge 2: "congratulate other players"; social nudge 3: "share your experience"). It is worth noting that men and women were equally distributed in each online panel (Italy, UK), with age range of 60 to 87 years. The majority of participants (59.7%) were between 65-69 years old, followed by 22.7% of them who were between 70-74 years old. The results of the study are fully illustrated in the D6.5 Gamified environment validated in a virtual lab.

Additionally, three older members of AGE investigated and tested the online games for 65+ (March 2016).

The second study conducted follows a longitudinal methodology. IMA developed a 2 separated tablet version of the DOREMI social and gamified environment. The first one containing the social and gamified components and the second one without them. The study had the aim to test if the social and gamified components of the DOREMI environment had an effect on performance and cognitive functions. At the baseline we added a more detail evaluation of participants' cognitive skills and we also included in the evaluation an in-depth interview in order to obtain qualitative information about the real experiences of the participants while playing the games. Eleven participants from 60 to 85 years old were recruited from their residences in Genova, Italy and agreed to play the games 3 times per week for 2 consecutive weeks, under the supervision of clinicians working in the residences. They were randomly assigned to two groups: target group (DOREMI cognitive games with social area/gamified environment) versus control group (DOREMI cognitive games without social area/gamified environment). In the meanwhile, during M29, data entry and statistical analysis of the results from the cross-sectional study was performed and preliminary feedback was provided to the rest of the partners.

During M30, reporting of the results for the D6.5 "Gamified environment validated in a virtual lab" has being prepared.

Task 6.4 - Validation of integrated system and refinement (SI4LIFE) - (M27–M36)

For the UK trial, CNR-IFC participated in the baseline and training activities at Extracare sites of Shenley Wood, Milton Keynes and S.Crispin, Northampton (from 07/01 up to 04/02/2016) and in the final evaluation phase (from 5/04 till 12/04/2016), with cardiovascular and nutrition experts.

The DoW didn't envisage CNR-IFC participation at the pilot sites; indeed, a clarification of roles in Task 6.4 at the time of the proposal preparation and budget allocation was not accomplished. For phase I, baseline, the DoW reports:

Phase I will be addressed to the baseline evaluation of the participants and will be completed within 15 days from the starting time. It includes 1) a comprehensive and multidimensional evaluation of the participants, particularly focused on functional, nutritional, cognitive and psychological aspects, 2) a dynamic assessment of health-related risks of participants doing daily activities at home.

Quantification of effort to comply with functional and nutritional evaluation (point 1) and with point 2 during the 15 days of baseline phase was not included in the budget of Extracare and Accord. During Leicester meeting, on September 2015, both partners declared the ability to cover the cognitive and phychological aspects, but also the unavailability of a cardiologist for taking care of points 1 and 2, and of a nutritionist for point 1. The costs of these specialists were not envisaged in the original budget for Extracare and Accord. Therefore, CNR-IFC decided to make these professionals available during the most critical phases of the trial, namely at baseline, during the training and in the final evaluation. This implied a stay of 37 days in the pilot sites for CNR-IFC staff.

CNR IFC will not claim more budget for these activities, since we aimed to guarantee the success of WP6 tasks and validation of platform in the pilot sites.

CNR-IFC carried out a series of activities as:
- Training on all functional and dietary tests to Extracare and Accord personnel, presentation of diet and physical activity guidelines to the involved personnel. Training on BIVA instrument use and data interpretation (7-9th January, 2016)
- Presentation of the DOREMI project and overall tests to participants, Shenley Wood 11th January 2016
- tests to measure metabolic parameter and body mass composition by BIVA system, training the local staff in its use; tests were performed at baseline and at final evaluation. CNR-IFC performed all tests on Extracare participants, both at baseline and in the post-intervention phases. CNR-IFC did BIVA analysis by dedicated software and provided the clinical results to the UK partners.
- dynamic tests such as 6MWT to collect in DOREMI participants physiological parameters (blood pressure, oxygen saturation and heart rate); tests were performed at baseline and at final evaluation; SPPB test for evaluation of frailty and estimate of users' balance
- tests to evaluate user functional exercise capacity, by 6MWT, and balance assessment by BERG test; tests were performed at baseline and at final evaluation
- training on DOREMI Diet Application, collection of user dietary habits, with support of METADIETA app, and generation of Users' Personalized Dietary Plan; dietary habits check was performed at final evaluation
- training on DOREMI Physical Activity Protocol, training on the use of PA Application, and generation of Users' Personalized Physical Activity Plan
- CNR-IFC provided a summary evaluation of blood test results for all participants according to Layman explanation. This summary will be provided also for the blood test results of the post-intervention blood withdrawal.

The Task 6.4 includes 4 activities phases (1) installation, (2) baseline, (3) training and (4) intervention and (5) post intervention assessment and analysis.

Activities to permit a fully installed (1) environment in the UK pilot sites started from M25. At ExtraCare the equipment was installed into the resident's apartments in December 2015 and January 2016. Some resident's didn't have any internet, and due to the Christmas break and a slow response from GP Consents, there was a delay in installing it. Furthermore a problem with the routers meant that some residents didn't get online for several days. When the residents were fully online, there were problems with the system staying connected. The Wii boards often disconnected and required restarting and the system would often go offline and required a restart. This took a lot of time from staff at ExtraCare as it was often required to attend resident's apartments to fix problems. Due to the problems with the integration, Mysphera and ISTI-CNR came to the UK to attempt to fix these problems. MYSPHERA staff was back in Februray to gather data from a bug that couldn't be reproduced in laboratory conditions. Making the most of the visit, an extra element to ensure the dataflow was installed in all the apartments. The problems were mostly fixed as far as ExtraCare could see, although there was still the occasional problem with Wii Boards disconnecting.

Baseline Tests (2) - Participant both in Accord and Extracare pilot sites collaborated to complete the initial baseline tests and questionnaires despite their complexity and the length of time taken to complete. Accord staff split the testing up over a number of days in order to ensure the participant did not tire and was also able to maintain his social and medical commitments/appointments.

The training activities (3) in the UK pilot sites have been conducted from M26. Accord and Extracare was supported by CNR IFC and DMU to design and deliver the training intervention. All the participants were a very interested and happy to collaborate during the training phase and picked up use of the balance board, mobile phone, wristband and tablet with ease. During the training intervention has been delivered to the subjects the information manuals provided due to the questions he was asking at subsequent visits. The residents learnt the serious games application quickly as it was user friendly and they enjoyed the games, but some of the features didn't work as planned.

The intervention phase (4) in the UK pilot study started at M27. During the starting phase of the intervention there were some technical issues. The progress, which was displayed by the dog moving through cities, didn't work properly as the dog wouldn't move along nor would the graphs showing their progress change. This was very frustrating for the residents involved, as it wasn't demonstrating the amount of effort they were putting into the app. occasionally the dog would progress and the graph would change. The application would also crash occasionally and some residents found that the games wouldn't work at times. Another issue was that the exercise area would say that a resident had already completed their exercises when they had not.

Accord and Extracare staff supported the participant with visits in order to answer any questions, encourage more varied, healthy dietary choices and to ensure that the monitoring equipment was working correctly. The participant liked to clarify if he was doing everything properly which demonstrates both how seriously he took the project and how conscientious he is as an individual. The tablet was always up to date and they always advised if he had any problems with food selections which staff were then able to amend. The subjects always made him available for regular monitoring visits and for resolving technical issues out of his control (allowing for his own medical appointments). On a number of occasions Accord and Extra care were alerted to the fact that the participant was showing 'offline' and therefore no readings were being generated, on each occasion a reboot of the system was necessary from the participant's apartment in order to reinstate to 'online' status.

Final evaluation tests (5), including a repeat of the initial screening tests, were repeated over a 5 day period in order to ensure the participant did not tire and also to allow for his medical appointments and social activities not to be disrupted. A leisure meeting at the end of the trial (8th of April, 2016) allowed participants of different villages to meet all together and to share opinions on DOREMI solutions and to give further feedbacks to Extracare, Accord and CNR-IFC staff.

- Significant results preparatory to the task
  - WSN and Context aware system validated in the living lab
  - Gamified environment validated in a virtual lab
  - DOREMI platform fully validated in the living lab and ready for the pilot implementation

- Deviations from Annex I and their impact on other tasks as well as on available resources and planning (if applicable)
  - Compared with the Task 6.3 description included in the Annex 1 the studies to validate the social and gamified environment have been modified
  - The UK pilot study didn't gain to involve 20 subjects as described in the Annex 1.

- Reasons for failing to achieve critical objectives and/or not being on schedule and explain the impact on other tasks as well as on available resources and planning (if applicable)

  - The change in the task 6.3 studies methodologies have been agreed by all the partners to permit to investigate the behavioural change in a real setting and expand the number of subjects to be involved in the study to strengthen the statistical significance of the studies.

