UNIVERSIDAD INTERNACIONAL DE LA RIOJA

Universidad Internacional de La Rioja
Máster universitario en Diseño y Gestión de Proyectos Tecnológicos

Home Care & Health Abroad
HCHA

Trabajo Fin de Máster

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Ciudad: Barcelona
Fecha: 20/02/2015

Resumen

Este trabajo recoge una propuesta de proyecto de investigación y desarrollo para una convocatoria del programa marco europeo de investigación H2020 dentro del tópico “Health, demography and wellbeing”. El proyecto Home Care & Health Abroad (HCHA) busca reducir el impacto de uno de los problemas sanitarios, demográficos y económicos más actuales en Europa: el incremento de la edad media de la población y por consiguiente el gasto económico y sanitario que ello supone. HCHA busca dar respuesta a este problema a través de la tecnología, en concreto, a través de las viviendas adaptadas tecnológicamente para ancianos. Esta herramienta permitirá proporcionar por un lado atención médica más económica, y por otro lado seguridad e independencia a las personas que habiten en dichas estancias, mejorando así su calidad de vida.

La propuesta del proyecto se presenta en inglés y siguiendo la estructura establecida por el programa de financiación.

Palabras Clave: Ambiente Asistido, Tele-Asistencia, Independencia, Calidad de vida

Abstract

This Master Thesis presents a research and development project proposal for a Call of the European framework programme H2020, within its topic “Health, demography and wellbeing”. The Project Home Care & Health Abroad (HCHA) seeks to give a unitary solution to one of most threatening health, demographic and economic challenges in EU: the unstoppable growth of aging population and the connected economic and healthcare cost. HCHA Project pursues the developing an innovative prototype of Ambient Assisted Living for elderly. This took will provide cheaper healthcare assistance and ensure elderly wellbeing, through an independent life and security feeling.

The proposal is presented in English and its structure follows the established template.

Keywords: Ambient Assisted Living, Tele-Care, Independence, Quality of life

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1. Introducción

La idea del proyecto HCHA surgió de manera progresiva. Desde el primer momento estaban claros los requisitos: que fuera un proyecto de ámbito internacional, para presentar a una convocatoria del H2020, que fuera innovador y que tuviera una implicación social. A partir de ahí, las posibilidades son infinitas y a pesar de que la idea de crear un proyecto relacionado con e-Health nació muy pronto esta se ha ido concretando y evolucionando.

¿Por qué e-Health? Verdaderamente el potencial de este sector es muy alto. La población europea tiene una tendencia de envejecimiento muy elevada, lo que supone un grave "futuro" problema, tanto social como económico; y la solución tiende a relacionarse con la combinación de las TIC y las ciencias de la salud, lo que daría lugar al concepto del e-Health. La UE entiende esta actividad como una de sus prioridades, al tratar esta de solucionar uno de los grandes retos sociales de nuestra sociedad, y destina numerosos recursos.

La idea inicial del proyecto consistía en crear un prototipo de dispositivo e-health que permitiera una comunicación a nivel usuario- profesional y usuario- usuario. Sin embargo, tras entrevistar a especialistas en el sector el alcance del proyecto y la tecnología se fue concretando. El estudio de la literatura realizado para establecer el estado del arte evidenció la existencia de innumerables soluciones de e-Health y Tele-Medicina[1]. Asimismo, el mismo estudio sirvió para detectar las causas que dificultan la implantación de este tipo de servicios. La dificultad de interacción entre los distintos dispositivos existentes es, sin duda, una de las problemáticas que dificultan la introducción de estas tecnologías en el sector sanitario actual. Por ello, uno de los objetivos principales del proyecto es precisamente desarrollar los dispositivos ya existentes para que puedan interactuar y ser controlados por un dispositivo de control creado necesariamente en el marco del proyecto.

El proyecto HCHA toma su forma final al entender este conjunto de dispositivos tecnológicos como un Ambiente Asistido (Ambient Assisted Living)- un concepto que describe el hogar como un ambiente equipado con diferentes herramientas (principalmente sensores) que velan por el cuidado de sus habitantes. De este modo se consigue convertir el hogar en un espacio que monitoriza al usuario detectando posibles accidentes o ayudándole en sus tareas diarias, mejorando así su autonomía y el cuidado de su salud. Además las

[1] Ver algunos ejemplos en el apartado "Concept and approach"

aplicaciones de un Ambiente Asistido son tantas como sus dispositivos auxiliares: detectar caídas, monitorizar parámetros de salud, prestar apoyo en tareas de rehabilitación o permitir la comunicación con familiares o el centro de salud…; y todos ellos son controlados desde un dispositivo central. Cabe destacar, que estos dispositivos o sistemas son especialmente útiles para personas mayores que viven solos y han de cuidarse por sí mismos, pese a las dificultades que les plantea la edad. El público estratégico del proyecto son aquellas personas mayores que residen fuera de su lugar de origen, puesto que son más vulnerables y su preocupación por la salud es más acentuada. Ahora bien, la tecnología desarrollada durante el proyecto es adecuada para cualquier perfil de usuario.

El trabajo Final de Máster en su conjunto, no recoge tan solo la propuesta preparada para una convocatoria del programa marco europeo de investigación H2020, sino que cuenta con otras partes propias de un trabajo de investigación de este tipo:

Sección 2- Resumen de la propuesta. En este apartado se describe la convocatoria y el programa al que se presenta la propuesta. También se recoge un resumen de la propuesta y la composición del consorcio a grandes rasgos.

Sección 3- Propuesta según el formato de la convocatoria. En esta sección se desarrolla el proyecto según el formato marcado por la convocatoria. Incluye la parte administrativa (donde se recoge un resumen del proyecto y el presupuesto) y la parte técnica, compuesta de los apartados de objetivos y estado del arte, implementación del proyecto, impacto, miembros del consorcio y cuestiones éticas o de seguridad.

Sección 4- Conclusiones. Este apartado recoge las principales conclusiones de la propuesta, la proyección de la misma tras su “implantación” y también las conclusiones del trabajo final de máster.

Sección 5- Bibliografía y referencias.

Sección 6- Anexos. El primer anexo recoge el contenido de la convocatoria a la que se presenta la propuesta HCHA, descrita en este trabajo. El segundo anexo contiene algunas estadísticas relevantes en el trabajo, todas ellas tomadas de Eurostat.

2. Resumen de la propuesta

2.1 Descripción de la convocatoria

El proyecto HCHA es una propuesta presentada a la Call PHC-25-2015- "Sistemas y servicios TIC avanzados para una asistencia integrada"[2] ("Advanced ICT systems and services for integrated care") que pertenece a la área de "Salud, cambio demográfico y bienestar" del pilar Retos Sociales del programa de financiación H2020.

Horizonte 2020 es un programa de financiación de la Comisión Europea, sucesor del 7º Programa Marco, cuya misión es incentivar iniciativas que favorezcan el cumplimiento de los grandes objetivos que se ha marcado la UE. Su duración es de 6 años, del 2014 al 2020 y su presupuesto previsto de 76.880 Millones de Euros. El H2020 se estructura en tres pilares principales: Ciencia Excelente, dirigido a potenciar la investigación; Liderazgo Industrial, cuyas prioridades son mejorar la competitividad industrial europea en algunos campos estratégicos y potenciar el papel de las PYMEs; y Retos Sociales, que fomenta la investigación en los principales retos que afectan a la sociedad europea.

Las 6 áreas de acción del pilar retos sociales son: salud; alimentación y agricultura; energía, transporte y clima; materias primas; sociedades inclusivas y seguridad. La propuesta HCHA se engloba dentro del área de "Salud, cambio demográfico y bienestar", en el área específica de "Personalización de la Salud y del Cuidado asistencial".

La motivación que lleva a crear esta área específica "Personalización de la Salud y del Cuidado asistencial", es el crecimiento de la población envejecida y de las enfermedades crónicas en Europa, según el programa de trabajo de CE 2014-2015 sobre salud, cambio demográfico y bienestar. Este hecho social, conjuntamente con la bajada económica causada por la crisis, han obligado a cuestionar la sostenibilidad y equilibrio de los sistemas sanitarios de los países Europeos, en los que Europa gasta alrededor del 10% de su PIB, según informa la Comisión Europea en su programa de trabajo 2014-2015 sobre salud, cambio demográfico y bienestar.

Frente a estos problemas sociales y económicos, la inversión en investigación en formas de cuidado sanitario más personalizadas, busca fomentar una innovación radical en este campo que permita en el futuro reducir las desigualdades en la salud y promover el envejecimiento activo y saludable.

[2] Ver Call PHC-25-2015 en el Anexo 1

En concreto, el reto de la Call PHC-25-2015: “Sistemas y servicios TIC avanzados para una asistencia integrada” es investigar y desarrollar nuevos modelos de organización asistencial basados en sistemas y servicios TIC, que contribuyan a crear un sistema sanitario más sostenible y orientado a las necesidades específicas de los pacientes y personas mayores.

El alcance de estas propuestas se caracteriza por avanzar en el estado del arte de tecnologías de tele-medicina, a través de nuevos sistemas TIC que favorezcan la asistencia integrada. Además se valorarán especialmente aquellas propuestas que busquen superar obstáculos tanto tecnológicos, como sociales u organizacionales en los distintos dominios. Entre otros:

- Desarrollo de un sistema sanitario eficiente económicamente, robusto, que asegure la privacidad de los datos y que facilite la monitorización del estado de salud de los pacientes.

- Desarrollo de servicios orientados al paciente que favorezcan su fortalecimiento, autonomía, cuidado de la propia salud y adherencia a los tratamientos que realiza.

En concordancia con los objetivos de la Call PHC-25-2015, el proyecto HCHA centra su actividad principal en el desarrollo de una tecnología nueva que le permita integrar otras tecnologías ya existentes. Es decir, que a través de la creación de un dispositivo de Tele-Asistencia se podrán gestionar también otros dispositivos ya desarrollados. El objetivo es crear un dispositivo capaz de controlar otros dispositivos de monitorización repartidos por el hogar, de manera que el usuario esté monitorizado y en caso de emergencia (tanto de tipo físico, como de enfermedad) se pueda alertar a los servicios sanitarios. Asimismo el dispositivo de Tele-Asistencia incluirá un acceso a una red social especialmente diseñada para personas mayores que le facilitará su comunicación con vecinos, amigos, familiares o incluso su centro de asistencia sanitaria. De este modo, mediante un sistema soportado por las TIC, se convertirá la casa del usuario en un ambiente asistido que mejorará su seguridad y autonomía.

Además, tal y como se sugiere en la Call, se contará con las aportaciones de los usuarios finales del servicio: pacientes, asistentes, responsables sanitarios así como de expertos en tecnología para la definición de los requisitos del proyecto. Se asegurará de este modo que el alcance del sistema desarrollado sea el esperado por los grupos de interés del proyecto. También se realizará una validación cualitativa y cuantitativa, tal y como se sugiere.

El impacto esperado del proyecto es esencialmente mejorar la calidad de vida de los ancianos, reforzando su seguridad y autonomía. También se espera una notable reducción en los días de hospitalización por paciente y en el número de visitas a Urgencias, lo que supondrá un ahorro económico para el sistema sanitario.

Lógicamente, otro impacto esperado del proyecto es el fortalecimiento empresarial e industrial de los socios del proyecto, primordialmente de aquellos que se dedican tanto a la fabricación como a la implementación de dispositivos TIC aplicados a la salud.

El modelo de financiación de este proyecto es de subvención al 100%, tal y como establecido para las propuestas de Investigación y Desarrollo del H2020. El presupuesto de la Call PHC-25-2015 asciende a €104,500,000 y se sugiere que el presupuesto de los proyectos presentados sean de entre 3 y 5 millones de Euros. Este es el caso del proyecto HCHA en que se pide la financiación de 100% de los gastos elegibles: 100% en costes directos (proyectos de investigación y desarrollo) y 25% en costes indirectos. Modalidad de pago.

La propuesta debe ser entregada, en su totalidad documental, a través del portal habilitado para ello “Electronic Submission Service” en la página web donde se expone la Call antes del 21.04.2015 17:00 hora local en Bruselas.

En la página explicativa de la convocatoria también se pueden encontrar enlaces a los documentos relativos al programa y sus condiciones de aplicación, así como sugerencias para una evaluación positiva del proyecto, plantillas para propuesta y otros documentos.

*Cabe destacar que la Call PHC-25-2015 es una convocatoria de una sola etapa (single-stage call), es decir, que requiere tan solo de una memoria técnica muy reducida para su primera aprobación. Para asegurar la calidad del trabajo académico se va a tratar la convocatoria PHC-25-2015 como una call de dos etapas y se presentará la documentación técnica en su totalidad.

2.2 Resumen de la propuesta

HCHA es una propuesta que ofrece una solución innovadora para afrontar los Retos Sociales Europeos relacionados con la salud, la demografía y bienestar.

Uno de los principales retos sociales en Europa está relacionado con el cambio en el ciclo de vida de su población. Con el avance de la medicina y la mejora de la calidad de vida, la esperanza de vida ha aumentado notablemente en los últimos tiempos y en la actualidad la esperanza de vida media para los hombres es de 75 años y 83 para las mujeres, según datos recogidos de Eurostat[3]. Por esta razón el porcentaje de población mayor de 65 años aumenta muy rápidamente y se prevé que en el 2080 el 50% de la población activa sea mayor de 65[4]. Esto supone una amenaza para la economía y la sociedad Europea.

Es previsible, que el aumento de población envejecida obligue a elevar los presupuestos destinados a los sistemas sanitarios, lo que supondrá una mayor carga de impuestos para los sujetos activos, que fácilmente se verán asfixiados económicamente. La desproporción de la pirámide de población, con un cuerpo muy delgado y una copa muy amplia, podría provocar un sistema de impuestos insostenible. Este hecho refleja la urgencia de encontrar sistemas alternativos para gestionar el cuidado a las personas mayores de modo eficiente, que nos permita adaptar el sistema sanitario a sus necesidades, de un modo sostenible económicamente y sin desvirtuar los servicios ofrecidos. La Comisión Europea es conocedora del papel que juegan las nuevas tecnologías de la información en este campo y apuesta por proyectos que fomenten el desarrollo de las TIC en el cuidado asistencial de los mayores europeos.

La propuesta HCHA cree en el rol decisivo de las TIC a la hora de desarrollar sistemas sanitarios eficientes, por ello, su objetivo principal es utilizar herramientas TIC innovadoras para realizar un seguimiento y vigilancia de las personas de edad avanzada en sus hogares. Esto permitirá a los ciudadanos de la tercera edad vivir en sus hogares de manera independiente y segura, y a la vez evitar la saturación de los centros sanitarios. A través de un cuidado intensivo en casa, se consigue una doble ventaja: se mejora la calidad de vida del usuario y se evita un coste elevado en los servicios sanitarios.

La propuesta HCHA pretende equipar el hogar del anciano con diferentes herramientas que velen por el cuidado de sus habitantes- es decir, busca crear un Ambiente Asistido. De este modo se consigue convertir el hogar en un espacio que monitoriza al usuario detectando posibles accidentes o ayudándole en sus tareas diarias, mejorando así su autonomía y el

[3] Eurostat. Ver Anexo 2
[4] Estadísticas sobre el envejecimiento de la población. Eurostat. Ver Anexo 2

cuidado de su salud. Además las aplicaciones de un Ambiente Asistido son tantas como sus dispositivos auxiliares: detectar caídas, monitorizar parámetros de salud, reconocer diferencias importantes en los hábitos de vida de la persona, prestar apoyo en tareas de rehabilitación, permitir la comunicación con familiares o el centro de salud, etc. y todos ellos son controlados desde un dispositivo central.

El seguimiento de los usuarios se llevará a cabo mediante distintas tecnologías o soluciones, algunas de ellas disponibles en el mercado y otras que deberán ser desarrolladas. Durante el proyecto se creará un dispositivo central que permita controlar otros dispositivos secundarios. Entre los dispositivos o aplicaciones secundarias se contarán algunos sensores ya existentes que detecten el movimiento y permitan obtener información en tiempo real sobre los hábitos y las rutinas de la persona. También se desarrollarán o adaptarán otros sensores que permitan observar tomar datos referentes a la salud del usuario (pulsaciones, tensión, nivel de azúcar…).

El dispositivo central de control, permitirá la integración e interacción de los sensores y a la vez actuará como dispositivo de tele-asistencia. Su software, desarrollado durante el proyecto, permitirá tanto al usuario como al centro sanitario interpretar los parámetros de salud registrados y además incluirá una red social que permita mantenerse en contacto con el resto de la comunidad, familiares o personal sanitario.

La propuesta se centra específicamente en crear un servicio de Ambiente Asistido para ciudadanos europeos de la tercera edad que elijan una residencia de jubilación en países distintos a su lugar de origen. El hecho de vivir en el extranjero puede suponer una atención menos personalizada en los centros sanitarios e incluso una integración menor en la sociedad, por ello se considera a estos ancianos más vulnerables y aumenta la preocupación por su salud y su seguridad. Ahora bien, pese a que el público estratégico del proyecto sean personas mayores extranjeras, la tecnología desarrollada durante el mismo es adecuada para cualquier perfil de usuario. De hecho, la explotación de los resultados del proyecto prevé la comercialización de la tecnología para cualquier perfil de público.

El proyecto no se ciñe tan solo a la creación de una tecnología de Tele-Asistencia y monitorización de personas mayores, sino que va más allá validando la misma. Para validar el prototipo de Ambiente Asistido desarrollado, la propuesta HCHA prevé instalar un demostrador de tecnología en 24 viviendas y habilitarlas para que puedan vivir 24 extranjeros jubilados. Estos estarán conectados, entre otras cosas, mediante la red social habilitada entre la comunidad, hecho que incentivará su utilización para mantenerse en contacto con el resto de sus miembros. En caso de emergencia, los miembros más cercanos

de la red pueden asistir a la llamada. Igualmente se contacta con la entidad sanitaria, tanto en caso de emergencia, como para prestar un servicio o para realizar consultas.

La validación del proyecto durará un año, tiempo durante el que los ancianos vivirán en sus "hogares cuidadores" y harán uso de las tecnologías habilitadas. Paralelamente se evaluarán una serie de parámetros cualitativos y cuantitativos que ayudarán a llevar a cabo un testeo de la tecnología, seguido de un proceso de corrección de fallos y finalmente la validación definitiva de la tecnología y del proyecto.

La validación del proyecto, denominada como Modelo del proyecto en este trabajo, se llevará a cabo en Menorca. Esta isla forma parte del conjunto de las Islas Baleares y es conocida por su tranquilidad y la cercanía de sus gentes, ideal para gente mayor. Además, el socio que se encargará del mantenimiento de la tecnología tiene su sede en la isla y esto facilitará la correcta validación del prototipo. Una vez finalizado el proyecto, el objetivo de las empresas socias del consorcio es explotar los resultados del proyecto en otros países. En primer lugar se implantarían tanto el sistema tecnológico como el modelo asistencial desarrollados en países del Sur de Europa y posteriormente se llevaría al resto de países Europeos interesados.

El proyecto será coordinado por SAR, una PYME española dedicada al cuidado asistencial de la gente mayor. También participarán en el proyecto Tecmova, una PYME experta en tecnología aplicada a la medicina asentada en las Islas Baleares; HEI, Empresa dedicada a la integración y promoción de la salud; y BEI, Instituto de investigación en bioingeniería de la Universidad Tecnológica de Kaunas, Lituania. Además, diversos miembros de prestigio en el sector de la tecnología y de la salud participarán en el proyecto en calidad de consultores externos dentro del Comité de Consultor.

