AAL Programme

Call for Proposals AAL-2015

Cover Page

Application areas addressed:	decision and control of daily activities social participation and wellbeing
Proposal full title:	**NOT ALONE AT HOME**
Proposal acronym:	**NOAH**
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Section 1: Relevance and Scope

1.1 A short summary of the challenge addressed and the overall project idea

RATIONALE

The NOAH (NOt Alone at Home) proposal addresses the theme of supporting independent life of older adults living alone, by empowering them in daily life activity self-management, by providing them with a more effective connection to their supporting networks (relatives, friends, caregivers) and by augmenting their safety and perception thereof.
In fact, besides objective needs related to healthcare and to compensation of possible impairments, being able to live independently also depends on subjective perceptions, such as feeling safe and comfortable while alone at home. For instance, in the AALIANCE2 ROADMAP [1,2] a holistic-oriented list of requisites for independent life is given, which includes:

- *a secure environment*
- *contacts with friends and family, giving reassurance*
- *physical, social and mental stimulation*
- *certainty that, in need, carers will come*
- *relying on appropriate responses when in troubles*
- *peace of mind*
- *…*

That is, even when not requiring constant care, chances of ageing at home are often jeopardized by the fear of being in need of help while unattended or of not being able to deal with daily living disparate tasks. Peace of mind is therefore a primary key for independent life. To this purpose, the NOAH proposal envisages a "light-technology" approach, based on inexpensive and unobtrusive monitoring techniques, on familiar and accessible interaction tools and on cloud-based data processing. NOAH system will mostly address user's needs related to safety, adherence to daily living prescriptions (therapies, physical activity, etc.), motivation and self-esteem, participation in social life. Exploiting accumulated knowledge about user's activity and needs, NOAH will provide the user with context-sensitive support.
The proposal addresses almost-fit elderly people, not suffering from major medical conditions or severe disabilities, dealing with (or being at risk of) age-related issues, including frailty, mild mental health ailments and cognitive decline. The proposal mostly focuses on **elderly living alone**, who represent a growing fraction of the elderly population and are likely to get the most benefit from the proposed technique. The NOAH system does not aim at implementing an "automatic" assistive tool, but instead at effectively integrating and complementing (family) caregiving practices in a two-sided approach: from the end-user point of view, effective tools will be provided, helping in planning and dealing with daily living activities in a safer and more effective fashion, also involving motivation and social engagement. From the (family) caregiver perspective, increased perspicacity will be attained by means of continuous, unobtrusive behavioral monitoring and information fusion techniques, providing objective measurements and detecting anomalies not necessarily evident at human, discontinuous observation.
Therefore, the main expected outcome consists of an overall increase of the effectiveness of caregiving practices, acting from both the demand side (gain in end-user self-confidence and autonomy) and on the offer one (empowering caregiver insights). Although the application scope is potentially much broader, the proposal focuses at a specific **business perspective**, mostly oriented at private users (directly supported either by family or by homecare services). Aiming at such goals also reflects on specific design constraints:

- **Intervention cost** should be affordable, sustainable and justified by clear value proposition. Hence, marketability studies and deployment strategies will be at the core of the design flow. A tentative cost figure in the 1k-2k € per user (projected on small-scale production, depending on actual service configuration upon specific needs, home characteristics, etc.) seems to be reasonable and, based on previous experience, within practical reach.
- Design efforts should be primarily aimed at **service deployment**, besides basic technology development. The NOAH proposal is based indeed on an almost complete layer of validated basic technologies, to be harmonized in an innovative service view and thoroughly tested through pilot studies. I.e., giving for granted proof-of-concept and feasibility studies, most technical design will be devoted to accessible and incisive interaction techniques, to devise and test simple and reliable installation and maintenance procedures, to develop automated behavioural analysis services, to deal with system ergonomics, accessibility and user acceptance. The "last mile" toward a practical and usable service will be therefore at the very center of a user-centric design process, involving users and stakeholders in the service specification phases as well as in extensive testing and iterative tuning.

In summary, we expect the project to result in a complete, ready-to-use package, suitable for enabling families and homecare providers to easily install, manage and operate NOAH services out-of-the-box, as described in deeper details in following sections.

THE OVERALL IDEA

A simplified view of the NOAH concept is given in Figures 1 and 2, referring to the home and the general system architectures, respectively.
Main components are detailed below:

Smartphone: smartphones are by now a familiar tool, even to elderly people, and, through the app concept, can be finely tailored to specific user's needs and preferences, also compensating for visual and hearing impairments. A great deal of processing power is available in modern devices, even at relatively low price tags. Within the NOAH vision, the smartphone hence plays a multifaceted role. First, it will provide the main interaction channel toward the user, implementing personalized user interfaces. Similarly, service aimed at the caregiving network will be provided through specific app development. Then, smartphone-embedded sensors will contribute to the overall behavioral monitoring functions, allowing for extending the system operating range beyond home boundaries. Finally, the smartphone will also provide the main gateway connecting home and personal sensors to the internet cloud, where data analysis, driving system feedback, will be carried out.

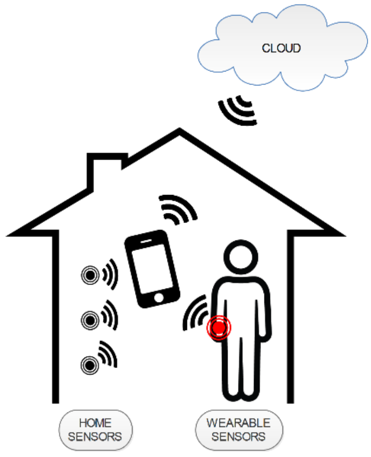


Figure 1- NOAH system overview: home

The **HOME kit**: the NOAH's perceptive layer will be constituted by simple wireless sensors, aimed both at security functions (e.g., gas leak, smoke, water flood) as well as at providing information about end-user home activity (e.g. detecting room presence, appliance use, bed occupancy, entrance door opening, toilet flush, etc.). The sensor set will be largely based on already-existing technology, relying either on commercial devices or on technologies developed and validated in previous (AAL) projects. No technical skill will be required for sensor installation and no management will be required: a "plug & play" approach will be implemented, allowing for self configurable, expandable and "portable" sensor network. I.e., upper system layers will automatically account for network expansion and modifications, allowing the user to add new functions as and when needed, simply by deploying a new device into the home. Besides sensors, a small/cheap home hub will deal with basic network supervision and bridge among different wireless communication standards.

Optional **personal** (wearable) **sensors** will be accounted for as well, whenever detailed physical activity monitoring functionalities will be needed. Alternatively, basic functions will be made available through the smartphone itself, exploiting the featured embedded sensors. The smartphone, however, is not suitable for accurate and reliable quantitative measurements of physical activity, as required, for instance, by fall detection and gait quality assessment. Such measures may require a relatively precise and stable body position reference, which is not compatible with the smartphone size and weight, as well as with its intended usage. In this case too, already existing technologies will be exploited: the wearable device MUSA will provide the starting platform. By connecting MUSA and the smartphone in a body-area network configuration, several monitoring functions will be seamlessly extended to outdoor activities. Also, integration of commercial body-worn devices, such as shoe pods and fitness bracelets will be considered.

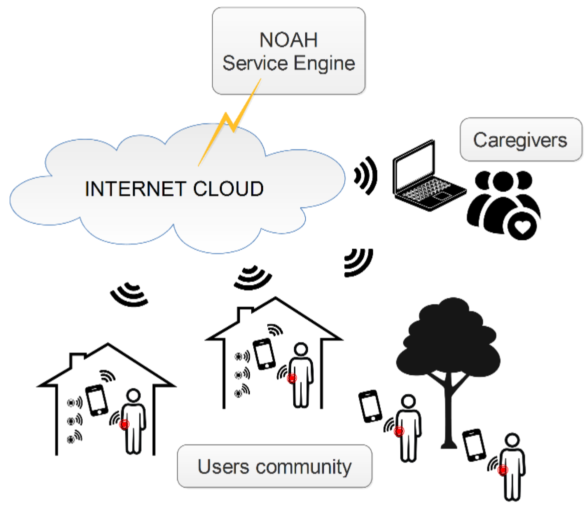


Figure 2 - NOAH system overview: general

The **NOAH cloud services** will account for collection, gathering and processing of data coming from the heterogeneous sensor network and from user's interaction. Cloud services will power apps dedicated to the end user and to the caregiving persons. At this level, all issues related to data security and privacy will be dealt with, implementing secure communication protocols and user- and role-specific authentication techniques. Different prerogatives will be granted to different users, upon mutual assessment of roles: for instance, each end-user will be allowed to tag other users as "relatives", "caregivers" and "friends". Based on such classification, selected data will be shared among users, with different interfacing fashions. For instance, the "caregiver" will receive all notification related to user safety and health risks, will be allowed to access the network status and to connect to the user, while the "friend" user will receive only intentional messages related, e.g., to social or and goals achievements. At the core of the cloud-based service, a data analysis module (**Behavioral Analysis Module**, BAM) will search the user data space for meaningful behavioral patterns. Data will be fused there, implementing unsupervised anomaly detection techniques (i.e., searching for relative changes in the customary behavioral patterns, as extracted from the sensor picture as a whole, not implying a common reference for "normal" behaviors) as well as more specific indicators, related, for instance, to sleep patterns, quantitative and qualitative assessment of physical activity, compliance with personal goals, etc.

Based on BAM outcomes, different **APP modules** will cast personalized feedbacks toward different users, based on their role and prerogatives. Two main apps are foreseen, targeting the end-user themselves and the caregiving network around them. The **End-User APP** will feature high accessibility, ease of use and will allow the user to get information on:

- System status (simple, "traffic-light" approach aimed at reassuring the user of proper functioning, fostering his trust plus basic indicators prompting the user about minor maintenance requests, such as battery replacement);
- Daily living agenda: he receives reminders about medical treatments or appointments, planned activity, etc.
- Attention needed: the user is notified about alarms (e.g., main entrance door not closed, flood) and unusual home facts (the door fridge is left open, water flows through the main inlet since too a long time,…)
- Daily personal goals management: the user may specify personal goals (e.g., want to walk for at least 30 minutes a day), to be checked by the BA module. The user gets feedback about achievements of his planned goals and receives suggestions/reminders about daily activity completion and improvement. For instance, BAM could discover a decreasing trend in physical activity, and suggest, in a friendly and motivational fashion, some additional step to match the aimed "score".
- The user can decide to share notifications with friends, either related to personal achievements or to social opportunities (e.g., "*going for a stroll in the park, want to join* ?")
- The end-user app also manages assistance requests, either based on user's intentional request (through the app itself or a call button) or based on automatic detection of risky conditions (such as falls), the app connects him to designated caregivers.

The **Caregiver APP**, instead, provide an information picture taken from a different angle:

- It allows to get at any time an overall check of system proper functioning, receiving in "real time" any technical alert (battery low, communication down, faulty sensor, …) or alarms (flood, etc.)
- Allows to look at the current "snapshot" of sensor status and at a simple and understandable timeline presentation of end-user activity, from which an intuitive understanding of the current situation can be gained (see example in Figure 3, taken from current CARDEA research a UNIPR). For instance, such a simple timeline feature should help if the care-receiver had a troublesome night, waking up frequently and not remembering it at morning.
- Beside direct inspection of sensor data, the BA module, operating in the background, helps in recognizing more subtle signs, possibly related to health or cognitive issues. The caregiver app make caregivers aware of such findings through trend analysis and anomaly detection, leaving however actual interpretation up to them and their knowledge.
- Caregivers can also interact with end-user app, by sending notifications, messages or phone calls.
- At any time, designated caregivers may also query the system for care-receiver GPS location.

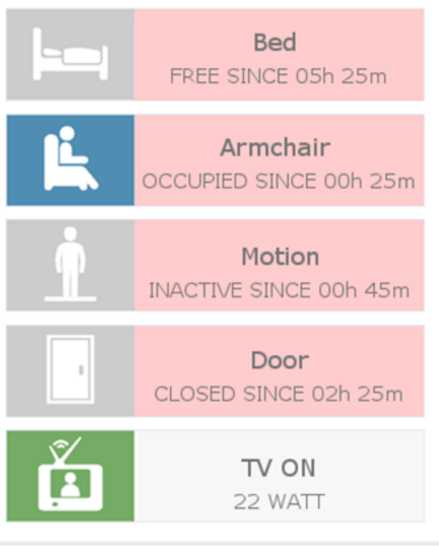


Figure 3 - sample sensor status screenshot

Summarizing, main NOAH innovation should consist of:

- Developing a practical, usable and accessible monitoring technology, within stringent cost constraints. Design efforts will focus also at **service deployment** strategies.
- A scarcely intrusive approach will be sought for, aiming at "**plug & play**" methodology, in which configuration needs are reduced to a bare minimum and driven by automatic procedures. The home architecture will be drastically simplified, accounting for flexible solutions and not necessarily implying any further infrastructure (just deploying sensors, with all services residing in the cloud environment).
- Implementing a cloud-based **Behavioral Analysis Module** consistent with the cost and unobtrusiveness constraints mentioned above

- With respect to more conventional AAL approaches, NOAH will cover a domain wider than the home environment alone, accounting, to some extent, for **outdoor behavior** as well.
- Developing an **innovative business model**, mostly oriented to private (self) care or homecare private provision. Value proposition to this (growing) market is likely to be much more straightforward. Public entities enters the picture as well, and are regarded here as secondary/tertiary beneficiaries (i.e., homecare services are often subcontracted by public services, and inherent prevention aims of the NOAH vision will eventually bring benefit to the healthcare system too).