  - Despite the amount of effort spent by Accord in recruitment activities, they failed in recruiting the number of subject expected by the Annex 1. Accord provided to the WP leader and the coordinator a detailed description of the reasons why they failed in the gain the objective. The reasons included: 1) Accord population are Older, More frail/unwell, less independent, less affluent, and lower in socio-economic status. 2) Accord's residential customers do not live in large retirement Villages but in separate, much smaller schemes. This makes (a) information dissemination, contact with customers and recruitment much more resource intensive, and (b) group recruitment activities less viable or effective.

- Explain deviations (if any) between actual and planned person-months (per beneficiary)

Please refer to the WP1 Project Coordination and Management regarding the effort change due to the modification in the UK pilot sites the recruitment.

- Corrective actions

To face off the issue related to the difficulties of Accord in recruiting the number of subjects expected by the Annex 1, all partners especially Coordinator and WP leader worked to find possible solution. Finally Extracare gave its availability to recruit more subject than the one planned in the Annex 1.

2.3.7 WP7 Exploitation, Dissemination and IPR (Leader UOC)

During this period WP7 focused on the re-submission of D7.3.2, addressing the comments of the reviewers, on the negotiation on IPR sharing, the preparation of questions to be asked to pilot participants and stakeholders, and dissemination activities. The new version of the deliverable included the list of exploitable results, more detailed exploitation plans for the wristband, the gamified environment and the whole solution, an explanation on how data related to exploitation will be obtained from pilots participants and other stakeholders, an expanded competitors' analysis, and the next steps to be performed towards the submission of D7.3.3. The dissemination activities performed by Consortium members are explained below in the task 7.4 section.

- Objectives

  - To assess the expected impacts of the project at EU27 level in relation to the emerging trends of the ageing population in EU Member States;

  - To disseminate the project outcomes in EU27 at large through social media and targeted actions;

  - To design and to set up an exploitation process of the project results in line with the specificity of the DOREMI consortium members and the characteristics of the Ageing Marketplace in EU27.

- Summary of progress towards objectives and details for each task

Task 7.1 - Development of exploitation and dissemination plan (UOC) – M3-M5

Completed

Task 7.2 – Market assessment and outline of the business plan (UOC)

(M10-M15; M23-M24; M35-M36)

D7.3.2 was resubmitted in February 2016 in order to address the comments from the reviewers. This new version included the list of exploitable results and the exploitation plan for the two DOREMI components most likely to be exploited individually (the wristband and the gamified environment) and for the whole solution. The current version of the deliverable explains how relevant data will be collected during the trial in order to test the different exploitation options (which actors could purchase the solution, how much would they be willing to pay, which is the most suitable pricing model, etc.). The options for the pricing mechanisms will include the Premium Model, which implies offering a basic version of the product for a cheaper price and to provide additional elements and features for an extra fee. A preliminary analysis on exploitation options was already carried out by some partners. In addition, the members of the Consortium were asked to assess the feasibility of DOREMI commercialisation by different stakeholders. The competitors' analysis was expanded in order to include more detailed information on price and pricing models. This allowed having a better estimation of the potential market value of the whole DOREMI solution and its individual components. In addition, some estimation of the costs and prices per user were provided.

Finally, the deliverable explained the next steps that will be performed towards the submission of D7.3.3, which are in line of reviewers' comments. The main tasks are to agree on IPR sharing, to contact stakeholders to evaluate their participation in the exploitation of DOREMI, to collect KPI to develop the commercial strategy (these KPI are described in the deliverable), to identify the changes that will be needed after the completion of DOREMI in order to have marketable products, and to assess the effectiveness of DOREMI and how it addresses the needs of elderly with evolving MCI on medium and long term basis.

The methodology to handle IPR issues was defined in the update of D7.3.2 in strictly collaboration with CNR-IFC, as Project Coordinator. Currently, discussion on the distribution of IPR among

partners is taking place: a list of exploitable results (ER) has been established and partners are providing input regarding the weight that each partner should have in each ER and the relative importance of each ER on the whole solution. In the technical meeting held in Barcelona on 21-22th of April, IPR distribution has been discussed. The table of ERs judged "commercially" exploitable has been almost finalized and needs final approval by each partner. Furthermore, the Consortium has discussed on the exploitation of the whole solution as well as on the final exploitation plan.

UOC has prepared some questions related to exploitation (willingness to use, willingness to pay, preferred pricing model, etc.) to be asked to the pilots participants and to other stakeholders who will be contacted during the following months. This will provide insights on how the exploitation of DOREMI can materialise and will help to improve the exploitation plans of both the whole solution and the individual products.

Task 7.3 – Impact assessment on Health Care system and on society at large (UOC) -

(M10-M15; M23-M24; M35-M36)

The methodology to perform the Impact assessment was presented in the Review meeting of year 2 . The analysis will follow an extrapolation accounting framework, which will link data from national statistics, DOREMI pilot sites results and DOREMI costs. Available data in national and international databases will be collected regarding the prevalence of the conditions that DOREMI is targeting (malnutrition, sedentariness, and mild cognitive decline) and health costs. Moreover, the results from the pilot sites will be used to estimate the potential effect of DOREMI on decreasing the prevalence of these conditions and thus, on increasing the quality of life of the elderly and diminishing health expenditure. In order to determine the global impact, expected benefits will be compared with the expected annual costs of DOREMI deployment. The costs will depend on the production costs, the costs of installing and providing DOREMI per user, the prevalence of the conditions in the population and the deployment level. On the other hand, benefits stem from the expected reduction in long-term care expenditure thanks to the deployment of DOREMI. The expected benefits will depend on the effectiveness of DOREMI, which will be assessed in the pilots.

UOC will perform the impact assessment once the pilots finish and the required data becomes available.

Task 7.4 – Dissemination activities (CNR-IFC) – M3-M36

AGE platform together with CNR-IFC has maintained an active presence of the project interim outcomes on the main on-line social network (Facebook and Twitter). Moreover, they have worked for the definition of more personalized dissemination activities in relation to the various target audiences that would be interested to DOREMI solutions and achieved results.

In April 2016 DOREMI Newsletter #4 was published.

All involved partners contribute to the dissemination of the project results under the coordination of CNR-IFC. In the section below "Significant results" the work performed by each partner in the reporting period is described.

IMA
- **Production of communication materials:**
  - ✓ Video creativity and production to promote the games (https://www.youtube.com/watch?v=LjTXtnVNqzc)
  - ✓ Flyer graphical design and production "Games for Health" including DOREMI games
  - ✓ Poster graphical design and production for dissemination of DOREMI games
  - ✓ Short press release about games for health, including DOREMI, for PR activities with Italian journalists with the aim to stimulate them to write some articles about the topic.

- ✓ Parallel activity with press release in English language for UK, China and Singapore dissemination activities.
- **Social media and website activities:**
    - ✓ In average 1 post every 2 weeks on FB and Twitter. And since April same activity also on Linkedin.
    - ✓ Video shared on You Tube.
    - ✓ Conference presentations shared on Slideshare.
    - ✓ Inclusion of DOREMI in the "imaginary research" page dedicated to the company's EU research activities, within the IMA web page (http://i-maginary.it/ricerca-en.html#ricerca) and dissemination of the "imaginary research" page through the IMA newsletter (Jan. 2016)
- **Newsletters**
    - ✓ IMA newsletter April 2016 issue: news about the MEDICON 2016 conference presence (which included the DOREMI games)
    - ✓ GAETSS Newsletter 5.02.2016 disseminates the DOREMI project with link to its website under the title "Health and Wellbeing Gamification Technologies" [the GAETSS newsletter is written by IMAs staff David Wortley]
    - ✓ Contribution to DOREMI project Newsletter
- **Participation in events**
    - ✓ Meeting with Mr Ivan Boo, CEO of Life Data Solutions Singapore and chairperson of Serious Games Association for pre exploitation activities in the south east Asian market (London, 9-10.11.2015). Contacts still ongoing to organise a big piloting event in Singapore.
    - ✓ 6th International Forum on Lifestyles and Health and Chongqing Bonded Area International Health Industry Exhibition and Chongqing Bonded Area International Health Industry Exhibition (Chongqing, 28-30.11.2015). IMA was able to obtain a free booth for the demo of the DOREMI games and pre exploitation activities.
    - ✓ Technology, knowledge and society conference (Buenos Aires, 18-19.02.2016). IMA (David Wortley) was invited to talk about 'The impact of lifestyle technologies on society' which included a brief presentation of the DOREMI project, and to showcase the demo of the games (http://www.slideshare.net/dwortley/lifestyle-technologies-and-society).
    - ✓ Medicon 2016- XIV MEDITERRANEAN CONFERENCE ON MEDICAL AND BIOLOGICAL ENGINEERING AND COMPUTING (Cyprus, 31.03-02.04.2016). IMA presented the paper 'Gamified wellbeing for all ages" How technology and gamification can support physical and mental wellbeing in the ageing society" – Actual system use presentations' (http://www.slideshare.net/dwortley/gamified-wellbeing-for-all-ages) and presented the videos of health games, DOREMI included.
- **IMA network:** IMA is creating a mailing list containing different types of Italian stakeholders around games for health specifically including the DOREMI active ageing gaming approach. Aim of this activity is to create a community of interest and to e.g. showcase the solutions inviting them to "open house events" as well as to start a series of exploitation activities. These will entail not only potential commercial exploitation, but also actions directed to public administration to make them aware of the potential and the impact of lifestyle technologies and games on the ageing society.

