# Impact

## 2.1 Expected impacts

*Please be specific, and provide only information that applies to the proposal and its objectives.*

*Wherever possible, use quantified indicators and targets.*

*• Describe how your project will contribute to:*

*o the expected impacts set out in the work programme, under the relevant topic;*

*o improving innovation capacity and the integration of new knowledge (strengthening the competitiveness and growth of companies by developing innovations meeting the needs of European and global markets; and, where relevant, by delivering such innovations to the markets;*

*o any other environmental and socially important impacts (if not already covered above).*

*• Describe any barriers/obstacles, and any framework conditions (such as regulation and standards), that may determine whether and to what extent the expected impacts will be achieved. (This should not include any risk factors concerning implementation, as covered in section 3.2.)*

The Robohome2.0 proposal well addresses the expected impacts listed in the work program for the specific research topic. The consortium gathers experts from different disciplines with the final aim of approaching the issue of developing and testing a service robot able to provide elder monitoring, training and assistance at home in a holistic and exhaustive manner. Robohome 2.0 aims at guaranteeing the needed reliability and easiness of use of all the ICT solutions offered, paying the main research efforts in their full exploitation and integration towards a system able to fit the user and his/her relevant stakeholders needs. Moreover, the multi-site nature of the final pilot testing phase, that will be performed in three different European municipalities, requires the implementation of a system that can be valid, usable and compliant with all these three healthcare systems. This implicitly means that the developed innovation meets the needs of the European and Global Market.

Here below, we will describe how the proposal will address the specific expected impacts of the call.

**Evidence for the benefits of service robotics developed, based on proof of concept and involvement of relevant stakeholders.**

Service robot is here embedded in what is configured as an advanced telemedicine service. Telemedicine has a long history; reviews quote it as beginning in 1948 when radiological images were transmitted for the first time by telephone from West Chester to Philadelphia, a 24-mile distance. Since then, electronics and computer science have allowed tremendous improvements and spreading of telemedicine applications, but, despite the technical maturity, telemedicine services are still limited and the **market remains highly fragmented**[[1]](#footnote-1),[[2]](#footnote-2),[[3]](#footnote-3). Telemedicine is a tool that should be integrated as much as possible into the usual practice of medicine and social services[[4]](#footnote-4),[[5]](#footnote-5), **however the integration of telemedicine service in healthcare systems is still** **an open challenge and requires high policy makers involvement to further develop**.

Elders assistance is becoming one of the most appealing applications of telemedicine because of the possibility to keep the elders monitored and safe in their house, where they feel most comfortable. Moreover, late recovery in permanent structures is becoming one of the main issue to cope with in the next years, favoring the best lifestyle of elders.

However, comprehensive solutions are still lacking. Although there are several experiences reporting that initial funding sources and reimbursement policies are the most important barriers that avoid widespread of telemedicine programs[[6]](#footnote-6),[[7]](#footnote-7), there is a study that deals with business models that determines how the application of telemedicine, in particular for post-stroke rehabilitation can generate positive cash balance. This study at outpatient clinics in Oklahoma concludes that 340 telemedicine visits are enough to provide positive net cash flow per year and they also expect to recover the initial investment within the 4th year of operation[[8]](#footnote-8). In addition, a clinical trial carried out in Thailand gives us evidence that home rehabilitation programs for post-stroke patients help reduce disability better than traditional hospital care. Although the costs of including the patients in the telemedicine programs is high, this measure has been marked as a cost-effective by the Thai Ministry of Health[[9]](#footnote-9). Indeed **Assisted Living Environments may play a key role in renewing the system of integrated social and health assistance.** However, apart the technological research, other issues strongly affect their capillary diffusion in European national and local environments. ***Overall it is necessary: 1) to assess and demonstrate the efficacy of the proposed assistance methodology; 2) to evaluate costs of the new solution versus the present operational modalities and point out economic benefits for all the involved actors, namely national and local socio-health systems, health institutions and citizens; 3) to design a new model of care delivery taking in account the new devices and related schemes for delivery and maintenance beyond the more evident clinical aspects.***

The Robohome2.0 project, thanks to the participation of a wide spectrum of potential stakeholders and to the data collected in the pilot will allow to evaluate quantitatively the assistance outcome.