El proyecto tendrá una duración de 3 años: 24 meses se dedicarán al desarrollo tecnológico del proyecto y los 12 meses restantes a la validación del prototipo.

2.3 Descripción del Consorcio

El consorcio ha sido compuesto siguiendo las pautas marcadas por la convocatoria: al menos debe componerse por tres entidades legales establecidas en países miembros UE distintos y siendo las entidades completamente independientes entre sí.

En este caso el consorcio está formado por cuatro entidades legales completamente independientes y establecidas en España, Austria y Lituania. Las entidades son reales y las descripciones que de ellas se presentan también guardan relación con la realidad, pero no todos los datos proporcionados son 100% reales. Algunas de las entidades han sido "adaptadas" al proyecto para cumplir con el fin académico del mismo.

En el caso de la empresa Tecmova, se ha tenido la oportunidad de contactar con su creador Toni Serra, que ha colaborado aportando su punto de vista sobre el desarrollo del sector y su conocimiento sobre el estado del arte de la tecnología Tele-Health.

El consorcio como unidad, recoge diversas instituciones con áreas de trabajo distintas. El punto de unión son las tecnologías e-health, tele-asistencia y la asistencia a personas mayores, pero cada socio aborda el problema desde un punto de vista diferente. La diversidad de posiciones ante un mismo reto enriquece las soluciones y esto es lo que se pretende en la propuesta HCHA: congregar distintos expertos que sean capaces de desarrollar una solución unitaria al reto planteado. Las empresas o instituciones han sido escogidas principalmente por su conocimiento ya sea tecnológico, médico-sanitario, de asistencia a ancianos, social u organizativo. También se ha tenido altamente en cuenta su experiencia en el sector y su anterior participación en proyectos parecidos.
Asimismo, los miembros del consorcio consideran una gran oportunidad participar en el proyecto HCHA, puesto que supondrá un gran empujón tecnológico para las empresas y reforzará su competitividad en el sector potenciando su capacidad de I+D. Las posibilidades de explotación del proyecto les abrirán nuevos mercados y oportunidades comerciales.

A continuación se describen brevemente las entidades que integran el consorcio. En el apartado *1.4 Members of the consortium* (contenido en la memoria técnica, dentro del formato de la convocatoria) se puede encontrar una descripción más completa sobre cada miembro.

SAR (SPAIN) – COORDINADOR

SAR es una PYME que ofrece servicios asistenciales a personas de edad avanzada. La empresa está situada en el área de Barcelona y cuenta con alrededor de 50 empleados distribuidos en diferentes servicios: asistencia a domicilio, residencias de ancianos, centros de día, etc. La compañía también ofrece servicios de Tele-Asistencia y actualmente está centrando su estrategia de innovación en la integración de nuevas TIC aplicadas a la asistencia, entre ellas los Ambientes Asistidos.

SAR es la empresa coordinadora del proyecto, se encarga principalmente de las tareas relativas a la gestión del proyecto, de la comunicación y divulgación del proyecto. Su gran experiencia en la asistencia a personas mayores permite a SAR ser uno de los pilares durante la definición de los requisitos del proyecto.

TECMOVA (SPAIN)

Tecmova es una PYME relativamente joven, que desarrolla su actividad empresarial en las Islas Baleares. Su negocio se centra en el desarrollo e implementación de tecnologías TIC como la Tele-Asistencia o la creación de ambientes asistidos y monitorización a través de sensores.

Tecmova ofrece sus servicios a personas mayores o con discapacidad que desean vivir de modo independiente, pero necesitan mantener su salud controlada en todo momento. Los sistemas de monitorización a través de sensores permiten a los usuarios llevar una vida normal, sabiendo que si ocurriera alguna emergencia automáticamente se daría la señal de alarma tanto a la familia como al centro sanitario y se tomarían acciones para asegurar la salud del paciente.

En el desarrollo del proyecto, Tecmova es la parte encargada de integrar las diferentes tecnologías desarrolladas dentro de un solo sistema y una sola red. También se encargará de implementar el prototipo de Ambiente Asistido en el las 24 viviendas que conforman el modelo del proyecto y de mantener y validar la tecnología del prototipo.

INTEGRATING THE HEALTHCARE ENTERPRISE (AUSTRIA)

La IHE es una compañía con base en Viena que involucra expertos en atención sanitaria, autoridades de los servicios sanitarios, industriales del sector e usuarios. Su objetivo es

mejorar la interoperabilidad de los sistemas sanitarios a nivel nacional y europeo. Para ello realizan actividades de promoción y fomentan la implementación de especificaciones y estándares a la hora de desarrollar herramientas o servicios al servicio de la atención sanitaria.

Su papel en el contexto del proyecto es colaborar a sentar los requisitos del proyecto y participar en las tareas de comunicación, divulgación y explotación. La colaboración de IHE es necesaria en la tarea de posibilitar la interoperabilidad de las tecnologías empleadas en el proyecto.

BIOMEDICAL ENGINEERING INSTITUTE (LITHUANIA)

El Instituto de Ingeniería Biomédica pertenece a la Universidad Tecnológica de Kaunas y fue creado con la misión de desarrollar y implementar nuevas estrategias y tecnologías aplicadas a la salud. El instituto congrega expertos tanto del sector sanitario como de las áreas de la electrónica, telecomunicaciones y tecnologías de la información.

Entre sus líneas de investigación claves se encuentran: Sensores y fuentes de información biomecánica y fisiológica, procesado de bio-señales y su aplicación en el campo de e-Health y tele-medicina.

Dentro del proyecto HCHA, el Instituto BEI tiene como tarea principal desarrollar el dispositivo Tele-Health que permitirá controlar desde su pantalla los sensores y otras tecnologías asistenciales distribuidas en el hogar del usuario. BEI dirigirá la creación de la red social para ancianos que desarrollará en colaboración con una empresa de software especializada. Esta será funcional a través del dispositivo Tele-Health previamente creado. Por último, también colaborará estrechamente con Tecmova en el desarrollo de sensores específicos para el proyecto.

3. Propuesta según el formato de la convocatoria

A continuación se desarrolla la propuesta del proyecto HCHA siguiendo el formato de la convocatoria PHC-25-2015 “Advanced ICT systems and services for integrated care” del programa H2020. La propuesta está formada de dos partes principales: la parte administrativa y la memoria técnica. Los capítulos recogidos en cada una de estas partes también son los establecidos por la convocatoria y se han elaborado siguiendo las pautas y recomendaciones proporcionadas por el organismo financiador.

La propuesta se desarrolla en inglés puesto que es el idioma previsto para este tipo de propuestas.

A. Administrative forms

A.1 General information

Title of Proposal: “Home Care & Health Abroad“

Proposal acronym: HCHA

Duration in months: 24 months

Fixed keyword 1: Ambient Assisted Living

Free keywords: Tele-health and Tele-assistance technologies, elderly independency…

Abstract: *(max. 2000 characters)*

Demographic changes are amongst the main Europe’s societal challenges. Recently the Europeans life expectancy has moved to 75 years-old for men and 83 for women[5], according to Eurostat records. Hence, Europeans require more health & care services along their life time. Moreover, the small birth rate forecasts that by 2060-2080, the old-age dependency ratio will be around 50% in EU-28, according Eurostat. Aging has become a threatening challenge to European economy and society.

[5] Complete statistics at Annex 2

Up-growing aging population raises the budget resources intended for health and care, while the drop in tax paying agents will lead to a non-sustainable tax pressure. It is vital for the EU to find alternative systems to deal with third aged Health & Care in a sustainable way.

EC glimpses the potential of ICT resources to deal with uprising challenges and HCHA project believes in their decisive role for healthcare system development.

The main target in this project is to make use of innovative ICT tools to monitor and watch elderly. This will help maintain third age citizens away from the hospitals and first care centres, while still keeping them under care at home. This goal can be reached by implementing Assisted Living Environments (ALE)- or “Caring Homes”. “Caring Homes” are equipped with sensors embedded in the living environment, which provide necessary data to monitor user’s health. Moreover, ALE will be prepared with other technological tools, such as Tele-Care devices that will provide elderly with the necessary assistance from Health and Care Institutions. These devices will support a social platform, allowing the users to communicate to relatives, neighbours or friends.

This project focuses specifically on foreign third age European citizens that choose their retirement at residences in abroad countries, especially by the Mediterranean coast. Health tourism and abroad retirement are becoming a more and more popular phenomenon among European elderly, and the HCHA wants to ensure their wellbeing through independent and secure life.

HCHA proposal is led by a Spanish SME in partnership with other Austrian, Lithuanian and Spanish enterprises. The length of the project is two years: the first devoted to technological development and the second dedicated to project Model validation.

A.2 Administrative data of participating organizations

Legal name: SAR

Short name: SAR

Address of the Organization Pº. Gracia Nr. 1, Barcelona. http://www.sar.es/

Legal Status of your organization SME

Legal name: Tecmova

Short name: TEC

Address of the Organization C/Mayor Nr.45, Menorca. http://www.tecmova.com/

Legal Status of your organization SME

Legal name: Integrating the Healthcare Enterprise

Short name: IHE

Address of the Organization Mariahilfer Straße 37-39, Wien. http://www.iheaustria.at/

Legal Status of your organization Research organization

Legal name: BIOMEDICAL ENGINEERING INSTITUTE

Short name: BEI

Address of the Organization Studentų g. 50, Kaunas.
http://en.ktu.lt/content/institute/biomedical-engineering-institute

Legal Status of your organization Higher education establishment

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A.3 Budget for the proposal

Participant	Country	(A) Direct personnel costs	(B) Other direct costs	(C) Direct costs of subcontracting	(D) Direct costs of providing financial support to third parties	(E) Costs of inkind contributions not used on the beneficiary's premises	(F) Indirect Costs (=0.25(A+B-E))	(G) Special unit costs covering direct & indirect costs	(H) Total estimated eligible costs (=A+B+C+D+F+G)	(I) Reimbursement rate	(J) Max. grant (=H*I)	(K) Requested grant
		€	€	€	€	€	€	€	€	%	€	€
SAR	Spain	1.051.200	166.000				304.300		1.521.500	100	1.521.500	1.521.500
TEC	Spain	897.600	897.600	288.000			246.400		1.520.000	100	1.520.000	1.520.000
IHE	Austria	360.000	55.000				103.750		518.750	100	518.750	518.750
BEI	Lithuania	681.600	88.000	96.000			192.400		1.058.000	100	1.058.000	1.058.000
TOTAL		2.990.400	397.000	384.000			846.850		4.618.250	100	4.618.250	4.618.250

A.4 Ethics issues table

1. HUMAN EMBRYOS/FOETUSES	Yes	No	Page
Does your research involve Human Embryonic Stem Cells (hESCs)?		X	
Does your research involve the use of human embryos?		X	
Does your research involve the use of human foetal tissues / cells?		X	
2. HUMANS	**Yes**	**No**	**Page**
Does your research involve human participants?	X		
Does your research involve physical interventions on the study participants?		X	
Does it involve invasive techniques?		X	
3. HUMAN CELLS / TISSUES	**Yes**	**No**	**Page**
Does your research involve human cells or tissues?		X	
If your research involves human embryos/foetuses, please also complete the section “Human Embryos/Foetuses”		X	
4. PROTECTION OF PERSONAL DATA	**Yes**	**No**	**Page**
Does your research involve personal data collection and/or processing?	X		
Does your research involve further processing of previously collected personal data (secondary use)?	X		
5. ANIMALS	**Yes**	**No**	**Page**
Does your research involve animals?		X	
6. NON-EU COUNTRIES	**Yes**	**No**	**Page**
Does your research involve non-EU countries?		X	
Do you plan to use local resources (e.g. animal and/or human tissue samples, genetic material, live animals, human remains, materials of historical value, endangered fauna or flora samples, etc.)?		X	
Do you plan to import any material - including personal data - from non-EU countries into the EU? If you consider importing data, please also complete the section "Protection of Personal Data" [Box 4].		X	
If your research involves low and/or lower middle income countries, are benefits-sharing measures foreseen?		X	

Could the situation in the country put the individuals taking part in the research at risk?		X	
7. ENVIRONMENT PROTECTION	Yes	No	Page
Does your research involve the use of elements that may cause harm to the environment, to animals or plants?		X	
Does your research deal with endangered fauna and/or flora and/or protected areas?		X	
Does your research involve the use of elements that may cause harm to humans, including research staff?		X	
8. DUAL USE	Yes	No	Page
Does your research have the potential for military applications?		X	
9. MISUSE	Yes	No	Page
Does your research have the potential for malevolent/criminal/terrorist abuse?		X	
10. OTHER ETHICS ISSUES	Yes	No	Page
Are there any other ethics issues that should be taken into consideration?		X	

I confirm that I have taken into account all ethics issues described above and if any ethics issues apply, I have attached the required documents.

A.5 Call specific questions

B. Research proposal

Health, demographic change and wellbeing

Call for proposals: PHC-25-2015

HCHA

Title of Proposal: Home Care & Health Abroad

Proposal Acronym: HCHA

List of participants:

Participant No*	Participant organisation name	Country
1 (Coordinator)	SAR	Spain
2	Tecmova (TEC)	Spain
3	Integrating the Healthcare Enterprise (IHE)	Austria
4	Biomedical Engineering Institute (BEI)	Lithuania

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4 Members of the consortium

a. Participants (applicants)

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5 Ethics and security

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b. Security

6 Call specific questions

B.1 Excellence

a. Objectives

- **Main objectives of the project:**

The main objectives of the project are the following:

1. Create innovative Ambient Assisted Living environment prototype.
2. Go beyond State-of-Art in Tele-Care solutions by developing a new device able to integrate in itself other existing technological tools, such as different kind of sensors.
3. Develop social networking software specially adapted for elderly necessities.
4. Carry out a project Model consisting on 24 Ambient Assisted Living prototypes, where 24 elderly will live independently and evaluate its efficiency.
5. Enhance Project Partners competitiveness in the pushing e-Health business.

- **General or long-term objectives of the project:**

The HCHA has long-term objectives in different areas: social, organizational and economic.

- Social objectives:

1. Increase wellbeing of European elderly, by enabling them to live longer in an independent and safer manner.
2. Increase Healthcare sector job opportunities in Europe, diminishing as well emigration of qualified professionals.
3. Cooperate to develop a more sustainable and cost effective Health and Care system for European countries.

- Organizational and economic objectives:

1. Develop an innovative Health and Care Tourism model.
2. Boost local economic activity out of season.
3. Reactivate real estate activity in areas with higher stocks of empty apartments.

b. Relation to the work programme

The Call PHC-25-2015 “Advanced ICT systems and services for integrated care” is part of the “Health, demographic change and wellbeing” section of the “Societal Challenges” pillar at H2020 Programme.

The Call's specific challenge is to research and develop new integrated care models based on ICT systems and services, that would help to contribute to the sustainability of health systems. This is the reason why HCHA project centres the main objectives in the development of new technology. Developing a Tele-Care device is only the way to achieve integration of already existing devices in a single one. In this way existing ICT will be able to play a decisive role in health systems. The project is a private initiative, thus its results might not have an immediate effect over public healthcare organizations, nevertheless within deliverables is planned to issue a Roadmap document showing the key steps to take for further integration of the system in public healthcare bodies.

As announced in the Call description obstacles are many, from technological, social and organizational points of view, but new approaches for integrated care systems and services are needed to effectively face aging and health systems overflow challenges that threaten Europe. HCHA gives a holistic solution, taking into account not only technical, but also social and organizational approaches to the problem, which is one of the HCHA project strengths.

Moreover, the HCHA project gives response to other main challenges described in the PHC-25-2015 call, regarding the "Personalizing health and care" topic:

- Pay attention to European aging population care challenge by making use of ICT services.
- Go beyond state of art through research and develop ICT potential in Tele-Health and Ambient Assisted Living sectors.
- Cooperate to build sustainable health systems where elderly and chronic patients are treated at home, avoiding health institutions overcrowding and ensuring patients' wellbeing and independence.
- Ensure patient-centred health system.

Additionally HCHA will contribute to other main European challenges, through the long-term project results exploitation:

- Employment- First target of European 2020 strategy. The project expects to create new job places which will employ Health & Care professionals.
- R&D- Second target of European 2020 strategy. HCHA will help and motivate SME partners to innovate as a way of renewing business. The partners will turn more competitive with respect to other similar companies and strengthen economy.
- Boost jobs, growth and investment- First initiative of the European Commission's 2015 Work Programme. Without a doubt one of the main challenges of the project is

to strengthen competitiveness among European SMEs in the Health & Care sector. The expected impact of project results exploitation will be the build-up of jobs and investment in the regions were project will be implemented. Furthermore, it will boost investment on Southern European health and care tourism.

c. Concept and approach

In a brief, this project seeks to develop an ICT Health & Care system and implement innovative prototype results on a model. Previously to technological development, a study to determine service requirements at three levels: social, medical and technological will be carried out. Once this stage results are drawn, the development and creation of the prototype will move on. The expected result is an Ambient Assisted Living system prototype, which will allow elderly to live independently in a safer way. This system will be comprised of a Tele-Care system or device which will integrate other accessible of newly created technology (for example sensors). This prototype will be implemented in 24 living spaces for elderly, turning them into "Caring Homes", which will ensure users independence and wellbeing. To validate the 24 prepared Ambient Assisted Environments equipped with prototype technology- so called Model of the project- and in order to achieve all project objectives, the Model will be implemented and developed. For a whole year 24 elderly, who desire to retire in Southern European country and make use of this innovative service, will live at projects developed "Caring Homes", will test and experience them. Along with the project the healthcare service will be fully developed and organized, in collaboration with the project partners, to ensure project results exploitation and continuity after the project ends. The technology installed in the Model will also be monitored, corrected and maintained. After a validation period of a year, the Model results will be studied and the project will finally close.

A wide range of results are expected out of this project. Mainly the project will go ahead in the research of healthcare ICT systems and services of elderly: a prototype of AAL and the project Model validation are HCHA main results. Another short-term result will be the strengthening of SME partners' business, which will broaden their markets and motivate to develop R&D solutions. Among long-term results is the growth of integrated Health & Care service based on ICT technology, which will set out an alternative to nowadays public healthcare system. This necessary shift in healthcare organization will create new job places, help to balance existing unsustainable Health systems and improve aging population wellbeing.

The scope of the project is ambitious because of its innovative approach, as well as because of its wide action range in three different spheres: Technological, Social and Organizational.

In the following sections, the main problematic involving each of the before mentioned spheres will be revised. Flowingly, the state-of-art and approach for possible solutions introduced.

Social approach:

The main goal: Contribute to improve elderly quality of live through Tele-Care and Ambient Assisted Technologies services. Favour diminishes in hospitalizations and stay in Hospital rate.

It is a well-known issue, that Europe, and other main occidental countries, are experiencing big demographic changes. While live expectance increase, birth rate remains very low. If trends do not change dramatically in following decades the forecast is to shift from nowadays wide-center population pyramid to wide-top pyramids.