SPECIFIC CHALLENGES

Although relying on demonstrated technology basis, the NOAH proposal entails a number of demanding challenges.
From the **user perspective**, we shall need to devise an interaction strategy (and related interfaces) suitable for inspiring user's trust and engagement, being perceived as useful and usable, yet not intrusive. Also, user experience design will need to account for flexibility, leaving the end-user in charge of selecting his personal choice of features and allowing him full control over sensible data sharing, fully taking into account ethical issues and thus preserving the users' human dignity. Effective implementation of user-centric design principles are therefore at the very center of the whole project. The project will take a co-creative approach, involving elderly users and stakeholders in defining needs, contributing to ideation and providing feedback on touchpoint prototypes and service concepts.
From the technical perspective, besides inherent interoperability and cost-related issues, main challenging aspects regard the aimed plug and play approach, which calls for the ability of building self-configurable systems, both at the local (i.e., home sensor networks) and at the cloud-system level. A constant concern is that of making the whole system fully manageable without exacting technical skills from primary and secondary users. Self-consistent, reliable system management and installation procedure are thus inherently part of the service vision, as well as of the market strategy and will require to shift the design paradigm adapting technology to the user, instead of training the user to technology itself. Also, the aimed behavioral analysis module (see below) will have to deal with a wealth of different situations: in agreement with the aimed plug and play vision, however, user-specific calibration procedures are to be avoided. In this vision, the anomaly detection/behavioural analysis engine should implement an (inherently challenging) non-supervised, self-adaptive approach.
Market-related challenges come from the need of identifying proper market placement for a product which has no predecessors: this implies a significant effort, besides technical developments, in eliciting market opportunities and in overcoming the current lack of potential users' awareness. Therefore, innovative communication strategies are critical to the project mission.

1.2 Alignment with the call challenge

In the following, details concerning alignment and consistency of the NOAH proposal with the call challenge are given, with reference to quoted call text fragments (*italics*).

*"The 2015 Call Challenge of the AAL Programme aims to fund ICT based innovative, transnational and multi-disciplinary collaborative projects with a **clear market orientation**…"*

The NOAH project articulation is indeed straightforwardly oriented to the market deployment. We start from the observation (based on previous experiences of consortium members) that the most limiting factor to AAL technology diffusion is rarely the intrinsic technology performance, but most frequently the difficulty in getting it properly received by users, in dealing with installation, configuration and maintainance, in making its function understandable and perceived as beneficial. Within NOAH planned activity, therefore, design focus will shift from technology devices to **service conception and deployment.** Consistently, the workplan accounts for a user-participated design process, aiming at fostering user acceptance "by construction" and including the market perspective in the design flow since the very beginning. Also, great attention will be given to communication strategies aimed at market penetration.

*"…that support older adults to live: Independently for longer, meaning **with as little (professional) help as possible** and **with choice and control** over the decisions, equipment and assistance. Actively in the sense of staying in charge of their own lives and **participate in society** the way they want."*

The NOAH project mainly aims at supporting self-trust and peace of mind in dealing with daily life activities. Proactive support strategies (reminders, management of personal goals, social engagement) are coupled to safety-oriented features and to unobtrusive behavioral monitoring, aimed at early detection of behavioral anomalies. Hence, the end user is supported in self-management of daily routines and his perception of safety is increased by the awareness of a "safety net" based on being continuously (yet unobtrusively) monitored. Help providers (family

members or professional caregivers) may take advantage of monitoring tools as well: information coming from NOAH cloud allow them to be constantly aware of assistance needs of the cared persons and to get early warning of potentially troublesome issues, which may remain unnoticed otherwise. This result in possibly reducing the intensity of required help, at the same time increasing its quality and effectiveness.
Participation in the community life is also fostered by increased self-reliance and by including social-oriented features in the NOAH aimed experience.

"*The key priority for the projects should be to provide and to pilot ICT-based solutions that will support older adults in their homes which: integrate existing technologies or develop technologies and infrastructures into easy to use, affordable and sustainable solutions that address a range of needs. Have a high potential to be commercialised and scalable"*

Ample recourse to existing technologies (either commercial or coming from previous research activity) will be accounted for indeed. This will allow for early start of piloting phases and to concentrate efforts, besides (already assessed) basic functionalities, on ergonomics, usability, accessibility as inherent components of the business model and on the behavioral model supporting the system. The cloud-based aimed architecture contribute to both the affordability (by minimizing home-based equipment) and scalability. Also a key to sustainability and scalability consists of the plug and play vision of systems. By requiring no technical training for installing and operating the NOAH service, the system lends itself to easily fit different use cases, ranging from family-based scenarios to professional homecare providers, easily integrating and complementing pre-existing practices.

1.3 An example scenario

Dagobert is a 72-year old man. He retired five years ago, and lives alone, with his children living in a different city borough and visiting him during the weekend. He suffers from blood high pressure and hypercholesterolemia, and starts having occasional memory lapses. Since his wife passed away, he often feels lonely and depressed. Due to this, his children would prefer him to move to a retirement home, located closer to where they live, and offering professional caregiving services. Dagobert, however, feels uncomfortable with this: although he realizes he may need some help, he would prefer not to leave his own home, packed with family memories, and the neighborhood where his lifelong friends live. Together with his family, he then decide to look for NOAH system support: he start browsing the NOAH website: example are given there, in a simple fashion, to help him in selecting the most appropriate set of functions for his specific needs. Since he is worried about memory lapses, Dagobert and his family include in the "service basket" safety alarms, medication reminders, outdoor localization, and others. After a few days, the personalized kit is delivered at Dagobert's home: installation just imply placing each sensor in its aimed position and push a button; once done (with some help from his family or by –technically untrained-caregiver), Dagobert is reassured about proper functioning of the sensor by the NOAH-app which was downloaded to his phone.
Through the app itself, Dagobert can now set his personal goals: want to walk for at least half an hour a day, need to take pills at 8am and 4pm, don't forget to watch his favorite TV show, go to the general practitioner once a month, …
After some time of usage, the system "gets acquainted" with Dagobert and unobtrusively monitors his habits. The app reminds Dagobert about pills and other appointments or duties. Also, NOAH keeps him aware of progresses toward his personal goals: a daily "score" bar encourages him to match his own proposals. Based on the "community" rules he has defined, friends can be involved in his activities, or simply made aware of it, maybe to set up shared activities as well.
He decides to go out for grocery shopping, but forgets making his morning call to his doughter, who is already at her working place. She accesses her app and is immediately reassured by looking at the morning timeline: her father woke up and attended his morning routines as usual. She notices there is no current home activity, so she ask the system for Dagobert's current location, as of the last GPS localization. Once reassured (Dagobert is on the familiar road to the shopping center) she drops a cheering message to his father, and gets back to work. In the meanwhile, the BA Module notice the average walking speed is significantly decreased over the last two weeks. While Dagobert receives incitement and encouragement, the designated caregiver is informed about this. By exploiting NOAH history feature, he discovers also a less regular feeding pattern (made evident by kitchen sensors) and that an increasing amount of time was spent watching TV. Suspecting a depressed mood, Dagobert's family then arranges for some additional visit during the week and for a home barbecue with friends on Sunday morning.

1.4 Success parameters of the proposal

In the following table, a schedule of significant and verifiable issues is listed, which can be used to monitor project progresses. Three categories of indicators are considered, consisting of project milestones achievements, of objective evaluation feedbacks from users and stakeholders and of relevant dissemination events.

Parameter	*Project month*	*Goal/verification*
User involvement	3	Number of end-user involved in user studies ≥ 10/pilot country
Service specification release	6	n/a
Pilot start	13	n/a
First user survey (primary and secondary users)	18	Average satisfaction > 50%
Service 2nd release	24	n/a
Second user survey (primary and secondary users)	30	Average satisfaction > 50%
Number of peer-reviewed scientific publications	36	≥ 5
Number of media citations	36	≥ 15
Voluntary pilot user withdrawals	36	< 5%
Users willing to keep using the NOAH system after project's end	36	> 30%

Section 2: Quality of the Proposed Solution and the Workplan

2.1 Technology methodology

In the following, the technical aspects involved in the project development are described. First, an overview of the services the consortium plans to develop, test and exploit on the market will be given. Then, the system infrastructure will be discussed, focusing on how data will be collected. Finally, how to deal with such data and what information to extract from them will be discussed. Some references are provided as well, useful for better framing the work proposal.

2.1.1. Overview of the system and service architecture

At the very heart of the technological side lies the ability to sense, capture and model seniors' habits and routines, being able to discern and detect anomalous patterns and trend changes. This goal can be accomplished by deploying a network of sensing devices, which can be of different nature and purpose, e.g. smart phones, wearable devices, environmental sensors. Data fusion and interpretation are then to be performed by advanced automated analyses, which can be tailored to the specific user's needs. Finally, the results of such analyses are returned as feedback or indications to the end users (seniors on the side of primary end users, informal and formal caregivers on the other side) via different, specialized user interfaces. A schematic representation of the system architecture is reported below.

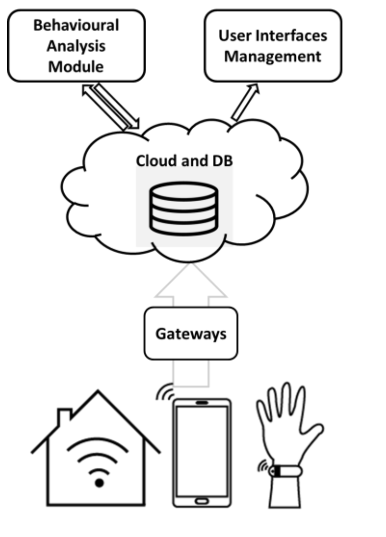


Figure 4 – NOAH system structure

A person who agrees to use the NOAH services will allow the system to collect information on his daily routines, which will be monitored via different methodologies. In fact, information can be extracted by simple environmental sensors (e.g. presence by Passive InfraRed sensors, activities from reed sensors, power meters etc.) as well as from small wearable modules or even from the smart phone itself (e.g. gait from Inertial Measurement Units, coarse localization from wireless signals or GPS etc.). Together, those heterogeneous sensors form the Data Acquisition Layer (DAL).
Sensors within the DAL collect and transmit data wirelessly, to allow for a minimal system setup invasiveness and effort. Depending on the kind of sensor, such data will be gathered by a suitable gateway, e.g. a smart phone can act as a mobile gateway for personal sensors, whereas an "home" gateway could deal with the home sensing devices. Not all the sensors will stream data in real-time; instead, in order to improve energy efficiency, data will be made available on-demand by gateways, which will

then take care of periodically filling a Data Base (DB) hosted on a Central Server (CS).
The approach to data management and transmission will be integrated (from hash structures to flows-streaming), being provided by an "Intelligent Network" (IN) functionality of the Cloud, in order to allow self-management of service by the stakeholders.
The project is in-line with "internet of-things" paradigm and with trends of 5G mobile communications.
A Behavioral Analysis Module (BAM) will then parse the sensors' raw data, stored in the DB, and look for interesting and meaningful behavioural patterns.
The processed data is then made available to the end users via a Web Application Server (WAS). Different User Interfaces (UIs) are offered, depending on the user, namely the subjects, the informal caregivers (relatives etc.) and the formal caregivers.

2.1.2. System infrastructure

As introduced before, the system could be viewed as composed of a Data Acquisition Layer and a Data Analysis and Interpretation Engine. As far as the former is concerned, we describe here the technical infrastructure which forms the basis to implement the desired sensing functionalities.
Basically, two macro-types of sensors are be involved: environmental and personal/wearable.
Environmental sensors are those traditionally associated with home automation services, exploited here also for collecting information about the user's behaviour. A table of useful environmental sensors and their associated behavioural information is provided below:

Passive InfraRed (PIR)	Simple sensors usually found in homes/structures to detect movement and, for example, automatically switch on lights. These sensors, thus, inherently carry presence information, which can be used to reconstruct, at a coarse level, the user's movement patterns in the house.
Humidity, temperature, luminosity	These sensors could provide both context as well as trace user's preferences.
Door, window, drawers etc.	Sensors mainly based on reed switches. A part from detecting openings/closing, which could be security features (especially for home door and windows), those sensors can act as "interaction sensors", i.e. they can detect when the user interacts with them. An example is the detection of accesses to the fridge or pantry.
Bed/chair occupancy	Similar to load cells, they can detect pressure and can be placed below chair cushions or bed mattress. Can provide information about user's rest patterns.
Power meters	Can monitor usage of electrical appliances (e.g. TV, bed lamp, oven, etc.).
Water flow	Can measure water consumption. Useful for tracing part of the Activity of Daily Living (ADL).

The aforementioned sensors already exist and were successfully integrated in the CARDEA home automation system [3], developed by UNIPR partner. Thus, no much efforts will be devoted in devising new technology in this sense, but rather the focus will be on how to effectively deal with the hidden behavioural information in the raw sensor data [4].
Another category of sensing devices will target more specifically the user, and trace its patterns even outside the home environment. Such sensors can be referred to as "personal" and can include wearable devices or smartphones. The purpose of those nodes is to collect data which are complementary to the information provided by the environmental sensors and to provide insights about user's behaviour in the outdoor environment as well. Within the NOAH project, such sensors will be mostly exploited for inferring early symptoms of possible diseases (such as wandering behaviour connected to dementia, or freezing patterns prodromic to Parkinson's disease). To this purpose, strict collaboration between IT designers and medical advisors in UNITBV will be exploited.
All the data coming from environmental and wearable sensors need to be gathered and logged into a DB hosted on a central server for further processing. Gateway and supervision technology will be based on the CARDEA system, already dealing with this and already extensively tested on the field (since 2007). On the other hand, wearable devices could stream data via a BlueTooth Low Energy (BTLE) connection to the smartphone, which will act as a gateway to the DB itself. In order to improve energy efficiency and expected battery life, not all sensor will stream data in real-time; instead, data could be stored locally and streamed only on demand.
The data server will be cloud-ready in terms of licensing and features. For scalability purposes, servers will be added on demand on the Cloud, allowing for automatically rebalance the computational demand. Disaster Recovery (DR) will be accounted for, by placing a primary server on-premise and a stand-by one on the Cloud. For added security, the stand-by server will feature a virtual private cloud.
Some research tasks will deal with optimization of heavy data traffic. The Intelligent Network functionalities (IN) are based on logical/physical separation, enabling service integrators to access as much of the resources as their skills allow (in-depth of the IN layers). This future-proof approach will enable easy creation, adaptation (customizing), portability and even real-time migration of service processing inside Cloud sub-nets.

- Service creation and, mostly, customization should be available as IN-SCE (Service Creation Environment) in the Cloud, compliant with the Service Independent building Blocks (SIB) model with I/O data that are specific to signaling (CID – Call Instance Data) and to computation (SSD – Service Support Data).