The stakeholder involvement is indeed an essential requirement highlighted by the Digital Agenda of the EC for 2020 and necessary to make feasible any proposed solution in the telemedicine field. **Robohome will involve from the beginning of the project, the GPs, the reference hospitals, the caregivers and the social services in order to sensitize them and to steer the project according to the societal needs.** This approach will assure that all of the project decisions will be taken according to the shared awareness and consciousness on the elder needs and make the final solution respondent to the healthcare service needs. The consortium includes different competencies in the health delivery panorama. This participation will allow the project to develop and supply solutions well accepted by the different health actors. Furthermore, the same actors are committed to carry on a wide dissemination of the project results at policy level within local, National and European boundaries.

The assessment of the effectiveness of the proposed service robot is complex and specific activities will be carried out during the project to get a reliable estimate of the overall impact of the use of Robohome2.0 system to the wellness of the elder. It is not possible to evaluate the time course of the decline of the single user independence and its progression towards frailty with and without Robohome2.0, within the Robohome2.0 time frame [PCL, SAS, agree? References?]. Nevertheless, we expect to show that elders with **Robohome2.0 tend to keep healthier and more active**, by the time course, and this will come out from **the functional indicators** (Task 8.2) set-up for the pilot and will be compared to statistics over similar population. Moreover, the multi-site nature of the final testing phase that will be held in three different European countries (Sweden, Italy and Spain) will guarantee that the proposed solution will be firstly adherent to the single National healthcare systems requirements but also to the ones shared at the European level. This implicitly means that the results of the pilot will be of interest not only at local level but also at European level.

In addition, we expect that the use of Robohome2.0 will help the family and the clinicians to recognize possible risky situations, making warning about the decline of the user which, on the contrary, might be disregarded by the caregiver. Indeed, the use of clinical scales inside the gaming platform of Robohome2.0 will help to keep a continuous evaluation of the status of the elderly and will drive prompt interventions in case of risk situations.

Another crucial element to assess the assistive outcome will be the capability of the user to interact and use of the system, considering a low-trained old person. Indeed for all consumer robots the capability to interact with untrained or minimally trained people in everyday environment is a crucial issue.

**These elements of assistance outcomes (clinical impact with respect to statistics, number of risk situations avoided or warned by the system, user feedback and usability of the system) will be the leveraging factors to prove the effectiveness of the use of the system and consequently its eventual economic benefit**.

In the final phase of the project Robohome will also define a possible **business plan[[10]](#footnote-10)** to demonstrate the cost-effectiveness of the technology and develop a proper business models for the technology transfer to massively deploy Robohome2.0 within a sustainable healthcare system. The business model will be based on a service model mainly elaborated by KORIAN, a large service provider in the elders assistance field. In particular, a business plan will be elaborated on the basis of the four basic questions: What? Where? How? Why? To this aim the following sequential steps have been identified:

|  |  |  |  |
| --- | --- | --- | --- |
| **STEP** | **PHASE** | **CONTENT** | **AIMS** |
| 1 | Business description and context | Status analysis. Analysis of projects solutions on the market to support elders at home. Novelty introduced by Robohome2.0 in assisting elder at home.  | Make explicit and structure the offer for selected business areas (clinical / social / comprehensive solution and so forth) in the context of assisting the elders at home.  |
| 2 | Strategies and position in the market | Identify possible strategies to enter into the market (provider for the public / private services or directly to the elder). | Clear evaluation of the company strategies and evaluation of the business risk.  |
| 3 | Development plan | Guide of all the decisions related to localization, production and marketing | Translate the first two steps into a concrete action plan, with timing and modalities. |
| 4 | Structure and Management | Evaluation of a congruent business structure with clear identification of roles and competences to achieve defined results. | Understanding of available resources and resources needed.  |
| 5 | Financing resources | Definition of the financial resources that can be found to finance the business. | Identify financial provider |
| 6 | Economical-financial projections. | Projections of economical and financial return in a defined reference period.  | Expected return and capital needs. |

In particular, in business description (phase 1), a clear market focus should be identified, for instance through successful use cases that can emerge from Robohome2.0 pilot. The economic evaluation is defined as **comparative analysis of alternatives based on the benefits and costs**[[11]](#footnote-11). These will be composed of direct and indirect costs. Incremental Cost-Effectiveness Ratio (ICER) will be considered as:



**Direct costs** of the National Health System are mainly costs of primary care and ambulatory visits, and drugs. In particular, the “sliding doors” mechanisms of evaluation, that is based on the number of admissions to primary cares, can be used as these data are available at SAS and PCL [Agree? References?] sites, deriving a **standard cost for each group of elder with similar clinical profiles** (Task 8.1). Direct costs for Robohome2.0 will also incorporate the costs of the technology of Robohome2.0 and its technical maintenance over time. **Indirect costs** will also be identified. These can be, for instance, care-givers time, nurses intervention, devices needed both for assistance and for clinical monitoring. **Quantification of indirect costs** will be carried out in collaboration with Public Health Providers (SAS, MUNICIP and Lombardy Region) in the three states in which the pilot will be carried out: Spain, Sweden and Italy.

