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inCASA

Integrated Network for Completely Assisted Senior citizen's Autonomy

D2.5 Annex - National Pilot Blueprint Package Update

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Executive summary

This deliverable collects and summarizes the “National Pilot Blueprint” for each of the five pilot sites of the inCASA project. The main objective of the present deliverable is to give a schematic view of the pilot deployment process to the members of the Consortium, in particular to the pilot representatives. This would give them a prospect of how each pilot will face the challenge of the inCASA project, presenting a brief image of “who, what, how and when” each pilot partner will implement the inCASA solution.

A blueprint is a technical drawing with white lines printed on a blue background, usually of an architectural or engineering design. This concept has been applied to this deliverable which presents the deployment plans for each of the inCASA pilot sites, illustrating how ATC, INSERM, KGHNI, CHC and FHC pilot sites will implement locally the inCASA solution.

This deliverable doesn’t aim at describing the objectives, methodology and outcomes of the project or single pilots, because this kind of information is already provided by other WP2 documents (e.g. D2.1 and D2.2). This deliverable should be used as a guideline to pilot implementation, often referring to other descriptive documentation.

Starting from a common framework, each pilot site directly provided their contribution to the document, following a proposed scheme for images, giving a common view, and then introducing in a free way the information useful to clarify the specific topic.

The document highlights that INSERM, KGHNI, ATC and CHC have planned the introduction of a pre-pilot phase to initiate a progressive implementation of the inCASA services. The pilots will able to have two different architectures for the pre-pilot and pilot phase, due to technical constraints and the need to progressively introduce inCASA components.

For each of the pilot sites, the Blueprint has been divided into different chapters, describing first who leads and participates in the pilots, including names and roles. Then, showing what the pilots are going to do (Use Cases) and how this has been divided into different deployment phases, the document matches this to the inCASA project’s iterative approach. A wide use of images and graphics has been introduced to show the local technological infrastructure hosting the pre-pilots and pilots. Schedules have been introduced showing how each pilot will be developed, including dates of the main steps towards pilot deployment.

Furthermore, following the recommendation by EC reviewers after the third review meeting (Brussels, May 2012), the pilots have added a specific paragraph on the Social care and Healthcare integration which explains how they are going to achieve the requested service integration from a professional and process point of view.

In conclusion, the national Blueprints show that the common technological framework is maintained, even if the inCASA project is performing different deployments of the solution. The model for service delivery and the involvement of users (elderly people, relatives, caregivers and professionals) is commonly shared among different pilots. The basic layer of Use Cases to be applied is strongly promoting these commonalities, trying to support data sharing, comparisons and exchange of information across the pilot sites.

1 Introduction

inCASA aims at developing a system that will support the aging population and facilitate them to stay well at their own homes. The inCASA technical platform will thus allow a flexible combination of components and services, for meeting the end-user's needs (independent living sensors, home automation, emergency alert systems, tele-and remote monitoring as well as home security and energy management), with a "check/act" approach. Five pilot sites in five different countries will implement the inCASA technical platform. Each pilot has different types of users, objectives and service provision models, thus allowing the project to carry out a thorough testing and evaluation of the system.

This deliverable will present the blueprint of the five pilot sites at the actual stage of the project (beginning Iteration 3). The name of this deliverable comes from the word "blueprint". A **blueprint** is a type of paper-based reproduction, a photographic print of a technical drawing with white lines printed on a blue background, or a similarly produced print with blue lines on a white background, usually of an architectural or engineering design.

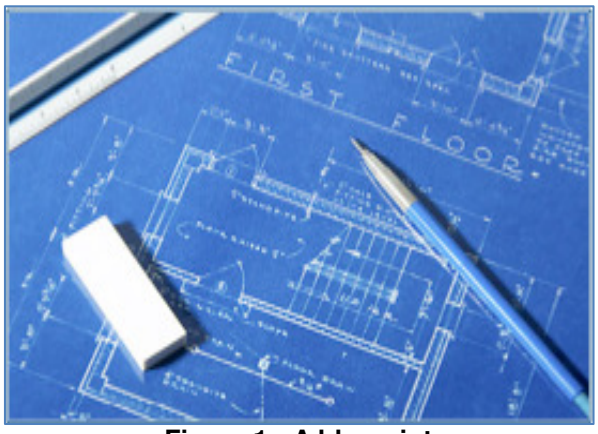

Figure 1 - A blueprint

More generally, the term "blueprint" has come to be used to refer to any detailed plan of action or a guide to doing something. The more general meaning of the blueprint term fits this deliverable, which will show schematically the deployment plan of each pilot site.