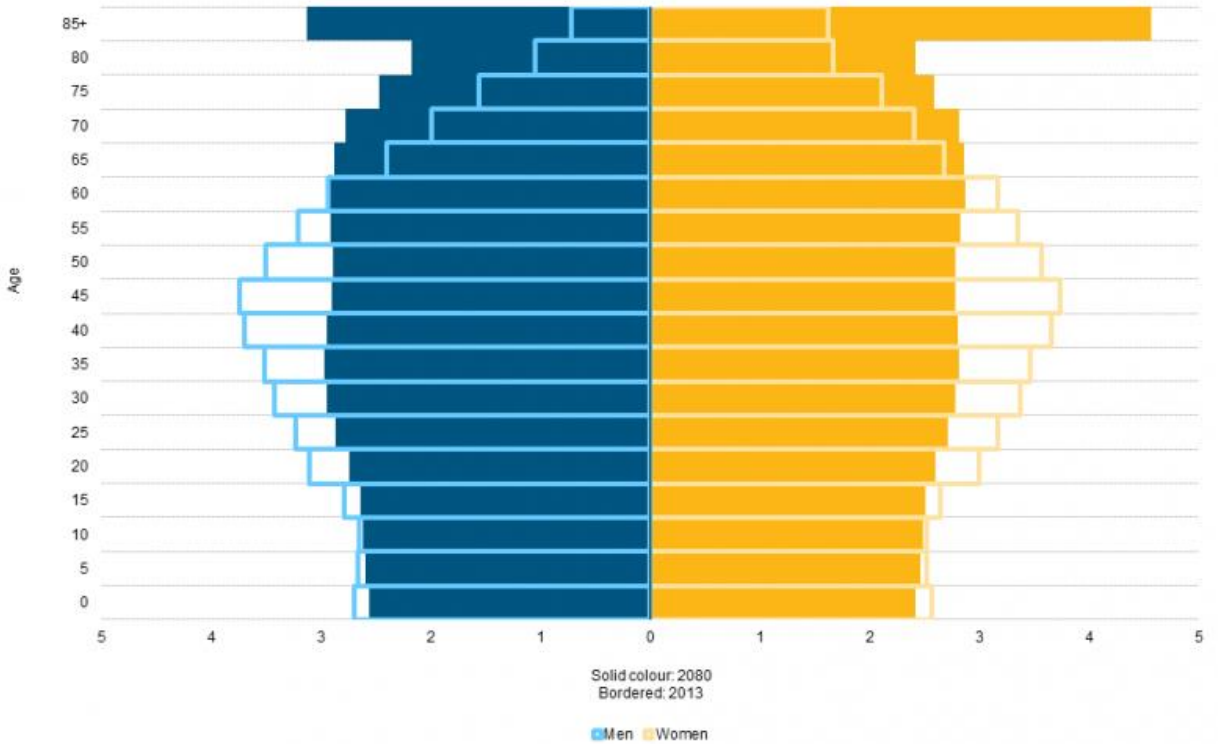

Fig. 1- Demographic pyramid in E-28 on 2013 (bordered) and 2080 (solid colour). Eurostat 2015

As it can observed from *Fig.* 1- Demographic pyramid in E-28 on 2013 (bordered) and 2080 (solid colour). Eurostat 2015 the population older than 80 forecasted for 2080 is very high in comparison with the population in working-years. These changes “will lead to big social and economic challenges in the daily life and care of elderly people” (Torres, 2007).

From the economic point of view, up-growing aging population raises the budget resources intended for Health and Care, but if paying agents diminish (the rate between population aged +65 to aged 15-64 will be about 50%) the economic and tax system can collapse. It is necessary and urgent to develop sustainable solutions to take care of aging European population, and to make this care more cost effective without reducing its quality, moreover, ensuring the quality of life of users. In this line, it is necessary to take into account that living independently is one of the essential requirements for elderly.

Another generalized problem is the overcrowding of Health Institutions. Elderly, usually suffering from chronic diseases, consume many of the resources of the healthcare system. European and regional authorities are aware of this problem and devote many resources on the one hand to enforce health workforce, and on the other hand to go ahead with health innovations and e-health solutions. These both are priority actions of the Third EU Health Programme 2014-2020, 3rd objective- *Contributing to innovative, efficient and sustainable health systems*. As an illustrative example some regions of Spain, as many other in Europe, are adopting “Remote Attention Health Care Model” centred on Tele Medicine (supported by TicSalut Foundation).

At this point, it is clear that ICT technologies show up firmly as an alternative to deal with uprising challenges. “The aim is to combine information and communication technologies and the social environment of elderly to develop new concepts, products and services for their daily life. In Europe such solutions are developed under the term “Ambient Assisted Living (AAL)” (Siegel, 2014, p.1).

Few researches have been carried out on the social and medical points of views, when implementing Tele-medicine systems to take care of elderly, and they are a necessary condition when implementing a user-centred technological project. The basis of HCHA technological solution will be the quality of life of future users and the medical requirements to ensure it, without assuming than AAL technologies and services, whatever they are, will improve the quality of live and well-being of elderly people.

For instance, HCHA project will undergo a social and medical requirement definition, based on other researches, but with its own methods. A qualitative study will be carried out to investigate how technologies can contribute to the daily wellbeing of elderly. Resulting requirements will be used to set the technological scope of the project and therefore, ensure the project creates the technology users and healthcare institutions certainly need.

As a consequence of implementing AAL and at-home quality healthcare, the quality of life of users is expected to be improved, reducing at the same time healthcare institutions

overcrowding. Better at-home service and monitoring of elderly will likely result in diminishing urgent hospitalizations per person per year and reducing the mean stay in Hospital rate.

Technological approach:

The main goal: Create a Model of Home Assisted Environment service by installing a prototype Tele-Care system integrated with other existing technologies.

E-health, Tele-Health, Ambient Assisted, Tele-Care, M-health… all of them are terms broadly used in our society for describing different remote healthcare services. But, do we give them the right meaning? In the following section the main concepts appearing in this project will be described giving examples of cutting-edge technology in these fields.

- **Tele-Health:**

Tele-Health concept usually refers to medical Tele-monitoring, what includes both monitoring of different patients biomedical signals and identifying possible anomalous risky situations, what would automatically generate an alarm to alert the healthcare centre. Nevertheless, Tele-Health often includes also Tele-Consultation services, which mean enabling communication with medical professionals. Although, Tele-Consultation with specialists is a rare practice nowadays, only available within private healthcare centres services.

These systems are usually designed for patients suffering from chronic diseases: asthma, circulatory, cardiac, respiratory diseases or diabetes, depression, Alzheimer… Because allows maintaining the patient at home but being highly monitored, as his disease requires.

Regarding the state-of-art:

There are several solutions on devices Tele-Consultation, including major companies such as Bosch, Intel... But they are neither practical nor popular. They usually maintain a relation Patient-Patient, Patient-Family, Professional-Professional (of course in this case device is not the same), but it is not a usual practice to enable connections Patient-Professional.

As mentioned before, Tele-monitoring opens a wide range of fields. There might be sensors distributed around the house studying various "signals", or devices that the patient turns on or enables to collect data (for example a smart t-shirt or bracelet). In these situations, the problem tends to be the amount of data to analyse and the specific requirements for each patient, according to his disease.

- Related devices:

• CareAct- developed by the American TeleCare supports monitoring, Tele-Consultation (audio, video and messaging) and assistance during rehabilitation.

•Intel Health Guide- developed by Intel allows monitoring of health parameters, Tele-Consultation (audio and video), calendar & reminder and interactive health sessions.

•Mobile Health Monitor- developed by TeleMedCare enables monitoring, self-formation and assistance during rehabilitation.

Fig. 2- CareAct system

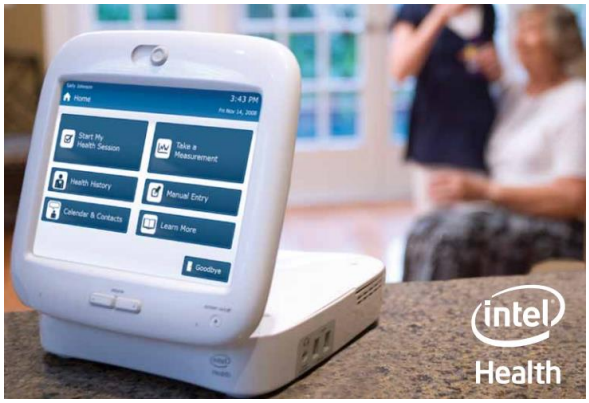

Fig. 3- Intel Health Guide device

- **Tele-Care:**

Tele-Care is usually related to care, assistance and social support. These services are focused on assisting dependent elderly at their homes. The goal is to transform the home in a secure environment for the elderly people. Assistance is accomplished through Tele-Consult devices and alert devices. Among developed Tele-Care services are: reminder to take the medicines, service helping to maintain daily routines, such as regular eating or sleeping timetables; service which asks for the patients' health status daily and reports about it. Users actioned alarm systems are also widely spread.

Usually, Tele-Care services are managed by NVOs, volunteers associations or even private healthcare suppliers. The main difference between Tele-Health and Tele-Care technologies is that, the last ones do not offer the possibility to connect with health specialists or are not completely connected to the healthcare systems. This fact makes Tele-Care technologies less effective, their results aren't as good as Tele-Health services results, as offer only partial solutions. However, these services are widely implemented and their impact in the market is bigger than Tele-Health services (Observatorio de Vigilancia Tecnológica Visión 2020 en el sector, 2007).

- Related devices:

•Teleasistencia Cruz Roja: Developed and implemented by the Red Cross is a patient enabled alarm device with geolocator.

•AsisT: Developed by Ibernex has alarm and reminder functions.

•Tunstall fall detection- Developed by Tunstall automatically detects falls and give the alarm.

Fig. 4- Red Cross alarm system

Fig. 5- AsistT Panel

Fig. 6- Tunstall fall detector

- **Ambient Assisted Living (AAL):**

The Ambient Assisted Living "promotes the provision of infrastructures and services for the independent or more autonomous living, via the seamless integration of info-communication technologies within homes and residences, thus increasing their quality of life and autonomy and reducing the need for being institutionalized or aiding it when it happens" (Memon, 2014).

This technology combines different sensors and devices controlled from a central control device (described in the previous section). Each sensor collects data about a different health parameter, allowing monitor diverse health aspects of the user. "A common feature of ambient intelligence is that many objects are inter-connected and act in unison, which is also a challenge in the Internet of Things" (Chung, 2013, p.1)

- Related projects and devices:

•Assisted Living- Created by Dutch Domotics is a system formed out of different sensors which allows the monitoring of elderly users and their daily routines.

•WISE Home Kit- Developed by Tunstall combines different "Tunstall's telecare sensors and alarms to support people live safely and independently at their home".

Fig. 7- Assisted Living from Dutch Domotics

Fig. 8- Tunstall's WISE Home Kit schematic

There exist well known innovative devices in these fields, but few of them are really coming to commercialize. Some of them because are too expensive, other might be non-intuitive enough to elderly. Recent studies have found out, that there are real difficulties in interaction of these systems among them. According to Chung (2013) "We found that most AAL systems are confined to a limited set of features ignoring many of the essential AAL system aspects. Standards and technologies are used in a limited and isolated manner (…). The efficient combination and management of heterogeneous things or devices in the ambient intelligence domain is still a tedious task, and it presents crucial challenges."

Although conventional projects, HCHA is not seeking to create a new device or system, even if this will be a necessary task. HCHA goal is to integrate Tele-Health devices and other AAL systems to create a compliant system able to provide a complete service to Elderly. To fulfil this activity, it will certainly be necessary to create a central controlling device, which will allow providing Tele-Health services. Other technology required, such as sensors, will be both newly created and developed from existing technology. All sensors will need to be adapted in order to enable their interoperability and interconnectivity. The solution must meet standard requirements, specified by IHE partner, to be able to interact with all its parts.

d. Ambition

The technological ambition is to create a AAL prototype built up of different devices and sensors, which provide either a service to the user (Tele-Consultation, medicament dispenser or health assessment), or monitoring data and information about user's health status to the responsible healthcare enterprise.

As mentioned before, part of the technology required to implement this project is already existing and the challenge and innovation consists in harmonizing all the parts and develop the required control system to allow maximum interoperability of the processes. Indeed, part of the HCHA project innovation potential resides in the integration of different technologies, which will presumably make the technology more available and cheap.

In basic, the whole system acts in layers, all of them protecting the core- users. There will be different layers of protection to ensure users quality of life and healthcare assistance.

- Social network

In 2013 a report commissioned by the Associated Retirement Community Operators in the UK found that there is a 'loneliness epidemic' sweeping Britain, with the average person over 65 spending more than 100 days alone each year.

Social networking could be playing an important role in keeping this elder community in touch with their community- in a broader sense. Nonetheless, frequently is stated that aged population is not using internet, but, this is fact is changing very fast. According to the UK telecom regulator OFCOM, the number of 55 to 64-year-old internet users creating a social network profile rose from 24% in 2011 to 35% in 2012.

In a few years, a large percentage of the older people will be using or could be trained to use social networks if they have enough incentive to do so.

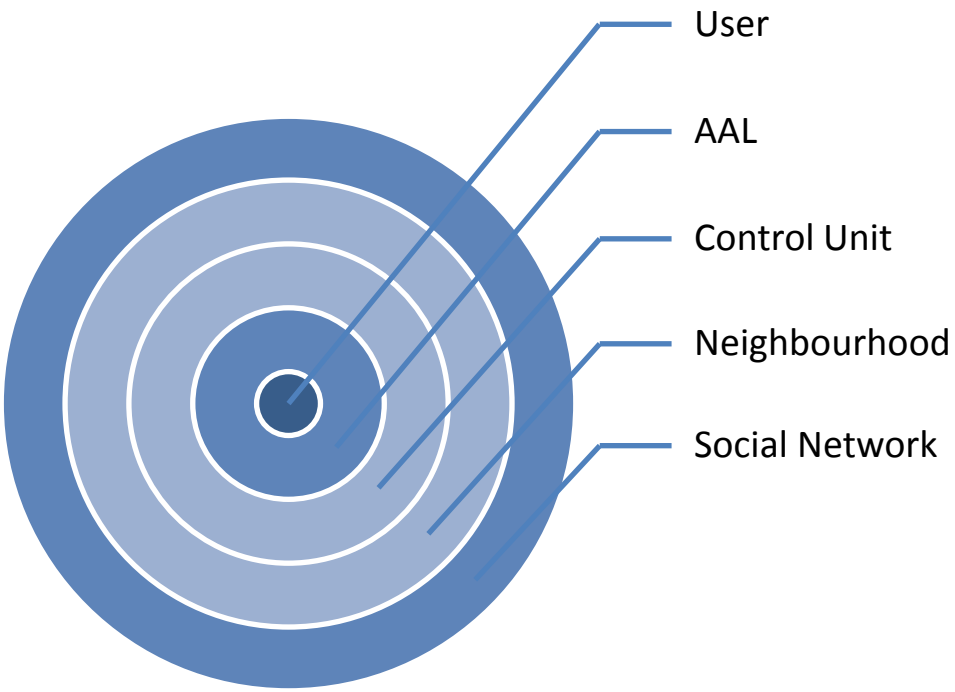

Fig. 9- HCHA Project system

OFCOM report also suggests that networks like Facebook could be a way of alleviating their isolation. However, HCHA proposal is to use a Social Network specially designed for elderly. This Social Network should be designed to create networks with friends and neighbours with a priority for proximity so, to generate truly virtual neighbourhoods.

- The neighbourhood

Complementing the virtual neighbourhoods, will be the real ones.

Neighbours relationship will create a space where people will feel protected. This is not implying that people will be forced to socialize but, it is likely that it will happen very naturally. In the case of this project, for instance, an expats community occupying 24 dwellings in the same building abroad (project model), with similar age, health conditions, challenges... will be likely to make some acquaintanceship of each other rather soon.

- The central Tele-Health unit

The project has developed the concept of a **central Tele-Health communication and control unit,** which will be a device, the same size like a tablet, to communicate more naturally than using a phone and more simply than using conference systems base in computers like Skype, Hangouts, Facetime, Messenger, etc.

The unit will be typically hanged on a wall, like a picture or will be in the format of a portrait in a place near the person, for instance on the table by the bed.

This Central Unit will contain just the features for an easy and fast audio and video communication with: family or closer friends, tele-assistance and medical services. The unit will permanently show their pictures and allow the user a prompt way to communicate in case of crisis, either physical or psychological. A touch panel will make the device functioning easier, as the user will only have to select whom to talk to by just pressing on the picture. This will generate a call to the required person or service using either of the conference system that better suits at time of implementing.

The communication device will use the house wifi service but it will also allow for mobile phone networks communication with the Teleservice provider and the Medical services in case of any failure in the system. It will be BEI's role to develop this Central Unit and Tecmova's role to implement in in the project Model and provide the necessary support.

- The Ambient Assisted Living (AAL)

The key technology of the project is the Ambient Assisted Living, which will help to turn the project from a simple Tele-Assisted home to a real "Caring Home", through the monitoring of the user.

The AAL technology is a combination of different sensors and devices controlled from a central control device (described in the previous section). Each sensor collects data about a different health parameter, allowing monitor diverse health aspects of the user. Meanwhile, devices connected to the AAL net might have different functionalities, such as delivering medicines at certain time, measuring blood pressure, working as scale or measuring blood glucose. The key point of the project is to develop different technologies to make them interoperable, and create then an AAL prototype.

Mainly two types of sensors monitoring solutions have been considered:

1. Movement sensors

   Each apartment will be equipped with a certain number of movement sensors, depending on the house or apartment, to monitor the movements and presence of the person in the different rooms of the house. For instance, a sensor in the kitchen will monitor the person is having visits at regular times for feeding. A sensor in the bedroom will ensure proper sleep times, a sensor in the living room to monitor enough movement, etc.

All the data will be collected by the sensors and delivered via WiFi to the processing centre where, a Big Data processor will create patterns that will define its regular habits. Alarms to the family in first instance and to the tele-assistance company or medical services in case of need will be generated when events like no-movement, no-wake up, no-back home and other are detected.

For instance, if the user goes to the sleeping room later than in the patterns, next day it will generate a report to the family. But if it visits 3 times the toiled during usual sleeping times, it will send a message to the tele-assistance service too.

2. Medical sensors

   The scope of the Project is far from developing medical sensors for devices. On the contrary, the Project aims at integrating existing medical sensors to interact with the central control unit.

   By using medical sensors and connecting them to the home WiFi network, the AAL can be equipped with different devices and solutions to keep users with permanent pathologies, under continuous control. The type of disease will determine the type of control required and it is not a purpose of this project to go further in this area. The fact is that the entire infrastructure can be compatible with such systems in the future.

AAL has a main advantage: due to its different functionalities it can be very easily adapted to the user necessities. The project will design and implement a very specific Model of AAL for elder people living abroad, yet the system created during the project could be customized, fully or partially, to adapt other types of communities or individuals.

The integration within sensors, devices and the central control unit will be done through standard domestic WiFi network which will easy installation and reduce costs.

B.2 Impact

a. Expected impacts

Impact is considered the reportable difference that the project HCHA will make in society and after its implementation. The HCHA impacts will be of different kinds, due to different project approaches. Benefits are expected in technological, healthcare, social, organizational or economic areas, at both general public and private sector level.

The expected impacts of this project are in line with the expected impacts of the call-for-proposals and the objectives of the call. Flowingly the outputs of the project will be exposed giving an indicator of each of it, describing the potential impact and the evaluation method. Expected impacts are also tightly related to each of the deliverables of the project.

Technological impact

The prototype developed and validated during HCHA project will be a step forward in AAL and Tele-Care solutions State-of-the-Art. On the one hand, newly developed technologies will provide new solutions, open new forecasts to research; on the other hand, integrated technologies will also provide a very valuable experience and give research a more sustainable point of view, thus the fragmentation of the ICT systems has been up to now a barrier for the developing of technology.

- Advance in State-of-Art:

Studies carried out to set project requirements play an important role of the project impact upon scientific communities. The knowledge acquired while developing the project will be captured in scientific reports and roadmaps (technological, medical and social), which will allow other researchers to benefit from obtained results and go further in their own researches.