CNR IFC

Dissemination

- Presentation of DOREMI solutions and initial results on nutrition at NU-AGE Project Final Conference, Brussels, April 5th, 2016.

- Submission of EIP-AHA Action Groups A3 commitment on Frailty and Frailty, Food, Nutrition

- Facebook, Twitter and website updates.

- Support to DOREMI video editing

- Data analysis and draft editing of UNIPI and CNR-ISTI publications

Exploitation

- CNR-IFC has reinforced the collaboration with NU-AGE, FP7-KBBE funded project, submitting as coordinator a project proposal (DEMAGOS) at JPI-HDHL call where diet assessment and physical activity protocols, developed in DOREMI, were integrated.

- Collaboration with PERSSILAA, FP7-ICT funded project, to test and validate the smart balance board developed within DOREMI project in a new population of +65 with more severe unbalance. To this purpose new data will be collected in a selected population of 30 PERSSILAA users with lower BERG score (<41, age 65-80 years).

AGE

- **Social media updates:** from November to April 10 direct Facebook posts with a coverage of almost 1100 people and weekly Twitter posts
- **Website updates on DOREMI via:**
  - ✓ A dedicated webpage for the project: http://age-platform.eu/age-work/age-projects/health-and-long-term-care/doremi
  - ✓ Recent update on the trial in the UK: http://www.age-platform.eu/age-work/age-policy-work/health/age-work/2906-doremi-project-starts-first-trial-in-the-uk (February 2016)
  - ✓ Link with EU paper on research projects, among which DOREMI is listed: http://www.age-platform.eu/dossiers-en-gb-6/2973-overview-of-eu-funded-running-projects-using-new-technologies-for-ageing-well (March 2016)
- **Work on the DOREMI video**
- **Supporting synergies with other online communities and networks:**
  - ✓ EIP AHA Action Group A3 – AGE contribution to the call for commitment for DOREMI.
  - ✓ EIP AHA Action Group D4 – AGE set up of the European Covenant on Demographic Change for gathering European stakeholders active for age-friendly environments and independent living).
- **Presentation of DOREMI in:**
  - ✓ AGE General Assembly and Annual Conference, 19-20 November 2015: distribution of project's leaflets (adapted PPT) and stand dedicated to AGE research projects, among which DOREMI. Attendance around 150 participants.
  - ✓ Launch of the European Covenant on Demographic Change, Brussels, 7-8 December 2015: distribution of project's leaflets (adapted PPT). Attendance around 150 participants.
- **Dissemination** of the following relevant papers, consultations and conferences, suitable for further dissemination by technical parners:
  - ✓ JRC Science for Policy Report - Feasibility study on dietary recommendations for older adults in the European Union.

- ✓ International Conference on Information and Communication Technologies for Ageing Well and e-Health (ICT4AWE 2016).

- ✓ European Medicines Agency consultation on fraility - 'Points to consider on frailty: Evaluation instruments for baseline characterisation of clinical trial population; Engineering for Society conference.

UNIPI

- **Publications**

  - ✓ C. Gallicchio, A. Micheli, L. Pedrelli, F. Vozzi, O. Parodi, "Preliminary Experimental Analysis of Reservoir Computing Approach for Balance Assessment", Proceedings of the 1st International Workshop on Advanced Analytics and Learning on Temporal Data co-located with The European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML PKDD 2015), Porto, Portugal, September 11, 2015, CEUR Workshop Proceedings, vol. 1425, pages. 57-62, 2015.

  - ✓ F. Palumbo, C. Gallicchio, R. Pucci and A. Micheli. "Human activity recognition using multisensor data fusion based on Reservoir Computing Journal of Ambient Intelligence and Smart Environments", vol. 8, no. 2, pp. 87-107, IOS Press, Published 15 March 2016, DOI 10.3233/AIS-160372.

CNR-ISTI

- **Conferences**

  - ✓ An extended versions of the accepted papers in "ECML/PKDD 2015 Workshop on: Advanced Analytics and Learning on Temporal Data" has been produced in order to be published in a special volume of Lecture Notes in Artificial Intelligence

  - ✓ The preliminary results regarding the outdoor and indoor socialization events, obtained by the application of EDA techniques (Task 4.2) together with the supervised modules produced in the Task 4.3, have been submitted to an international conference on Intelligent Environments.

    - ▪ D. Bacciu, S. Chessa, E. Ferro, L. Fortunati, C. Gallicchio, D. La Rosa, M. Llorente, A. Micheli, F. Palumbo, O. Parodi, A. Valenti, F. Vozzi, "Detecting Socialization Events in Ageing People: the Experience of the DOREMI Project," submitted to The 12th International Conference on Intelligent Environments - IE'16.

- **CNR-ISTI** contributed to the development of the periodic **DOREMI newsletter** by also producing several images and videos on the devices composing the DOREMI system and their usage during the system integration event held in November 2015.

DMU

- Interview with Andrew Bomford from BBC radio 4 with Mark Scase from DMU and two of the DOREMI residents about their experience of being involved in an EU funded project. The interview was broadcast on the "World at One" – a lunchtime broadcast on radio 4 (the national radio station) on 24/3/16 that has an audience of 3.5 million. The interview is available from http://www.bbc.co.uk/programmes/b0745d3g. The interview that was done was about the importance of the EU for research.

- Two people from met the UK Government education minister – Vicky Morgan – when she visited DMU and told her about the DOREMI project. Her visit got press coverage: http://www.leicestermercury.co.uk/Nicky-Morgan-launches-pro-EU-campaign-tour/story-29097191-detail/story.html and was on the TV.

- Significant results

Dissemination

Partners performed several dissemination activities, including dissemination through social media and other Internet platforms (Facebook, Twitter, Linkedin, You Tube, Slideshare), production of communication materials (videos, flyers, posters), website updates, participation in conferences, publications, press releases, a radio interview, newsletters, and contacts with different stakeholders and other online communities and networks.

Exploitation

- Re-submission of D7.3.2 by addressing the comments from the reviewers. Including, among others, more detailed exploitation plans, a more extended competitors' analysis, and a description of KPI to be collected.
- Negotiation on IPR sharing among Consortium partners.
- Design of questions to be asked to pilot participants and stakeholders in order to assess exploitation options.
- Collaboration with PERSSILAA project for a further validation of DOREMI Balance assessment tool by the smart balance board
- Collaboration with NU-AGE project in the JPI-HDHL call, to link Mediterranean Diet and new Biomarkers developed in NU-AGE with ICT solution of DOREMI on nutrition

- Deviations from Annex I and their impact on other tasks as well as on available resources and planning (if applicable)

Not applicable.

- Reasons for failing to achieve critical objectives and/or not being on schedule and explain the impact on other tasks as well as on available resources and planning (if applicable)

Not applicable.

- Explain deviations (if any) between actual and planned person-months (per beneficiary)

Not applicable.

- Corrective actions

D7.3.2 was re-submitted in February 2016.

2.4 Project management during the period

▪ Project Management has carried out monitoring activities to ensure that:

- the research activities are carried out according to the settled time schedule and budget;

- the project objectives are efficiently achieved;

- the project is managed according to the contract between the DOREMI Consortium and the EC, maintaining a continuous link with the EC;

- overall legal, contractual, ethical, financial and administrative management of the project have been respected.