1.1 Purpose and content of this deliverable

Purpose of this deliverable is to present the Pilot National Blueprints for the inCASA project, providing a consolidated plan of how each pilot site will be developed. In order to achieve this goal, the present deliverable D2.5 aims at:

- summarizing, for each pilot site, the number of users to be involved;
- presenting the pilot structure, identifying the involved roles and points of reference at each level of local organisation;
- describing the local technological architecture of the inCASA project deployment (components and services to be implemented);
- presenting the local work plan for the pre-pilot and pilot phase;
- describing how the pilot will implement the Social care and Healthcare service integration;
- introducing a list of selected devices with expected quantities for the pre-pilot and for the pilot phase.

1.2 Outline of this deliverable

Chapter Two presents the inCASA overall pilot deployment phases, the pilot structure and organization who will participate during the pre-pilot and pilot phases.

Chapters Three to Seven present the national blueprints for the five pilot sites, each dealing with the following topics:

1. Pilot deployment strategy, showing the distribution of the use cases implementation on the different pilot phases;
2. Pilot Architecture, illustrating, also graphically, the technological architecture of the pre-pilot and pilot;
3. Pilot Work plan, presenting steps and procedures for implementation of the pre-pilot and pilot;
4. Pilot Social care and Healthcare integration, explaining, also graphically, who are the stakeholders involved and the process that every pilot will have to implement, to achieve the service's integration;
5. Pilot Schedule, presenting the timeline followed by pilots.

Chapter Eight presents the conclusions emerging from the national Blueprints.

Finally, Appendix A presents the list of the specific devices that will be used in the inCASA project.

2 The Pilot deployment phases

The inCASA project has been divided into three deployment phases corresponding to an iterative approach of the requirements elicitation and technical activities. Particularly, WP2 and WP3 deliverables provide input to these three phases. The methodological phases identified on the DoW will be respected and explained in the deliverable D6.1 Pilots aims, samples and methodologies.

The approach is in agreement with what we declare in the new version of the DoW 3.2 (see Part B of the inCASA DoW 3.2 – page 31):

"The pilot will be divided into steps, where completion of each step is a prerequisite to the next phase, as follows:

- ***Phase 1:** define target users / describe profiles for frail people and relevant parameters to be collected / define data model / define an assessment plan / recruit small patient group (for range of age, disease groups, health relevant parameters) and to establish a pre-pilot with a limited number of users finalizing the installation process, device testing / intermediate interviews with the testing group / check requirements;*
- ***Phase 2:** recruit large testing group with the overall number of users / provide and install hardware / intermediate interviews with the entire testing group / collect parametric data;*
- ***Phase 3:** data collection and comparison / results analysis / architecture refinement action (software settings, service settings) considering feedback coming from EC reviewers, after the third Review Meeting, focusing on the Healthcare/social care service integration and additional functionalities depending on pilot needs to validate the product and the services".*

2.1 Phase One (Pre-pilot)

Phase One marks the pre-pilot phase of the inCASA project implementation and will be used to test the technologies and services involved.

During the pre-pilot phase the inCASA solution and selected telecare and/or telehealth services in a small sample of end-users' homes will be installed. The purpose here is to test the inCASA service delivery and the architecture in a real environment and also to evaluate the effectiveness of the integration of technologies. Therefore, it should be considered that since the pre-pilot phase deploys a reduced set of devices and a testing architecture, the final architecture of the inCASA pilots may be different (as a result of the testing and evaluation of the pre-pilot).

Originally, the pre-pilot phase would only include two pilots, namely ATC and CHC. However, at the inCASA project General Assembly meeting held in Rome, it was decided to also include KGHNI and INSERM pilot sites in the pre-pilot phase. This should increase the speed of the project implementation phase and thereby partially recover the initial project delay.