Moreover, the Model of the project, the implementation of the prototype in 24 homes, will certainly be another key point for technological impact. The experience gained through the validation of the model is critical when speaking of project impact and success. Scientific communities will be able to develop and perfect technologies based on the experience and results of AAL and Tele-Health device real functioning and their validation.

Great part of the novelty of HCHA project lies in the validation of the prototype. The collecting of data during validation process will allow maximizing the impact of the project through the study of validation results. There exist few studies, which describe real, operating systems functionalities: effectiveness, technological readiness, social and economic advantages and

disadvantages, clear benefits, etc. Based on Models validation data it will be possible to confirm (or in very adverse case, deny) better health outcomes, quality of live improvement and economic savings, thorough the use of ICT in integrated care.

The expected impact concerning State-of-Art refers to improving of the knowledge and experience of decisive ICT role in healthcare. Therefore, the improving of the knowledge will be measured through two indicators showing the impact of all HCHA scientific publications among the scientific community and among general public.
Impact upon scientific community is measured through the number of references to scientific publications, and the expected reference value is 30 after 2 years.
The impact upon general public is measured through the number of visits to the web page containing an abstract of HCHA scientific publications adapted to general public. The expected reference value is 5.000 visits per year over the first 4 years.

There are some deliverables involved in the consecution of this indicator:

D.2.1- Qualitative study conclusions

D.2.2- Users requirements/ necesities report

D.2.4- Medical requirements report

D.2.6- Technical requirements report

- Developing of compatible technology:

Another expected impact at the technological level is the developing of new technology compatible with the prototype created within HCHA project.

HCHA project implies development and integration of existing technology with a newly created Tele-Health control device. This means, the project is developed with certain technological applications (mainly monitoring sensors), but its framework is open to the incorporation of new technological applications, such as robotic devices, assistance support, specific health parameters measuring devices, educative/ rehabilitation applications, etc. This fact opens many doors for further R&D of applications. AAL will be able to integrate new technologies and therefore have a great innovation potential for the beginning.

A clear indicator showing the impact of the project at this point, will be the development of new applications able to work together with the project developed system. This would show the technological partnership with other leading companies or institutions and strengthen the potential of the project prototype. Technological partnership will be strongly supported during

project dissemination and exploitation activities. The expected impacts are three newly developed applications compatible with the prototype per year during the 3 first years after project validation.

To promote this kind of impact, the project foresees the creation a roadmap for integrating new devices to the existing prototype, after the project model validation.

Moreover, project will propel the creation and use of a social network specially designed for elderly. The impact of this tool is meant to be mostly social, but it can become a big innovation phenomenon, as is a tailored application to improve grown-up communication.

Health, wellbeing and social impacts

The project achievements in health, wellbeing and social areas are decisive, because these are the main motivation of the project development. The proposal HCHA, developed under "Health, demographic change and wellbeing" topic, aims to make use of ICT to successfully overcome challenges threatening European society. In this section the real impact of the HCHA proposal upon health and social challenges will be evaluated.

- Contribute to the sustainability of health systems:

The project will develop an ICT Health & Care prototype based on AAL and Tele-Health technologies, which is a precedent of offsite care systems and services. Distance and remote health care services are forecasted to be the future of health services, according to numerous studies and EC health strategy is giving a clear support to ICT applications in Healthcare.

Developing an AAL prototype and validate its model will allow the project to draw quantitative and qualitative results on the implementation of ICT technologies to manage daily health care needs of elderly. This achieved knowledge will help to develop a more sustainable and cost effective Health and Care systems in Europe.

It might be complex to quantify expected health impact of the project, because elderly may suffer different chronicle diseases and researches reporting Tele-health impact are usually presenting narrow studies for specific diseases. Therefore, flowingly will be presented results based on general studies, but these might slightly change when speaking about a specific illness, such as health failure or pulmonary disease. The expected benefits resulting from implementation of HCHA remote health care system are the following:

- Days in hospital: A key benefit of the proposal is to reduce admissions and days spent in care institutions. Strengthening users' healthy habits and providing healthcare assistance at home are two important factors, supposed to influence diminish of days spent at hospital per patient. The positive impact upon this parameter would help overcome healthcare institution saturation and allow better care for hospitalized patients as well as at home caring patients.

According to the "Health at glance: Europe 2014" report, average stay in Hospital in 2012 was about 7.8 days per person average across EU member states, but for elderly the rate grows up to 9.4 days, according to Imison et al (2012). The expected shift on length of stay at hospital rate is a reduction of 20%. This fact will imply significant economic savings, described in further sections.

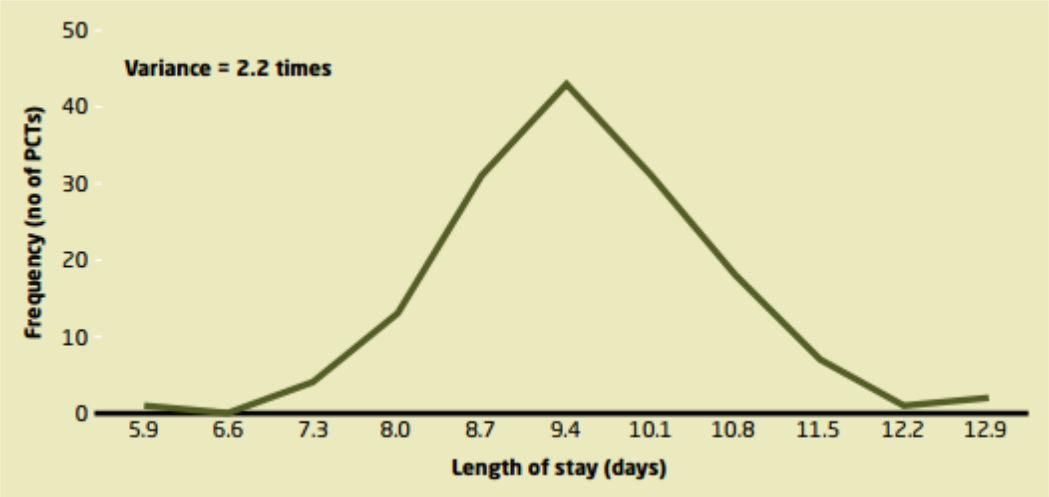

Fig. 10 Average emergency length of stay for patients over 65.

Source: The King's Fund analysis of Hospital Episode Statistics (HES) data 2009/10, and Office for National Statistics (ONS) Mid-2007 population estimates

- Emergency department visits: Keeping users monitored at home and in constant contact with care institutions will certainly diminish visits to primary care departments. This parameter is also a key direct benefit of the project and is expected to report very positive consequences to the healthcare system: diminish of emergency visits, avoiding saturation in primary healthcare institutions, better assistance to patients…

- Quality of life: Quality of life is a clear benefit uprising from the project, but it is an unquantifiable parameter. Nevertheless qualitative researches show that most valued quality of life attributes are: independence, supporting in a loving way, social interaction, avoiding sudden change and safety among others. The HCHA project will focus at helping aging to keep their independence and safety, while enabling as well their communication with others, to ensure the quality of life of project users gets better.

The quality of life will be measured through a qualitative indicator. Is expected that at least 75% of project system users will believe their quality of life is better after the validation of the model. The inquire used to measure customers satisfaction will help to determine parameter satisfaction, but will as well collect data about specific benefits and detriment over quality of life.

- Mortality: Although reducing mortality rate is usually taken as a benefit resulting from Tele-health technologies implementation, it will not been considered in this project, because of the complexity to analyse its causes when not speaking about a certain chronic disease. Mortality rate diminish is taken into account when speaking of a certain illness, but not for general ageing.

- Step forward in personalizing health and care. Motivate active aging.

As mentioned before the HCHA project will have an impact upon users' quality of life by enabling them to live longer in an independent and safer manner. Autonomous living, communication ability and security are the three pillars of quality of life promoted by HCHA.

- Autonomy: AAL technology will help aging in their daily tasks. Moreover, having the control of their health and medication on their own will potentiate their autonomy, healthy and active aging.

Expected impact concerning users' autonomy is a change on their behaviour. Users are expected to show more implication on their own health, and develop healthy skills and active aging habits. These routines will report in better health outcomes, better feeling and healthier lifestyles. A specific indicator to show this benefits would be redundant, thus benefits are shown through quality of life indicator and stay in hospital day rate indicator.

- Communication: Independence does not imply loneliness. Project target users will dispose of Tele-care technologies as well as a social network specially designed for their necessities. These tools will guarantee their social interaction with carers and relatives; and encourage them to actively interact with other users. The goal is to strengthen communication and at the same time strengthen community participation and fight loneliness feeling, very common among elderly.

Considering the first project target users will be aged people living abroad, the strengthening of the communication among their community and with their relatives is an imperious requirement.

To evaluate the impact of this parameter, after the project validation will be carried out interviews with users and their relatives to collect valuable testimonials about the efficiency of the communication systems. The expected impact is allowing fluid communication and raising of communication and sharing motivation.

- Security: Through motorization of patients and automatic risk detection, the healthcare organization will be able to respond to dangers rapidly and the user will feel safer at home. Additionally applications controlling the accesses to the house, alarm or emergency button could be available and would exponentially raise security feeling.

The indicator measuring the efficiency of safety systems is the reducing of emergency visits to the Hospital, as consequence of better safety systems and better at home assistance.

Besides, the proposal ensures a step forward in personalizing health and care. As described in previous chapters, the AAL and Tele-Care technologies have a strong potential in personalizing health and care. HCHA focuses not only in technical or medical solutions, but attempts to create a system, which brings together different social, medical and organizational services delivered to patients. This fact will make easier and more effective the healthcare assistance delivered to users.

Improvements on healthcare systems can be measured through long term economic savings (described below).

Business impact upon partner companies

- Enhance project partners competitiveness

The successful developing of HCHA project will have very positive results over project partners' business. The project will enhance consortium partners' competitiveness in the pushing e-Health business. Each of the partners has different markets, thus innovations developed in the project will benefit them all by delivering such innovations to the markets.
Moreover, the project will strengthen European industrial position in both ICT products and services.
The main Project outcomes and their expected impact upon the partners' companies will be described in the following section. Furthermore a forecast of business situation in the coming 5 years will be carried out:

- **SAR**

SAR benefit from the project is mainly organizational. After the implementation of the HCHA, SAR will be able to deliver a very innovative service: AAL, home care through ICT. This new

service and organizational model will open new markets without employing many human resources. The partnership with Tecmova will presumably be continued, so both companies can work together in the implementation of these services.

Moreover, the company will have had a newly open AAL complex in Balear Islands, what will favor their services propagation in the islands.

Additionally SAR partnership with IHE will allow another new market: giving healthcare assistance to expats, which desire to move to the Spanish seaside.

Foreseen market increase for tele-health technologies among SAR patients is depicted in the following diagram:

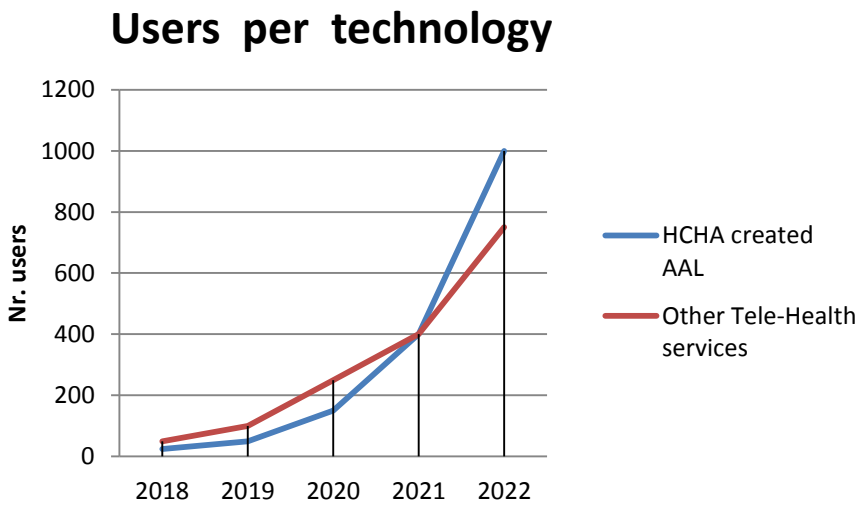

Fig. 11- Diagram showing the Nr of uses per type of technology. Foresight of Project authors.

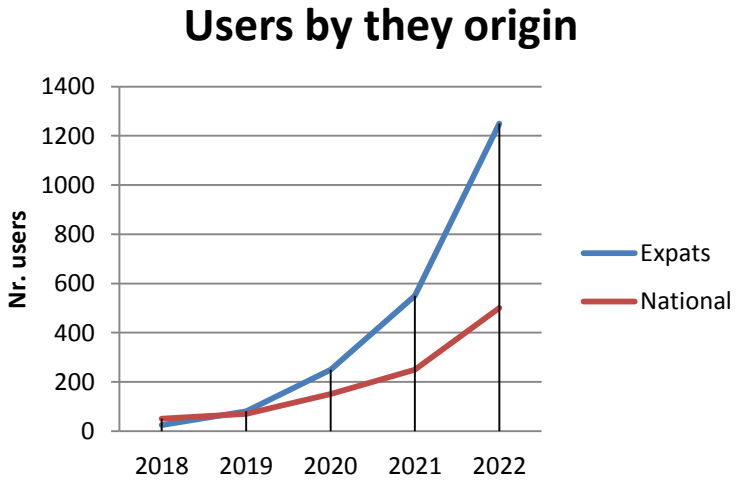

Fig. 12- Diagram showing the recivers of SAR technology and their origin. Foresight of Project authors.

- **Tecmova**

Tecmova will share projects intellectual property rights (IPR) regarding the AAL prototype together with BEI. Their main benefit from the project will be the commercialization of the prototype, but the rights to develop further the created technology is also a very big benefit.

The company will see very reinforced its R&D potential, what will give the company an inestimable competitiveness in comparison with other businesses in the sector.
Foreseen turnover increase for Tecmova:

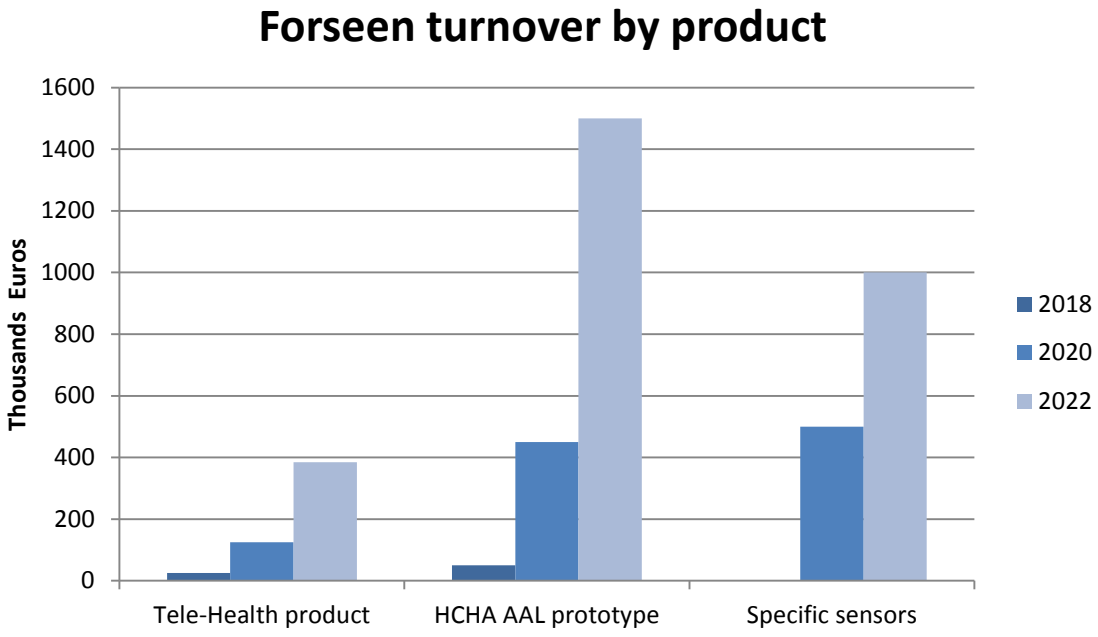

Fig. 13- Tecmova's forseen turnover by product. Foresight of Project authors.

- **IHE**

IHE main benefit from the participation of the project is the knowledge and the contacts obtained. Social, medical and technological knowledge are a benefit which will help the enterprise to broaden their advisory services. IHE is also looking forward to long term partnerships, and contacts done within the project and among the consortium are very positive benefits. Moreover, the enterprise will organize project communication and divulgation activities, which will boost also their position among other health institutions in Europe.

- **BEI**

BEI is the other proprietary of the AAL prototype technology projects intellectual property rights (IPR). The institute is not focused in commercialization of the technology, whereas the

possibility to develop it is an essential condition. The project lines with the research carried out at the BEI institute for the last years and the participation will give a strong push to their studies. Lithuania is meant to be one of the cutting edge sensor developing countries and the project will help BEI to maintain its leading position. The university and the Lithuanian scientific community glimpse a strategic potential on this project, an excellent opportunity to finance critical research.

Economic impact

The economic impact of the project is tightly related to the exploitation of the project. The project itself has a small economic impact; most valuable economic impact appears as an outcome of the exploitation activities in long term evaluations.

- **Economic savings:**

2193 average health expenditure per capita per year

Most studies confirm that substantial savings can be achieved through the implementation of Tele-care technologies. Savings are a reasonable consequence of other impacts of the project: reduction in admission rates and days spent in the hospital. If the project expects to reduce about 2 days the average stay and hospital, and the cost per day per person is 281,15 (according to the European Health at a Glance report 2014 the average health expenditure per capita per year is about 2193 €), the overall project Model expects to save about 13.500 € in healthcare services per year. If the project model is taken to a macro scale, results could be extrapolated and it would be possible affirm that the implementation of ICT tools for healthcare at patients home could be a profitable innovation.

However, at the present moment, Tele-care solutions may have a high cost. The market is not very developed and only small competitiveness takes place. Integrated care services include very innovative technology and only privileged customers can purchase them. This is the reason, why developing the technology in the framework of a project makes ICT care services more available: the funding organism grants the R&D and the technology can be evaluated and tested by the customers without a big cost for them. Validating the prototype, the development and commercialization of the technology will require a big investment, but this is an effort the partner companies are prepared to overcome.

Few researches have proved the economic savings of Tele-health technologies and AAL. Some of them contradict and there are no exact evaluations, because variables change from study to study. Mostly results depend on the type of chronic disease the patient suffers.