- IN-SMP (Service Management Point) will be the structured service repository, with most of interoperability due to FSL (Flexible Service Logic) multi-format service specifications – e.g. with XPDL (XML Process Definition Language) / BPEL (Business Process Execution Language).
- According to object-oriented models, FSL will be deployed/instantiated to run in the Cloud server – at the main SCP (Service Control Point) level of the IN model. Active Assisted Living will take benefit of the Subscriber model – with IN profiles in Home/Visited Location Registers, based on CSI (Customized enhanced logic Subscriber Info).
- NoAH will prove that modern communication methods (introduced in global telecom networks) can be implemented at individual level, with a “personal-bubble” of services that can run in real time. Conceptually, the electrical Smart Grids “granularity” principle is applied by NoAH to individuals, but with “cutting-edge” instrumental and data and communication solutions.

The cloud will implement a reference model that link “data provider entities” with entities that are in charge with storing the information. The cloud activities will formalize the cloud services using WADL (Web Application Description Language) formalization. The data model will implement an XMLSchema enriched by semantic annotation.
The project will allow collecting and integrating data from various sources, providing high-reliability access and usage. The main functionalities of enterprise applications will be transfered to the mobile devices, and this can be done using a combination between a Cloud Computing environment and a set of well-defined services, because mobile platforms will use REST APIs, for example, to access data.

2.1.3. Data analysis

All the data, collected and stored in the DB as explained in the previous sub-section, is subject to automated analysis looking for interesting and meaningful user patterns. After processing, data is sent back to the users in the form of feedback and notification. It is possible to identify three different classes of users: *(i)* direct end-users, recruited in the framework of the NOAH project, who would like to receive feedback on, e.g. their routines accomplished, the Activities of Daily Living (ADL) performed, the relative changes in his own trends and habits; *(ii)* informal caregivers, e.g. relatives, who are informed of relative variations in the user’s habits and routines, as they could represent an indicator of the user’s condition; *(iii)* formal caregivers, professional figures in charge of gathering the necessary information and making assumptions on the user’s condition and quality of life. All these users will receive a more suitable, personalized feedback from the system, via different User Interfaces (UIs).
Data analysis on human behaviour and habits is a difficult task, due to the extremely variable nature of the object of study. Let us consider the task of inferring the accomplishment of ADLs from the home environment, for instance cooking. A person will not accomplish such activity each time in the same exact manner. Depending on the meal, he could use different appliances, e.g. the oven or the hob; nor the activation patterns of the involved sensor would be the same each time. Moreover, such activity can differ in time duration, and can be interrupted/interleaved with many other activities, e.g. watching TV or answering the phone.
All these aspect make the task of ADL recognition extremely difficult: simple methodologies based on sensor count thresholding may lead to misinterpretable results; moreover, determining such thresholds is not easy indeed, as these would vary between sensors, between users. With increasing amount of data being generated in a unit time, it is no longer possible to handcraft data analysis techniques. Instead, a more general approach is to be looked for, resorting to machine learning techniques [7,8].
Investigating complex tasks as human activities and behaviours, poses the additional difficulty of dealing with badly/scarcely annotated data, making the mining/learning problem harder. In fact, human activities are not sequential nor have crisp boundaries. For this reason, the data analysis will be carried out in an “unsupervised” or “semi-supervised” perspective. Also, the problem at hand could be better formulated as to look for relative changes or “anomalies” in the monitored patterns, i.e., unlikeliness of given data. In any case, the adopted approach will be flexible and adaptable, exploiting common domain information from other users as well, in order to better model each single scenario.
All the above consideration apply in general, not only to ADL detection. Detecting trends and behaviours (and relative anomalies or variations) can, in fact, benefit from a broader context, e.g. that provided by wearable sensors and smartphones. In this way, not only the home environment acquires information about the user, but also his outdoor activities are considered, leading to an enriched feature set. For example, wearable sensors equipped with Inertial Measurement Units (IMUs) can be used to study several gait-related attributes (e.g. step frequency, velocity, balance; [6]), as well as activity levels, approximated energy expenditure indexes [5] etc. Such sensing devices can be both commercial activity trackers (reducing the costs and efforts of product engineering and certifications), as well as integrated IMU systems. In addition, a smartphone could also provide outdoor GPS localization, tracking the user’s favourite and recurrent patterns.

2.1.4. User Interaction

Outcomes of the technical layers described above need to brought to the users, accounting for self-determination and for specific opportunities, elicited by implementing a strictly user-centric design flow, and accounting for all stakeholders represented in the partnership. In particular, besides primary and secondary users, service creation will avail itself of the medical and marketing advices. Specific apps (and web apps) dedicated to primary and secondary end-users will be developed, along the concepts introduced in Sect. 1 and based on extensive user involvement in co-creation sessions. Design efforts will also aimed at service deployment. Technical design will be devoted to interaction techniques, to devise and test simple and reliable („plug and play”) installation and maintenance procedures, to deal with system ergonomics, accessibility and user acceptance. The “last mile” toward a practical and usable service will be therefore at the very center of a user-centric design process, involving users and stakeholders in the service specification phases as well as in extensive testing and iterative tuning.

2.2 Resources (expertise, infrastructure, etc.) needed

A widespread range of competences is needed to bring the NOAH vision from the basic concepts illustrated above to its actual implementation and market placement. **Users** (intended here as both the elderly end-users and the caregiving persons around them) are to be kept at the main focus in developing the system and related market strategies. Hence, the NOAH workplan constantly involves users, actively contributing to all project phases. However, user contribution needs to be elicited through sensible mediation, bridging cultural and language gaps among different stakeholders. This key task calls for user research studies to be carried out by the project, and therefore for **user experience researchers** to be involved. Through UX design, intrinsic opportunities offered by technology can reach the target user in an effective way, matching expectations and value perception.

Implementation of the NOAH system involves a widespread range of IT expertise, including **sensor designers**, **networking and cloud specialists**, **system engineers**. Also, the system “intelligence” mostly relies on the behavioral analysis module, which calls for **data scientists** to be involved as well, backed by **geriatric and psychological advice**.

Web- and Android-app designers need to collaborate, in order to convey UX studies into practical user interfaces.

As claimed in overall idea description, the NOAH project features explicitly heads for market deployment, by tuning the market strategy concurrently with system design activity. Different competences will contribute to this, including organizations managing pilots (bringing experiences in **social and health care**), **economic researchers** and **market communication specialists**.

Finally, pilots execution involve human beings in an experimental setting. From this perspective, expertise in dealing with related **ethical** concerns is of paramount importance.

The system development will rely on simple and popular technologies, so that no need for specific technological facilities is foreseen, besides labs already available at technical partners headquarters.

2.3 The perspective of the end-users

The project primarily targets 65+ adults, not suffering from major chronic diseases or severe disabilities, yet possibly being affected by age-related endemic diseases (e.g. hypertension, mild diabetes) or by mild cognitive deficits. Although not conceptually limited to this, the NOAH service will be tested involving persons (male and females in similar proportions) living alone in ordinary homes and receiving occasional care from relatives or professionale caregivers. Within such an extended age group, the NOAH perspective may fit a wide range of needs, not necessarily strictly correlated to specific age classes. Users will be selected hence by ample inclusion criteria, based on their own perception of being “healthy” and their motivation in keep living independently. Secondary users are key figures as well, with the NOAH service serving (also) the purpose of making the link between the care-receiver and the care-giver a less demanding and intensive task, at the same time increasing its reliability and extending its scope. Similarly, since the project encompasses support to the social dimension as well, connections between primary users will be considered, this resulting in a “community of users”, to be deeply involved in all project phases.

Knowledge coming from users will inspire and drive the NOAH service implementation, since the early conceptualization phases: based on structured methods, user research will look for both explicit needs (as perceived by users) and for unexpressed ones, i.e., further opportunities enabled by the aimed scenario and elicited through stakeholders discussion.

A critical issue involving users’ knowledge and sensitivity regards the delicate balancing between system perspicuity and perceived intrusiveness: in particular, the behavioral model aims at inferring information related to user’s daily living (possibly to early detect health issues, and most notably cognitive-related ones) and has therefore access to personal sensitive data. Although, from the technical point of view, management of such data will be carried out (upon user’s informed consent) complying with all relevant ethical regulations and guidelines, the user’s subjective perception of this is critical to system trust and acceptance, with clear impact on market perspectives as well. We expect the final tuning to come from facilitating “informed” stakeholder discussion.

During pilot testing, primary and secondary users will be at the core of the iterative design loop, providing the technical and creative teams with feedbacks on system performance and addressing weaknesses and improvement spaces. Such a feedback loop is important for refining base concepts, as well as for enabling users, once acquainted with the service environment, to identify their own way of exploiting inherent chances. A relatively long pilot duration is accounted for, to allow for such a self-shaping process to develop properly.

Similarly, analysis of the pilot experience will provide roots for exploring market opportunities and tuning the business model: the market approach will be designed on both the economic and communication components, based on user appreciation and evaluation of pilot service.

2.4 Pilot application

Aimed NOAH concept and service will be thoroughly tested in extensive pilot studies: to exploit the full potential of user-centric approach, and by exploiting early availability of a subset of supporting technology, pilots will feature a relatively long duration, explicitly accounting for (at least) two major design/user-test iterations.
Three pilots will be implemented at three different European locations, and namely in Italy, Romania and the Netherlands. Pilot distribution account for a significant variety of different socio-economic and cultural contexts (differing also in social and health service organization and standards) thus representing a meaningful benchmark toward European-wide diffusion.
Each pilot site will focus at a local community and involve about 20 users: each user will be equipped with the NOAH home kit and will be paired to (at least) one caregiving person in his personal supporting network.
The pilot study, consistently with the overall project approach, will regard the complete "life cycle" of the aimed service, including self-installation and management of the home kit. Nevertheless, each users community will be backed up by a pilot team, including both personal and technical support figures. Within the pilot simulation, the pilot team will play the role of the local service provider: each team will receive the NOAH service toolkit and (thanks to simple procedures made available) will individually set up and manage the cloud environment related to the pilot population. This will allow to check the complete service deployment chain, allowing to better shape both technical tools and aimed market strategies.
A remote technical support service will also be implemented within the project, allowing pilot teams for receiving help in diagnosing possible problem and in monitoring proper functioning of the local- and cloud-based services and again contributing to emulate a full commercial service deployment.
Users will be constantly followed and periodically interviewed, to assess their satisfaction about system behaviour and its perceived impact. Also, gathering events involving all local users will be held, to stimulate discussion and to maximize feedback impact on service design.
At the end of the project, should the service proven to be successful, pilot users will be given the option of keeping using the NOAH system. User response, supplementing questionnaires and interviews, will allow for testing user satisfaction and their perception of service value, again providing relevant hints to the building of business models.

2.5 The exit strategy

The NOAH service does not actually aim at compensating or supporting user in any life-critical function, and will pursue a non-obtrusive profile, not implying any major change in life habits. Nevertheless, the proposal envisages a set of supportive functions, shaped upon user's needs, which aims at extending his autonomy and chances of independent life, somehow moving forward the threshold beyond which institutional care becomes necessary.
Although the Consortium will cease to exist at the end of the project and no formal responsibility can be assumed for the time beyond then, the partners, in their own interest and at their best possible options, feels committed to avoid any discomfort the users may experience due to abrupt service discontinuing.
Physical devices included in the NOAH home kit will remain the property of the end user, unless the user asks for having them removed by the pilot team.
Depending on the pilot test success, users will be given, at the end of pilot timeframe, the possibility of keeping using the NOAH service (possibly upon subscription of a limited fee, covering ongoing expenses related to service provision such as, for instance, cloud storage).
Of course such possibility is subject to conditions which are not fully verifiable at the time of proposal writing; nevertheless, it is regarded as an additional opportunity given by the project, in the aimed perspective of proceeding toward the market upon project termination.
Pilot population, in fact, may turn so into a first set of beta testers, supporting the developmentof subsequent releases of the NOAH service, while approaching the eventual market deployment. Such possibility is regarded as being realistic indeed, also because of the envisaged "light" approach to service management, which should not require the partnership too a demanding effort to be kept alive beyond the projects end.
Should unforeseen circumstances force a different solution instead, shut down of cloud services will be planned and communicated to users with due notice, providing users with support in uninstall procedures.

2.6 Work plan (organisation of the project)

The NOAH work plan reflects the main project vocation toward a user-centric approach, with technology subordinated to the users' drive and to a clear market aim. Therefore, constant reference to users and market perspective is assumed throughout the whole project flow. The work plan is articulated in 5 Workpackages, with WP1 (led by UNITBV) dealing with the technology backstage supporting service implementation. Within WP2 ("People-centric service design", led by TELLART) a strong cooperative effort is foreseen to gather all stakeholders to collaborate in the NOAH service conceptualization work. Validation is carried out in WP3 (lead by BRAINPORT), through which the full NOAH deployment chain will be simulated and critically evaluated by target users themselves. WP4 ("Roadmap to market", led by FHJ) brings into the picture the market provision, introducing affordability and sustainability concerns into the overall project flow and evaluating project outcomes in such a specific lightBesides such thematic workpackages, general issues about project implementation, management and dissemination will be dealt with in WP5, led by UNIPR.
In order to release the full power coming from user involvement, a peculiar project timing is foreseen, with early

start of pilots being enabled by relatively advanced readiness level of background technology. This in turn allows for allocating time for re-design phases based on feedbacks originated by pilots and market analysis after a first pilot period.
Hence, a tripartite time sequence is planned (as sketched in macrophases included in the Gantt diagram in sect. 3): project year 1 is devoted to service conceptualization and first implementation; then, while technology refinement proceeds, preliminary service are validated by users during year 2. Service then undergoes a thorough review and redesign step, accounting for both technology improvements and for fieldtest feedbacks. Updated service is then released to pilots and evaluated during year 3. At the end of the last project segments, recommendations for both the service and technology finalisation and the marketing strategies are worked out, providing roots for actions to be taken by business partners beyond the project ending. The aimed project timeline is thus conceived to leave appropriate time for implementing true user-participated design activities; innovation therefore will then come not from technology research only, but from a more comprehensive vision, encompassing the experience of different kind of users as the main project drive and accounting for the whole "lifecycle" of the NOAH service package, including all steps needed to carry technology out of research laboratories into the homes of end-users.