 In the phase of structure and management (phase 4) of the business plan **RTL of the different components (Section 1.3.2) will be fully taken into account** in estimating the resources required to bring all components to the product level and to evaluate the time to market of several components.

Such business plan can be the basis of any company that would enter into the field.

One of the key mission of EU robotics research is to accelerate the robotics innovation turning the results of the research and the technology development into competitive products and services at a much faster pace. Robohome2.0 will participate to this goal especially thanks to the representation of the complete supply chain in its consortium. In Robohome2.0 the market chain is fully represented (GIRAFF, SXT, SG), from the research (UNIMIL, POLIMI, UOP, OREBRO BDigital UMA) to the robotic industry up to the global healthcare equipment suppliers (KORIAN) and end-users (PCL, SAS, Munic. This will help in guiding correctly the research into real opportunities to the final users and to the market, ensuring an R&D&I strategy that maximizes the market impacts and intakes.

The crucial impact will be the development of the value chains based on module and component supply service sector as well as non technical value chains based on stakeholders and service providers. The technology transfer will be a key element in the wealth creation process across the value chain that derives from the investments in robotics. Robohome2.0 will support this process of technology transfer by properly addressing the guidelines of Intellectual property management into the CA and by fostering the strong link among research and industrial partners in the consortium.

**Reduction of admissions and days spent in care institutions, and prolongation of time spent living in own home when ageing with emerging functional impairments.**

Frailty, cognitive and physical decline are syndromes that progress slowly but constantly over time and the actual monitoring methods, such as brief and periodic visits conducted about every 6 months, or clinical evolutions based on patient reported questionnaires are not enough to early detect meaningful changes or significant but rare events such as fall, naps or transient neurological events that sometimes are just forgotten by the elder because of their rare occurrence. The increasing share of elderly population coupled with the related healthcare costs are a great incentive towards the design of new care models to assist the elderly needs. In particular, a modification of the structure and organization of the network of services, increasing the assistance on the territory is required [TELEMEDICINE: NATIONAL DEVELOPMENT GUIDELINES, ITALY].

ICT research and innovation can contribute in this reorganization, by supporting the shift of the core of the assistance from the hospital to the territory through innovative assistance models centered on the elder. Modalities of distribution of these new services are fundamental, as they can assure: (i) equity of access to the primary and secondary care, (ii) a better management of chronicity and continuity of care through a multidisciplinary approach and (iii) a valid support for emergency services.

Currently, the panorama is populated by a set of small companies that provide some of the needed services, while only a holistic comprehensive approach can support the effort of shifting the care model.

In many European countries telemedicine services is diffused, in some cases it is sustained by national projects.

The current situation of the elderly home care in Sweden

In Sweden, the National Strategy for e-health was published already in 2006. It was a bootstrap document that has been developed through regular reports [LAST DATE 2012/2013?]. Indeed in Sweden, telemedicine is largely diffused: in 2008 there were already more than 100 applications in more than 75% of the hospitals [OLD DATA]. Principal applicational areas are: televisit (patient-doctor), telemonitoring and radiological teleconsulting.

The current situation of the elderly home care in Spain

In Spain, Regional Health Systems, part of the National Health System, have focalized their attention on e-health in the last twenty years, sharing the view and the development of systems and services based on telemedicine.

In Great Britain, the Departmnet of Health, in may 2008 has financed a large project on teleassistance and telehealth: the “Whole System Demonstrator”[[12]](#footnote-12), oriented towards frail or chronic people. 6000 patients and more than 200 clinicians were involved. Results have been very promising, for instance a 20% reduction in emergency admissions in cardiac patients was observed, and a new program has been launched in 2012 by that Department: “Three million lives”[[13]](#footnote-13). About 100,000 new users were gathered in the first two years of the project that aims at a potential basin of users of 3 million people in GB.

The current situation of the elderly home care in France

In France, the Ministery of Health has published on the Journal Officiel del la Republique Francaise[[14]](#footnote-14), the legislative framework that regulates telemedicine services, condition of attuation and evaluate organizational aspects for the French Health system to recognize Telemedicine services.