Nevertheless, HCHA innovative and integrative approach of technology expects to make technology more available and increase overall economic savings. Expected savings in different years follow this trend:

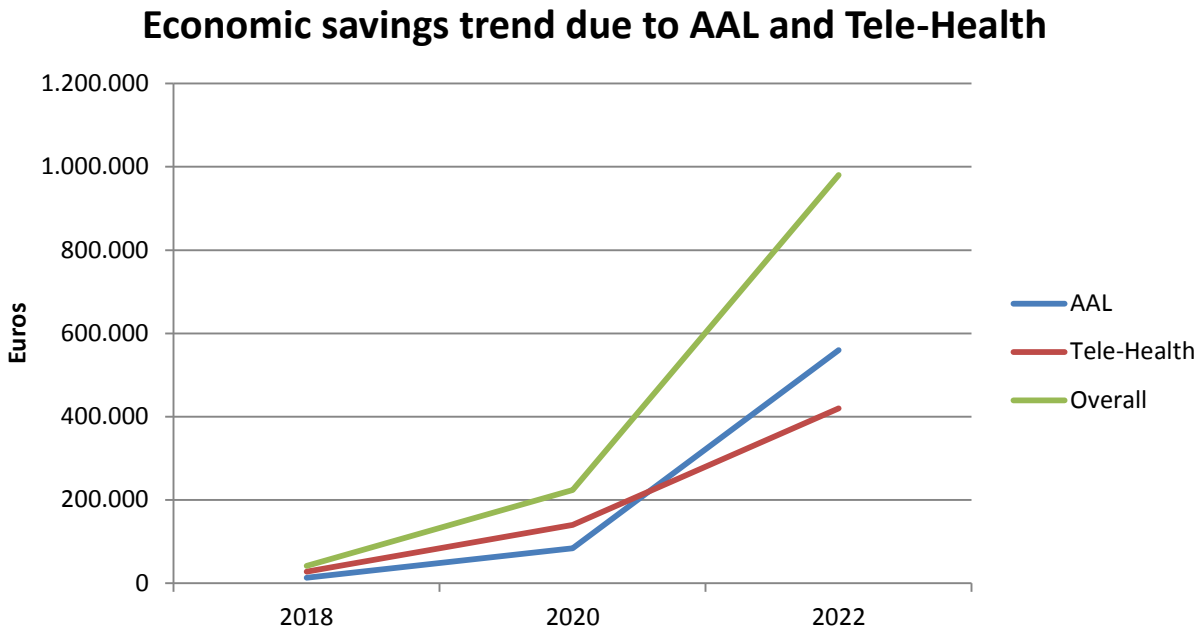

Fig. 14- Economic savings trend due to AAL and Tele-Helth. Foresight of Project authors.

- Boost healthcare sector job opportunities

The development of the service associated to project, which would maintain alive the demostrator after finishing the Project, will create new job opportunities. Home care requires healthcare specialists, social assistants, technical assistance service, technology maintaining service, IT specialists…

Right after finishing the Project, the number of Jobs created will increase in a very small amount, but as the partners business expands, the job opportunities will escalate.

Table 1- Expected impacts table

Type of impact	Output/ deliverable	Target public	Expected impact parameter	Indicator	Expected impact
Technological	Reports (D.2.1, D.2.2, D.2.4, D.2.6)	Scientific community/ general public	Improving knowledge of ICT role in healthcare Advance in State-of-Art	Nr of visits to the web page	5.000 visits per year
	Technology integration roadmap (D.2.5)	Scientific community	Development of new technologies able to interact with HCHA prototype	Creation of new applications	3 applications per year
Health & social	AAL service	Healthcare community	Days in hospital	Hospitalization days rate	Reduction of 20% days rate for project users
	AAL service	Target users	Quality of life. Involving autonomy, security and communication	User's satisfaction	75% affirm better quality of life
	Social networking software	Target users	Behaviour change Better communication	User's and family evaluation	Testimonials
Economic	Enhance partners business competitiveness	Project partners	Positive results over project partners' business- Either turnover, market rate or knowledge	-	-
	Economic savings	Healthcare community	Economic savings in healthcare due to diminish of stay length in hospital and diminish of emergency visits	Economic savings per year	13.500 € savings in Healthcare in 2018

b. Measures to maximise impact

- Dissemination strategy and communication strategy

Objectives:

● Make the project well-known ● Promote Project benefits among aging population in Europe ● Generate and direct discussions with experts about project researches results ● Positively influence public opinion about the Project ● Contribute to spread the importance of ICT technologies as a support for health and care systems ● Raise European citizens interest on Tele-health ● Potentiate healthy aging among elderly

Table 2- Dissemintaion actions and calendar

Action	Date	Target Public	Partner responsible	Budget
Corporate image	M1	Public	IHE	1.000 €
Project leaflet	M1	Public	IHE	1.000 €
Website of project	M1	Public	IHE	2.000 €
Article at EC webpage	M1	EC and public	IHE	-
Contacts database	M1	Consortium	SAR	-
Articles in local press	M5	Public	All	500 €
Newsletter	M3	Public	PM	500 €
Organize Tele Health& Care symposium	M8	Scientific community	IHE/BEI	10.000 €
Workshop with European Care Institutions	M9	Healthcare community	IHE	10.000 €
Participate at “ICT and Healthcare Forum 2016”	M12	Scientific community	TEC/IHE	2.000 €
Spread results in international press	M24-36	General public	IHE	1.000 €
Spread results through special open access publications	M24-36	General public	SAR	2.000 €

IHE is in charged partner of communication activities, nevertheless all partners are supposed to participate in most of the dissemination and communication activities, even if they are not responsible of the task.

The communication and divulgation strategy is essential to ensure visibility of the project and to propitiate the proper exploitation of results.

Only most signifying communication and divulgation outputs are taken as project deliverables and enumerated in the table of deliverables.

Table 3- Expected impact of the dissemination strategy

Indicator	Expected	Verification of the source
Webpage activity	10.000	Webpage visits
Project leaflet	10.000	Nr. of distributed leaflets
Contacts database	5.000	Nr. of contacts
Articles at the press	20	Nr. of articles
Newsletter	300	Registered participants
Workshop with European Care Institutions	40	Nr. Participants
Tele Health& Care symposium	15	Nr. of lecturers
Special publications	2.000	Nr. of publications distributed

- Exploitation strategy:

Objectives

- Exploit R&D project results
- Strengthen commercial Tele-Health areas of SME participants in the project
- Boost scientific partners influence in e-Health sector
- Ensure IPR of created innovations
- Potentiate developing of combinable applications

Table 4- Exploitation actions and calendar

Action	Creation Date	Implementation date	Partner responsible
Market analysis	M25	M35	SAR
Product and service analysis	M25	M35	IHE
Business model design	M26	M35	SAR
Marketing actions	M26	M30	IHE
Search for investment	M	M	IHE
Partnership for the business	M	M	IHE

Main exploitation actions are tightly related to the Project partners business or investigation activities after the concluding of HCHA Project. Through exploitation initiatives, the consortium wants to ensure the continuity of the Project results and the successful impact upon their own enterprises.

Each partner has different interests on the Project and their expected impact is also different, but exploitation actions are mainly focused in AAL prototype business development, thus this is the core of enhancing partners' competitiveness.

B.3 Implementation

a. Work plan- Work packages, deliverables and milestones

The work plan of the project has diversification of activities in order to cover all HCHA project goals and allow a wide action range. The main activities, or areas of the project are reflected in work packages and smaller activities are tasks within those work packages.

It is necessary to go through project main stages in order to define the work pacakges:

Fig. 15- Project main stages

1) **Requirement definition**

   - Social necessities User profile and necessities definition based on qualitative studies.

   - Medical prerequisites Medical requirements of the technology.

   - Technological requirements Transfer previous requirements to technological sphere. Identify and select best technologies accordingly to state of art. Define technological development basis and planning.

2) **Technological development of a compliant solution** Develop or/and adaptation of existing technology to achieve a real integration of technologies/devices for the creation of an Assisted Living Environment prototype.
3) **Implement the Project Model** Renovate environments into assisted living homes
4) **Test, monitor, correct and validate results of the Model**

Simultaneously to these main stages, project management, communication and exploitation activities will be carried out. The exploitation of the results of the HCHA project is a vital activity in order to ensure project long term results.

The stages of the project are essential when defining the milestones and dividing different activities into work packages. In this project, there are 6 main groups of activities reflected in 6 work packages:

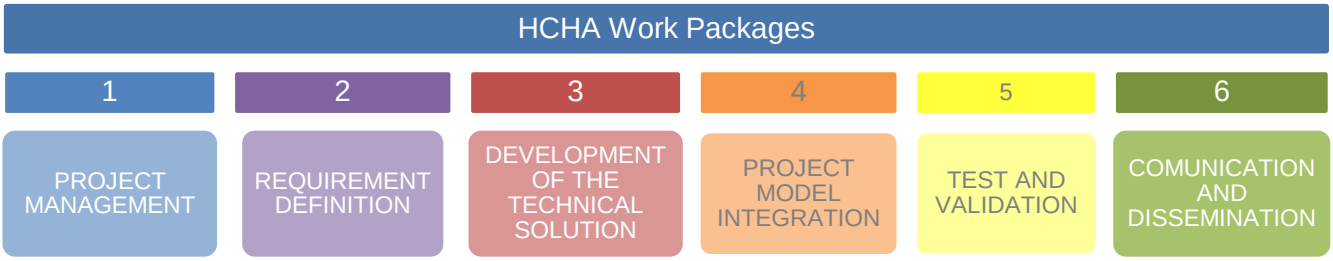

Fig. 16 - Project work packages

The structure of the project and dependencies between work packages are shown in the following diagram:

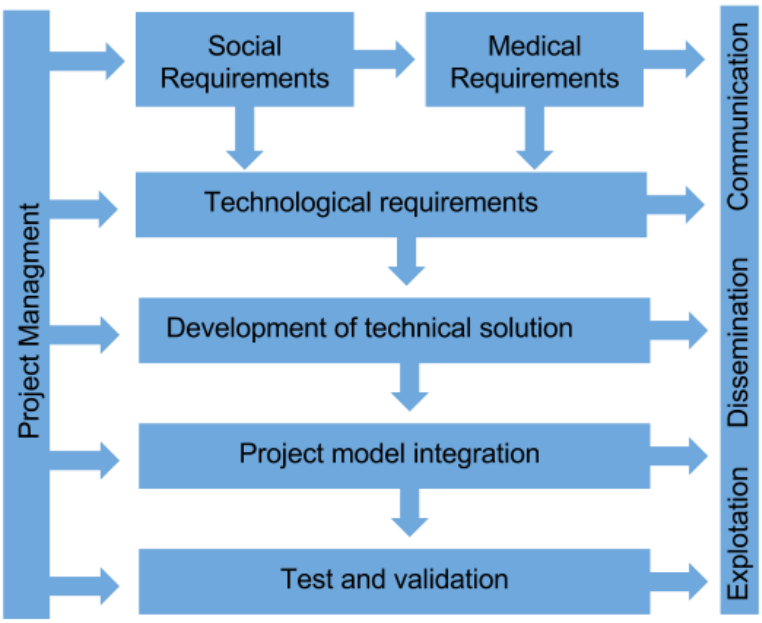

Fig. 17- Diagram showing project dependencies

The WP1 and WP6, managerial and communication activities, start and end together with the project. The other work projects have a finish-to-start dependency: for instance, no development of the prototype can start, without being completed the requirement study. For this reason, control over activities and tasks is of great importance to ensure the project development according to the planned calendar. Milestones have been set as control points, which help to chart project's progress. In HCHA project milestones correspond either to the completion of key deliverables or to the shift to the next work package or work package task.

- **Activities developed at each of the work packages**

The **WP1** is the organizational core of the project. Through this WP the project main management activities will be carried out: planning, implementing, controlling and correcting the organizational issues of the project. The leader of this WP is the SAR and mainly the

Project Manager, who will work on it in collaboration with an assistant. They are responsible for carrying out the tasks, planning the project, controlling it and issuing the deliverables. Nevertheless, main decisions about project organization and development will be taken democratically by the consortium as a whole- through the Administrative Managing Board, formed up by a representative of each partner and lead by the Project Manager.

Within WP1 key events are Kick-off meeting, Project Launch meeting, Trimestral Meetings (carried out every 3 months) and Closing meeting. During these meetings main project managerial issues and decisions will be discussed. The meetings will be prepared by the WP leader, but attended by all AMB and CE[6]. For the two first trimesters the meetings will be held in Barcelona, at the Coordinator partner headquarters, however, afterwards the meetings will be held in Menorca island, were the project Model will be developed and the main technological partner is settled. Additional meetings can be organized if necessary, but they will not require all partners' assistance, they could be only necessary to disscuss technical issues, and only implied partners should participate. Nevertheless, whenever it is possible meetings should be carried out on-line.

Key deliverables of this work project are mainly documents issued form the meetings (meeting minutes, result reports…), documents showing agreements between partners (Grant and Consortium agreement) and project management documentation (Project Handbook, monthly reports, administrative and closing documentation…).

The **WP2** is centred in the requirement definition. The main objective of this WP is to set out the project requirement at three different levels: social, medical and technological; which will allow further technological development. Requirement definition bases on partners knowledge and experience, as well as the researches carried out previous to the HCHA project. However, partners need to put together their finding and clearly set requirements for the developing of the technological prototype. At this point scope risk assessment is highly required, thus slightly deviations of the scope would result in undesired prototype performance or unnecessary characteristics. The study will result in clear and simplified requirements, delivered in scientific reports in the different study areas.

Most partners will be very involved in this work package, but the leader is the Project coordinator SAR, who has the better knowledge about the project scope.

The WP3 joins together the main developing of project technical solution. The WP includes complex technological tasks carried out by the two main technological partners of the HCHA proposal: BEI and TEC. There are four main tasks comprised in this work

[6] See section " Management structure and procedures".

package: 1) The creation of a central Tele-Care controlling device, which will be the control panel of whole AAL technologies and sensors. 2) The software development of the Tele-Care controlling device and a social network software development. 3) The adaptation of existing technologies, to make them compatible and able to interact with the newly created Tele-Care device. 4) Finally all developed and adapted technologies will be integrated into a unitary prototype of AAL system.

The resulting deliverable of this work package is the AAL prototype validation.

The **WP4** is the project model integration. This work package aims at creating 24 AAL Models out from the system prototype. Each model is a home installed with AAL prototype and prepared for living. The prototype will be installed, sensors need to be strategically placed all over the building, and afterwards the tools need to be verified. It is necessary to check if technology is working properly and if data received is trustful and data processing and interpretation is correct. To ensure technology effectiveness, a maintenance of the tools will be carried out till the end of the project.

Deliverables of this work package are the technical specifications of the installation, the models and a maintenance plan.

The **WP5** refers to the Model test and validation. The model or demonstrator of the project will be validated through the living in them. Elderly living in the equipped homes will carry out a normal life, but data received from the sensors will allow testing technology while monitoring their health parameters. Time to time corrections will be needed to carry out at the AAL prototypes. Moreover, the elderly will receive healthcare assistance service from the healthcare partner organization; this will help to organize an integrated care service at a whole, starting from very small number of users and growing on after the project concludes. The work package includes model pre-validation and validation processes, during which technology, economic and organizational issues will be evaluated. Surveys to measure technology impact upon quality of life will be also carried out. Main parameters taken to measure quality of life will be: Autonomy in daily life, satisfactory communication and security feeling. To measure this parameters is a difficult task, but it will be done through inquires to users, their relatives and caregivers.

The **WP6** gathers together all tasks related to communication, dissemination and exploitation strategies. Mainly the WP objectives are to scatter information about the project to potentiate the impact of its results. The exploitation strategy also derives in effective results that can be strengthened and promoted after the project concludes. Specially, the

goal is to develop a business plan to boost partner's competitiveness in the ICT and Healthcare business.

All these tasks are described in detail in the section "Measures to maximise impact". Further information on Work Packages is shown in table 3.1.a.

- **Milestones of the project**

Milestones mark specific events along the project timeline. These events, which can be the signature of a key document or the finalization of an important task, are set at a certain date when planning the project and are very useful to monitor project progress during its development. If milestones are achieved on time, means the project develops successfully. The HCHA project identified critical milestone, which mark the beginning of a work packages ensuring the on-time developing of the project.

M.1 Grant Agreement – Consortium partners and European Commission coordinator sign an agreement, which enables the Project to start. This agreement is the project starting point, it will be carried out at M0.

M.2 Partners agreement on project development – Consortium partners agree on the project planning, regarding responsibilities for tasks, deliverables, project calendar and results property. All this information is described in the "Project Handbook" deliverable, which is a roadmap for HCHA project management and tries to ensure its success. **Date: M1**

M.3 Joint report on social, medical and technical requirements – A joint report gathers together all requirements necessary to follow with the development of technology. **Date: M8**

M.4 Prototype of Ambient Assisted Living validation– Prototype joints together Tele-Care device, monitoring sensors and other applications to monitor health or enable elderly wellbeing. Result of technological development and integration. **Date: M20**

M.5 Model Installation – Installation of the 24 environments, which make up the model. **Date: M15**

M.6 Model pre-validation report – Model is pre-validated and corrections implemented. **Date: M31**

M.6 Model Validation report – Model is validated and results are gathered in an official validation report. **Date: M36**

M.7 Closing report – Partners consider project results are achieved and formally close the project. **Date: M36**

- **Project calendar and Gantt chart**

The project development in time is the following:

Table 5- Project calendar

Trimester	1	2	2	4	5	6	7	8	9	10	11	12
Previous to project	M.1											
1- Management	M.2											
2- Requirements			M.3									
3- Technical solution							M.4					
4- Model								M.5				
5- Test & Validation										M.6		M.7
6- Communication												

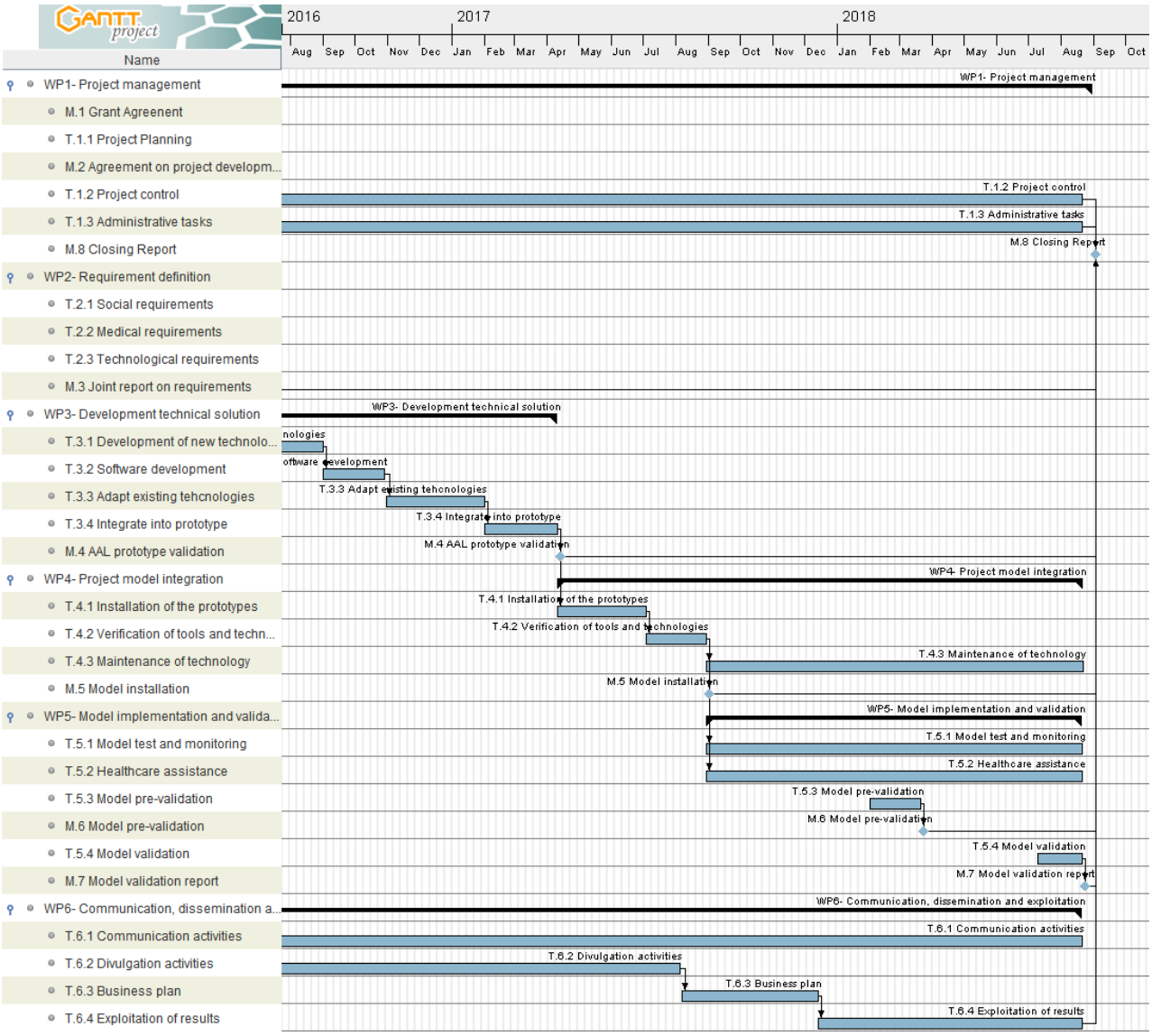

Fig. 18 – Project Gantt diagram. Source: Project authors

Table 3.1a: Work Package description

Work Package Nr.	**WP 1**			Start date: Month 1
Work Package	**PROJECT MANAGEMENT**			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	53	-	-	-
Objectives	1. Define Project management roadmap 2. Agree on the Project key points and Calendar 3. Monitor and control project activities 4. Complete administrative tasks			
Tasks	T.1.1 Project planning-"Project handbook" T.1.2 Project developmente control (Project Scope and Quality & Risk assurement) T.1.3 Administrative tasks + Project closing tasks			SAR SAR SAR
Deliverables	D.1.1 Consortium Agreement and Garant Agreement. M1 D.1.2 Project Handbook (Project Management Plan). M1 D.1.3 Launch meeting minute. M2 D.1.4 Project's trimestral reports (6 reports overall). D.1.5 Project results report (at the endo of the project). M36 D.1.6 Project Administrative documents. M36 D.1.7 Closing documentation. M36			SAR SAR SAR SAR SAR SAR SAR
Main Milestones	M.1 Grant Agreement M.2 Partners agreement on project development M.7 Closing report			M0 M1 M36