Individual workpackage (WP) description

WP number	**1**		**WP duration: 33**	*M1 – M33*		
WP title	**Technology**					
Activity type	*Research & Development*					
Participant no. (lead partner first)	**4**	**1**	**2**	**5**	**9**		
Participant short name	**UNITBV**	**UNIPR**	**AICOD**	**VSRO**	**TELLART**		
Person-months per participant	**9,5**	**28**	**14**	**22**	**0,4**		

Objectives of the WP
To assess base technology for pilot implementation; to develop the necessary infrastructure (cloud, home and wearables); to design, develop, and implement a unified database; to implement base algorithms for the Behavioural Analysis Module and data mining application operating at cloud level. All design activities will be iterated (at least) a couple of times, in order to account for outcomes of the first pilot round.

Description of work (possibly broken down into tasks) and role of partners

Task 1.1 Technology base assessment (M1-M3): this task will review the available technology and development perspectives within the project timeframe, to provide WP2 with proper feasibility and opportunity information.
Task 1.2 Networking infrastructure (M4-M13, M23-M26): this task, led by UNITBV, will be twofold and deal with: *(i)* implementing the necessary cloud-based infrastructure for data logging/analysis/display defining a uniform, convergent framework; *(ii)* defining and implementing the Data Base (DB) structure, guaranteeing homogeneous data handling via shared, public APIs (Application Programming Interfaces). Also, data mining methods will be applied, and specific applications will be developed. The service deployement procedures at this level will be implemented. This task, given its standardizing purpose, will be in close correlation with T 1.3-1.5.
Task 1.3 Home and personal kit (M4-M13, M23-M26): this task, led by UNIPR, will define and implement *(i)* the tools and methods for gathering data from environmental (home) and personal (wearables, smartphone) sensors network, *(ii)* the appropriate gateways for properly interfacing to the DB. With reference to subtask *(i)*, a base common technology will be defined for primary end users: a smartphone equipped with the app and necessary features will be adopted. Wearable sensors, on the other hand, will enable app functionalities (e.g. activity tracking) and implement features for qualitative and quantitative assessment of the user's motion (e.g., step counter, gait quality and balance, trunk sway, etc), to be correlated, through UNITBV medical advice, to prodromes of health issues. Within this task, plug & play features for all devices, dealing with ease of installation, configuration and management will be accounted for.
Task 1.4 Behavioural Analysis Module (M7-M33): suitable automated data-analysis methods will be designed, resorting to machine learning techniques, for capturing relevant patterns in the user's habits and routines. Detection of relative deviations or anomalies with respect to the habits will be the primary aim of this task. Proper handling of the DB interface will also be part of this task.
Task 1.5 App and user experience (M7-M14, M23-M26): this task will deal with implementation of concepts devised in WP2 related to user interaction. Two main categories of users are identified: primary end-users, and caregivers (both formal and informal). Different approaches will be adopted, depending on the targeted user. Primary end users will rely on an Android-enabled smartphone, exploiting embedded sensors. Secondary (caregiving) users, not needing any sensing functionalities, will access in multiple modes (app, web) to the knowledge base. Also, interfaces will account for authentication precedures and for personalized access features, providing relevant informations according to the user category: primary end users are notified of

trends/personal goal achievement, informal caregivers of overall information about trends, formal caregiver will be granted a more exhaustive interface, with extended data and information available.

Involved partners: UNITBV leads, UNIPR deals with sensors and with behavioral analysis, AICOD with app implementation, VSRO with cloud service implementation. Tellart will advice, based on WP2 outcomes.

Deliverables of the WP:
D1.1 (M03) Base technology report and technology research plan
D1.2 (M12) First technology report, including infrastructure, devices and apps (1st release)
D1.3 (M15) Behavioral Analysis report
D1.4 (M25) Second technology report

WP number	**2**			**WP duration: 23**		*M1 – M23*			
WP title	**People-centric service design**								
Activity type	*Research*								
Participant no. (lead partner first)	**9**	**3**	**5**	**6**	**1**	**8**	**2**	**7**	**4**
Participant short name	**TELLA RT**	**PROG ES**	**VSRO**	**FHJ**	**UNIPR**	**BRAIN PORT**	**AICOD**	**ALAG**	**UNITB V**
Person-months per participant	**4**	**10**	**5**	**4,5**	**4**	**4**	**2**	**1,5**	**1**

Objectives of the WP
To design and conduct user research; to document the needs of elderly users and caregivers; to develop concepts for the service experience; to define user-centric guidelines for technology deployment.

Description of work

Task 2.1 Pre-Plan Research Package with partnership (M1-M3): objective of this task are to review proposed sensor/network technology, consider the insights on target users from market research and research relevant works and outputs from previous, related projects. Also, a detailed research plan will be prepared, including interview agendas. Finally, tools and templates for audiovisual recording and notes will be planned.
Task 2.2 User research (M1-M4): this task will focus mainly in user interviewing and analysis. In fact, direct interviews/observations will be conducted on small selected groups of primary users (i.e. elderly in their own homes), as well as on small selected groups of secondary users (i.e. caregivers). The outputs of such interviewing process will be analyzed in order to grasp further insights.
Task 2.3 Concept development and validation (M3-M6): task goals will be to develop storyboards describing the proposed user experience, to produce early-stage paper and functional prototypes of service touchpoints, and, finally, to validate concepts and prototypes in co-creation sessions with primary and secondary users.
Task 2.4 Service design (M5-M14): in this task, the specifications for technology partners will be developed (thus, this task will be correlated with the activities in WP1). Hgih-level wireframes will be created, as well as a service blueprint detailing each stakeholder's contribution to delivering the service across touchpoints and over time
Task 2.5 Service refinement (M18-23): the last task of this WP2 will deal with devising the research questions for the two pilot phases (thus in correlation with WP3), reviewing findings from pilot sessions and, finally, with identifying and recommending service design improvements to the technology partners (activity correlated with WP1).

Involved partners: TELLART leads, PROGES, BRAINPORT and UNITB will be involved as pilot managers, all the remaining partners will participate in the co-creation process.

Deliverables of the WP:
D2.1 (M03) Research and Concepting Plan - Documented plan and interview agenda for the WP2
D2.2 (M04) User Research Report - Report outlining end-user needs, motivations, concerns, service opportunity map (moments and locations where service can support users).
D2.3 (M06) Concept Report - Report collating storyboards and documentation of prototypes produced.
D2.4 (M08) Service Specifications - Report collating revised service storyboards, blueprints and user touchpoint maps for implementation of the service
D2.5 (M24) Refinement Recommendations - Two reports containing UX refinement recommendations

WP number	**3**		**WP duration: 31**		*M6– M36*		
WP title	**Validation**						
Activity type	*Demonstration, Evaluation*						
Participant no. (lead partn. first)	**8**	**3**	**5**	**1**	**4**	**9**	
Participant short name	**BRAINPORT**	**PROGES**	**VSRO**	**UNIPR**	**UNITBV**	**TELLART**	

Person-months per participant	**21**	**24**	**23**	**6**	**6**	**0,2**	

Objectives of the WP: To identify users for carrying out the pilots; pilot start-up; to collect data and assess the performance of the pilots; to devise sustainable exploitation of the results of the pilots

Description of work

Task 3.1 Identification of pilot users (M6-M11): The criteria for the selection of users to be involved in the pilots are identified, based on service specification coming from WP2. Criteria will refer to the end-user, his living environment and the caring network around him. Distribution between genders will be accounted for. Pilot teams visit each perspective user and get connected to cargivers and relatives as well. Users are informed about the pilot goals, its methodology and scope, before asking for informed consent. Users are asked to answer to questionnaires developed in, to assess their current expectation and perception.

Task 3.2 Pilot start-up (M9-M14):. Pilot kit is delivered at users' homes. Installation is carried out by primary or secondary end-users, with the help of pilot teams. After checking for proper functioning, a "silent" initial phase is planned, during which sensors records home and user's activity, with no feedback through the service. This phase aims at assessing the starting baseline, training the behavioural analysis module and providing a reference for quantitative evaluation of the impact of the service over user's lifestyle and activity.

Task 3.3 Experiments – phase I (M12-M24): The NOAH service is fully activated, and an observation phase starts. During such phase, users are supported by pilot teams, which are in turn backed up by technical partners.

Task 3.4 Pilot evaluation – phase I (M20-M26): After a 8 months period, the system and service performance are analysed, by means of mid-pilot questionnaires (involving both primary and secondary end-users), sensor data statistics and pilot teams comments. Based on this, a feedback report is filed, providing guidelines to WP2 for the second design round.

Task 3.5 Experiments – phase II (M25-M36): Based on the second technology release, a further observation phase starts. At the end of this phase, if possible (depending on the user appreciation and on technical outcomes), the service will be continued (with limited support from the project partners) beyond the project end.

Task 3.6 Pilot evaluation – phase II (M31-M36): At the end of pilot phase II, a more thorough assessment of primary and secondary user feedback is carried out. Based on this, final recommendation from pilots for further exploitation are reported.

Involved partners: BRAINPORT leads, PROGES, UNITBV manage local pilots; UNIPR, AICOD and VSRO provide remote technical support.

Deliverables of the WP:

D3.1 (M6) Criteria for selection of test sites
D3.2 (M16) Evaluation material
D3.3 (M20) Mid-pilot feedback report
D3.4 (M36) Pilot final evaluation and recommendations for exploitation

WP number	**4**	**WP duration: 36**	*M1-M36*			
WP title	**Roadmap to market**					
Activity type	*Research*					
Participant no. (lead partner first)	**6**	**7**	**2**	**3**	**8**	
Participant short name	**FHJ**	**ALAG**	**AICOD**	**PROGES**	**BRAINPORT**	
Person-months per participant	**26**	**12**	**12**	**5**	**4**	

Objectives of the WP

Aim of WP4 is develop suitable policies and marketing strategies to introduce the NOAH system on EU market. Draw up a business plan, identifying (from an economic point of view) a sustainable business model. Particular attention must be paid to harmonize the approach to the market proposed with the different national context, in which private and public operators act according to different political models. Identify specific opportunities for dissemination and exploitation, tailoring the activities to the different national markets.

Task 4.1 definition of market constraints (M1-M6): identify the "state of art" in the models of home-care services (public and/or private) operating in the various countries; devise a strategy with which the services enabled by the system NOAH can link up with the different national stakeholders of the care services; define a target-price, compatible with market opportunities, for kits and services. This assessment will act as a constraint to the technical choices of T1.1;

Task 4.2 development of a draft business plan (M7-M17): define an innovative business model, oriented either to private (self) care than to home-care (public and/or private) services. It is estimated that the self-care market is the one that has the best growth potential. However, the use of technology (such as the NOAH system) will have significant consequences for national health systems, whether they are delivering care-services directly or by private operators.

Task 4.3 tuning of models (M16-M27): strategies and policies identified in T4.3, will be improved based on the preliminary experiences of the pilot installations (see T3.4). Will be considered indications about the economic sustainability of the system, the benefits (real-perceived) enjoyed by end-user, the effectiveness of the interaction of the NOAH system with the caregiver and other stakeholders.

Task 4.4 definition of marketing actions (M24-M31): great attention will be paid to communication strategies aimed at market penetration. The field of home-care services is highly diversified depending on the European country. The spectrum of users potentially interested by the services of the NOAH system is very wide, but the fragmentation of services and operators is remarkable. New communication strategies, which make extensive use of modern marketing techniques (aimed, for example, the exploitation of the social network channels) will be studied and developed. A plan of dissemination activities will be defined in detail. Among the main dissemination activities that will be performed, the plan will include: online and offline communication tools, press materials, participation in events (such as AAL Annual Event and similar Forum), dissemination through website and social media, professional and scientific publications, short videos.

Task 4.5 development of a final business plan (M31-M36): Assessing the outcome of the pilot experiences (see T3.6), of the market research, of the opinions of users and caregivers, a final business plan will be released. It will offer a vision that looks beyond the particular context of the countries that host the pilot installations. An overall strategy of market access, defining exactly the services offered, the technology platform and associated costs (possibly differentiated according to the country of reference) it will define. Final BP will include: branding strategy, list of stakeholders to be addressed and a promotional strategy.

Involved partners: FHJ leads with ALAG support, AICOD, PROGES provide insights as private companies, BRAINPORT will collaborate in refining models and marketing actions.

Deliverables of the WP
D4.1 (M18) Draft Business Plan - Draft business model including value proposition and draft business plan
D4.2 (M32) Plan of dissemination and exploitation activities – Define a plan of activities that take in account different model of approach to the market, depending of particular context of the country if necessary.
D4.3 (M35) Final Business Plan - Final business plan including promotional strategy guidance on market entry

WP number	**5**		**WP duration: 36**		*M1 – M36*				
WP title	**Management and dissemination**								
Activity type	*Management, dissemination*								
Participant no. (LP first)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Participant short name	**UNIPR**	**AICOD**	**PROGES**	**UNITBV**	**VSRO**	**FHJ**	**ALAG**	**BRAINPORT**	**TELLART**
Person-months per participant	**6**	**4**	**1**	**1**	**1**	**6**	**4**	**1**	**0,5**

Objectives:
- to effectively manage NOAH to maximise the production of results in the most cost effective manner and to the proposed timescales, ensuring the correct execution of the project's work plan, including its updating during the project's lifetime (if needed).
- to facilitate communication and integration between the partners and stakeholders
- to ensure timely interaction and delivering of reports to AAL and the national authorities
- ensure sufficient innovation management stimulating exploitation and innovation elements
- to ensure dissemination of the project results to the wider community

This WP will be led by UNIPR as the overall project coordinator with strong support by AICOD in dissemination actions.

Description of work

Task 5.1 Project coordination (M1-M36): Setting up management structures and appointing responsible: The basic project management structure will be defined by the Project Coordinator including the legal basis, the establishment of the overall Project Management Body (PMB), the overall project contact list, appointing the Project Coordinator and partners' coordinators (appointed by partners at the kick-off meeting). An internal monitoring system will be designed following a quality managment approach. A periodic check of the implementation plan, including content tasks/responsibilities of partners as well as the planned dates of WP meetings, will be carried out. The process of monitoring and managing the design, development and delivery of the project will need to be carefully monitored and evaluated. All the partners will be strictly involved in every monitoring phase in order to improve the awareness on the whole project. Support to the partners in the administrative management of the project will be guarantee.

Task 5.2 Communication (M1-M36) Coordination of communication activities. Efficient communication among partners is an important prerequisite for a smooth running of the project activities. This task is aimed to: *(i)* Guarantee of an efficient communication environment for the management of the project; *(ii)* Support of a reliable communication flow among activities and participants, *(iii)* Coordinate all interactions between the AAL

Europe and the project; *(iv)* Collaborate with international networks to ensure valorisation of results throughout the project. Facilities for efficient communication will be evaluated.