▪ Consortium management tasks and their achievement

We are now at 30 months of the project. During the last six months (from M25 to M30) management activities have been intense by both the project coordinator, the Project Management Office as well as the individual participants. The management activities that have been performed in this period has kept at best all these means and infrastructures that are required for the efficient communication and collaboration among the partners, as well as among the project, the EC and the external community. Highlights of activities that have been performed by the consortium in this reporting period can be summarised as follows:

- Submission of deliverables due in the period and resubmission of one rejected deliverable

- Drafting and submission of reports on project advancement (Interim);

- Distribution of the P2 interim payment;

- Organisation of the project's rehearsal meeting in Brussels (15ʰ December 2015) for the review meeting at the Commission (16th December 2015);

- Co-organisation of two face to face consortium (plenary and technical) meetings in Vienna (5-6 November 2015) and Barcelona (21-22 April 2016);

- Maintenance and continuous update of the project's mailing lists (doremi-fp7@ifc.cnr.it, technicalcoordinator@doremi-fp7.eu, wpleaders@doremi-fp7.eu, info@doremi-fp7.eu);

- Amendment of the Consortium Agreement to reflect changes of legal representatives;

- Constant update of the project's web-based collaboration tool and repository, operating in the framework of the website as a secure-access private area for consortium members only. The collaboration area is administered with the responsibility of the project coordinator and populated with the contributions of all consortium members;

- Quality check and submission of deliverables to the Commission;

- Constant communication between the consortium members;

- Regular communication and update provided by the project coordinator to the PO.

The table below shows the status of the project tasks:

Table 3: Status of the project tasks

WP no	WP NAME/ TASK	LEADER	DoW		DEVIATIONS		STATUS
			Start month	End month	Start month	End month	
WP1	**Project Coordination and Management**	**CNR**	**1**	**36**	–	–	**ACTIVE IN PROGRESS**
Task 1.1 Project Management		CNR-IFC	1	36	–	–	Active, in progress
Task 1.2 Administrative Management		CNR-IFC	1	36	–	–	Active, in progress
Task 1.3 Risk Management and Quality assurance		CNR-IFC	1	36	–	–	Active, in progress
WP2	**End user profile and Active Ageing Lifestyle protocol development**	**CNR**	**1**	**12**	–	–	**COMPLETED**
Task 2.1 Target users definition, literature analysis and survey for scenarios of use		CNR-IFC	1	6	–	–	Completed
Task 2.2 Active Ageing Lifestyle protocol development		SI4LIFE	2	8	–	–	Completed
Task 2.3 Validation Plan		UOC	9	12	–	–	Completed
WP3	**Development of WSN environment and autoconfiguration system**	**MYSPHERA**	**3**	**24**	–	–	**COMPLETED**
Task 3.1 Requirements, parameters and sensor selection		MYSPHERA	3	9	–	–	Completed
Task 3.2 Sensors development and production		MYSPHERA	6	24	–	–	Completed
Task 3.3 Sensor Integration and Middleware		CNR-ISTI	6	24	6	20	Completed
Task 3.4 Auto configuration system and calibration		AIT	9	24	–	–	Completed
WP4	**Development of a Smart Environment for Context Awareness**	**UNIPI**	**1**	**33**	–	–	**ACTIVE IN PROGRESS**
Task 4.1 Data preparation and models assessment specification		UNIPI	1/20	8/30	–	–	Completed
Task 4.2 Activity recognition : explorative data analysis		CNR-ISTI	6	30	6	33	Active, in progress
Task 4.3 Activity recognition: predictive machine learning approach		UNIPI	6	30	6	33	Active, in progress
Task 4.4 Reasoning system and Personalization		AIT	20	33	10	33	Active, in progress
WP5	**Development of Social and gamified environment**	**IMA**	**3**	**24**	–	–	**COMPLETED**
Task 5.1 Gamified active ageing protocol definition		DMU	3	8	–	–	Completed
Task 5.2 Game-based active ageing environment		IMA	6	14	–	–	Completed
Task 5.3 Exergames development		IMA	13	24	–	–	Completed
Task 5.4 Social games development		UOC	13	24	–	–	Completed
Task 5.5 Cognitive games development		IMA	13	24	–	–	Completed
WP6	**Validation driven system integration at lab and pilot site**	**SI4LIFE**	**20**	**39**	**14**	**36**	**ACTIVE IN PROGRESS**
Task 6.1 Data Collection and pilot site preparation		CNR-IFC	20	30	14	27	Completed
Task 6.2 Living lab validation and integration of WSN and Context aware system		CNR-ISTI	20	30	18	25	Completed
Task 6.3 Validation of Social and gamified environment through behavioral analysis		UOC	20	30	–	–	Completed
Task 6.4 Validation of integrated system and refinement		SI4LIFE	28	36	27	36	Active, in progress
WP7	**Exploitation, Dissemination and IPR**	**UOC**	**3**	**36**	–	–	**ACTIVE IN PROGRESS**
Task 7.1 Development of exploitation and dissemination plan		UOC	3	5	–	–	Completed
Task 7.2 Market assessment and outline of the business plan		UOC	10/23/35	15/24/36	–	–	M10-15 Completed/M23-M24 Completed/M35-M36 Not yet started
Task 7.3 Impact assessment on Health Care system and on society at large		UOC	10/23/35	15/24/36	–	–	M10-15 Completed/M23-M24 Completed/M35-M36 Not yet started
Task 7.4 Dissemination activities		CNR-IFC	3	36	–	–	Active, in progress

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

The DOREMI project started to implement its quality and risk management procedures on January 2014 by implementing the D1.1 Project Management Plan to ensure consistency on internal processes, procedures, and outcome generation. The **Scientific and Quality Manager (SQM) of DOREMI** has monitored compliance of the project progress with the work plan on the basis of quarterly progress reports provided by each Work Package Leader and project guidelines defined for quality control and quality assurance.

The SQM and Project Management Office have monitored and dealt with following issues in the period under consideration. Namely:

a) Extra budget needed to purchase materials and pay for services for the trials

b) Difficulties in the recruitment of an adequate number of participants in UK

c) Technical issues with the installations in the UK pilot sites

d) Clinical management at UK sites for the trial

The need of an extra budget to buy a number of items (tablets, smartphones, sensors etc.) that were not originally envisaged or budgeted was required to implement trials in UK and Italy. To overcome this problem, the consortium decided to take on the amount exceeding the planned budget and to apportion this amount according to partner shares using a compensation mechanism. This decision was unanimously voted by the partners during the DOREMI Plenary Meeting held in Vienna on 5-6 November 2015 according to provisions of the Consortium Agreement, namely Art. 6.3.2. This entails that whatever expenses are accepted by the EC for each single partner, some partners will accept to receive a sum below their maximum limit of the EU contribution and others will get a higher contribution. In particular, MYSPHERA, that has taken care of purchasing the majority of the technical items and will be the partner with the highest over expenditure by the end of the project.

To face off the issue related to the difficulties of Accord in recruiting the number of subjects foreseen in the DoW, all partners worked to find an alternate solution. Extracare accepted to recruit more subjects than those planned in the DoW. To enable the recruitment of these additional participants, Accord agreed to transfer 20.000€ to Extracare at the end of December 2015.

The beginning of the trial was slightly delayed due to technical issues and to the Internet connection. While the testing environment setup went quite well, some problems occurred in the real apartments. Additionally, Internet was made available on the 15th of February for all apartments and this did not make it possible to check beforehand if the DOREMI system was working properly. MYSPHERA and CNR ISTI decided to send staff onsite and by the end of January 2016 hardware and sotware isues were fixed. Poor and intermittent Internet connectivity also caused the tablet app applications to crash. To avoid problems, Extracare staff had to visit up to twice a day the participants to make sure that everything was working properly.

Concerning the clinical management at UK pilot sites, specific activities of Task 6.4 (WP6) were not not properly reflected in the budget and effort allocation of partners involved. For instance, no effort and budget were foreseen for Extracare and Accord to comply with the functional and nutritional evaluation during the 15 day baseline and training phases of participants. In September 2015, during a technical meeting held in Leicester, both Accord and Extracare declared they could cover the cognitive and phychological aspects, but they pointed out that neither a cardiologist nor a nutritionist were available. To overcome this issue, CNR-IFC decided to make professionals available for these critical activities during the baseline, training and final evaluation.

- **Changes in the consortium (if any)**

Not applicable.

- **List of project meetings, dates and venues**

Table 4: List of project meetings

		Type of meeting	Date	Venue	Participants
	1	Skype conference on WP7	03/11/2015	N/A	CNR IFC, AGE
	2	Skype conference on WP4	03/11/2015	N/A	CNR IFC, AIT
	3	Plenary meeting	5-6/11/2015	Vienna	All partners
	4	Technical Meeting on WP3, WP4, WP6	01/12/2015	Pisa, Italy	CNR IFC, CNR ISTI, UNIPI
	5	Review rehearsal	15/12/2015	Brussels, Belgium	All partners
	6	Review meeting	16/12/2015	Brussels, Belgium	All partners
	7	Skype conference on WP7	16/02/2016	N/A	CNR IFC, UOC
	8	Technical Meeting on WP3, WP4, WP6	17/02/2016	Pisa, Italy	CNR IFC, CNR ISTI, UNIPI
	9	Technical Meeting on WP3, WP4, WP6	23/02/2016	Pisa, Italy	CNR IFC, CNR ISTI, UNIPI, SI4LIFE
	10	Skype conference on WP7	23/02/2016	N/A	CNR IFC, UOC, AGE
	11	Technical Meeting on	21-22/04/2016	Barcelona, Italy	All partners

D1.4.1 Interim Periodic Report (Period 3)

- **Project planning and status**

The project is progressing in accordance to the specified work plan and timetable as described in the Annex.