Task Nr.	T.1.1	Start date: Month 0		End date: Month 2
Task Name	Project planning			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	3	-	-	-
Overview	This task objectives are to define the project management roadmap and to ensure partners agree on project key points. The task starts with the signature of the Grant Agreement, where all Consortium partners ensure their participation on the project; and ends up with the Agreement on Project Development- a formal acceptance of the Project Handbook.			
Related Deliverables	D.1.1 Consortium Agreement and Garant Agreement. M0 D.1.2 Project Handbook (Project Management Plan). M1 D.1.3 Launch meeting minutes. M1			SAR SAR SAR

Key Events	• Kick-off meeting Participants: SAR, TEC, IHE, BEI. Date: M0 • Project launch meeting Participants: SAR, TEC, IHE, BEI. Date: M1	SAR SAR

Task Nr.	T.1.2	Start date: Month 2		End date: Month 36
Task Name	Project developmente control (Project Scope and Quality & Risk assurement)			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	35	-	-	-
Overview	This task objective is to guarantee project's scope and quality all along its development. Project scope and Quality & Risk management objectives are defined in the Project Handbook and monitored thorough monthly reports. The project will be controled and monitored and any deviations will be corrected to ensure project successfully reaches its results.			
Related Deliverables	D.1.4 Project's semestral reports (6 overall) Every 6M D.1.5 Project results report (at the end of the project) M36			SAR SAR
Key Events	• Project meeting I Participants: SAR, TEC, IHE, BEI. Date: M6 • Project meeting II Participants: SAR, TEC, IHE, BEI. Date: M12 • Project meeting III Participants: SAR, TEC, IHE, BEI. Date: M18 • Project meeting IV Participants: SAR, TEC, IHE, BEI. Date: M24 • Project meeting V Participants: SAR, TEC, IHE, BEI. Date: M30 • Project meeting VI Participants: SAR, TEC, IHE, BEI. Date: M35			SAR SAR SAR SAR SAR SAR

Task Nr.	T.1.3	Start date: Month 2		End date: Month 36
Task Name	Administrative tasks + Project closing tasks			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	36	-	-	-
Overview	This task objective is to complete all administrative tasks regarding the management of the project. Documentation to be tranfered to EC and other legal documentation. Project closing related administrative works are included in this task.			

Related Deliverables	D.1.6 Project Administrative documents D.1.7 Closing documentation	SAR SAR
Key Events	• Project Closing meeting Participants: SAR, TEC, IHE, BEI. Date: M36	SAR

Work Package Nr.	**WP 2**	Start date: Month 2		
Work Package	**REQUIREMENT DEFINITION**			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	9	3	10	9
Objectives	1. Set out project requirements at three different levels: social, medical and technological 2. Draw results together to further design of a technical solution			
Tasks	T.2.1 Social requirements- Identify user necessities. Organizational needs. T.2.2 Medical requirements- Study possible integration of the service with Health organizations. T.2.3 Technological requirements- Select best technologies accordingly to previously described requirements.			SAR/IHE IHE BEI
Deliverables	D.2.1 Qualitative study conclusions. M4 D.2.2 Users requirements/ necesities report. M4 D.2.3 Ethic and Legal issues dossier. M4 D.2.4 Medical requirements report. M6 D.2.5 Integration of service with health institutions roadmap. M6 D.2.6 Technical requirements report. M8 D.2.7 Roadmap for project's technological development. M8 D.2.8 Create a webpage with different available technologies data and recommendations for developers. M8			SAR IHE SAR IHE IHE BEI BEI BEI
Main Milestones	M.3 Joint report on social, medical and technical requirements			M8

Task Nr.	T.2.1	Start date: Month 2		End date: Month 3
Task Name	Social requirements			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	9	-	3	-

Overview	The objective of this task is to carry out a qualitative study among elderly and Health Care Insitutions and based on its results, together with other scientific researches draw AAL users necesities and "must-have" requirements for technology. Requirements must condensate users, caregviers and institutions interests and needs. Also ethics and legal issues will be researched. SAR as SME specialized in caregiving is the expert partner in elderly necessities. IHE will help carring out the study in Austria, among target users.	
Subtasks	S.2.1.1 Qualitative study in Austria and drawing of results. Qualitative study in Spain and setting requirements S.2.1.2 Ethics and Legal issues study.	IHE SAR SAR
Related Deliverables	D.2.1 Qualitative study conclusions. M4 D.2.2 Users requirements/ necesities report. M4 D.2.3 Ethic and Legal issues dossier. M4	SAR SAR SAR

Task Nr.	T.2.2	Start date: Month 4		End date: Month 5
Task Name	Medical requirements			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	-	-	6	-
Overview	The objective of this task is to set out all medical requirements to be supported by the AAL. The sensors can collect different data, but this must be proccessed to obtain necessary medical parameters to surveil elderly health. Another key issue is to study the possibility of integrating the AAL service into public Health organizations.			
Subtasks	S.2.2.1 Compile necessary medical parameters list and the way to process data to outcome them. Informaton gathered through interviews. S.2.2.2 Create a roadmap for the integration of AAL service with public Healthcare Institutions.			IHE IHE
Related Deliverables	D.2.4 Medical requirements report. M6 D.2.3 Integration of service with health institutions roadmap. M6			IHE IHE

Task Nr.	T.2.3	Start date: Month 6		End date: Month 8
Task Name	Technological requirements			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	-	3	1	10

Overview	The objective of this task is to transfer users and health requirements into the technological sphere. Flowingly identify and select best technologies to meet project requirements and study the way to develop or/and integrate them. Define technological development basis and planning. BEI is expert partner in developing of new technologies.	
Subtasks	S.2.3.1 Base technological requirements out of social and health requirements. S.2.3.2 Identify and select best technologies to meet project requirements. S.2.3.3 Study how to develop and integrate those technologies. S.2.3.4 Define project technological development roadmap.	BEI BEI/TEC BEI/TEC BEI
Related Deliverables	D.2.6 Technical requirements report. M8 D.2.7 Roadmap for project's technological development. M8 D.2.8 Create a webpage with different available technologies data and recommendations for developers. M8	BEI BEI BEI

Work Package Nr.	WP 3			Start date: Month 9
Work Package	DEVELOPMENT OF THE TECHNICAL SOLUTION			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	-	37	-	47
Objectives	1. Adapt existing technologies (mostly sensors) to create an unitary AAL technical prototype. 2. Develop central controling device. Develop other if necessary. 3. Device software development. Develop social network. 4. Integrate adapted and developed technology into the prototype.			
Tasks	T.3.1 Development of new required technologies. T.3.2 Software development. Social network development. T.3.3 Adaptation of existing technologies. T.3.4 Integrate new technologies into a prototype.			BEI/TEC BEI/TEC BEI/TEC BEI/TEC
Deliverables	D.3.1 Prototype of a central controling tele-care device. M12 D.3.2 Software source code. M14 D.3.3 Social network for elderly software. M14 D.3.4 Adaptation of existing sensors to the prototype. M17 D.3.5 Integrated AAL technological prototype. M20 D.3.6 Technical specifications and users manual. M20 D.3.7 Validation protocol of prototype. M20			BEI BEI BEI TEC BEI BEI BEI
Main Milestones	M.4 Prototype of Ambient Assisted Living validation			M20

Task Nr.	T.3.1	Start date: Month 9		End date: Month 12
Task Name	Development of new required technologies			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)		12		20
Overview	The objective of this task is to create all those technologies required to develop an AAL, which are not available at the market. As a forecast mainly the Tele-Care controling device will be created and aslo some specific sensors that may be unavailable at the moment.			
Subtasks	S.3.1.1 Development of Tele-Care central controling device S.3.1.2 Development of essential unavailable sensors			BEI TEC
Related Deliverables	D.3.1 Prototype of a central Tele- Care controling device. M12			BEI

Task Nr.	T.3.2	Start date: Month 13		End date: Month 14
Task Name	Software development + social network development			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)				6
Overview	The aim of this task is to develop the software for the Tele-Care central controling device. This software will allow to process all data gathered by the sensors and give an easy display of it to the user and to the healthcare institution. As well it will make available Tele-Comunication system and an risk detection and alert system. A social network will be developed for prividing elderly whith a tailored communication tool.			
Subtasks	S.3.2.1 Set requirements of the software S.3.2.2 Develop the software S.3.2.3 Develop a social network specifically for elderly S.3.2.4 Test the software			BEI/TEC BEI BEI BEI
Related Deliverables	D.3.2 Software source code. M14 D.3.3 Social network application. M14			BEI BEI

Task Nr.	T.3.3	Start date: Month 15		End date: Month 17
Task Name	Adaptation of existing technologies or applications			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)		15		15

Overview	This task consist on the adaptation of previously selected technologies to match the goal of HCHA project. The technologies will be adapted to a common output system, so that can be integrated within each other an work together to get a complete service of AAL. Moreover, technologies will be controlled from a newly created device, what means the data outcome and the connection needs to be standarized.	
Subtasks	S.3.3.1 Set standarized technological requirements S.3.3.2 Adapt technologies to the standarized requirements S.3.3.3 Check interaction of the technology	TEC/BEI TEC TEC
Related Deliverables	D.3.4 Adaptation of existing technologies prototypes. M17	TEC

Task Nr.	T.3.4	Start date: Month 18		End date: Month 20
Task Name	Integrate new technologies into a prototype			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)		10		6
Overview	This tasks aims at integrating previously created and developed technologies into a unitary protorype of AAL technology. After the original prototype will be tested and corrected other 23 will be assembled to further development of the Project Models.			
Subtasks	S.3.4.1 Integration of prototype S.3.4.2 Testing, monitoring and correcting the interaction of the prototype S.3.4.3 Validation of the prototype S.3.4.4 Developing of other 23 prototypes			BEI TEC/BEI BEI TEC
Related Deliverables	D.3.5 Unitary AAL technological prototype. M20 D.3.6 Technical specifications and users manual. M20 D.3.7 Validation protocol of prototype. M20			BEI BEI BEI

Work Package Nr.	WP 4	Start date: Month 20		
Work Package	PROJECT MODEL INTEGRATION			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)		41		10
Objectives	1. Create Model AAL environments out from the prototype. 2. Apply integrated technologies- prototype in 24 homes. 3. Ensure the proper working of the Models and their maintenance.			

Tasks	T.4.1 Installation of the prototype at the living environments T.4.2 Verification of the tools and technologies T.4.3 Maintenance of the technologies	TEC TEC/BEI TEC
Deliverables	D.4.1 Technical specifications of the installation. M22 D.4.2 Models: Ambient Assisted Living environments (24). M24 D.4.3 Maintenance plan. M25	TEC TEC TEC
Main Milestones	M.5 Model Installation	M24

Task Nr.	T.4.1	Start date: Month 20		End date: Month 22
Task Name	Installation of the prototype at the living environments			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	-	20	-	5
Overview	The objective of this task is to install the prototype in the living environments to transform them into Assisted Living Environments.			
Subtasks	S.4.1.1 Installation of sensors S.4.1.2 Installation of other devices S.4.1.3 Connect all of them to allow interaction			TEC TEC TEC
Related Deliverables	D.4.1 Technical specifications of the installation. M22			TEC

Task Nr.	T.4.2	Start date: Month 23		End date: Month 24
Task Name	Verification of the tools and technologies			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	-	5	-	5
Overview	This task is aimed to verify the correct working of the tools and technologies to precede with the project Models.			
Subtasks	S.4.2.1 Verify the prototype is working once installed S.4.2.2 Verify data consisence and processing procedure S.4.2.2 Correct eventually problems			TEC/BEI TEC/BEI
Related Deliverables	D.4.2 Models: Ambient Assisted Living environments (24). M24			TEC

Task Nr.	T.4.3	Start date: Month 25		End date: Month 36
Task Name	Maintenance of the technologies			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	-	6	-	-
Overview	The objective of this task is to set the maintenance requirements as well as ensure their fulfilment.			
Subtasks	S.4.3.1 Technical specification and maintenance plan creation S.4.3.2 Carry out maintenance of the technologies			TEC TEC
Related Deliverables	D.4.3 Maintenance plan. M25			TEC

Work Package Nr.	WP 5		Start date: Month 25	
Work Package	MODEL TEST AND VALIDATION			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	20	5,5	1	1
Objectives	1. Analyse and monitor the Models 2. Provide required Healthcare assistance to Model users 3. Test, monitor, correct and validate the Models			
Tasks	T.5.1 Model test, monitoring and correcting T.5.2 Provide Healthcare assistance to users T.5.3 Model pre-validation T.5.4 Model validation			TEC SAR SAR SAR
Deliverables	D.5.1 Testing and monitoring protocol. M26 D.5.2 Assistance service organization best practices. M35 D.5.3 Pre-validation report. M30 D.5.4 Final validation report. M36			TEC SAR TEC SAR
Main Milestones	M.6 Model Pre-Validation report M.7 Model Validation report			M31 M36

Task Nr.	T.5.1	Start date: Month 25		End date: Month 36
Task Name	Model test, monitoring and correcting			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	-	6	-	-

Overview	This task objectives are to test, monitor and eventually correct the Model during its validation time.	
Subtasks	S.5.1.1 Test the Model S.5.1.2 Monitor the Model S.5.1.3 Correct the Models deviations	
Related Deliverables	D.5.1 Testing and monitoring protocol. M36	TEC

Task Nr.	T.5.2	Start date: Month 25		End date: Month 36
Task Name	Provide Healthcare assistance to users			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	30	-	-	-
Overview	This task is created to provide Healthcare assistance to the Model users in case of emergency. Moreover, there are some tasks SAR is commited to carry out regularly, such as, visits, help in home tasks…			
Subtasks	S.5.2.1 Regular visits to the users S.5.2.2 Help in house keeping tasks S.5.2.3 Continuous sueveilance- to provide help in case of emergency			
Related Deliverables	D.5.2 Assistance service organization best practices. M35			SAR

Task Nr.	T.5.3	Start date: Month 25		End date: Month 36
Task Name	Model pre-validation			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	2	1	1	1
Overview	The model will be pre-validated by in its three different requirement levels: social, medical and technological. If any deviations are found the responsible partner will correct the incidence. Pre-validation will be carried out through interviews with the users, Healthcare organization and through protocols to test the model.			
Subtasks	S.5.3.1 Pre-validation S.5.3.2 Correcting deviations			SAR TEC/IHE
Related Deliverables	D.5.3 Pre-validation report. M31			SAR

Task Nr.	T.5.4	Start date: Month 35		End date: Month 36
Task Name	Model validation			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	2	1	1	1
Overview	The model will be validated the last month of the project. Validation will evaluate Models performance in social, medical and technological spheres and verify them against project expected results. If any deviations will be studied by their causes and conclusions will be reflected in the validation report and result report.			
Subtasks	S.5.4.1 Validation S.5.4.2 Cause study of deviations S.5.4.3 Drawing conclusions on reports			SAR SAR SAR
Related Deliverables	D.5.4 Final validation report. M36			SAR

Work Package Nr.	WP 6	Start date: Month 1		
Work Package	COMMUNICATION, DISSEMINATION AND EXPLOITATION			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	13,5	4,5	25,5	3
Objectives	1. Carry out communication and divulgation activities 2. Design effective result exploitation 3. Develop a business plan to extend project activity after project ends and achive long term results of the project.			
Tasks	T.6.1 Communication activities T.6.2 .Divulgation activities T.6.3 Business plan T.6.4 Exploitation roadmap for each partner			SAR/IHE IHE SAR IHE
Deliverables	D.6.1 Project website and promotional material. M1 D.6.2 Workshop conclusions. M9 D.6.3 Business plan. M27 D.6.4 Exploitation roadmap for each partner. M35			IHE IHE SAR IHE

Task Nr.	T.6.1	Start date: 1		End date: 36
Task Name	Communication activities			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	3	-	6	-

Overview	Carry out communication activities and project promotion	
Subtasks	1. Prepare corporate image 2. Webpage creation 3. Create contact databse 4. Project promotion activities	IHE IHE SAR IHE
Related Deliverables	D.6.1 Project website and promotional material. M1	IHE

Task Nr.	T.6.2	Start date: 6		End date:23
Task Name	Divulgation activities			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	6	-	12	-
Overview	Carry out divulgation activities			
Subtasks	1. Organize Tele Health& Care symposium 2. Organize Workshop with European Care Institutions 3. Participate at “ICT and Healthcare Forum 2016” 4. Spread of results			IHE IHE IHE SAR
Related Deliverables	D.6.2 Workshop conclusions. M9			IHE

Task Nr.	T.6.4	Start date: 24		End date: 27
Task Name	Business plan			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	1,5	1,5	1,5	-
Overview	Develop a business plan to extend project activity after project ends and achive long term results of the project.			
Subtasks	1. Market analysis 2. Product and service analysis 3. Business model design			SAR IHE SAR
Related Deliverables	D.6.3 Business plan. M27			SAR

Task Nr.	T.6.1	Start date: 28		End date: 36
Task Name	Exploitation of the results			
Participant Nr.	1	2	3	4
Participant Name	SAR	TEC	IHE	BEI
Persons/month (of participant)	3	3	6	3
Overview	Design effective result exploitation			
Subtasks	1. Results exploitation 2. Search for investment 3. Seatch for partnerships			SAR IHE IHE
Related Deliverables	D.6.4 Exploitation roadmap for each partner. M35			IHE

Table 3.1 b: List of work packages

Work Package No.	Work Package Title	Lead Participant No.	Lead Participant Short Name	Persons-Months	Start Month	End Month
WP 1	Project management	1	SAR	53	M1	M36
WP 2	Requirement definition	1	SAR	31	M2	M8
WP 3	Development of technical solution	4	BEI	84	M9	M20
WP 4	Project Model integration	2	TEC	51	M20	M36
WP 5	Model validation	1	SAR	46	M25	M36
WP 6	Communication, dissemination and exploitation	3	IHE	46.5	M1	M36
				311.5		