The current situation of the elderly home care in Italy
It is known that due to cultural reasons, most of the Italian elderly people and their families prefer an “aging in place” option [Gori C. & Da Roit B. (2006) The Italian way to commodification of care. In: C. Ungerson & S. Yeandle (Eds) The Changing Boundaries Between Paid and Unpaid Care, pp.223–258. Palgrave, London]. Yet this preference encounters in practice the challenges of an underdeveloped community care system. In fact, even if in the last 30 years the expenditure devoted to long-term care and the provision of services in kind have grown, the Italian welfare state is still characterized by a ‘familistic’ approach where the public sector devotes a scarce amount of money to care (prioritizing cash benefits over services in kind) and the arrangement of care is largely left to families [Gori C. Home care in Italy: a system on the move, in the opposite direction to what we expect. Health Soc Care Community. 2012 May;20(3):255-64]. The cash benefit in form of companion payment represents the main public long-term care input, which, in most of the cases is used to employ migrant care workers who are the main carers for the elderly at home. The working conditions of these sitters might be very hard, and they often need to spend most of their time in helping the elder in the activities of daily living, so that some other needs of the elder are necessarily neglected. The main task of family members often consists in organizing and monitoring the work of the sitters, and the life pace of the contemporary society often prevents them from spending time with the elder. In addition, with the companion payment family carers receive a monetary support but do not receive the information and counseling that in fact all the surveys show they want, especially with regards to the diseases that affect elderly people and the provision of healthcare [Lamura G. et al. (2010) Migrant workers in the long-term care sector: lessons from Italy. Health and Ageing Newsletter 22 (1), 1–6.]. The system seems to have found an “equilibrium” as most of the users gain some practical advantages from current arrangements [Gori C. Home care in Italy: a system on the move, in the opposite direction to what we expect. Health Soc Care Community. 2012 May;20(3):255-64]. Nevertheless, this equilibrium exposes the care for the elder to the risk of an unsatisfying quality, and if it is difficult to adequately meet the existing needs, short of time and human resources, it is very hard to implement good monitoring and preventing strategies against the development of a condition of frailty and disability.

In Europe the communication 689 of 2008 from the EC Commission[[15]](#footnote-15) was finalized to sustain the member states in the realization, on a large scale, of telemedicine services, through initiatives as: increase confidence in telemedicine services, get deeper knowledge in regulatory, ethical and legal issue, solve technical issues and support the market. The EC prompted each member state to identify priorities for that state and push towards development with dedicated guidelines. This was perceived by the Economics and Social Committee of the EC[[16]](#footnote-16) as a “cultural revolution” that should be framed inside the evolution of the health system in the whole Europe.

**With such a background, the Robohome2.0 intervention would represent an additional aid and resource to favor a comprehensive care to the elder at home, integrated in and integrating the community of users surrounding the elder. Establishing a network of providers of social and health care, not Robohome2.0 would represent an additional virtual care provider but it would also promote the creation of an integrated care system.**

To make a home assistance solution feasible and deployable to the elderly the complete comprehension of the elderly needs is required. Indeed, the elderly with emerging functional impairments has the primary need of a continuous and personalized training and assistance at home possibly under supervision of both formal and informal caregivers. The possibility to offer such an integrated service at home seems the most ecological solution to train and monitor the elderly effectively. **Robohome 2.0 will offer an integrated solution including all the main ingredients: monitoring, training and assistance at home.** **The approach proposed is an advanced tele-assistance, for which the presence of a remote caregiver, connected through internet to provide 24h assistance, is not required as much activity is delivered by the virtual caregiver embodied inside Giraff**.

This means that the Virtual Caregiver has to be embedded with advanced artificial intelligent algorithms that, taking advantage of all the information gathered by the Robohome system during the elderly daily life, can recognize the current user condition and lifestyle, and plan/update the assistive and training program accordingly. This would allow saving resources from rationalization of their use. For instance, some of the activities can be taken over by the virtual therapist, freeing the family and the system by some repetitive activity and reducing possibly the costs.

The virtual caregiver will provide also clinical tests that will be both the standard gold standard and also tests that are completely transparent to the user thus avoiding any memory effect when the user is not so compromised. These tests together with the assistance of formal caregivers only when necessary will assure the reliability of the assistance updates provided to the user. Moreover, by having access to a patient’s information, the care team will be able to make better informed treatment decisions which could reduce the number of physician office visits and hospital stays. Finally, keeping the elderly fit and in a good psycho-physical condition will avoid as much as possible traumatic events or urgent admission at Emergency Department.