Task 5.3 Innovation Management (M1-M36): Elaboration of Rules of Procedures for the PMB tackling decision making procedures and conflict resolution issues. Development of a management plan to support partners in their innovation process helping them to control costs and providing access to important complementary knowledge (Project Coordinator in strictly collaboration with AICOD). Also, guidelines on ethical issues and security will be prepared by the appointed responsible defined during the kick-off meeting.

Task 5.4 Reporting (M9-M36): Preparation and presentation of annual progress and financial reports by the Project Coordinator summarizing the thematic and financial performance of the project. Elaboration and submission of the mid-term review report and final review report of the project.

Task 5.5: Dissemination Plan and Actions (M6-M36): Elaboration of a dissemination plan by the task leader with the aim of facilitating the dissemination of results. Planned content: branding strategy, list of stakeholders to be addressed, online and offline communication tools, communication and press materials, timing and scheduling, dissemination actions.

Organize effective dissemination actions (defined in detail in the dissemination plan) including: participation in events (based on calendar of international and local events for dissemination and demonstration purposes, such as AAL Annual Event), dissemination through website and social media, online and offline publications and materials, professional/scientific publications, short videos.

Involved partners: UNIPR leads, all partners involved.

Deliverables of the WP:
D5.1: Set of guidelines (M3)
D5.2: Dissemination plan (M3)
D5.3: Website and initial dissemination material available (M6)
D5.4: First Calendar year report (M12)
D5.5: Mid-term review (M18)
D5.6: Second Calendar year report (M24)
D5.7: Final report (M36)

Work package (WP) overview list

WP no.	WP title	Type of activity	Lead partic. no.	Lead partic. short name	Person months	Start Month	End month
1	*Technology background*	*RTD*	4	UNITBV	73,9	1	33
2	*User-centric service design*	*RTD*	9	TELLART	36	1	23
3	*Validation*	*DEM*	8	BRAINPORT	80,2	6	36
4	*Roadmap to market*	*RTD*	6	FHJ	59	1	36
5	*Management and dissemination*	*MGT*	1	UNIPR	24,5	1	36
	TOTAL				273,6	1	36

Deliverables overview list

Del. no.	*Deliverable name*	*from WP*	*type of deliverable*	*Dissemination level*	*Deliv. date (proj. month)*
D1.1	Base technology report	WP 1	Document	Restricted	3
D1.2	First technology report	WP 1	Document	Restricted	12
D1.3	Behavioral Analysis report	WP 1	Document	Public	15
D1.4	Second technology report	WP 1	Document	Public	25
D2.1	Research and Concepting Plan	WP 2	Document	Public	3
D2.2	User Research Report	WP 2	Document	Public	4
D2.3	Concept Report	WP 2	Document	Public	6
D2.4	Service Specifications -	WP 2	Document	Public	8
D2.5	Refinement Recommendations -	WP 2	Document	Public	24
D3.1	Criteria for selection of test sites	WP 3	Document	Public	6
D3.2	Evaluation material	WP 3	Prototype	Public	16
D3.3	Mid-pilot feedback report	WP 3	Document	Public	20
D3.4	Pilot final evaluation	WP 3	Document	Public	36
D4.1	Draft Business Plan	WP 4	Document	Restricted	18
D4.2	Plan of dissemination and exploitation activities	WP 4	Document	Public	32
D4.3	Final Business Plan	WP 4	Document	Restricted	35
D5.1	Set of guidelines	WP 5	Document	Public	3

D5.2	Dissemination plan	WP 5	Document	Public	3
D5.3	Website and initial dissemination material	WP 5	set of tools	Public	6
D5.4	First Calendar year report	WP 5	Document	Public	12
D5.5	Mid-term report	WP 5	Document	Public	18
D5.6	Second Calendar year report	WP 5	Document	Public	24
D5.7	Final report	WP 5	Document	Public	36

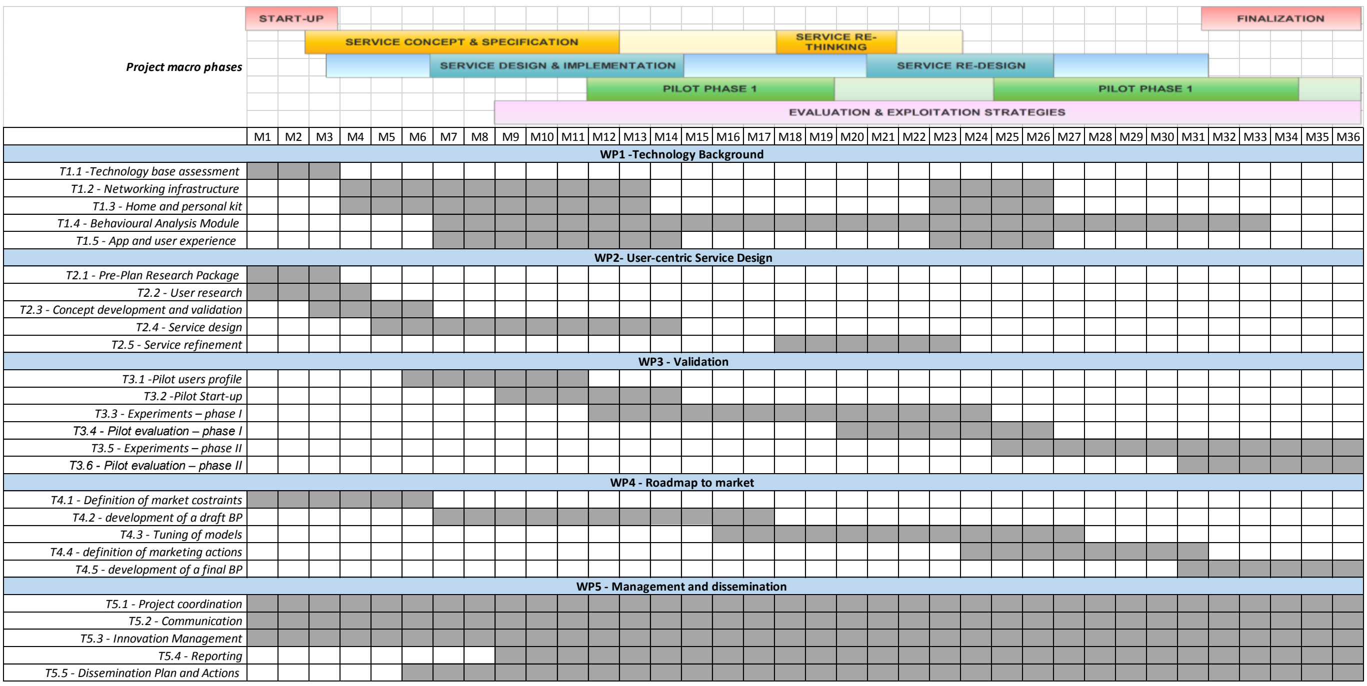
Milestones overview list

No.	*Milestone name*	*WP involved*	*Expected date (project month)*	*Means of verification*
M1	Service creation	**WP2**	8	D2.2, D2.3, D2.4,
M2	Pilot phase 1 start	**WP1**, WP3	12	D1.2, D3.1
M3	First pilot assessment	WP1,**WP3**,WP4	20	D1.3, D3.2, D3.3, D4.1
M4	Pilot phase 2 start	**WP1**, WP2, WP3	25	D1.4, D2.5
M5	Second pilot and market perspectives assessment	WP3,**WP4,**WP5	36	D4.3, D3.4

Summary overview of staff effort in person months (pm)

		WP1	WP2	WP3	WP4	WP5	Total PM
1	UNIPR	28	4	6		6	44
2	AICOD	14	2		12	4	32
3	PROGES		10	24	5	1	40
4	UNITBV	9,5	1	6		1	17,5
5	VSRO	22	5	23		1	51
6	FHJ		4,5		26	6	36,5
7	ALAG		1,5		12	4	17,5
8	BRAINPORT		4	21	4	1	30
9	TELLART	0,4	4	0,2		0,5	5,1
	Total	*73,9*	*36,0*	*80,2*	*59,0*	*24,5*	*273,6*

Gantt chart of the project phases



Section 3: Quality of the Consortium and Project Management

3.1 Quality of the Consortium

The consortium counts 9 partners from 4 different EU countries. Expertises and role of each partner are briefly described in the following.

Partner 1 – UNIPR, University of Parma, IT (Reference persons: Paolo Ciampolini, Ilaria De Munari)

UNIPR participates in the project with his research group at the “Assistive Technology and Domotics” lab, active in the field since 2004. It has strong connections with public and private care providers in the Parma regions and cooperates with many of them in the framework of local projects and trials. UNIPR has thus developed specific expertise in the user-centred design of AAL-oriented solutions. UNIPR is active in several AAL-related projects, bearing also scientific coordination responsibilities in some of them. Activities relevant to the current proposal include the “A nostra ca’” (“At our home”, 2007) project aimed at providing ICT support to “ageing at home” of elderly people living in rural and mountain areas. Within that context, several nursed homes, located in the Parma region, are currently still running services and technologies developed by UNIPR. The University participated in the AAL-JP projects “FOOD” (3rd call), “HELICOPTER” (5th call) and ENSAFE (2014 call) UNIPR was involved in the AALISABETH project, funded by the Italian Institute of Research and Science on Ageing (INRCA).
As for its contribution to the current project, UNIPR, besides serving as the Project Coordinator, will participate with academic staff persons (professors, researchers and technicians) and temporary researchers (research fellows, PhD students).
In order to facilitate transferring research products to the AAL market, UNIPR funded (and participates in) a spin-off company (I-Cubo srl), that carries on engineering, industrialization and distribution of UNIPR research products.
Role in the project: UNIPR will mainly contribute to the technical development workpackage, with lead responsibility in the home-kit development and in sensor networking. I-Cubo will support the project (as third party linked to UNIPR) by taking care of production of home-sensor technology. Besides the technical duties, UNIPR will coordinate the project and lead WP1.

Partner 2 – AICOD, Aicod Srl, IT (Reference person: Silvia Mossini)

AICOD is a SME based in Parma, Italy. The company provides services in Information and Communication Technologies (ICT) and Digital Communication strategies as service provider and software developer. We design, develop, support and promote software ICT applications using integrated, state-of-the-art technology and by means of a creative approach. We provide our customers with high quality creative solutions, tailor-made to their needs and expectations. Aicod has wide experience in web marketing and in the new generation of social media. Established in 2007, the company has a high profile portfolio of successful project both in private and public sector. Aicod’s expertise covers:

- Software design and development;
- Web and Mobile ICT applications design and development;
- Websites&Portals design and development;
- User Experience design and Content Structuring;
- Graphic interface design;
- Social media engagement and strategy

AICOD team has several years of experience in addressing the major issues of digital communication, in developing and implementing ICT services and social engagement.
Role in the project: AICOD will be an ICT partner supporting the development of the

- Design of UX experience
- Interface design
- Sw development
- Dissemination (webportal, social media)
- Social networking

Partner 3 – PROGES, Proges s.c.a r.l., IT (Reference person: Lorenzo Lasagna)

Proges is a Social Cooperative (non-profit organization) active all over Italy, with more than 2.500 employees. It provides educational, health and medical services for children, elderly, ill and disabled

people. Every day, more than 1.500 Proges assistants bring their care to about 3.000 senior people at home or in nurse-residences. Proges provides 15 Homecare Services, assisting about 1.200 people.
Proges planned R&D projects to improve assistance quality for a large number of Public Administrations (such as Lombardy and Tuscany Regional Governments, Municipalities of Milan, Turin, Aosta, Parma, Piacenza and Lucca) and Private Companies (such as Istituto Clinico Humanitas, Centro Cardinal Ferrari, Istituto Piccole Figlie).
Role in the project: Proges will provide its own expertise, know-how and methodology in health-care services, bringing a qualified contribution during the design and production phase. Its management will supervise the application and testing of the product, involving (if necessary) the Medical Care and Social Service networks. Proges managers and assistants will also contribute to process and analyze the experimental outcomes, even monitoring end users satisfaction, and informal caregivers and other stakeholders' point of view. Besides managing the Italian pilot, PROGES will also support the initial need assessment (in co-working with the WP1 leader) through elaborating methodologies and the demand survey.

Partner 4 – UNITBV, Transilvania University of Brasov, RO (Reference person: Sorin Moraru)
UNITBV is a state university having more than 23000 students at full-time programs at license, master and doctorate level. It has a "full-confidence" rate at national evaluation and ranked among the firsts at national level for Research of Excellence. The University has wide range cooperation with European universities, leading companies and research institutions.
UNITBV developed a Green ENergy Independent University CampuS – GENIUS aiming at creating a Scientific Research Institute composing 12 buildings based on sustainable development and renewable energy. The GENIUS researches in the field of quality of life. The ICT infrastructure - designed and developed entirely by the specialists from the Faculty of Electrical Engineering and Computer Science to be involved also in the implementation of the current project - includes the new IBM Green Data Center. This makes this Campus the first Romanian Green Campus and one of the international demo structures, being itself an important research facility. The University has proven experience in designing and implementing Large Distributed Systems with Wireless Sensor Networks, Virtualization, Monitoring and Smart Resource Allocations with Private Cloud Support - as a task to be fulfilled also in the current project. Being also an important resource included in the current project, a SOA platform was developed by the UNITBV using a cloud computing architecture.
The Faculty of Medicine and the County Emergency Clinic Hospital, affiliated to Transilvania University offers, facilities as proper site for enrolling geriatric and mental disease patients and follow-up them.
The team of UNITBV to be involved in the actual project has also ICT & Health proven experience in international cooperation projects such as Using IBM CloudBurst and Rational Application Developer to Develop Mobile Applications for Remote Healthcare Monitoring with Feedback Functions, the VirtualElectroLab project and the Virtual and remote laboratories.
UNITBV has a long-standing cooperation with Vision Systems (the Romanian ICT SME involved in the project) in various fields, in particular in software development and in jointly implementing international projects (VetTrend: Development of a transnational experiment-based learning environment in the Leonardo da Vinci programme).
Role in the project: The University will bring its scientific expertise to the research activities of the project with several respects. It will develops cloud services, design the software architecture (taking into account data security aspects), data analysis process and cloud technology. It will provide medical knowledge tot he conceptualization phase and, later, in the development of the behavioral analysis module. UNITBV will also hosting the Romanian pilot site, availing itself of the close cooperation with the Social Service Department of Brasov Municipalities.