Table 3.1 c: List of Deliverables

Deliverable (number)	Deliverable name	Work Package number	Short name of lead participant	Type	Dissemination level	Delivery date
D.1.1	Consortium Agreement & Garant Agreement	WP 1	SAR	R	PU	M1

D.1.2	Project Management Plan	WP 1	SAR	R	PU	M1
D.1.3	Launch meeting minutes	WP 1	SAR	R	PU	M2
D.1.4.1	Project monthly report I	WP 1	SAR	R	PU	M6
D.1.4.2	Project monthly report II	WP 1	SAR	R	PU	M12
D.1.4.3	Project monthly report III	WP 1	SAR	R	PU	M18
D.1.4.4	Project monthly report IV	WP 1	SAR	R	PU	M24
D.1.4.5	Project monthly report V	WP 1	SAR	R	PU	M30
D.1.4.6	Project monthly report VI	WP 1	SAR	R	PU	M35
D.1.5	Project results report	WP 1	SAR	R	PU	M36
D.1.6	Project Administrative documents	WP 1	SAR	R	CO	M36
D.1.7	Closing documentation	WP 1	SAR	R	CO	M36
D.2.1	Qualitative study conclusions	WP 2	SAR	R	PU	M4
D.2.2	Users requirements/ necesities report	WP 2	IHE	R	PU	M4
D.2.3	Ethic and Legal issues dossier	WP 2	SAR	R	PU	M4
D.2.4	Medical requirements report	WP 2	IHE	R	PU	M6
D.2.5	Integration of service with helth institutions roadmap	WP 2	IHE	R	PU	M6
D.2.6	Technical requirements report	WP 2	BEI	R	CO	M8
D.2.7	Roadmap for project's technological development	WP 2	BEI	R	CO	M8
D.2.8	Create a webpage with different available technologies data and recommendations for developers	WP 2	BEI	DEC	PU	M8

D.3.1	Prototype of a central controling tele- care device	WP 3	BEI	DEM	CO	M12
D.3.2	Software source code	WP 3	BEI	OTHER	CO	M14
D.3.3	Social network for elderly software	WP3	BEI	OTHER	PU	M14
D.3.4	Adaptation of existing sensors to the prototype	WP 3	TEC	DEM	CO	M17
D.3.5	Integrated AAL technological prototype	WP 3	BEI	DEM	PU	M20
D.3.6	Technical specifications and users manual	WP 3	BEI	R	PU	M20
D.3.7	Validation protocol of prototype	WP 3	BEI	R	PU	M20
D.4.1	Technical specifications of the installation	WP 4	TEC	R	CO	M22
D.4.2	Models: Ambient Assisted Living environments(24)	WP 4	TEC	DEM	PU	M24
D.4.3	Maintenance plan	WP 4	TEC	R	PU	M25
D.5.1	Testing and monitoring protocol	WP 5	TEC	R	PU	M26
D.5.2	Assistance service organization best practices	WP 5	SAR	R	PU	M35
D.5.3	Pre-validation report	WP 5	TEC	R	PU	M 31
D.5.4	Final validation report	WP 5	SAR	R	PU	M36
D.6.1	Project website and promotional material	WP 6	IHE	DEC	PU	M1
D.6.2	Workshop conclusions	WP 6	IHE	R	PU	M9
D.6.3	Business plan	WP 6	SAR	R	CO	M27
D.6.4	Exploitation roadmap for each partner	WP 6	IHE	R	PU	M 35

Table 3.2 a: List of milestones

Milestone (number)	Milestone name	Related work package(s)	Estimated date	Means of verification
M.1	Grant Agreement	WP 1	M0	Signature
M.2	Partners agreement on project development	WP 1	M1	Signature
M.3	Joint report on social, medical and technical requirements	WP 2	M8	Accomplish
M.4	Prototype of Ambient Assisted Living validation	WP 3	M20	Validate
M.5	Model Installation	WP 4	M24	Installed
M.6	Model pre-validation report	WP 5	M31	Accomplish
M.7	Model validation report	WP 5	M36	Accomplish
M.8	Closing report	WP 1	M36	Accomplish

- **Risk assessment**

To ensure the proper implementation of the project risk assessment is carried out identifying principal project risks and contingency plans to overcome them if risks come to materialize.

Table 3.2 b: Critical risks for implementation

Description of risk	Work package(s) involved	Proposed risk-mitigation measures
Loss of a partner	All	To prevent this risk to have a high impact upon the project, there will be alternative partners “preselected”. The partner retired will be replaced.
Project scope deviation	WP2 and WP3	SAR and the project manager will specially control the project scope deviation to avoid a wrong definition of requirements or unsuccessful development. If deviation occurred, would be detected and solved immediately.
Budget increase	All	Budget increase is a risk to all projects. In this case, reduction would be done through avoiding subcontracting. If extreme case occurred, partners would help funding the project.

Technology integration problems	WP4	If technological devices would be unable to integrate and interact with each other, the project would undertake more development activities and reduce its scope.

b. Management structure and procedures

In this section will be reviewed the organizational structure of the project, as well as the different roles and responsibilities of the consortium partners. Other organizational issues such as communications, meetings… will be also exposed.

The disparity on tasks and work packages favour the show up of different management organs at different levels. They can be easily understood in a hierarchic diagram; where above upper levels manage tasks at lower levels. To ensure perfect working within all work packages and hierarchic stages, it is important to determine the means of communication.

The management structure is described in the figure below:

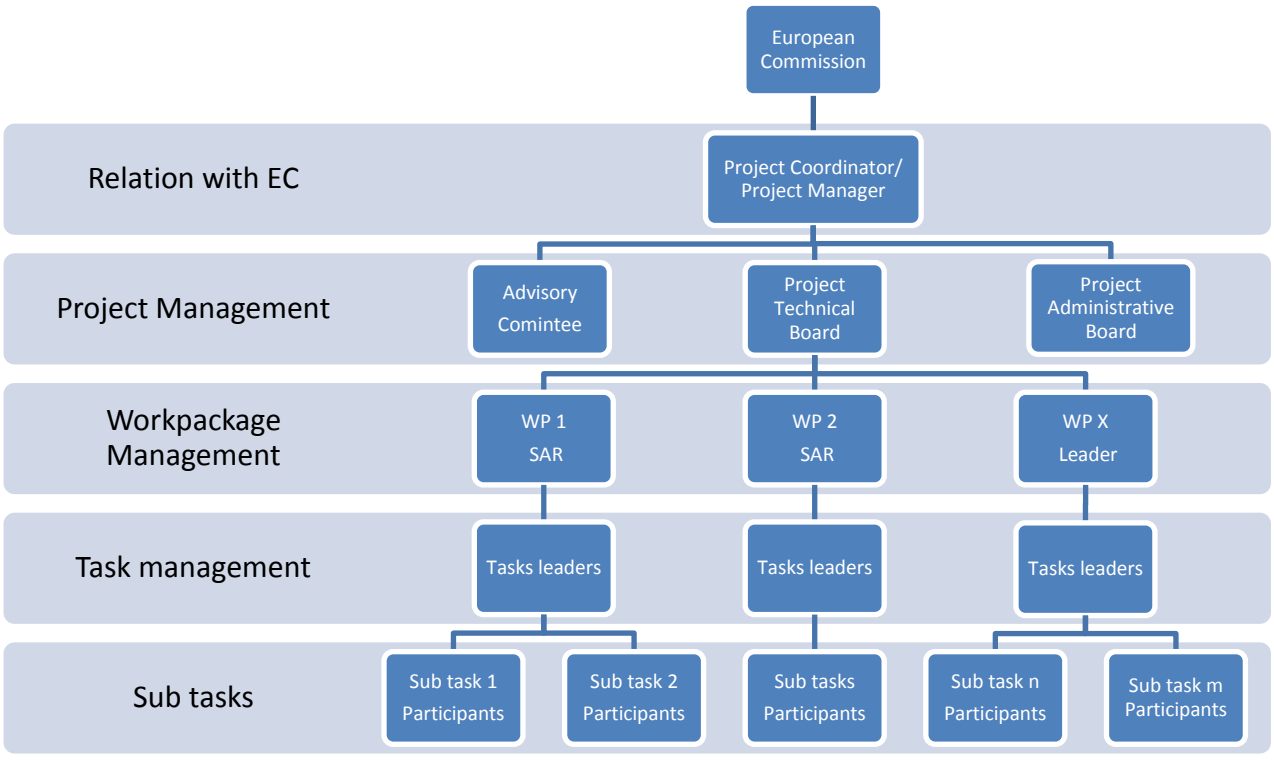

Fig. 19- Project management structure

- Description of roles:

Project Coordinator + Project Manager: In this project both figures are integrated in the same person. The PM coordinates the project activity and organizes it. PM is the highest authority inside the project. He takes most important managerial decisions in collaboration

with the Project Management Board and Project Administrative Board. As project Coordinator he is also the representative of the project in front of the EC.

Together with assistants he carries out the work of WP 1. Mainly organizes project activity and controls it through monthly project reports. He is in charge of project budget, risk and quality assurance, project monitoring and control… everything needed to ensure project scope and success.

Project Technical Board: Is the main project authority, formed by all the work package leaders. The board will take project decisions and solve conflicts if required. The PM is the leader of this body and must take decisions in collaboration with them. All decisions are taken democratically, taking the decision with biggest support.

The PTB, as it names shows, is mainly devoted to technical matters: development of activities of the work packages, actions to take to avoid certain risk or correct certain operations, questions concerning project scope…

The Project Technical Board is meant to meet every half a year at least at the Project meetings, but can organize other unscheduled meetings if required by the PM.

Project Administrative Board: Is a government structure parallel to the PTB, which mainly centres its activity in purely managerial and bureaucratic tasks. Is the body in charge of revising documentation to send to the EC, approving deliverables…

The board will take decision only on administrative matters. As the authority is less than the PTB, the PAB is formed by a member of each Consortium Partner, but not compulsory the Work Package leaders.

Project Advisory Comitee: Made up of different area experts non directly related to the project, the committee gives advice to the PTB (if required). The PAC helps the project maintain its initial scope and specially gives advice on technological matters. This Comitee works together with the PTB during the biannual Project Meetings and can be consulted on-line at any time during the development of the project.

The PAC is formed by: other healthcare sector leading enterprises managers or experts.

Work package leaders: They are in charge of the management of their own work package. Must report to the PM about the development of the WP. WP leaders might take into account, that within their work package are different tasks assigned to different partners. He should coordinate all activities to reach the objectives of the WP and assure regular work to all implied personnel. Milestones are key points to evaluate WP success.

Task leaders: Their responsibility is to get the tasks done, sometimes in collaboration of different partners. Task leaders report any problem to the upper instances, mostly work package leader.

- Responsibilities:

To make clear project responsibilities a responsibility matrix is introduced below, showing the level of implication all participants must take in the project.

Table 6- Responsability matrix

WP / Partners	SAR	TEC	IHE	BEI
WP1	R/D	I	I	I
WP2	R/D	C	D	D
WP3	I	D	C	R/D
WP4	I	R/D	I	D
WP5	R/D	D	I	C
WP6	D	I	R/D	I

Kinds of responsbilities: Responsible, Developer, Consultor, Informative

- Internal communication strategy

Communication is essential to guarantee an effective management and quality of the Project. An exhaustive description of internal communication strategy will be developed in the deliverable D.1.2- Project Handbook.

- Meetings

Within WP1 key events are Kick-off meeting, Project Launch meeting, Semestral Meetings and Closing meeting. In all of them will be discussed main project managerial issues and main decisions will be taken. Also semestral reports will be revised. The meetings will be prepared by the WP leader, but attended by all AMB and CE. They will take place at the project headquarters in Menorca. Other meetings can be organized if necessary, but they will not be of compulsory assistance, and can even be on-line.

c. Consortium as a whole

The consortium gathers together institutions from different backgrounds that look at the same problem from different scopes, what certainly will be very enriching for the project. The

partners are selected to contribute to the project with their own knowledge: technical theoretical and practical, social and business experience.

El consorcio como unidad, recoge diversas instituciones con áreas de trabajo distintas. El punto de unión son las tecnologías e-health, tele-asistencia y la asistencia a personas mayores, pero cada socio aborda el problema desde un punto de vista diferente.

Divesity of positions to deal with a common challenge will help to ensure HCHA Project scope and successful impact.

The members of the consortium are glad to have the chance to participate in such a big Project, mainly because it will help to boost their companies technological level and will reinforce their competitiveness in the market by potenciating their R&D ability. Exploitation possibilities will open new markets and comercial opportunities.

Each partner's individual contribution to the Project is detailed in the section *1.4 Members of the consotium.*

d. Resources to be committed

Table 3.4 a: Summary of staff effort

Indicate the number of persons/ months over the whole duration of the planned work for each work package, for each participant. Work package leader is identified in bold.

	WP 1	WP 2	WP 3	WP 4	WP 5	WP 6	Total Person/ Months per Participant
1/ SAR	**53**	**9**	-	-	**34**	13,5	109.5
2/ TEC	-	3	37	**41**	8	4,5	93,5
3/ IHE	-	10	-	-	2	**25,5**	37,5
4/ BEI	-	9	**47**	10	2	3	71
Total Person/Months	53	31	84	51	46	46,5	311,5

B.4 Members of the consortium

a. Participants (applicants)

SAR

SPAIN

WWW.SAR.ES

SAR is a SME, which offers health, care and social services to elderly. The company was established in 1990 and at the moment has over 50 employees in Barcelona region and offers a wide range of care services: home care, retirement homes and day care centres among others. For a couple of years now the company provides Tele-Care services and has enabled a small call centre. SAR focuses its activities on the customers' wellness, health and comfort, willing to provide a better service day to day. In this effort and aware of social challenges the care of elderly involves, the company has a clear priority in innovation and is fast in adopting of new ICT technologies, that help to maintain service quality and ensures customers best care.

SAR is still a local company (at the moment all its services are developed within Barcelona Metropolitan Area), but forthcoming expansion plans include moving to Girona, Mallorca and Menorca regions. Moreover, the company eagers to start providing its services to foreign expats, who choose Spain as their retirement destination. This phenomenon is becoming more and more habitual and requires the Healthcare providing enterprises to offer customized for them.

Role in the project:

The role of the company in the project is clear, SAR is the project coordinator. It takes the main managerial tasks, as well as communication and dissemination activities. Because of its large experience in social care and healthcare, the company will also participate in setting requirements related activities.

Key person:

The key person for this project is the Project Manager and Responsible of Innovation of the company.

- **Matias López**

Industrial Engineer. PMP. Innovation Department Manager

He is an important person in SAR, who successfully developed previous projects in SAR and tightly cooperated to give SAR its Innovation DNA, which has now. Matias has more than 15 years' experience in healthcare sector and over 30 years' experience in project management. Its engineer background will also be very profitable.

Its figure will be very useful to the project as congregates in a person the two main aspects of HCHA project: technological knowledge and healthcare systems deep understanding.

He speaks fluent English and has good communication and organizational skills, as a Project Management position requires.

TECMOVA

SPAIN

WWW.TECMOVA.COM

Tecmova is a newly created SME, located in Menorca island. The enterprise was created in 2011 and now employs 15 professionals distributed in R&D, Technical Service, Assemblage and Administration departments. Its activity is centred in developing healthcare technology such as AAL, Tele-Health, monitoring through sensors…

Tecmova's e-assistance system monitors the daily activity of customers through wire free sensors installed all around the house. The system evaluates user's activity and detects risky situations. In case of alarm the company will inform the family or healthcare organization and take necessary actions to guarantee customers wellness. Furthermore, the company has enabled a private web application that contains key data about user's health state.

Tecmova is a young enterprise; nevertheless its experience is already significant. The company has carried out substantial number of installations in and perfected its technology along these years. However, innovation plans are numerous and the company needs a financial aid to accomplish them. Among companies innovation strategy are following initiatives: the developing of a video conference communication tool, more powerful and sensitive sensors able to monitor new parameters; and more precise data processing software. Another key feature the company plans to introduce is the capability to adapt other devices to the system, for instance a medical dispenser, which would ensure medicine regular supply to the user and act as reminder.

The following figure shows the operative of Tecmova services (including expected features):

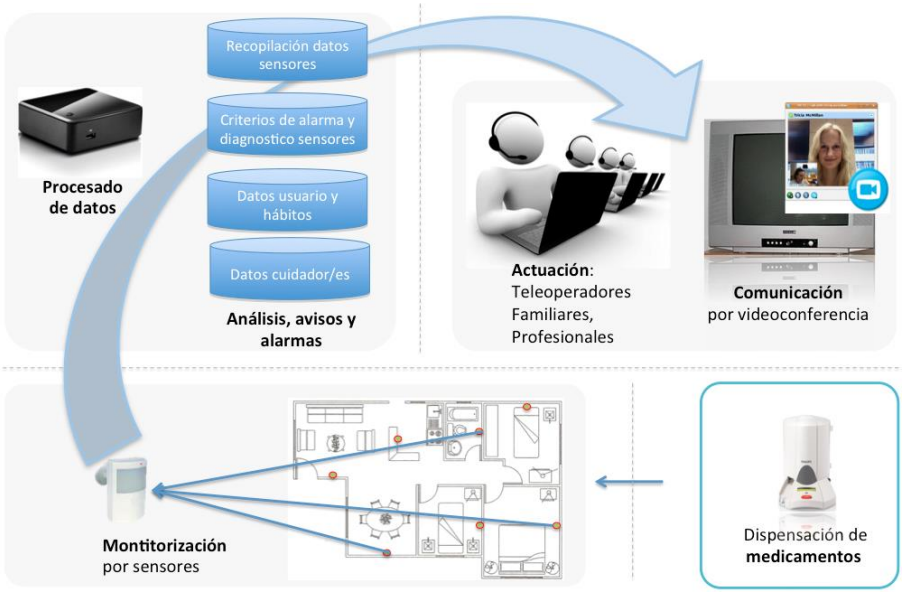

Fig. 20- Tecmova's service diagram. **Source: Tecmova**

Role in the project:

The role of Tecmova in the project is essential. Tecmova will provide its experience about technology; will help to develop an improved service. The companies experience in Ambient Assisted Living is crucial for the project, as it can assess about technology at any stage of its development, although the company can't develop it on its own. Enterprises interest in the is very high, as it would imply a strong step forward in Tecmova's R&D capacity, having an expected long term effect on company's presence in the sector and its sales.

Key persons:

- **Toni Serra**

Communication and public relations expert. MBA. CEO

Toni is a founder partner of Tecmova's Company and actual CEO. He deeply studied the e-health market during his MBA studies and gained valuable experience working in different companies related to the sector until he managed to start with his own company.

The good company results in his first years are the best guarantee of his experience and market knowledge. Non-stop innovating is his motto and as he glimpse the new opportunities and decisively leads the company towards them.

His contribution to the project is rather strategical, than technical. His wide contact portfolio and established relations with healthcare companies and political institutions are vital to warrant the project develops as expected and its divulgation and exploitation is successful.

- **Leo Ruffini**

Industrial Engineer. Telecommunications Master. R&D Office Manager

His is an experienced engineer, who has a both wide and deep view over the technological challenges of the company. Together with his team has developed many of the company's cutting edge technology and researched new ways of tele-assistance services and AAL.

His role is to coordinate technology development tasks and to ensure proper installation of prototypes for perfect project validation.