The community of Robocare2.0 fosters a high communication between stakeholders to optimize the use of resources, both institutional and voluntary, reducing the risks of hospital admissions and readmissions. The reduction of readmissions will also have a beneficial impact of the Health providers budget.

**Thus, the comprehensive and multidisciplinary home care solution offered by Robohome 2.0 will finally have a great impact in the healthcare economy. This solution represents a ground breaking personalized service and reverse the trend towards the institutionalization of senior and disabled citizens while ensuring that they enjoy improved living conditions in their home environment.**

**Improvement in quality of life of older persons and of their carers.**

The most of the elderly prefer to live independently surrounded by all of their comforts and habits at home. When functional and cognitive impairments naturally associated to the ageing process, such as memory loss, decreased mobility and frailty, occur the ability to live unaided become compromised. Therefore, a comprehensive and adaptive telemedicine solution offering a personalized and continuous monitoring, assistance and training can be an effective solution to promote the elderly independence at home and to improve his/her quality of life.

To design such a cutting-edge solution that can be deployed to the elderly independently on their primary disease, it is important to sensitize the community of the elders towards their empowerment in order to make them more active in maintaining an healthy and active lifestyle. This process should start in a prevention phase to maximize the envisaged results. The elderly have to be persuaded towards the concept that an active participation in monitoring their health status can promote patients’ adherence and compliance with treatment plans, help them assume more responsibility for their health and may prevent unnecessary emergencies. Moreover, the elders awareness that the service robot is serving them exactly at their point of need and in the full respect of their privacy makes the elders more confident about his conditions. The assistance provided by Roboohome will be completely multidisciplinary and will cover the physical, cognitive, behavioural and social domain. Thus, Robohome has the potential to support a greater change in individual attitude and behavior and it will slow down the progression of the elder decline.

Our aim is to move elder far from just watching TV passively. We dream a society in which all the people can feel an active and useful part and not simply a higher weight as they increase their age. The collection of memories, the bank of time, the suggestions to youngers are all elements that would contribute to a less eager and more giving society.

Moroever, having in mind that the effectiveness of a telemedicine solution is maximized only if the system can assure personalization, Robohome will be designed and deployed as a modular system providing to each person, only the modules needed to offer the specific level and the type of assistance. In Robohome personalization

is achieved also in the activity center and continuously tuned by the virtual caregiver.

Robohome can help not only the elderly but also the formal and informal caregivers. Indeed, Robohome allow family members and care teams to respond to changes in an elderly person’s condition, help prevent accidents and emergencies, and coordinate necessary support. This coordination of the care will make the formal caregiver more aware of the daily patient conditions thus facilitating the decision making process that becomes more well-timed and successful. In the meanwhile the offered service will relief a bit the responsibility of the informal caregivers that can become more peaceful in the interaction and “management” of their beloved. In fact using Robohome they can trust on a secure system that connects the elderly to all of the interested care providers.

**The Robohome solution will empower both the patients and informal caregivers to take care of their health and to be independent. This will be crucial to decrease the current divide that partly prevent the spread of innovative ICT telemedicine solutions in healthcare.**

Robohome is grounded on the following principles:

- ***modularity***, to offer a customized solutions tailored on the single user cognitive, physical and social needs.

- ***adaptability***, to offer a system that can learn from the user feedbacks and thus can adapt the user scenario and the human-robot interaction modality to the current user condition adopting always a user-centered approach.

- ***applicability to realistic setting*** that is the elderly home. This principle implies that the solution has to be cost-effective, and well accepted by the elderly. Usability will be always considered as a primary aim to deploy the ICT requiring minimum user empowerment. To assure applicability at home the service robot has to be perceived as an help and not a burden and thus the HRI has to be optimized to minimize this risk.

- ***transparence of monitoring*** to increase user acceptability. The user has not to perceive the system as a stranger always ready to press him and force him doing unwanted activities. It would be crucial to establish a good relationship in which the user can always rely on the Virtual Caregiver and can be not bored but motivated by the suggested activities and stimuli.

- ***promoting the communication*** between different actors involved in the healing and caring process to improve therapy and training adherence and to let the elderly be in the center of ...

- ***interoperability*** to offer a solution that is compliant with standards. This principle is not probably directly perceived by the user but it will be crucial to assure a future deployment of the implemented solution.

All these principles will be essential to assure an ecological solution able to offer the following expected impacts for the elderly:

-To enable older people live independently for longer time in their preferred environment

-To promote better and healthier lifestyles also encouraging and offering social and community activities

- To stimulate the end-user in remaining physically and mentally active.