Partner 5 – VSRO, Vision Systems, RO (Reference person: Dominic Kristaly)
VSRO is a software company based in Brasov, Romania. On top of its core activity of software development, the company offers also consulting, training and project planning for software solutions. Vision Systems offers a wide variety of multimedia services, ranging from the classic presentations and creative entertainment to high-end design, and consulting in industrial and technical fields. Vision Systems built advanced, modular, scalable, multi-user, multi-profile, safe and reliable web platforms useful for a wide range of applications (from e-learning to industrial applications). Vision Systems developed platforms and tools for several activity domains, concentrating on ease of use and accessibility. Vision Systems has extensive experience in managing web-based services and in computer applications for automation, control and data management. The staff is composed of MSc students and MSc, PhDs and university professors.
Bringing in its technical skills and competences Vision Systems has been actively involved into European projects in which the tools developed by them include collecting of data from sensors software, mobile user interfaces, virtual 3D worlds accessible through Internet, educational platforms,

learning objects for intelligent mobile devices, on-line tests and questionnaires and interactivity tools, multimedia presentations, clips for YouTube. Vision System participated in several European projects such as VIM, Molecole, Vet Prof.E.S.S.Ion.A.L, VET TREND, ORSA MINORE, TIP TOE. In addition, Vision Systems is involved in the implementation of AAL projects such as the FOOD and the HELICOPTER project since 2011.

Role in the project: Vision Systems will collaborate with UNIPR and UNITBV in designing the software and overall architecture of the system and the database for storing the data; development of cloud services for social interaction; alarms/alerts through email or SMS; programming/developing of software-based user interfaces for desktops, tablets, smartphones; data security.

Partner 6 – FHJ, University of Applied Sciences FH JOANNEUM, AT (Reference person: Walter Scheitz)

FHJ is one of the largest Universities of Applied Sciences in Austria. The Institute of eHealth is part of the Department of Applied Computer Sciences. Its thematic competences are Information and Communication Technologies (Computational Intelligence, (mobile) Software Engineering, Databases), Health Sciences (Clinical Research, GxP, Epidemiology) and management (Business Intelligence, European and Austrian law, Quality management, Risk management, Process management) as well as eHealth, mHealth and Public Health. One of our key areas of research is Ambient Assisted Living (AAL), in particular Healthy Ageing and Smart Living. The Institute of eHealth will use its expertise to support the project in connecting workplace and health/social care system as well as implementing innovative ICT in eHealth and mHealth solutions. The know-how deepened and acquired in this project will be incorporated into education at the University of Applied Sciences FH JOANNEUM.

Walter Scheitz, BA, MSc, MBA, Senior Researcher, has many years of experience in Health Economics, Health Service Management, Business Management and Marketing. He has been active in the research and development of AAL solutions for many years and is member of the AAL-AUSTRIA association. He is also founder and chairman of the AAL-STYRIA (Scientific Association for Active Assisted Technology and Smart Living) association. He also managed 2011-2913 the national project **DIAFIT** (*Diatary Nutrition Assistant with Multimodal Interfaces and Intelligent Kitchen Terminal).* He was leading the task “Health Services” in the FP7 project **MASELTOV** (Mobile Assistance for Social Inclusion and Empowerment of Immigrants with Persuasive Learning Technologies and Social Network Services). MASELTOV researched and developed innovative information technologies to facilitate bidirectional integration via local community building and to empower cultural diversity. A further FP7-project was **PALANTE** (PAtient Leading and mANaging their healThcare through EHealth). The Institute of eHealth developed an electronic X-ray record for Styria in cooperation with the Styrian Hospital Holding (KAGes) and the Styrian health funds. In the project **FACTS** (Human Factors Technologies and Services), the eHealth Institute developed the visualisation and simulation of this behaviour in animated, virtual 3D environments.

Role in the project: FHJ will lead WP4, and bring major responsibilities in the market-oriented studies an in designing the NOAH business perspective.

Partner 7 – ALAG, Arzt und Labor EDV A. Günzberg GmbH, AT (Reference person: Alwin Günzberg)

ALAG’s main business is the development and distribution of software and hardware for the health care sector. Key customers are general practitioners of all medical disciplines, except dental care.ALAG also provides ICT-solutions for medical and diagnostic laboratories and provides ICT-support for reimbursement of patient costs in welfare settings. With 12 years of experience, ALAG has a leading position in Styrian/AUSTRIA medical ICT-solutions.

Role in the project: major responsibilities in in devising the deployment strategy and building the "commercial" service infrastructure.

Partner 8 – BRAINPORT, Brainport Development N.V., NL (Reference person: Marcel de Pender)

Brainport Development has opted for a comprehensive approach in the distinctive People, Technology, Business and Basics domains within which programs are developed at the interface of technology and society; one of these is Brainport Health Innovation, which is a platform on which national and international parties in (health) care, government, knowledge and research institutions as well as industry share knowledge and cluster initiatives in the field of healthcare and technology. In “Brainport Navigator 2013, beyond Lisbon!”, the Brainport´s strategic program includes the establishing of a healthcare and technology program based on practice and patients, and geared to facilitating the central role of the patient/client by: stimulating and facilitating innovation in healthcare; bridging the gaps identified between patients, healthcare providers, companies and knowledge institutions; setting up and maintaining a knowledge network; expanding entrepreneurship in the healthcare sector. Brainport Health Innovation zooms in on healthcare and technology. In clustering some fifty projects at the beginning of the healthcare and technology program, Brainport established Brainport Health Innovation to ensure synergy between the projects and the sharing of knowledge, linking projects together. This keeps costs to a minimum and boosts the business activity in the field of healthcare and technology. The Eindhoven region can then achieve the goals it has set: to provide answers to the growing need for innovation in healthcare; to develop (new) economic activities based on the combination of healthcare and technology; to improve collaboration between the actors in a market segment and/or field of technology and/or application; to boost the market value ("proof of concept", acceptance, funding) of healthcare technology and healthcare products. Current Projects: the Remote Services project being undertaken by Brainport Health Innovation aims at investigating which eHealth services must become available in the Eindhoven region. An open and inexpensive provision should offer all residents with an internet connection in their homes access to all eHealth services. The Living Lab eHealth is an open laboratory where ageing people are able to physically test new services in an approachable way. With insight into user needs, the Living Lab explores the possibilities of eHealth applications and can showcase this insight and the possibilities to the administrators. It is an open innovation platform where care providers and technology companies can also perform real-life testing

Role in the project: Brainport will host the Eindhoven pilot making available its knowledge of the local structures, collaborating to service specification, implementation and local management. Brainport will also contribute to the refinement of the business model, and lead WP3.

Partner 9 – TELLART, Tellart BV, NL (Reference person: Paul Skinner)

Tellart is an experience design and engineering company specialising in interactive objects and environments that connect to the web. Since its founding 15 years ago, Tellart has been on the forefront of information and interaction design, and has consistently bridged industry and academia. Team members regularly teach graduate and post-graduate courses at top design schools and universities, on topics including product and service design, physical computing, experience prototyping, design for emergency medicine, and human habitation and life support in extreme environments.

Tellart is made up of a select and tightly integrated team of designers, technologists, researchers and strategists who combine a user-centric approach with innovative uses of emerging technology to solve meaningful problems. From addressing childhood obesity to building services for the elderly, clients come to Tellart for a rigorous concept development and problem solving process, backed by hands-on skills that allow us to design, build, and iterate towards the optimal solution. The premise for all Tellart's work is that the physical and digital aspects of any experience, product or service are intrinsically bound to one another and must be crafted together from the start, with fundamental human needs in mind.

Tellart's process, from discovery to design to development, is founded on meticulous visual sensemaking that combines qualitative research, co-creation workshops and visual mapping to make complex ideas tangible and actionable.

Tellart was a lead partner in the Business Innovation Factory's Nursing Home of the Future project, editing and synthesizing primary and secondary research findings to shape the project's mission, core messages and overarching narrative. The company has won numerous international design awards, perhaps most notably for its role in the creation of the Google Web Lab exhibition at the Science Museum in London, which ran from Summer 2012 through Summer 2013 and saw ~600K in-museum visitors collaborating with ~6M online visitors to create millions of pieces of user-generated content. The exhibition's Sketchbot has since been acquired to the Smithsonian Cooper Hewitt Design Museum's permanent collection and is on display in NYC.

Role in the project: Tellart will take lead responsibility in user research and interaction design, translating the needs of primary and secondary users into experience design concepts and ultimately into service blueprints and technology specifications.

Partnership overview

As of the partners profile reported above, the NOAH partnership is well suited for the project goals, balanced among main expertise required. The project is in fact based on a varied set of advanced information technologies, brought to the user by means of a sensible, user-centric design approach and keen on rapid access to the market, thanks to the consideration of the whole development chain, accounting for service deployment and management issues into the project flow. Consistently, NOAH partners are evenly distributed to cover all components. In order to elicit sensible and sound service specifications, the whole target ecosystem is involved by participation of all partners in the conceptualization phase, driven by UX specialists at TELLART.

IT technical developed will be driven by research partners (UNIPR and UNITBV), backed up by professional expertise coming from enterprises (VSRO, AICOD). Within such a technical subgroup of

partners, clear, non overlapping responsibilities are identified, with UNIPR dealing with sensors and sensor networking, UNITBV with the overall cloud architecture, VSRO with implementation of cloud-based services and AICOD with interface software. Validation will be sought for by extensive pilot trials, involving a well-differentiated set of end-user representatives. BRAINPORT, PROGES and UNITBV (cooperating with the Department of Social Services of Brasov Municipalitiy) brings into the project accounts for quite diverse national policies, socio-economic and cultural contexts, thus providing a European-scale benchmarking opportunity. The health perspective is brought into the project by the medical group at UNITBV, as well as by e-health specialists at FHJ and ALAG, whereas market opportunities will be pursued through extensive studies and evaluation carried out by FHJ in cooperation with pilot organizations. Marketing implementation strategic guidelines will be worked out by ALAG, which has long experience in e-health product marketing, and by AICOD, actively involved in communication strategies and advertising campaigns.
The market project vocation also reflects on the majority of business-oriented partners involved, with 4 SME's participating and different business models implied by pilot experiences. Main business partner (PROGES) is deeply involved with homecare service provision and is therefore a straightforward opportunity for exploitation of project results.

3.2 Project management

The Project management comprises the following bodies: **Coordinator** (intermediary to the European Commission and responsible of the project management); **General Assembly** (principal decision-making body); **Management Committee** (in charge of the scientific tasks and the technical assessment).

Coordinator. The Coordinator is responsible for the overall management of the Project. In particular, the Coordinator shall be responsible for: a) Vis-à-vis the Commission: (i) supervising the scientific, technical and administrative progress of the Project, and keeping informed the Commission of all the relevant information as specified in the Contract; (ii) coordinating the reporting to the Commission on the basis of the information gathered from the Contractors; (iii) submitting documentation to the Commission, including all reports, Project Deliverables and any other necessary information required. b) Vis-à-vis the other Contractors: (i) organising the activities and chairing the meetings of the General Assembly and Management Committee; (ii) forwarding any documents and information connected with the Contract performance to the General Assembly, Management Committee and the Contractors concerned; (iii) acting as an intermediate between the Contractors.
The Coordinator is also in charge of supervising the project progress, with respect to scientific and technical issues. With this respect, the Coordinator shall be and responsible for: (i) supervising the preparation of technical reports and Deliverables, the achievement of Milestones, coordinating and soliciting Contractors' contributions, and monitoring consistency with planned time-schedule, (ii) collecting from Contractors requests for modification, update or adjustment of technical workplan or other relevant issues, to be reported to the General Assembly, (iii) provide support and mentoring, if needed, to Contractors less accustomed to innovation initiatives, in facing the project participation issues and fully exploiting their potentials.

General Assembly. The General Assembly consists of one representative of each Contractor. Each representative has one vote and may appoint a substitute to attend and vote at any meeting. The General Assembly is entitled for: (i) deciding political and strategic orientation of the Project; its Workplan and Budget; (ii) making proposals to the Parties deciding upon the Workplan and its major changes; (iii) making proposals to the Parties upon the allocation of the Budget to the Workplan and approving the changes of the Project Shares, if exceeding 10% of the EU contribution; (iv) making proposals to the Parties upon the review and/or amendment of terms of the EU Contract and approving them; (v) making proposals to the Parties to suspend all or part of the Project or to terminate all or part of the Contract, or to request the Commission to terminate the participation of one or more Contractor and approving thems; (vi) in case of default of a Contractor, agreeing on actions to be taken against the Defaulting Contractor; agreeing procedures and policies in accordance with the Contract for the management of the Knowledge, IPR and Publications matters.

Management Committee. The Management Committee consist of the Coordinator and of one representative of each WorkPackage of the project, indicated by the General Assembly. Under the control of and in compliance with the decisions of the General Assembly, the Management Committee is responsible for: (i) implementing the political and strategic orientation decided by the General Assembly; (ii) making proposals to the General Assembly about changes in the contract and actions against defaulting Contractors; (iii) implementing the Workplan; (iii) monitoring the progress of activities against the Project Deliverables; (iv) supporting the Coordinator in elaborating reports on whole Project;(v) proposing to the General Assembly any amendments and integrations of the the Workplan; (vi) agreeing on press releases and joint publications and making proposals to the Parties on the policy of dissemination and exploitation of the results; (viii) ensuring the respect of quality standards; (ix) overseeing the promotion of gender equality in the project and the respect of ethical rules; establishing liaisons with other international organisations; facilitating the resolution of conflicts (if any).

Meetings. The General Assembly normally meets every six months. The Management Committee meets at least every six months, generally interleaving meetings with GA ones. Other meetings can be required by any Contractor upon written request in the case of an emergency situation. The chairman (Coordinator) provides an agenda to the members of the body (and also a copy to the all Contractors, even if not members) not later than ten calendar days in advance of the relevant meeting. The agenda must give full details and background to relevant proposed decisions. Should a Contractor suggest adding a discussion/decision to the proposed agenda, it shall do so in writing to all other members at least six calendar days prior to the meeting date.