UK trial is now over and material for the installations has been shipped to Italy. MYSPHERA has to check if all wristbands work properly before the trial starts in Italy and quality of the Internet connections has to be controlled in all aparments of subjects enrolled in the trial. This may lead to a one week delay (approx.) of the start of the trial in Italy, but no major issues are expected in the coming period.

Project planning with regard to the overall management and coordination includes the continuation of the regular activities ensuring the smooth implementation of the project, i.e.:

- constant communication and collaboration between project participants
- constant communication with the commission's PO
- maintenance and update of the project mailing list, website and collaboration tool
- regular reporting for the efficient follow-up of the project's progress and partners'performance
- Organisation of the last plenary meeting in conjunction with the final conference, most likely in Brussels
- Organization of the final project review (October 2016?)

Effort

Total effort spent in the reporting period corresponds to 23% of the total project effort. Table 5 below gives a breakdown of the effort spent per work package and per partner in the reporting period. Effort of partners AIT and IMA are updated up to 31st March 2016 (M29).

Total effort spent since the beginning of the project corresponds to 104% of the total project effort for the project with a 4% overspending. Table 6 shows the effort spent per work package and per partner from the beginning of the project also in relation to the effort planned in the DoW.

Table 5: Breakdown of the effort spent per work package and per partner in the reporting period

Workpackage	WP1		WP2		WP3		WP4		WP5		WP6		WP7		TOTAL per Beneficiary	
EFFORT SPENT PER WP AND PER PARTNER IN THE FIRST SIX MONTHS OF YEAR 3 (M25-M30)	ACTUAL	PLANNED	ACTUAL	PLANNED	ACTUAL	PLANNED	ACTUAL	PLANNED	ACTUAL	PLANNED	ACTUAL	PLANNED	ACTUAL	PLANNED	ACTUAL	PLANNED
Beneficiary 1- CNR-IFC	2,80	12,20	0,00	9,00	0,00	0,00	0,70	1,00	0,00	1,00	3,93	6,00	0,50	3,00	7,93	32,20
Beneficiary 1- CNR-ISTI	0,70	0,50	0,00	1,00	0,00	22,50	4,13	17,00	0,00	0,00	3,40	8,00	0,40	0,50	8,63	49,50
Beneficiary 1 - CNR Coordinator	3,50	12,70	0,00	10,00	0,00	22,50	4,83	18,00	0,00	1,00	7,33	14,00	0,90	3,50	16,56	81,70
Beneficiary 2 - UNIPI	0,32	2,00	0,00	1,00	0,00	2,00	6,08	34,00	0,00	0,00	2,72	8,00	0,22	1,20	9,34	48,20
Beneficiary 3 - MYSPHERA	0,32	1,50	0,00	1,00	0,00	41,00	0,00	0,00	0,00	0,00	14,41	12,00	0,11	3,00	14,84	58,50
Beneficiary 4 - AIT	0,00	1,50	0,00	1,00	6,15	17,00	1,00	10,00	0,00	0,00	0,00	4,00	0,00	2,00	7,15	35,50
Beneficiary 5 - UOC	0,28	1,50	0,00	5,00	0,00	0,00	0,00	0,00	0,00	12,00	5,50	11,00	0,68	7,60	6,46	37,10
Beneficiary 6 - Extra	0,03	1,50	0,00	7,00	0,00	2,00	0,00	2,00	0,00	3,00	9,80	14,00	0,10	1,50	9,93	31,00
Beneficiary 7 - IMA	0,58	2,50	0,00	1,00	0,00	0,00	0,00	0,00	0,00	30,00	9,19	6,00	3,43	3,00	13,20	42,50
Beneficiary 8 - DMU	0,79	1,50	0,00	1,00	0,00	0,00	0,00	0,00	0,00	29,00	6,65	8,00	0,52	1,50	7,96	41,00
Beneficiary 9 - AGE	0,30	1,80	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3,09	12,30	3,39	14,10
Beneficiary 10 - SI4LIFE	0,10	1,00	0,00	12,00	0,00	2,00	0,20	2,00	0,00	8,00	9,71	29,00	0,10	1,50	10,11	55,50
Beneficiary 11 - Accord	0,31	1,50	0,00	4,00	0,00	1,00	0,00	0,00	0,00	2,00	5,62	7,00	0,02	1,50	5,95	17,00
TOTAL	6,53	29,00	0,00	43,00	6,15	87,50	12,11	66,00	0,00	85,00	70,93	113,00	9,16	38,60	104,88	462,10

Table 6: Effort spent from the beginning of the project

Workpackage	WP1		WP2		WP3		WP4		WP5		WP6		WP7		TOTAL per Beneficiary	
CUMULATIVE EFFORT SPENT PER WP AND PER PARTNER FROM THE BEGINNING OF THE PROJECT	ACTUAL	PLANNED	ACTUAL	PLANNED	ACTUAL	PLANNED	ACTUAL	PLANNED	ACTUAL	PLANNED	ACTUAL	PLANNED	ACTUAL	PLANNED	ACTUAL	PLANNED
Beneficiary 1- CNR-IFC	13,50	12,20	12,70	9,00	2,20	0,00	2,90	1,00	2,90	1,00	6,78	6,00	4,15	3,00	45,13	32,20
Beneficiary 1- CNR-ISTI	1,10	0,50	1,00	1,00	22,50	22,50	18,14	17,00	0,00	0,00	7,50	8,00	0,70	0,50	50,94	49,50
Beneficiary 1 - CNR Coordinator	14,60	12,70	13,70	10,00	24,70	22,50	21,04	18,00	2,90	1,00	14,28	14,00	4,85	3,50	96,07	81,70
Beneficiary 2 - UNIPI	1,65	2,00	1,00	1,00	2,01	2,00	32,72	34,00	0,00	0,00	6,37	8,00	1,09	1,20	44,84	48,20
Beneficiary 3 - MYSPHERA	1,40	1,50	1,01	1,00	50,01	41,00	0,00	0,00	0,00	0,00	19,28	12,00	1,24	3,00	72,94	58,50
Beneficiary 4 - AIT	1,80	1,50	0,97	1,00	15,11	17,00	9,56	10,00	0,00	0,00	0,00	4,00	0,47	2,00	27,91	35,50
Beneficiary 5 - UOC	1,25	1,50	5,01	5,00	0,00	0,00	0,00	0,00	12,00	12,00	9,43	11,00	6,66	7,60	34,35	37,10
Beneficiary 6 - Extra	0,71	1,50	6,20	7,00	1,78	2,00	0,85	2,00	2,20	3,00	12,45	14,00	0,20	1,50	24,39	31,00
Beneficiary 7 - IMA	1,79	2,50	0,47	1,00	0,00	0,00	0,00	0,00	48,01	30,00	9,29	6,00	7,71	3,00	67,27	42,50
Beneficiary 8 - DMU	1,31	1,50	1,18	1,00	0,00	0,00	0,00	0,00	29,28	29,00	6,65	8,00	0,90	1,50	39,32	41,00
Beneficiary 9 - AGE	1,37	1,80	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	7,16	12,30	8,53	14,10
Beneficiary 10 - SI4LIFE	0,73	1,00	10,00	12,00	2,00	2,00	2,00	2,00	10,00	8,00	17,16	29,00	0,83	1,50	42,72	55,50
Beneficiary 11 - Accord	1,40	1,50	3,89	4,00	0,97	1,00	0,00	0,00	1,80	2,00	12,02	7,00	0,22	1,50	20,29	17,00
TOTAL	28,01	29,00	43,43	43,00	96,58	87,50	66,17	66,00	106,19	85,00	106,93	113,00	31,33	38,60	478,63	462,10

WP2, WP3 and WP5 are closed. Management (WP1) activities have absorbed 97% of the effort; WP4 and WP6 have used 100%, and 95% of the effort respectively; both WPs had a very high and intense workload during this period of the project to run the pilot trials in UK. For WP7, dedicated to dissemination and exploitation activities, percentage is 81%.