-To better support the maintenance of the health of the elderly providing a personalized multidisciplinary training and a continuous and mainly transparent monitoring that becomes more present only at their point of need

**Therefore, Robohome will optimize the sustainability, will increase the social inclusion of the users and will strengthen the relationship between rehabilitation team, users and caregivers thus producing a better coordination of the care process that is completely centered on the end-user wellbeing.**

**Global leadership in advanced solutions supporting active and healthy ageing.**

One of the main features of Robohome is that it will allow the collection and analysis of large volumes of health data (lifestyle, physiologic variables, movement patterns, cognitive performances, health variables such as hearth rate or pressure... ). This information constitutes the foundations on which the efficacy of the provided system can be assessed during the final multi-site pilot testing phase. However, this feature will not contribute to that end if the information collected is not shared between partners. The interoperability between them is ensured by the use of a common platform (the Robohome), but connections with existing infrastructures will also be

needed, to decrease adoption barriers and to ease deployment. Interoperability issues are also very

important when considering future developments and exploitation of Robohome. A system in

which interoperability at all levels (syntactic and semantic) has been taken into account since the beginning

of the design will be easier to integrate within the current infrastructure of hospitals and it is more likely to

be widely adopted. Therefore, Robohome integrability and interoperability will be guaranteed by its adherence to standards: Semantic, Terminology and coding (ICD (ICD‐9‐CM), LOINC, SNOMED, UHID, AIFA), and Synthactic (HL7, (CDA, Clinical Document Architecture), DICOM) standardization. Moreover, for modularity and extensibility, the software architecture will be designed and developed as a multi‐level one.

Robohome implements a secure model, performing authentication, providing authorization for integrity and confidentiality of information.

The specific focus in Robohome on the economical and ethical aspects related to the deployment of a service robot able to train and monitor eldest people at their point of need in their preferred environment will lead to a much richer understanding of the issues as well as the potential, which can then be applied when regulators need to consider the economic, social and ethical issues which Robohome will undoubtedly expose. The industrial partners of the consortium, Giraff, SXT and Signal GeneriX Ltd are already working on advanced telemedicine technologies for elderly and will first pursue the exploitation of the project results. The experience of Robohome will be crucial for these industrial partners because the strict link with the most relevant stakeholders together with the multi-site nature of the final test will strengthen their competitiveness and will enable them to develop innovative solutions meeting the needs of European and global markets.

EXPLOITATION OF THE SINGLE MONITORING MODULES ... AZIENDE + KORIAN INPUT IS REQUIRED

## 2.2 Measures to maximise impact

### a) Dissemination and exploitation of results

• Provide a draft ‘plan for the dissemination and exploitation of the project's results’ (unless the work programme topic explicitly states that such a plan is not required). For innovation actions describe a credible path to deliver the innovations to the market. The plan, which should be proportionate to the scale of the project, should contain measures to be implemented both during and after the project.

*Dissemination and exploitation measures should address the full range of potential users and uses including research, commercial, investment, social, environmental, policy making, setting standards, skills and educational training.*

*The approach to innovation should be as comprehensive as possible, and must be tailored to the specific technical, market and organisational issues to be addressed.*

• Explain how the proposed measures will help to achieve the expected impact of the project. Include a business plan where relevant.

• Where relevant, include information on how the participants will manage the research data generated and/or collected during the project, in particular addressing the following issues:

oWhat types of data will the project generate/collect?

oWhat standards will be used?

oHow will this data be exploited and/or shared/made accessible for verification and re-use? If data cannot be made available, explain why.

oHow will this data be curated and preserved?

*You will need an appropriate consortium agreement to manage (amongst other things) the ownership and access to key knowledge (IPR, data etc.). Where relevant, these will allow you, collectively and individually, to pursue market opportunities arising from the project's results. The appropriate structure of the consortium to support exploitation is addressed in section 3.3.*

• Outline the strategy for knowledge management and protection. Include measures to provide open access (free on-line access, such as the ‘green’ or ‘gold’ model) to peer-reviewed scientific publications which might result from the project.

*Open access publishing (also called 'gold' open access) means that an article is immediately provided in open access mode by the scientific publisher. The associated costs are usually shifted away from readers, and instead (for example) to the university or research institute to which the researcher is affiliated, or to the funding agency supporting the research.*

*Self-archiving (also called 'green' open access) means that the published article or the final peer-reviewed manuscript is archived by the researcher - or a representative - in an online repository before, after or alongside its publication. Access to this article is often - but not necessarily - delayed (‘embargo period’), as some scientific publishers may wish to recoup their investment by selling subscriptions and charging pay-per-download/view fees during an exclusivity period.*

**Dissemination**

Dissemination of project results into knowledge, products, and exploitation are key indicators of the success of the project. The dissemination targets individuals, large companies, SMEs and (local) governments to raise awareness, knowledge and skills. The potential **target audience** of the project is composed of the following

subjects: i) health policy makers, public and private health institutions, private insurance companies; ii) medical personnel including medical doctors, para-medical personnel, formal and informal carers; iii) elderly and their families; iv) Scientific community.