Rules of voting and conflict resolution. In voting each Party shall have a vote. Each representative may appoint a substitute to attend and vote at any meeting. Meetings of the bodies shall constitute a quorum if more than fifty (50) % of the members are present or duly represented by proxy. Decisions will normally be taken by seeking consensus. However, after allowing a reasonable amount of time for illustrating and defending conflicting points of view and in order to avoid deadlock in the project operational progress, decisions shall be taken by a majority at least of 67% of the votes of members present or represented. If the decision being taken is unacceptable to partners found in the minority positions, the Project Coordinator may initiate the conflict resolution procedure. In case of conflicts between the Consortium Members, a group of three arbiters will manage it. Two of them are named by the parts in conflict and the third by the two arbiters named. If the two arbiters fail in reaching an agreement, the third arbiter will be named by the Coordinator.

Vote on distance. The Chairman may decide, notifying it within the agenda, that the meeting shall be held by means of electronic mail, video conference, telephone conference or similar communication systems.

Minutes. The Chairman drafts the minutes of each meeting to formalise in writing all decisions taken and shall dispatch them to the members (and also a copy to the all Contractors, even if not members). The minutes are considered as accepted by the members if, within fifteen calendar days from receipt thereof, nobody has objected in writing to the Chairman, provided that objection shall be either on such formalisation or on a decision that was not part of the agenda and which was not accepted by all members.

Control measures and quality assurance. The aim of control measures (responsibility of the Coordinator) is to ensure quality and progress monitoring. The progress of the project will be monitored according to the defined work packages and against the planned time schedule. Milestones are the key to monitoring the progress of the project in its entirety and of individual WPs and for identifying problem areas in time for corrective actions to be taken. Special consideration will be given to the value of the human and physical resources used to accomplish the tasks. Monitoring will help to control and refocus the project's implementation, through continuously observing and ensuring that the resources foreseen for each project step are effectively used according to the project's Description of Work, work schedules are respected and concrete outcomes are delivered.

Reporting. Every three months, the partners provide an internal progress report to the Project Coordinator, who collates the inputs and assesses the technical progress and spending profiles against the work plan. They report progress of activities defined under the work packages (stage of completion of each work package); correspondence with the time schedule of the project; progress of the whole project, deliverables and results. On completion of individual WPs, the Project Coordinator review the associated deliverables. Corresponding status reports and statements of expenditure in Euros up to that point are the responsibility of the Project Coordinator, in conjunction with the financial departments of the partners. Internal progress reports are the basis for constructing the official reports requested by the Commission as part of the contractual duties.

Management procedures. The project will be continuously managed using standard PERT planning and control techniques to ensure that each facet of the project keeps both to time and to budget, with resources being made available as and when required.

Internal project communication. It will be based on tele-working (e.g. file transfer, emails, teleconferences, and so on) and on technical meetings to facilitate and to promote opportunity for work and team development. In particular, the coordination among workpackages will be carried out by means of a dedicated Project cooperative working system, where document in progress are available for the representatives of the Partners. Tools will be available to maximise collaboration and sharing of real time information in order to take the right decisions in the right time.

Access-rights to Knowledge and Pre-existing Know-how needed for the execution of the Project shall be granted on a royalty-free basis only upon written request specifying the scope and duration of their application. In case of Pre-existing Know-how, Access-rights shall be granted only after conclusion of a bilateral agreement between the Parties concerned.

3.3 Contingency plan

In general, it is worth highlighting that the proposal largely relies on stable technologies, that the Consortium aims at exploiting in innovative way. Largest uncertainties are of course related to the degree of perceptiveness the system will be able to show. Implementing useful services, however, should be possible even if performance of the data analyzer should come out to be much poorer than expected. Hence, risks inherent to the proposal philosophy can be considered quite low. Further unpredictable or unexpected events perturbing the planned activities, along with foreseen counteractions:

Possible risk	*Counteraction*
A partner (except for the coordinator) is not able to continue its collaboration (in full or in part) to the project	The General Management Committee will try to guarantee the normal continuation of the project by redistributing the outgoing partner's tasks among remaining partners, if possible. Otherwise, the project objectives will be revised accordingly.
Unpredictable events cause extra cost not included in the general budget of the project.	The General Management Committee will try to guarantee the continuation of the project by revising the cost weights of the various tasks in order to find an acceptable compromise, if possible. Otherwise, the project objectives will be revised accordingly.
Pilot technical failures	Partner responsible for the pilot, in cooperation with technical partners, will manage prompt replacement of faulty components.
Communication failure	No life-critical task is related to network availability. Nevertheless, since all functions (and most notably alarms) relies in that, the system (at cloud's edge) will constantly monitor network connectivity (PING messages), promptly informing designated caregiver(s) of emerging problems. In critical situations, redundancy of the network connection may be accounted for.
The pilot user is not able to exploit system and services functionality	Periodical checks by the pilot team should guarantee an early discovery of the problem. Further instruction or service adaption will be provided.
The pilot user refuse to continue the trial	An "early exit" procedure will be allowed to the user. Depending on the trial time remaining and on financial resource availability, a new user may be inserted in the trial.

3.4 Ethical and legal issues

The project methodology foresees to define relevant services to be implemented and tested with the active contribution of users, according to user centred design principles. Therefore specific ethical issues will be dealt with in detail during the service conceptualization phase. Nevertheless, some fundamental issues regarding ethics have been considered, as outlined in the following table.
Possible ethical issues involved in the project are likely to relate to the following:

- The gathering of data
- The information and feedback from users
- The gathering of data relating to the assessment of socio-economic evaluation.

In particular, the consortium will address specific issues concerning data processing, and namely:

- Quality of the data;
- Processing of special categories of data;
- Information to be given to the end-users when collecting data;

- Data subject's right of access to data both during the data collection process and during the report of the project;
- Right to object data considered as personal or private;
- Confidentiality and security of the data processing through previous agreement with the involved researchers
- Notification of the processing to the end-users.
- Guarantee the anonymity of the data collected
- Code the data to avoid recognition of sources
- Save the collected data during 10 years in the research centres involved in the project
- Involved actors in the project will be informed at the moment to start the collection of data for the socio-economic evaluation.

With respect to legislation, consultation will be carried out taking the following into account:

<table>
<tr><td rowspan="5">All Countries</td><td>Code of Nuremberg</td><td>• Volunteer consent of the human being is absolutely essential
Article 10</td></tr>
<tr><td>Helsinki Declaration</td><td>• To take part in a research Project, people must be volunteer participants and duly informed
Articles 20, 22, 23</td></tr>
<tr><td>Charter on the Fundamental Human Rights in the EU</td><td>• The whole research process will respect integrity and privacy.
• Protection of personal data and rights of the elderly will be observed and guaranteed.
Articles 3, 7, 8 and 25.</td></tr>
<tr><td>UNESCO Declaration on the responsibilities of the present Generations Towards the Future Generations</td><td>• Accept and appreciate the rich diversity of cultures, forms of expression and ways of being human during the research process.</td></tr>
<tr><td>Ethics and EU funded research Council Decision 1513/2002/EC on FP6</td><td>• The research activities will be carried out in compliance with fundamental ethical principles and will respect regulations and ethical guidelines in countries where the research will be carried out.
Article 3</td></tr>
<tr><td>Italy</td><td colspan="2">Directive 95/46/EC, entered into force on the 1st. of January 2004 – Legislative Decree n. 196/2003 – Decision of the Responsible Authority on Privacy (Garante) n. 52/2008 – and related general authorizations: n. 2/2013, n. 8/2013 and n. 9/2013. People involved in the study will have to sign informative and agreement forms related to their participation in the research and the utilization of data (Nota Informativa al trattamento dei dati personali e sensibili; Consenso Informato)</td></tr>
<tr><td>Romania</td><td colspan="2">Law 667/2001 on the protection of individuals with regard to the processing of personal data and on the free movement of such data (L nr. 677 publicat in M.Of. nr. 790 din data: 12/12/2001).</td></tr>
<tr><td>The Netherlands</td><td colspan="2">Directive 95/46/EC. Reference from the Centrum voor Ethiek en Gezondheid (Centre for Ethics and Health, CEG) founded by the Minister of Health, Welfare and Sport and participated by the Health Council and the Council for Public Health and Health Care) will be followed.</td></tr>
</table>

3.5 Available resources

The overall resource plan of the project is summarized in the table below, which gathers data introduced elsewhere in this proposal:

Partic. no.	Participant short name	Total costs €	Total costs fraction	Subcontr. €	Contrib. €	WP1	WP2	WP3	WP4	WP5	Total pm
1	UNIPR	444.000,00	*21,76%*	50.000,00	222.000,00	28	4	6	0	6	44
2	AICOD	271.000,00	*13,28%*		108.400,00	14	2	0	12	4	32
3	PROGES	241.000,00	*11,81%*		35.700,00	0	10	24	5	1	40
4	UNITBV	165.600,00	*8,12%*		165.600,00	9,5	1	6	0	1	17,5
5	VSRO	182.600,00	*8,95%*		140.920,00	22	5	23	0	1	51
6	FHJ	202.740,00	*9,94%*		152.055,00	0	4,5	0	26	6	36,5
7	ALAG	99.625,00	*4,88%*		59.775,00	0	1,5	0	12	4	17,5
8	BRAINPORT	300.000,00	*14,71%*	144.000,00	255.000,00	0	4	21	4	1	30
9	TELLART	133.470,23	6,54%	58802,63	80.082,00	0,4	4	0,2	0	0,5	5,1
Total		**2.040.035,23**	***100,00%***	**252.802,63**	**1.219.532,00**	**73,9**	**36,0**	**80,2**	**59,0**	**24,5**	**273,6**
						27,0%	*13,2%*	*29,3%*	*21,6%*	*9,0%*	

Due to the nature of the project, actual costs are dominated by manpower and technical development. Pilot costs are structured as follows: cost of the home kits for all pilots will be born by UNIPR (and its linked third party I-CUBO), with devices then left as a free perpetual loan to the end-users. Smartphones will be provided to primary end-users, with all costs born by UNITBV, who will be in charge of implementing cloud services provision. Running cost of the pilots, instead, will be born by pilot partners (BRAINPORT, PROGES and UNITBV, availing itself of the internal cooperation with the Department of Social Services of Brasov Municipality).

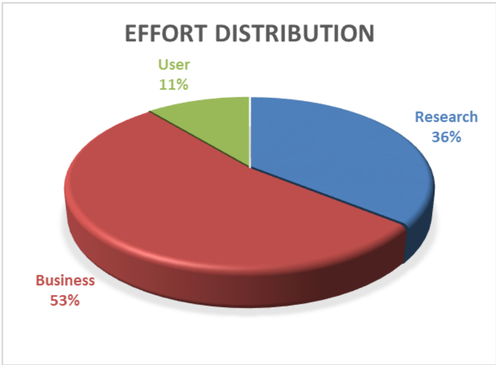


Figure 5 – Effort distribution chart

Cost figures above do not precisely match the effort proportions, due to quite different labour costs in participating countries. As shown in Figure 5, more relevant effort contribution will come from business partners, with research partners being involved in development and evaluation tasks. Significant involvement of end-users is foreseen as well.

Subcontracting does not impact significantly (about 12%) on total costs, and no subcontracting at all is planned for project mainstream activities. We expect a moderate exploitation of in the following areas: services related to pilot run (BRAINPORT), production of prototypal devices (UNIPR) and consultancy (TELLART). No acquisition of significant infrastructure resource is planned: technical development will avail itself of existing labs at industrial and research partners' sites.

3.6 The Intellectual Property Rights management (IPR) and other legal issues

Issues related to intellectual property right will be managed and regulated according to the following subsections:

Non Disclosure Agreement - In order to achieve project objectives, some tools belonging to the background of one or more partners may be necessary. In the different tasks to be done in the project, partners have to work together. In order to protect knowledge that can result from the background of a partner, additionally to the Consortium Agreement, a Non Disclosure agreement could be signed between involved partners.

Patents - Each new patent developed under the project will be disseminated to the partners. The access to intellectual property rights will be discussed during the meetings of the General Assembly. Patents resulting from common foreground of the project will conduct to common patents.

Knowledge sharing - The project web site will be used for internal dissemination of document and knowledge. Every project's document, from meeting agenda to Deliverable, will be posted on the collaborative platform of the project.

Management of IPRs and knowledge - The management of IPR issues and knowledge management are handled by the General Assembly (GA). The handling of IPR issues and the management of knowledge shall follow the established guidelines and processes provided by the European Commission, the IPR helpdesk, under the general AALA recommendations.

The Consortium Agreement (CA) for the NOAH project will set out clear provisions around intellectual property and confidential information. The CA will specify the following points in detail:

- Protection of each other's confidential information from unauthorized disclosure and the use during the project and for a certain time period after the end of the project
- Ownership of Intellectual Properties created out of the project by either the creating party, or jointly created by two or more parties.
- The access to IPR needed for the execution of the project
- The access to IPR needed to utilize the results of the project
- The access to a party's background or side ground IPR.
- The licensing terms for Intellectual Property created out of the project
- The general scope for the parties to mutually agree specific provisions during the course of the project
- The approval procedure to be followed before dissemination, publication, standards submissions of project results. The reason is to allow partners to do an IPR check before public release. The project coordinator will assist in a conflicts resolution procedure.

Finally, IPR exploitation will be considered in detail by the business plan developed by the end of the project.

Section 4: Potential Impact of the Proposed Solution on Quality of Life

4.1 Improving Quality of Life for end-users

The NOAH service addresses need of primary and secondary end-users (formal and informal caregivers). The connection between end-user and supporting persons is made stronger, more continuous and effective, this contributing to improve quality of life of both.

NOAH services will be based on a light, scarcely intrusive approach, and will require neither specific skill to be developed by end user, nor notable changes in living environments. The elderly end-user will receive support in daily life self-management, both in the form of a "companion" app tool, providing help in reminding tasks or in organizing and guiding daily and social activities, and by fostering peace of mind and self-reliance. The awareness of the NOAH service constantly watching over him and straightforwardly connecting to his care network (relatives, friends, caregiver) will mitigate fears of being unattended ("what if I need help while alone at home?").
Such perception of safety will reflect on increased self confidence and eventually increase chances of keeping living at home longer. Similarly, secondary users will take advantage of permanent monitoring features and of the reasoning capability of the system: through easy and accessible tools, relatives and caregiver are provided with a deeper insight of the cared person needs, allowing for a more perspicacious, yet less intrusive, support. Quality of the formal/informal care can thus be improved, at the same time relieving the caregiver from the burden of too frequent "surveillance" checks and reducing anxiety and inadequacy feelings when far from cared ones.
Continuous monitoring and data analysis are also the key for early discovering of anomalies, possibly related to health issues and thus enabling prevention and early intervention when needed.