The figure below shows effort spent per WP over the DoW from the beginning of the project (M1-M30).
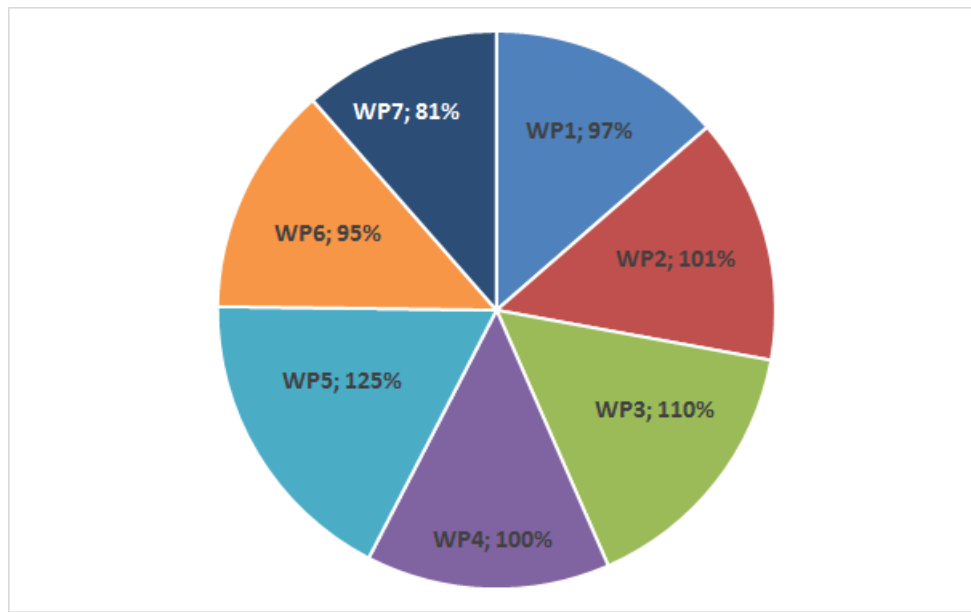

Figure 1: Effort spent per WP over DoW from M1 to M30

Effort spent per partner is consistent with work activities carried out from the beginning of the project.

According to Recommendation n.6, partner AGE war required to redistribute some of its effort; on the other hand some partners needed to use extra effort during the period. Details are provided below.

P01 - CNR IFC

CNR participates in the project with two Institutes: CNR IFC and CNR ISTI. CNR effort in WP5 (1 PM) was erroneously allocated in the DoW to CNR ISTI instead of CNR IFC. In addition CNR IFC has claimed extra effort in the following Work Packages:

WP4: Human Activity Recognition: Additional physiological tests with DOREMI wristband carried out at CNR IFC site with a new group of elderly volunteers (November 2015).

WP6: Enrollment of new subjects for living lab activities, participation in the clinical tests to ensure safety and measurements of the physiological parameters.

As mentioned earlier in this report, CNR IFC made professionals available for clinical activities during the baseline, training and final evaluation of the trial in UK. This has entailed a stay of 37 days for CNR-IFC experts on cardiovascular function and nutrition at the Extracare pilot sites of Shenley Wood, Milton Keynes, S. Crispin, and Northampton, from 07/01 up to 04/02/2016 and from 5/04 till 12/04/2016. As the aim of the coordinator was to ensure the success of the WP6 tasks and the validation of the platform in the pilot sites, CNR IFC will not claim more costs for effort used in these activities.

Additionally, CNR IFC drafted the guidelines on physical activity and diet that were necessary for

training Extracare and Accord staff involved in the clinical trial. A slide presentation was made available for training purposes at the UK villages, and training activities for the impedance meter (BIVA) use and for the physical tests to be carried out in UK and in IT sites were carried out.

WP7: Extensive work (not foreseen in the DoW) with UOC for the definition of a methodology for ownership sharing. Preparation of a table for the exploitation results and interview of several partners for IPR sharing.Submission of the DEMAGOS proposal at the JPI HDHL call in collaboration with PERSSILAA and NU-AGE projects.

P03 – MYSPHERA

One of the reasons for MYPSHERA to overspend in WP6 is due to the fact that during November 2015 a data collection in parallel with some refinement in the wristband firmware had to be carried out in addition to intense activities for the set up of the trials in UK.

P04 AIT

Although completed, AIT needed to use left resources in WP3 and WP4 to finish and update tasks in WP3 and WP4 as the "wish list" and "bug list" after the UK trials proved quite long.

P07 – IMA

IMA overspent in the effort on dissemination and exploitation activities (WP7), reacting on opportunities that emerged during the current period of the project.

P08 – AGE

According to the Commission and reviewers recommendations, AGE released 4,51 PMs that have been redistributed as follows:

- IMA: 1,2PMs
- MYSPHERA: 1,4PMs
- CNR IFC: 1,4PMs
- UOC: 0,51 PM

P11 – ACCORD

Much more effort was spent on WP6 than had been envisaged for Accord. There was particularly intense activity for Field Trial recruitment during October and November 2015 by Accord's main DOREMI Field Trial team (made up of five staff). This was needed because it was found that the number of Accord's residents who both (i) wanted to take part and (ii) met all the various inclusion criteria was *extremely* small. This meant that recruitment activity had to be extended from the planned 2 – 4 schemes to an eventual total of 20 schemes spread out across a large area (55km radius approx.). The final recruitment success rate for Accord customers for this project was 1 in 1,000 customers, significantly lower than Accord's experience with other research projects.

The figure below shows effort spent per partner from the beginning of the project and remaining effort.
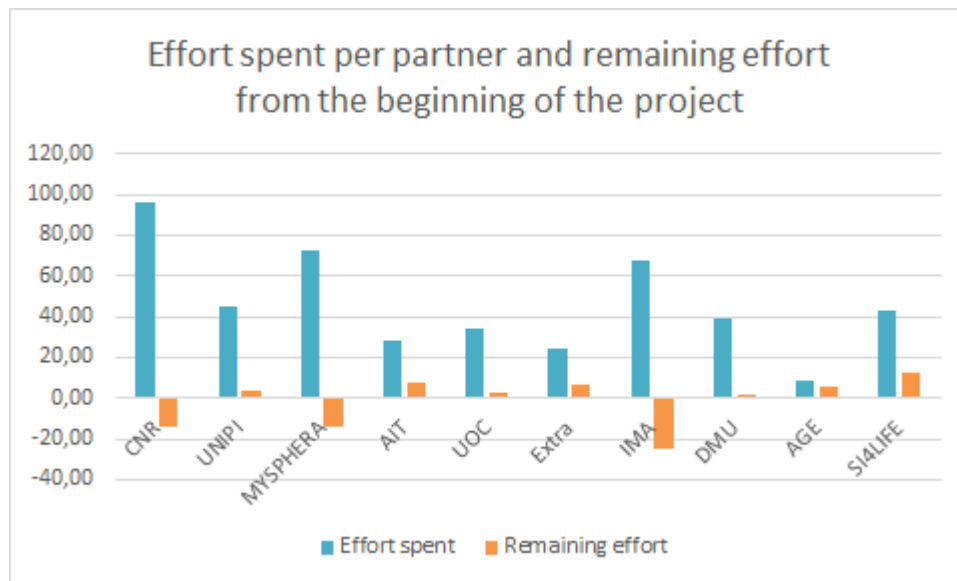
Figure 2: Overview of spent and remaining effort per partner from the beginning of the project.

Costs

As shown in the table below, total costs incurred by the consortium in the period under consideration (M25-M30) amount to € 541.185 excluding indirect costs. From the beginning of the project, 87% of the total project cost have been used (indirect costs excluded). Breakdown of the costs shows that expenditure relates mainly to personnel costs (81**%** and 91% of cumulative personnel costs calculated over the DoW).

A budget transfer of 20.000 € from Accord to Extracare took place at the end of December 2015.

Table 7: Personnel and other major direct costs per partner incurred during the period