The next figure shows the pre-pilot Use Cases selection and the related pre-pilot sites implementation. The KGHNI and INSERM pilots decided to start pre-piloting the inCASA solution with the support of NTUA and TID.

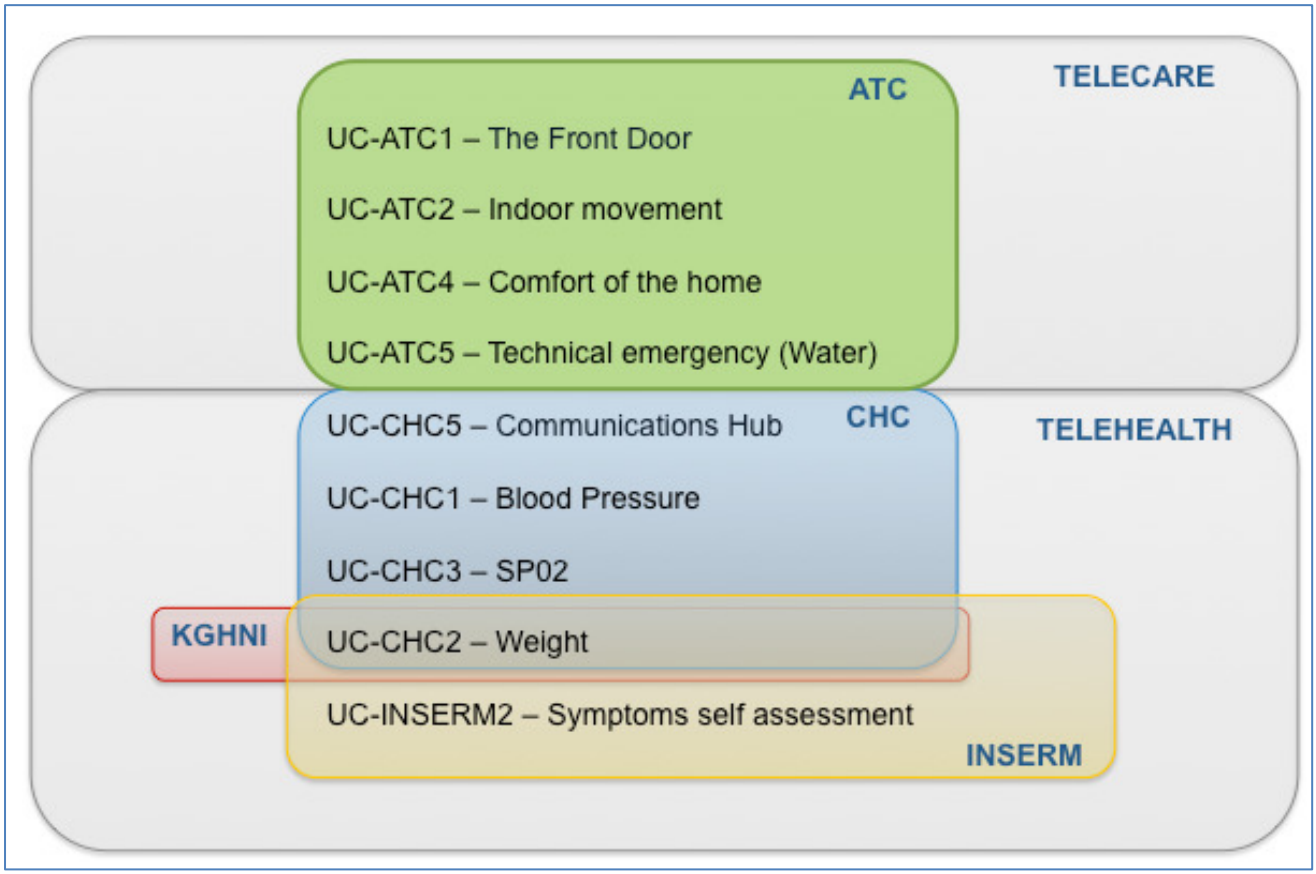

Figure 2 - Pre-pilot Use Cases

2.2 Phase Two (Pilot)

In this phase each pilot will focus on his specific domain (telecare/telehealth), but services and devices will be implemented on an increasing number of users to progressively reach the final number. This approach is needed to correctly set-up the service to reach all the users, reducing the amount of organisational problems

The pilot site (FHC) which won't run a pre-pilot will start from here; the testing and experiences from the pre-pilots (especially regarding functionality and deployment) will have been fed into the preparation of this phase so that also FHC will indirectly benefit from the pre-pilot phase.