In order to reach these stakeholders and ensure an effective dissemination, the project foresees the following dissemination mechanisms:

1) PROJECT WEBSITE

A **project web site** will be established, including a presentation of the project objectives and methodologies

and comprehending web facilities for communication and dissemination of information and progresses

done by the project. Each partner will contribute to provide the scientific contents of the site.

These contents will be collected, organised and formatted by P1, UMIL and published on the web. The content of the site will be updated regularly on a monthly basis. Links will be created with relevant web sites.

The web site will be divided into two main sections.

A public section will be used for dissemination of knowledge generated by the Project to the public. A

devoted section will spread information about scientific results together with abstracts and, when

possible for copyright reasons, full text of published scientific papers.

A private section, which will be accessible only to Participants, and will be used to inform Participants on items such as general information on Meetings, Progress reports etc. This part of the web site can be used by each partner of the Consortium to download documents and run discussions.

2) PROJECT COORDINATED IMAGE

A project coordinated image will be prepared and will include the project logo, a coordinated set of project tools for reports and presentation of the project results, and the project brochure to be used in different dissemination occasions.

3) EDUCATION

The network of partners, the connections and the knowledge acquired within the project, will positively influence the didactic proposals that can be offered at a local or international level to students (undergraduate or postgraduate), to researchers or professionals (e.g. Master, Doctorate courses, Summer schools).

4) PARTICIPATION TO EVENTS

Participation to relevant international event for standardization and dissemination such as the Continua European Symposium 2013 and e-Healthweek 2013 and their following editions.

5) PUBLICATIONS AND WORKSHOPS

Publication of technical and research papers in well‐known scientific and industrial journals, magazines, newspapers (IEEE Transactions, BMC Journals, Elsevier Journals, ACM series) preferring always the open access journal to increase the target audience.

Presentation of results at conferences, seminars, workshops (a list in section ??) both through speeches or posters. Within the initial dissemination plan, partners will contribute to create a list of possible conferences and events connected with the topics dealt with by the project in order to exploit all possible dissemination means. All intended publications must be put on the common website and submitted to all partners together with a request for permission to publish. Response of the partners has to be made within 4 weeks after receipt.

6) DATA and TOOLS SHARING

Selected algorithms and methods implemented in the project will be made available to the scientific community under a GPL(or equivalent) licence through forums such as SourceForge. This will make it easier for other scientists to build their research upon Robohome results.

Robohome will use open sources software instruments that will be made available for the design and setup of new rehabilitation programs. This will be a significant contribution to the research community.

**Exploitation**

The Robohome consortium will design a clear Exploitation Plan that shall detail the following: Identification of exploitable results, market analysis, industry and competitive analysis, commercial relations and business plan. The exploitation plan will be devised of exploitation tasks which will allow the consortium to identify Robohome related products that could have commercial applications, assess the opportunities and risks related to each product, evaluate the effort needed for commercialisation of the products and initiate contact with potential business partners of future clients. During the development of the Robohome Project a Consortium agreement and Exploitation agreements will be signed by all the companies taking part in the Robohome Project. The Consortium Agreement that will be agreed and signed by the partners before project commencement will refer to and define the exploitation rights within the consortium.

**Standardization issue**

**Management of intellectual property**

The Exploitation and IPR Management task will perform the monitoring of the ROBOHOME IPR activities and IPR work, and based on this create an IPR Management List. The assessment of ROBOHOME Intellectual Property Rights involves mapping the IPRs in view of the ROBOHOME deliverables (as a basis for providing stronger and more practical IPR agreements for these specific IPRs when needed). The IPR policies of the targeted standardisation bodies will also be considered in this context.

The above described analysis, assessment and auditing of ROBOHOME IPR aspects will provide a basis for steering the technological activities (towards non-infringement of Third Party IPR), strengthening the collaboration (via understanding of the Consortium IPRs, and providing more appropriate agreements) and building up of ROBOHOME IPR itself.