INTEGRATING THE HEALTHCARE ENTERPRISE

AUSTRIA

WWW.IHEAUSTRIA.AT

IHE Austria engages clinicians, health authorities, industry, and users to improve healthcare interoperability by helping national and European stakeholders and policy-makers in adopting, promoting and implementing IHE specifications developing tools and services in support of interoperability testing.

The group started in 2008 to develop the strategy of the society.

Target of this association is the support for the technical implementation of European AAL and other eHealth projects for increasing of quality, effectiveness and efficiency of healthcare.

The aim of the association is to establish a network of stakeholders, organisations and persons who are interested, so that productive, cooperative and target oriented work can take place.

Role in the project:

The enterprise main role in the project is to collaborate to set project requirements and manage partnerships and contacts. IHE will also be in charge of communication, divulgation and exploitation activities carried out under WP6. The company will have to organize a symposium and a workshop in Tele-Health and AAL. IHE experienced in interoperability of technologies and standards is also very welcome to the project.

KAUNAS TECHNOLOGICAL UNIVERSITY

BIOMEDICAL ENGINEERING INSTITUTE

LITHUANIA

WWW.BIOMED.KTU.LT

Biomedical Engineering Institute is part of the research scientific community of the Kaunas Technological University. The Institute has very experienced researcher personnel in technological fields. Moreover, the Institute strongly collaborates with LSMU (Lithuanian Health University) and VU (Vilnius University) in health related issues and sensors developing respectively. This strong coalition has helped to place Lithuanian researches in top rankings when speaking about sensors technologies.

In addition, the BEI has participated in important H2020 projects related to Tele-Health technologies, for instance: “PrimCare IT” or “Go-Smart”. BEI has participated in over 30 projects for the last 10 years. Its knowledge is highly valuable to the project.

The Biomedical Engineering Institute mission is to create and apply advanced decisions for health care using electronics, telecommunications and IT growing fields. Among their top research fields are: Physiological and biomechanical information sources and sensor investigation, bio signals processing methods researching and the knowledge extraction and appliance in the fields of e-Heatlh and telemedicine systems.

Role in the project:

BEI role in the project is to develop the main control Tele-Care device. This device will allow controlling sensors and other assistive technology from its main panel, as well as enabling Tele-Care communication functions. BEI experience is critical to develop the device and its software. Moreover, the wide knowledge in sensors technologies will benefit the successful interaction of the controlling device and different kind of sensors.

KTU and BEI organize annually a conference centred in Tele-Health technologies. This conference will help to disseminate HCHA results among specialized sector researchers.

Relevant publications:

Janušauskas, Artūras; Marozas, Vaidotas; Lukoševičius, Arūnas. “*Ensemble empirical mode decomposition based feature enhancement of cardio signals*. Medical Engineering & Physics. Oxford : Elsevier. ISSN 1350-4533. 2013, Vol. 35, iss. 8, p. 1059-1069.

Gargasas, Liudas; Jurkonis, Vidmantas; Bikulčienė, Liepa; Žvironienė, Aušra; Daukantas, Saulius**.** *Functional state evaluation system with distributed intellect for elderly and disabled persons.* Technologies of Computer Control. Riga : RTU. ISSN 2255-9108. 2012, Vol. 13, p. 57-62.

Relevant projects:

“Microsensors, microactuator and controllers for mechatronic systems” (Go-Smart) - 2014

“Counteracting brain drain and professional isolation of health professionals in remote primary health care through tele-consultation and tele-mentoring to strengthen social conditions in remote Baltic Sea Regions” (PrimCare IT) - 2011-2014

“Development of the Sensor System Technology to Monitor and Evaluate Human Physiological Data Employing MEMS, IT and Smart Textiles Technologies” - 2011-2013

“Strengthening social capacities for the utilisation of e-Health technologies in the framework of ageing population”- 2007-2013

b. Third parties involved in the Project

Third parties involved in the project are the Members of the Comitee of experts, which will be organized during the M1 of the HCHA project.

Besides, software developers in charge to develop the social network will be subcontracted.

B.5 Ethics and security

a. Ethics

Main ethic issue that involves the proposal is the participation of humans for the Model validation.

24 elderly will live in the project Model environments (24 AAL homes) and according to Siegel (2014) the possible limitations of AAL are an un-researched impact upon user's health due to overexposure to electronic devices. As AAL is a system consisting of different technologies distributed in the house connected through Wi-Fi, this could cause electro smog effect, having a negative impact in user's health. Nevertheless, this is a risk users usually face at their own homes, where many electrical devices and Wi-Fi nets are also available.

Another issue to take into account is the balance between privacy and protection. If not correctly dimensioned, AAL technology could over-support and over-protect elderly, invading their privacy. It is necessary to reach a balance between user needs and abilities and technology.

Managing ethic issues is an important task to be developed throughout the project. For this reason it is foreseen to tackle this matter within the development of WP2. An "Ethic and Legal issues dossier" (Deliverable 2.3) will be created to ensure the further project development fulfils also Ethic issues.

b. Security

Security issues are related to the management of personal data. The project involves personal data collection and processing, what requires to fulfil legal actions concerning the personal data.

The prototype will be designed to be enough robust and privacy compliant, according to standards and requirements.

Moreover, the personal data collected during the Model validation will be treated according to requirements fixed in the country legislation. In this case according to Spain's LPOD- Ley Orgánica 15/1999 de 13 de diciembre de Protección de Datos de Carácter Personal.

B.6 Call specific questions

N/A

4. Conclusiones

A modo de conclusiones se presentarán las contribuciones principales esperadas del proyecto HCHA, así como una revisión crítica de algunos puntos de la propuesta. También se propondrán líneas de trabajo futuro, que quedarían abiertas tras la implementación del proyecto.

El proyecto HCHA contribuye de modo esencial al sistema sanitario de los diferentes países europeos. El objetivo principal de HCHA es prestar asistencia a domicilio- a través de la tecnología AAL- a personas de la tercera edad, obteniendo de este modo beneficios tanto para la persona como para el centro sanitario que la atiende.

Por un lado, el proyecto promueve la mejora de la salud y la calidad de vida de los usuarios a través de la monitorización y de la tecnología Tele-Health. La monitorización de los pacientes mediante distintos sensores proporciona al centro sanitario y a la familia un mayor control sobre el estado de salud de los usuarios y permite prevenir enfermedades al ser estas detectadas y tratadas a tiempo. Además, tanto la monitorización del usuario como su seguimiento a través de un dispositivo Tele-Health, repercuten en una mejoría de su calidad de vida. Contar con asistencia sanitaria en su propia casa beneficia a los ancianos tanto física como emocionalmente: la tecnología les hace sentir más autónomos, seguros y conjuntamente les proporciona herramientas de comunicación esenciales para no sentirse aislados ni solos. Al mismo tiempo, poder constatar fácil y diariamente el propio estado de salud potencia una mejora de los hábitos de vida y una “alfabetización sanitaria” de los usuarios.

Por otro lado, y como resultado de una mayor monitorización de la salud de los usuarios, los centros sanitarios se verán menos congestionados gracias a la disminución de hospitalizaciones de emergencia y la reducción en la duración de las hospitalizaciones. En consecuencia se producirá un ahorro en los sistemas sanitarios de los distintos países Europeos. Estos beneficios serán patentes desde el primer momento, sin embargo el potencial de su impacto positivo se irá manifestando a medida que se realice la explotación del proyecto. Por ello, la tecnología desarrollada en el proyecto HCHA sienta las bases para el desarrollo de sistemas sanitarios más económicos y sostenibles.

El proyecto tiene como público estratégico aquellas personas mayores que residen fuera de su lugar de origen, puesto que son más vulnerables y su preocupación por la salud es más

acentuada. Ahora bien, la tecnología desarrollada durante el proyecto es adecuada para cualquier perfil de usuario.

Por lo que refiere a los puntos críticos de la propuesta, cabe destacar la dificultad en mantener el correcto enfoque del trabajo. A medida que se ha desarrollado el proyecto y la investigación se han ido abriendo distintas posibilidades y líneas de trabajo. En este sentido ha sido importante evitar la dispersión que podría haber supuesto un peligro para la integridad del proyecto, buscando abarcar muchos temas pero sin profundizar ni definir una idea clara de ninguno de ellos. Con respecto a ello, se ha optado por no introducir en el proyecto conceptos como el turismo asistencial o la repoblación de viviendas deshabitadas, que podrían haber aportado un valor añadido a la propuesta, pero se han descartado para evitar el riesgo de la dispersión.

También, es preciso destacar que la realización del proyecto ha permitido entrar en contacto con empresas tecnológicas que investigan soluciones para el sector sanitario. Escuchar de primera mano sus opiniones y su visión de futuro ha sido esencial para plantear adecuadamente el alcance del proyecto. Por un lado, recalcan la importancia de la tecnología, pero también ponen de manifiesto el peso que tienen en este tipo de proyectos los aspectos sociales y organizativos.

Tras la implantación del proyecto, las líneas de trabajo e investigación iniciadas abren un gran abanico de posibilidades para futuras investigaciones y proyectos. Un foco importante de investigación serán las aplicaciones para el dispositivo creado en el proyecto. Entre ellas una aplicación que facilite la rehabilitación desde casa, u otra de ejercicios cognitivos para personas mayores. Con el tiempo también será posible desarrollar un software más potente capaz de analizar patrones en los datos y “predecir” enfermedades o detectar síntomas. Otro punto interesante a tratar sería la creación de historiales clínicos on-line, accesibles para los diferentes centros sanitarios al que el usuario acude.

Por último, desde el punto de vista de la investigación pienso que sería muy interesante realizar un estudio pormenorizado de los costes y del impacto económico de estos sistemas. En Europa se han llevado a cabo pocos estudios de este tipo y los resultados no siempre coinciden, dependen mucho de las variables.

El campo de las TIC aplicadas al cuidado asistencial presenta muchas posibilidades a la investigación, el desarrollo y la innovación.

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6. Anexos

Annex 1- Call for proposals PHC-25-2015

PHC 25 – 2015: Advanced ICT systems and services for Integrated Care

Specific challenge: Research on new models of care organisation demonstrates that advanced ICT systems and services may have the potential to respond to, amongst others, the increasing burden of chronic disease and the complexity of co-morbidities and in doing so contribute to the sustainability of health and care systems.

One challenge in re-designing health and care systems is to develop integrated care models that are more closely oriented to the needs of patients and older persons: multidisciplinary, well-coordinated, anchored in community and home care settings, and shifting from a reactive approach to proactive and patient-centred care.

Scope: Proposals should go beyond the current state of art in tele-health and tele-care systems by developing new approaches for integrated care supported by ICT systems and services. Proposals should address barriers from technological, social and organisational points of view in the following domains:

- Development of robust, privacy compliant, accurate and cost-effective systems that facilitate monitoring of patient status, patient activity and compliance with therapy;
- Fusion, analysis and interpretation of patient and care provider data, to improve decision making among formal and informal care givers and patients;
- Multi-channel and multi-actor interaction and exchange of knowledge in integrated care settings, across digital collaborative platforms;
- Development of patient-oriented services to support patient empowerment, self-care, adherence to care plans and treatment at the point of need;
- Development of new patient pathways, new training programmes for the care workforce and new organisational models to improve the coordination of care services as well as the skills and collaboration of health professionals, social carers and informal care givers;
- Personalisation of care management programmes to specific characteristics of patients' profiles, through analysis of multimodal data, risk stratification algorithms for

chronic diseases and multi-morbidity conditions, predictive algorithms of patient's status, and personalisation tools for patients and;

- The creation of new knowledge for the management of co-morbidities and for addressing poly-pharmacy.

The design process of such ICT systems and services should entail participation of a wide range of users, developers and stakeholders, including medical doctors, nurses, social workers, patients as well as programmers and interaction designers. Gender and ethical issues should be paid due attention. Validation should provide proof-of-concept with both qualitative parameters and quantitative success measures.

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 and 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Reduced admissions and days spent in care institutions, and improvements in the daily activities and quality of life of older persons through effective use of ICT and better coordination of care processes.
- Strengthened evidence base on health outcomes, quality of life and care efficiency gains from the use of ICT in integrated care.
- Improved cooperation and secure information exchange among the actors involved in health, social and informal care services.
- Improved interaction between patients and their carers, and more active participation of patients and their relatives or other informal care givers in care processes.
- Improved usability and adaptability of ICT systems for integrated care, taking account of the complex relationship between digital technologies and their social and human context of application.
- Reinforced medical knowledge with respect to management of co-morbidities.
- Strengthened European industrial position in ICT products and services by measurable indicators such as new business areas, start-ups and protected intellectual property

Type of action: Research and innovation actions

Link to source:
http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2269-phc-25-2015.html

Annex 2- Eurostat statistics

Find below some Eurostat statistics which were used in this work.

Indicator: Life expectancy at birth, by sex

Description: The mean number of years that a new-born child can expect to live if subjected throughout his life to the current mortality conditions (age specific probabilities of dying).

For men For women

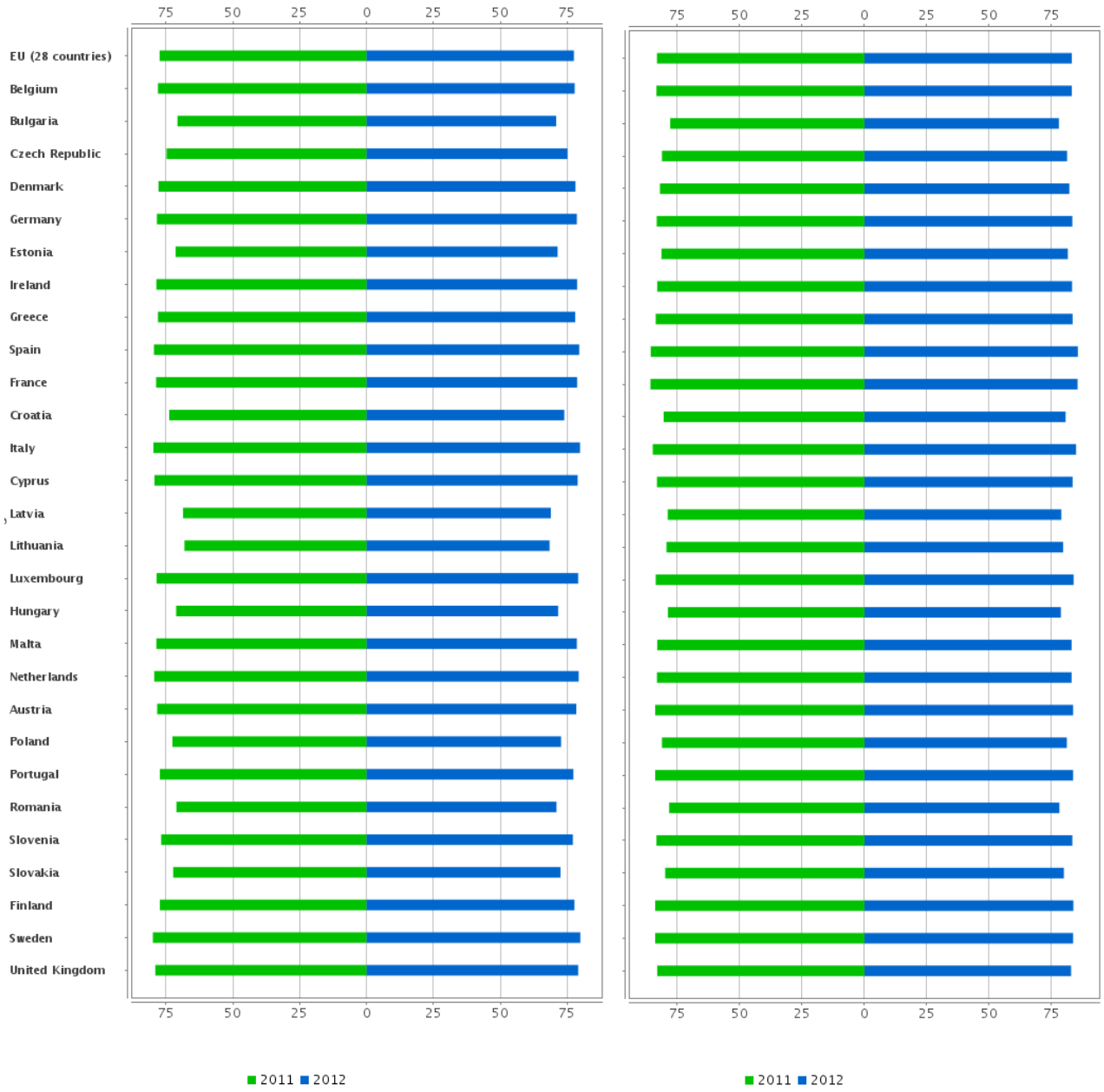

Fig. 21- Life espectancy diagrams. Source Eurostat

Indicator: Projected old-age dependency ratio %

Description: This indicator is defined as the projected number of persons aged 65 and over expressed as a percentage of the projected number of persons aged between 15 and 64.

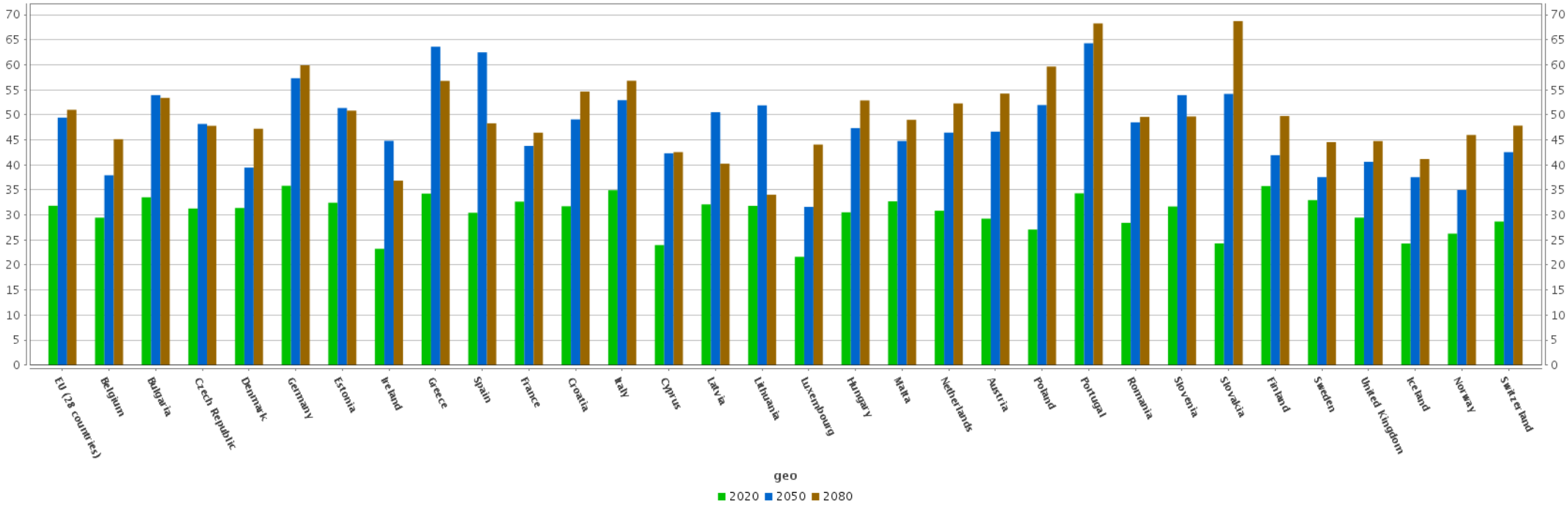

Fig. 22- Projected old-age dependency ratio diagram. Source: Eurostat

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