| Personnel, subcontracting and other major Direct cost items				
Interim YEAR 3 (1 November 2015 – 30 April 2016)				
n.	Short name	Personnel costs	Other direct costs	Subcontracting Costs	Total costs
	CNR IFC	€ 36.589	€ 16.165	€ 2.000	€ 54.753
	CNR ISTI	€ 50.672	€ 8.210	€ 0	€ 58.882
1	CNR	€ 87.261	€ 24.375	€ 2.000	€ 113.635
2	UNIPI	€ 21.440	€ 4.442	€ 0	€ 25.882
3	MYSPHERA	€ 42.824	€ 27.912	€ 2.000	€ 72.737
4	AIT	€ 39.445	€ 5.443	€ 0	€ 44.888
5	UOC	€ 22.867	€ 1.700	€ 0	€ 24.567
6	Extra	€ 23.460	€ 5.180	€ 0	€ 28.640
7	IMA	€ 59.735	€ 3.451	€ 0	€ 63.187
8	DMU	€ 44.878	€ 3.546	€ 0	€ 48.423
9	AGE	€ 20.720	€ 139	€ 0	€ 20.858
10	SI4LIFE	€ 46.936	€ 4.075	€ 0	€ 51.011
11	Accord	€ 29.704	€ 17.653	€ 0	€ 47.357
	Total	€ 439.270	€ 97.915	€ 4.000	€ 541.185
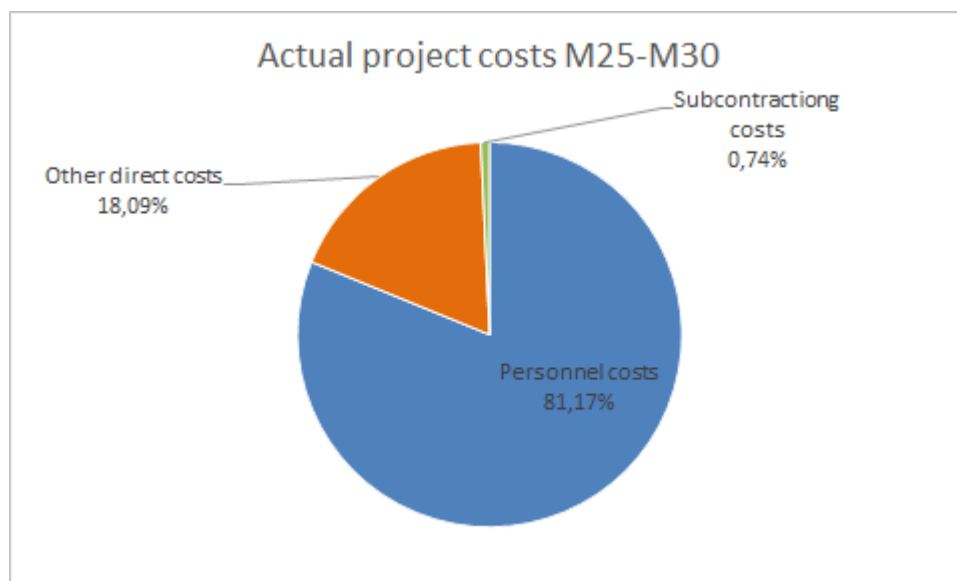
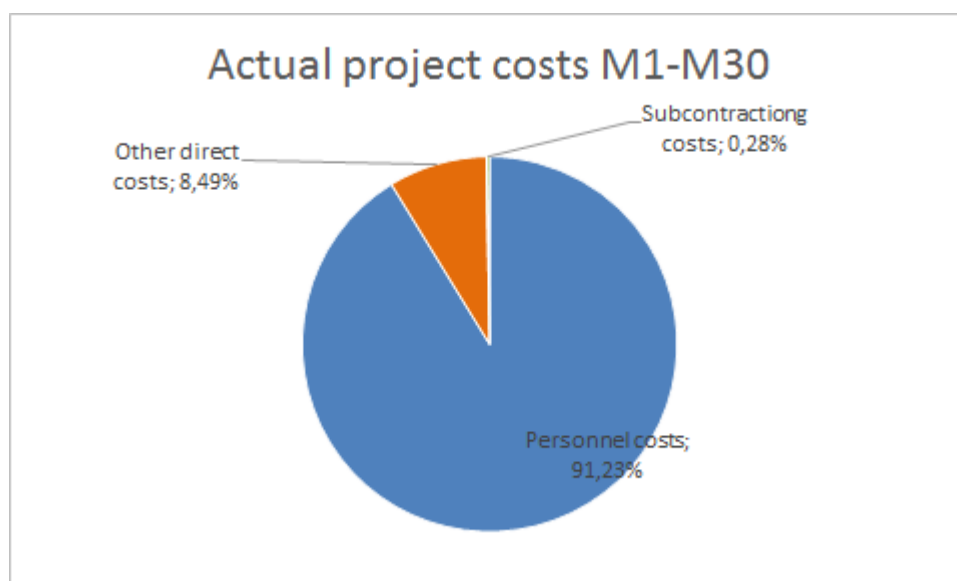Figure 3: Project costs M25-M30 (excluding indirect costs)

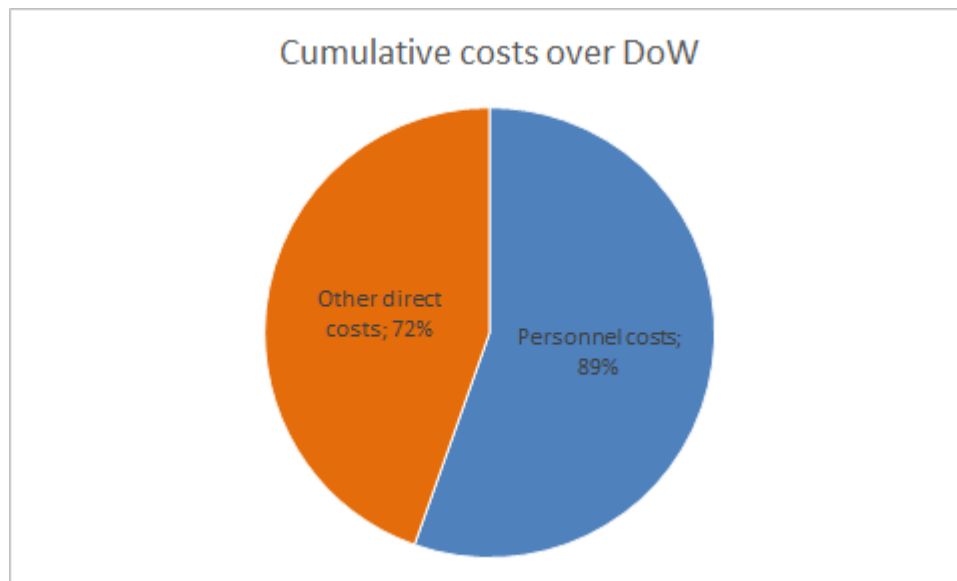Figure 4: Project costs M1-M30 (excluding indirect costs)

Figure 5: Cumulative costs (excluding indirect costs) over DoW

- **Impact of possible deviations from the planned milestones and deliverables (if any)**

Not applicable

- **Changes of the legal status of any of the beneficiaries (if any)**

No changes in the legal status of the partners occurred.

- **Development of the project website (if applicable)**

The DOREMI project has established and operates its official website (www.doremi-fp7.eu) since mid-April 2014 under the responsibility of the Coordinator, CNR IFC. The internal area can be accessed by the project members only, and operates as a web-based collaboration tool and repository, collecting all project materials and information so that they can be easily retrieved and downloaded by the partners. Additional functionalities may be implemented in the time-course of the project.

The website is constantly updated.

- **Co-ordination activities during the period (communication between beneficiaries, possible co-operation with other projects/programmes)**

DOREMI is outward-looking and welcomes expressions of interest in collaboration. Following collaborations with other consortia are in place.

1. DOREMI and NU-AGE, both FP7 funded projects, are interacting on diet protocols. CNR IFC and University of Bologna, coordinators of the above mentioned projects, have submitted a JPI HDHL (Joint Programming Initiative – a Healthy Diet for a Healthy Life) joint proposal.

2. Thanks to CNR IFC initiative, DOREMI is now included in two Action Groups of EIP-AHA A3 Frailty, Food and Nutrition

A3 Area 1 - *Screening and assessment of malnutrition as a risk factor for active and healthy aging* in which CNR IFC is committed in the following tasks:

- 5.1 Objective: Manage frailty and functional decline through targeted intervention: Develop physical exercise training programs and physical activities tailored to older frail people and with functional decline.

- 5.1 Objective: Manage frailty and functional decline through targeted intervention: Develop nutritional and hydration plans, and cognitively, physically and intellectually stimulating social activities to improve independent daily living and mental wellbeing in target populations.
- 5.1 Objective: Manage frailty and functional decline through targeted intervention: Software programme and ICT devices for feeding and food related tasks.

A3 Area 3 - *Prevention on functional decline and frailty*: commitment submitted in April 2016

In addition, collaboration with the PERSSILAA FP7 project on ICT solutions for independent living and active ageing of pre-frail and frail elderly, has recently started.

3. DELIVERABLES AND MILESTONES TABLES

3.1 Deliverables

Table 8: List of deliverables

DELIVERABLES										
Del. no.	Deliverable name	Version	WP no.	Lead beneficiary	Nature	Diss. level[1]	Delivery date from Annex I (Project month)	Actual/ Forecast delivery date	Status Not submitted / Submitted	Comments
D1.1	Project Management Plan	1	1	01 CNR	R	PP	1	03/01/2014	Submitted	
D2.1	Target users and scenarios of use	1	2	01 CNR	R	PU	6	24/04/2014	Submitted	
D1.2.1	Interim Progress Report	1	1	01 CNR	R	PU	6	16/05/2014	Submitted	

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[1] **PU** = Public

PP = Restricted to other programme participants (including the Commission Services).

RE = Restricted to a group specified by the consortium (including the Commission Services).

CO = Confidential, only for members of the consortium (including the Commission Services).

Make sure that you are using the correct following label when your project has classified deliverables.