4.2 The aimed service models

NOAH service addresses need of a wide range of elderly users, whose condition lies somehow in between the "fit" conditions, not requiring any care, and frail or medical conditions requiring constant care. To such a fraction of elderly population (and to their relatives), perception of insufficient home safety often leads to "dependent" form of living, either by moving to assisted living facilities or by accounting for home care assistants. Besides related high costs, such solutions may badly affect the elderly self-esteem and quality of life, possibly reflecting on a faster lane to frailty.
In these cases, however, even a simple support may well tip the balance in favour of independent life, saving economic and personal costs.
Therefore, NOAH system encompasses straightforward, uncomplicated and inexpensive approach to address needs of improving perception of safety and peace of mind in such sensitive situations.
Although features of the envisaged NOAH service well fit many more complex schemes and are suitable for being effectively integrated into wider social- and health care programmes,in this proposal we look at a more straightforward business case, directly involving elderly users themselves or their families, possibly mediating through homecare (private) providers.
This approach would likely better fit the wide variety of care-providing models across European society: in some countries (mostly in southern/eastern Europe) elderly care is quite often taken care

by the family or local communities, whereas a more institutional approach (involving also private stakeholders, such as insurance companies) is frequent in northern and western countries. In these cases too, however, services having a low medical intensity are quite often subcontracted to private organizations.
We therefore will test such a model in a variety of cases across different pilots; as discussed in deeper detail elsewhere, a corollary of the "light" approach, which not necessarily involves an institutional apparatus, is that the whole service should allow for (primary or secondary) end-user self-management of all installation, management and maintenance tasks. This considerably shifts the design focus, broadening the user-centric approach toward all phases in the product lifecycle, instead of concentrating on its primary function alone.
With respect to the picture of current service, NOAH envisaged progresses consists of in both an increase of service performance (fostered by integrating NOAH tools into current practices) and in a widened scope: thanks to the price-conscious approach and to the plug & play attitude, a perspective audience larger than professional and institutional care providers can be approached.

4.3 Social and ethical impact

The NOAH vision is inherently based on social considerations too. As explained in previous sections, in fact, supporting the community feeling and the social network around the end-user is among the major keys NOAH will exploit. "Smart" monitoring features will feed a more reliable and effective communication between the user and his caring network. Social engagement will enter among the personal goal strategy pursued by the NOAH companion app.
In a more general sense, the NOAH approach will build on top of existing social relationships, aiming at relieving both the elderly person and his relatives and caring persons from fears, stress and anxiety connected to the need or choice of living alone while ageing. NOAH will bring such an option within the reach of an increased number of persons, thus also indirectly benefitting the society at large, in terms of reduced social expenses and, thanks to the early detection of health warnings, possibly lowering healthcare expenses as well.
The technical concept (and most notably the plug & play goals) also allow to foresee potential impact of the NOAH service in terms of business innovation, impacting on the way of working of different business figures ranging from freelance home nurses to private care providers and institutional organization. This may result in expanding their market opportunities and thus indirectly favour employement policies.
The other side of the social coin, of course, is the inherent concern about ethical issues. Due to the nature of the aimed NOAH service, sensitive data are acquired and processed by the system. Nevertheless, besides implementing state-of-the-art technical measures to ensure data security, the NOAH conception will leave the primary end-user in full control of his privacy: raw data will not be shared with any third person (including designated caregivers) and synthesized information will be accessible only to designated persons, according to authorization granted by the user himself.

4.4 Other user segments

The NOAH concept is actually based on an inherently interoperable, open and expandable view. The sensing layer can be easily adapted to different needs, by including different sensors, as well as different interfaces can be straightforwardly accounted for. This makes the NOAH platform suitable for easy adaption to different needs, still sharing the same background concepts of affordability, sustainability and ease of management.
This include, for instance, supporting younger people with disabilities or accounting for specific medical conditions.
On a broader account, some of the technologies to be developed with the NOAH workplan will have a much larger application scope: most notably, the behavioural analysis and the non-supervised anomaly detection techniques we shall refine may fit a wider range of data science problems.

Section 5: Potential impact of the Proposed Solution on Market Development

5.1 The business case

The NOAH system will be an excellent business opportunity in relation to the increasing demand for the proposed service by end-users and public healthcare services.

The consumer market is becoming more and more important as people are taking more responsibility in their health and are willing to pay for the services they will like.
Professional care organisations also need to be targeted as in the end they will be connected and play a key part in the services offered and possess the trust and reliability that can spread confidence in the NOAH system.
The development of the proposed system on market, however, needs to take into account some challenges on the road to valorisation.
Main challenges are:

a) The consumer retail market for health and self-care products and services is relatively undeveloped – with the consumer market infrastructure particularly weak and the level of awareness of users very low;
b) The time taken to procure new innovation causes SMEs a challenge as does the complexity and sometimes lack of transparency of the procurement process.

As part of the NOAH project a **business model** will be developed to describe how the product service will create, deliver and capture the value of the innovation and will consider the market, economic, social, cultural and other contextual factors across Europe.
The business plan will be part of the business model and it will define the target group and its value network, the active competition, the unique selling proposition and the strategy for market entry.
Key factors will include:

- **Customers:** understanding the needs of different potential customers:
    - **primary end users** are elderly people who are physically able to use a normal mobile phone and are able to independently manage their personal care . The technical innovation will become a supportive part of the individuals' life enabling them to live longer and more independently at home. Understanding both their needs and the barriers to adopting or purchasing innovative services and products is crucial.
    - **secondary and tertiary end users -** family members and formal caregivers.
      The project aims to improve their life by easing the pressure and allowing for innovative care system to be designed and managed. Understanding their needs is also crucial.
- **Competitors:**
  A thorough understanding of the existing and emerging competition is key to the successful development and positioning of innovative products.
- **Strategy for market entry**
  A first release is expected to reach the market shortly after project closure. Fundamental to this strategy will be the need to build the market that NOAH can enter including both the health and social care provider procurement market and a consumer market. Particular strategic efforts will engage in those countries where public and private sectors are actively working together to overcome the barriers to the procurement of innovation and to the development of a consumer market.
- **Marketing and sales**
  A key task is to raise awareness of the potential health, well-being and efficiency benefits of NOAH system to the primary, secondary and tertiary users.
  For this purpose partners will develop a comprehensive marketing and promotion strategy to be part of the NOAH business model for sustainable market development.
  Also, the unique selling points need to be exploited, and the right pricing needs to be defined.
- **Distribution channels**
    a. To drive the procurement of innovation from health and social care providers;
    b. To promote retail opportunities for primary and secondary end users, such as mainstream retailers and retailers specialising in assisted living services and products;
    c. To boost online shopping for the development of the consumer market infrastructure.
- **Customer relationships**
  The **NOAH** system will take into account the importance of the consumer experience.
  Key factors are:
    - follow-up and continuing service process;
    - Rapid and professional monitoring of customer satisfaction
- **Business Process**
  Focus should be on operational processes, processes that constitute the core business and create the primary value stream.
  Typical operational processes which should be included in the business case are the **purchasing, manufacturing, advertising and marketing, and sales** processes.
  Furthermore, the supporting processes, like technical support should be in place before entering the market.

- **Business viability (cost-revenue model):** To reach positive return on investment, affordability has to be aimed at. An on-going strategy to continuously improve the product and service will enable the NOAH system to compete on product and service quality, reliability and effectiveness as well as cost.

5.2 Dissemination

A wide dissemination of the objectives, targets and results of NOAH system is certainly the key factor for the success of the project, in order to draw attention on the social and economic impact that the system can bring to local and regional communities and on the related business opportunities.
Dissemination activities will be **key activities** throughout the project.
The **dissemination plan** will be jointly developed by the participants of WP4, and in particular T4.4
The plan will clearly define and identify:

1) The target groups per key categories and per partner country as well as their interests in the NOAH project;
2) The dissemination channels;
3) The dissemination materials and tools;
4) The key dissemination actions.

The Noah project will adopt a multi-dimensional dissemination approach with the use of a wide range of communication tools to reach different target groups and raise awareness on NOAH system.
Target groups (aligned with the project target groups) to be addressed with NOAH results are:

1) End-users (primary, secondary and tertiary end users)
2) Formal and informal care-givers;
3) SMEs working on elderly-related ICT solutions;
4) Public institutions and policy makers at local, national and European level interested in ICT solutions in health care;
5) European networks and projects, innovation centres;

The following dissemination channels and activities have been identified:

1) **NOAH Project website**
   An interactive and multimedia website will be set up as
   - a portal for project partners (websites, shared tools for communication and research);
   - a community for end-users – sharing experience, questions, advice, feedbacks;
   - a section for the “product and service” presentation to end-users;
   - a section for the partnership and marketing opportunities for SME, Formal and informal care-givers;
   - case histories presentation.
2) **Social media channels**
   Social networks will be used to promote an awareness-raising campaign for the project.
   This will be done by means of a strategy for the engagement of all types of end users with tailored messages and call to action for marketing lead collecting.
   The use of social network will be divided in different social pages and accounts for different targets, building an engagement and viral communication for end-user target, and a digital PR and social influencer based strategy for the other targets.
3) **Digital Press**
   To increase attention on the opportunity of NOAH system a targeted production of contents will be set to be delivered to the press – digital and traditional, national and European.
   A press-office, connected to the digital PR social strategy, will be set up, that will create press releases throughout the project, and especially at the end. Press-tours for a selected range of journalist will be organized to have a live view of the active experimentation of the project.
4) **Partners’ websites** to disseminate project activities and results to external networks
5) Existing AAL Programme initiatives and networks by connecting to their relevant events and thus reaching to larger professional and business audiences;
6) End-user organizations and their networks
7) Planned dissemination materials and tools

Materials and tools for dissemination

a) Graphical identity of NOAH project to be used consistently by the consortium throughout implementation. The logo & templates (letterhead, PPT etc.) produced by the Coordinator will be visible on all dissemination materials and the website already during the launching phase.
b) Brochures & a project roll-up will be used by partners at conferences & events they participate in.
c) Videos: an internal process for the quick and effective production and publishing of video materials will be established. Videos will be uploaded on Youtube and/or Vimeo.

d) General presentations: some generic presentations will be delivered at the beginning of the project to be adapted to the different occasions. Also, the master presentation will be regularly updated and distributed via the project platform.
e) Publications: scientific partners will use of project results to publish scientific and professional publications.
f) Social media: the communication activities will strongly rely on web-based social media tools (Facebook, Twitter, LinkedIn, YouTube) to efficiently reach a wide range of different target groups. The use of other platforms (Slideshare, Flickr) will be considered during project implementation.

Key dissemination actions

- **Events**: Events are a main dissemination and engagement method both at local and international level. A calendar of events will be developed to give an overview of targeted venues and events (local & international events, including participation on the AAL Annual Event) for dissemination and demonstration purposes.
- Regarding local events, partners will assess the suitability of attending and the scope of the participation based on timing, budget, technical/artistic/other constraints, general participation and impact of the event, etc.
- Local events will be managed by Pilots under their own operations. Some specific and more relevant events may be given project-wide status, under the coordination of the Project Coordinator.

Cooperation with European networks: Connect and cooperate with other European networks besides AAL could give rise to a larger network of actors and stakeholders that effectively disseminate and communicates project results. Therefore, sharing best practices through the European Union can be achieved by approaching existing transnational networks and programmes such as: The European Network of Living Labs; EIP-AHA action groups and reference sites; Health Cluster Europe on top of that, individual engagement by project partners involving their own contacts and networks will also be managed.

5.3 Standards and interoperability

The NOAH system will largely use existing, well estabilished protocols for smoother and more reliable operation, as well as for better scalability and openness.
As far as the communication standards are involved, the network of environmental sensors will adopt IEEE 802.15.4/ZigBee protocols, implementing a home gateway toward the NOAH cloud. BlueTooth (BT) and BlueTooth Low-Energy (BTLE) protocols will, instead, be mostly exploited by the network of personal sensors (e.g. smartphone, wearable devices). Smartphones' GPS functionalities will be exploited to provide outdoor localization capabilities. Moreover, interfacing towards commercial BT/BTLE-enabled devices will be performed using specific APIs for the Android system. WiFi (IEEE 802.11 b/g/n) or mobile 4g network will be used by personal sensors' gateways to connect to the cloud-based environment. Also, ADSL internet access could be exploited by the environmental sensors'gateways. The exchange of information between towards server side will be built around an open standard – XML (Extensible Markup Language) and by using SOA (Service Oriented Architecture) principles, considerably increasing the interoperability and openness of the entire system.
Since the NOAH system collects potentially sensitive data, access to such information will be implemented through a secure platform, allowing access to authenticated users only, granting differentiated access rights based on the user's role. Dedicated communication protocols (e.g. HTTPS, OpenSSH) and mechanisms (e.g. AES cryptography) will be used.

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Annex: Ethical "declaration" table

Ethics declaration of proposals in the AAL Programme	**Described on page or "not relevant"**
• How is the issue of informed consent handled?	p. 12, Sect. 2.3 p. 16, WP3, T3.1
• What procedures does the proposal have to preserve the dignity, autonomy and values (human and professional) of the end-users?	p. 6, sect. 1.1
• If the proposal includes informal carers (e.g. relatives, friends or volunteers) in the project or in the planned service-model - what procedures exist for dealing with ethical issues in this relationship?	p. 6, sect. 1.1
• If the proposal includes technology-enabled concepts for confidential communication between the older person and informal and formal carers, service providers and authorities – what procedures are planned for safeguarding the right to privacy, self-determination and other ethical issues in this communication?	p. 4, sect. 1.1 p. 21, UNITBV role p. 22, VSRO role p. 30, sect. 4.3 p. 32, sect. 5.3
• What "exit" strategy for the end-users involved in the project does the proposal have (in terms of end-users leaving the project during its implementation and after the project's end)?	p. 13, sect. 2.5
• How are the ethical dimensions of the solution targeted in the proposal taken into account? (Brief description of distributive ethics, sustain-ability et.al.)	p. 30, sect. 4.3