All issues regarding confidentiality, IPRs, Background, Sideground, Foreground, agreement on exploitation rights, and clarification of each individual’s rights and obligations are going to be included in the **Consortium Agreement**, document to be signed by all partners before starting the project. The Project Manager is responsible for the use of IPR within the Consortium, according to the terms laid out in the Consortium Agreement.

Primarily, the project aims to enrich and expand the state-of-art and state-of-practice of the home assistance and training methods deployed to the elderly in Europe. In order to carry out the work, the partners will develop and share know-how and technologies in many forms, including, but not limited to algorithms, tools, experiences and methodologies. The know-how exchanged between the partners may include, in certain cases, background. The partners are in agreement on the principles for the management of intellectual property, as summarized herein.

The consortium agreement will be written in such a way that it is possible for all partners to carry out their project work whenever it is dependent on transfer of knowledge from other partners, whether this is foreground or background knowledge. The consortium agreement will protect the legitimate IP interests of all partners by explicitly limiting the rights to background knowledge and, where required, even limiting the rights to foreground knowledge developed during the course of the project when there is no need-to-know or need-to-use.

In general, tools, methodology documents, benchmarks and case studies will be available to all; while some proprietary tools and algorithms developed by the partners may be available at the discretion and terms of their respective owners. In spite of the latter restriction, all the partners intend to pursue publications of the underlying principles of the technologies embodied in their tools in the appropriate academic conferences. Finally, all knowledge will be managed in accordance with the consortium agreement that will be timely prepared and signed by all consortium members

**Management of Knowledge, Technology Transfer, Plans for the use, IPR & Patents**

All knowledge will be managed in accordance with the IPCA Consortium Agreement. Relevant discoveries will be patented for the use of ROBOHOME’s partners, and relevant licensees and spin-offs will ideally be transferred, so that both established companies and emerging companies can benefit from the ROBOHOME research.

**The Foreground Management and Plans** for the use will be updated by the IPR Policy committee which will consist of both technical and legal experts form the relevant partners. This group will report regularly to the Management Team and the Plans for use on new IPR generated during the project. The group will also prepare and regularly update the Foreground Management and IPR strategy of the consortium and present a Final Exploitation Plan to the penultimate and final meeting.

**Foreground Management** will be based on modern methods, such as BSCW on the private area of the webpage, which allow cooperative work on “living” documents. The Management Team is responsible for the day-to-day Foreground Management.

**External dissemination and Technology Transfer**: The wish and responsibility to publish research results and carry out Technology Transfer will be carefully weighed against the necessity to keep specific foreground within the consortium and not to endanger future exploitation. All partners provide information about planned publications to the consortium and the Management Team, so a publication can be delayed until patents applications etc. has been filled. This rule is valid up to 1 year after the end of the project.

**Plans for using the foreground (IPR and Exploitation)**: The IPR regulations will be defined in the IPCA Consortium Agreement (CA). The terms in the CA deal with the protection of foreground related to joint invention, application for patents and further use of foreground. In addition to this, terms are defined for the access-rights to foreground, mainly based on the document on the provisions for implementing integrated projects. The CA– a legally binding document - deals with: 1) Protection of individual partners background. 2) Protection of IPR gained in the project (foreground). 3) Definition of the exploitation strategy (patents, licensing etc.). 4) A contingency plan that ensures the access to foreground if a partner (with project-critical IPR) leaves the consortium.

Results of the project will ideally be new software and middleware technologies. Special care will be taken to avoid obstructions to the exploitation of results. Partners, who own the rights of specific foreground developed in the project, are encouraged to exploit these results, licensing the results or at least transfer the rights in exchange for an appropriate financial compensation to partners willing to exploit the rights.

### b) Communication activities

• *Describe the proposed communication measures for promoting the project and its findings during the period of the grant. Measures should be proportionate to the scale of the project, with clear objectives. They should be tailored to the needs of various audiences, including groups beyond the project's own community. Where relevant, include measures for public/societal engagement on issues related to the project.*

TO BE FILLED

HO FINITO LA FANTASIA … QUI FORSE POTREMMO METTERE UNA TABELLA??

**Continua Health Alliance** is a non-profit, open industry organization of healthcare and technology companies joining together in collaboration to improve the quality of personal healthcare. With more than 200 member companies around the world, Continua is dedicated to establishing a system of interoperable personal connected health solutions with the knowledge that extending those solutions into the home fosters independence, empowers individuals and provides the opportunity for truly personalized health and wellness management. The Continua Health Alliance[[17]](#footnote-17) is promoting the development of end-to-end, plug-and-play connectivity of personal health devices and services.

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