EU restricted = Classified with the mention of the classification level restricted "EU Restricted"

EU confidential = Classified with the mention of the classification level confidential " EU Confidential "

EU secret = Classified with the mention of the classification level secret "EU Secret "

	(Period 1)									
D7.7	DOREMI web site and press release for the EC	1	7	05 UOC	P	PU	3	29/05/2014	Submitted	
D2.2	Active Ageing Lifestyle Protocol	1	2	10 SI4LIFE	R	PU	8	07/07/2014	Submitted	
D4.1	Data preparation and models assessment specification	1	4	02 UNIPI	R	PP	8	07/07/2014	Submitted	
D3.1	Specification of Wireless Sensor Network for LifeStyle Protocol implementation	1	3	03 MYSPHERA	R	PP	9	11/08/2014	Submitted	
D7.1	Dissemination plan	1	7	05 UOC	R	PU	9	11/08/2014	Submitted	
D7.2	Exploitation plan	1	7	05 UOC	R	CO	9	11/08/2014	Submitted	*Resubmitted on 05/09/2014 due to formatting problems*
D7.8	DOREMI portal	1	7	05 UOC	P	PU	9	18/08/2014	Submitted	
D5.1	Gamified active ageing protocol	1	5	08 DMU	R	PU	8	30/09/2014	Submitted	
D7.5	Dissemination activities toolkit	1	7	01 CNR	O	PU	12	04/11/2014	Submitted	
D7.3.1	Updated Exploitation plan and business plan	1	7	05 UOC	R	CO	12	11/11/2014	Submitted	
D1.5.1	Quality and Risk Management report	1	1	01 CNR	R	CO	12	17/11/2014	Submitted	
D2.3	Validation plan	DRAFT	2	05 UOC	R	PU	12	25/11/2014	Submitted	*Submitted as draft version*
D1.2.2	Annual Periodic Report (Period 1)	DRAFT	1	01 CNR	R	PU	12	05/12/2014	Submitted	*Submitted as draft version*
D1.2.2	Annual Periodic Report (Period 1)	FINAL	1	01 CNR	R	PU	12	23/12/2014	Submitted	

D5.2	Game-based active ageing environment	1	5	07 IMA	R	PP	14	06/02/2015	Submitted	
D4.1	Data preparation and models assessment specification	Re-submitted after rejection	4	02 UNIPI	R	PP	8	20/02/2015	Submitted	*Re-submitted (The version submitted on 07/07/2014 was rejected by the Commission)*
D3.1	Specification of Wireless Sensor Network for LifeStyle Protocol implementation	Re-submitted after rejection	3	03 MYSPHERA	R	PU	9	20/02/2015	Submitted	*Re-submitted (The version submitted on 31/07/2014 was rejected by the Commission)*
D7.3.1	Updated Exploitation plan and business plan	Re-submitted after rejection	7	05 UOC	R	CO	12	20/02/2015	Submitted	*Re-submitted (The version submitted on 11/11/2014 was rejected by the Commission)*
D2.3	Validation plan	FINAL	2	05 UOC	R	PU	12	31/03/2015	Submitted	*Final version (submitted as draft version on 25/11/2014)*
D3.2	Wireless Sensor Networks, Integration Middleware and System Configuration	1	3	01 CNR (ISTI)	P	PU	18	30/04/2015	Submitted	
D1.3.1	Interim Progress Report (Period 2)	1	1	1 CNR	R	PU	18	30/04/2015	Submitted	
D1.3.1	Interim Progress Report (Period 2)	Revised version	1	1 CNR	R	PU	18	11/05/2015	Submitted	*Revised version (the description of one task was missing)*
D7.6	Dissemination activities report	1	7	01 CNR (IFC)	R	PU	18	11/05/2015	Submitted	
D6.1	Annotated data available And easy accessible	1	6	10 SI4LIFE	R	PU	22	31/08/2015	Submitted	
D1.5.2	Quality and Risk	1	1	01 CNR	R	CO	24	02/11/2015	Submitted	

	Management report			(IFC)						
D7.3.2	Updated Exploitation plan and business plan	1	7	05 UOC	R	CO	12	04/11/2015	Submitted	
D3.3	Production of units for pilots	1	3	03 MYSPHERA	P	PP	24	05/11/2015	Submitted	
D5.3	Exergames	1	5	07 IMA	P	PU	24	05/11/2015	Submitted	
D5.4	Social games	1	5	05 UOC	P	PU	24	05/11/2015	Submitted	
D5.5	Cognitive games	1	5	07 IMA	P	PU	24	05/11/2015	Submitted	
D6.2	Annotated data available and easy accessible	1	6	10 SI4LIFE	P	RE	24	05/11/2015	Submitted	
D7.3.2	Updated Exploitation plan and business plan	1	7	05 UOC	R	CO	24	05/11/2015	Submitted	
D5.3	Exergames	Updated	5	07 IMA	P	PU	24	30/11/2015	Submitted	*Updated version*
D5.4	Social games	Updated	5	05 UOC	P	PU	24	30/11/2015	Submitted	*Updated version*
D5.5	Cognitive games	Updated	5	07 IMA	P	PU	24	30/11/2015	Submitted	*Updated version*
D1.3.2	Annual Periodic Report (Period 2)	1	1	1 CNR	R	PU	24	04/12/2015	Submitted	
D7.3.2	Updated Exploitation plan and business plan	Updated	7	05 UOC	R	CO	12	24/02/2016	Submitted	*Re-submitted* *(The version submitted on 05/11/2015 was rejected by the Commission)*
D6.3	Annotated data available and easy accessible	1	6	10 SI4LIFE	P	RE	27	31/01/2016	Submitted	
D4.2	Activity recognition modelling and reasoning system development	1	4	02 UNIPI	R	PP	30	03/05/2016	Submitted	
D6.4	WSN and Context aware system validated in the	1	6	1 CNR	R	PP	30	03/05/2016	Submitted	

	living lab								
D6.5	Gamified environment validated in a virtual lab	1	6	05 UOC	R	PP	30	03/05/2016	Submitted
D1.4.1	Interim Progress Report (Period 3)	1	1	1 CNR	R	PU	30	03/05/2016	Submitted

3.2   Milestones

Table 9: List of milestones

MILESTONES							
Milestone no.	**Milestone name**	**Work package no**	**Lead beneficiary**	**Delivery date from Annex I**	**Achieved Yes/No**	**Actual / Forecast achievement date**	**Comments**
MS1	The Active Ageing Lifestyle protocol	WP2, WP3, WP4, WP5	1 CNR	Month 08	YES	07/07/2014	*Deliverable D2.2 Protocol approved and submitted to the EC. Content translated in functional requirements in WP3, WP4 and WP5.*
MS2	Final Selection of the sensors	WP3	3 MYSPHERA	Month 09	YES	30/09/2014	*Final list approved by the clinical partners according to the parameters identified in the protocol*
MS3	Preliminary data set collected from the selected sensors available for the data driven model of the context aware system	WP3, WP4	3 MYSPHERA	Month 12	YES	Achieved	*Approval of the final list of data by the WP3 leader and the SQM.*
MS4	Preliminary version of the WSN environment, Smart environment for Context awareness and gamified environment to kick off the living and virtual labs	WP3, WP4, WP5	01 CNR	Month 18	YES	30/10/2015	*In month 24 the work of WP3 officially ended with the delivery of the WSN system, which is going to be installed in month 26 in a collaborative work between WP3 and WP6 partners.*

MS5	Developed Sensors prototypes ready for the validation activities, WSN environment and auto configuration system ready for full integration *(Means of verification: Delivery of the bracelet/wristwatch and sensorized bed carpet prototypes (at least 6 prototypes each).Submission and formal approval of deliverable and prototypes included in D3.2 by the SQM)*	WP3	03 MYSPHERA	Month 24	YES	30/10/2015	*N/A*
MS7	Social and gamified environment ready for integration *(Means of verification: Submission and formal approval of deliverable and prototypes included in D5.3, D5.4 and D5.5 by the SQM and WP leader . The set of tests carried out both in the living lab and in the virtual lab have been successfully completed)*	WP5	07 IMA	Month 24	YES	30/10/2015	*The 'social and gamified environment' was delivered by Month 24, nevertheless, some minor changes, needed to complete the integration with the Kiola server and to fix some bugs, will be done also during Month 25 and Month 26. In these months, different releases will be delivered and tracked in the 'release notes' file (attached to the prototype and continuously updated).*
MS8	DOREMI platform fully validated in the living lab and ready for the pilot implementation *(Means of verification: All the prototypes released by the WP3, WP4 and WP5 have been tested in task 6.2 and task 6.3 and have successfully completed the integration)*	WP6	10 SI4LIFE	Month 28	YES	28/02/2016	*DOREMI platform verified and installed at pilot sites for T6.4 activities.*

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