The details of this last phase will be defined during the course of Phase Two and documented in "D2.4 - Requirements consolidation and prioritisation iteration 2" and are part of the "Expanded Use Cases" introduced in "D2.1 – Preliminary requirements investigation".

2.3 Phase Three (Pilot Escalation)

The third (and final) phase of the inCASA project implement an extended pilot structure on the final period of the project in order to improve the number of delivered services, with special focus on Social care/Healthcare Integration's Use Cases.

The details of this last phase will be defined in the course of Phase Two and documented in "D2.6 - Requirements consolidation and prioritisation iteration 3" and may include part of the "Expanded Use Cases" introduced in the "D2.1 – Preliminary requirements investigation".

2.4 The number of users

The next table shows the final number of patients to be considered for the pre-pilot and pilot phase:

Partner	Country	Number of Users	
ATC	Italy	**Pre-pilot:**	3
		Pilot:	20
CHC	United Kingdom	**Pre-pilot:**	3
		Pilot:	25
INSERM	France	**Pre-pilot:**	5
		Pilot:	30
KGHNI	Greece	**Pre-pilot:**	2
		Pilot:	25
FHC	Spain	**Pilot:** 30 (6 groups of 5 patients)	

Table 1 - Overall number of pilot users

2.5 The Pilot Structure

Each pilot site has an internal structure following a common framework:

National Coordinator/Project Leader: The National Coordinator is responsible for the pilot site. S/he identifies the organisations and users (both elderly people and the social and healthcare professionals) who will participate in the pilot implementation. He provides guidance to the pilot implementation and provides feedback on the results. The pilot site coordinator is appointed to lead the process and train other staff in carrying out the pilot.

Lead person for inCASA pilot components: The lead person for a single inCASA pilot component (i.e. “Ethical commission” or “Technical Management”). S/he needs to take responsibility for assessing the level of compliance with the single component and outcomes/results.

Healthcare/Social Care Structure Management: This is the chief executive, governing body or one of the senior managers of the locally involved social and healthcare organisations. The Healthcare/Social Care Structure Management ensures the implementation of the action plan and provides the necessary resources to undertake the task locally.

Multidisciplinary operations group: Represents the staff at all levels. It could involve the following staff:

- Case/Care Manager (ex: one member from social services or a social-skilled paramedic who may also be responsible to recruit and manage elderly users)
- Caregivers (ex: a nurse who may also be responsible for audit)
- Professionals (ex: doctor who will help also to profile user behaviour)
- Eventually, a member from other clinical/non-clinical services involved in pilot (Personal/Value Added Services).

3 ATC Pilot Blueprint

The ATC pilot focuses primarily on social care and telecare services. However, we also aim to integrate Telehealth scenarios involving General Practitioners. It is organised as shown in the diagram below:

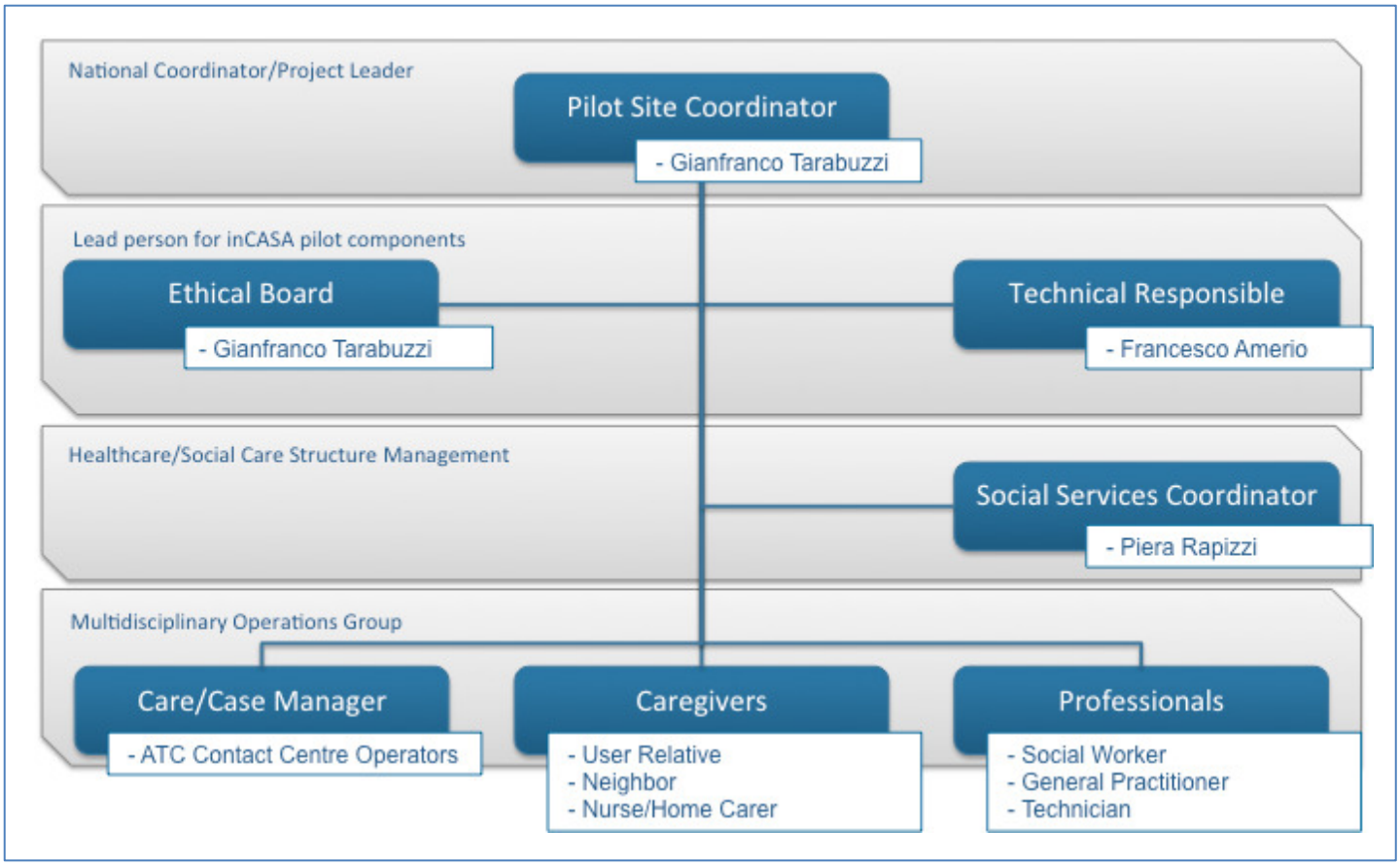

Figure 3 - ATC Pilot Organisation

National Coordinator/Project Leader
Pilot Site Coordinator is Gianfranco Tarabuzzi.

Lead person for the inCASA pilot components
The ATC pilot will have a strong component related to the technical services, made to support day by day user's life also monitoring the "technical" status of the house and providing support if needed. Therefore a Technical Responsible is necessary to coordinate the technician's work. Francesco Amerio will cover this role.

Healthcare/Social care Structure Management
Due to the social nature of the pilot, the Social Care Structure Management will be held by Piera Rapizzi, who is the Director of the Social Services of the central area of Turin where the ATC pilot's users live.

Multidisciplinary operations group
Case management will be managed by the ATC Contact Centre Operators (ATC Contact Centre will be the Service Provider for the inCASA services for the ATC pilot). The ATC pilot will involve the following professionals: i) social workers for social intervention and actions as outcome of the habits monitoring activities; ii) technicians who will respond to technical alerts (technical

issues/problems) during the extension of the pilot, and iii) General Practitioners who will be involved during the Phase Three (Pilot Extension) of the ATC pilot to perform analysis of the habits monitoring data from a clinical point of view, trying to compare habits data with clinical information about the users in order to plan right decisions and actions. The involve will be coordinated with the national organizations of the GPs (FIMMG).

3.1 ATC Pilot deployment strategy

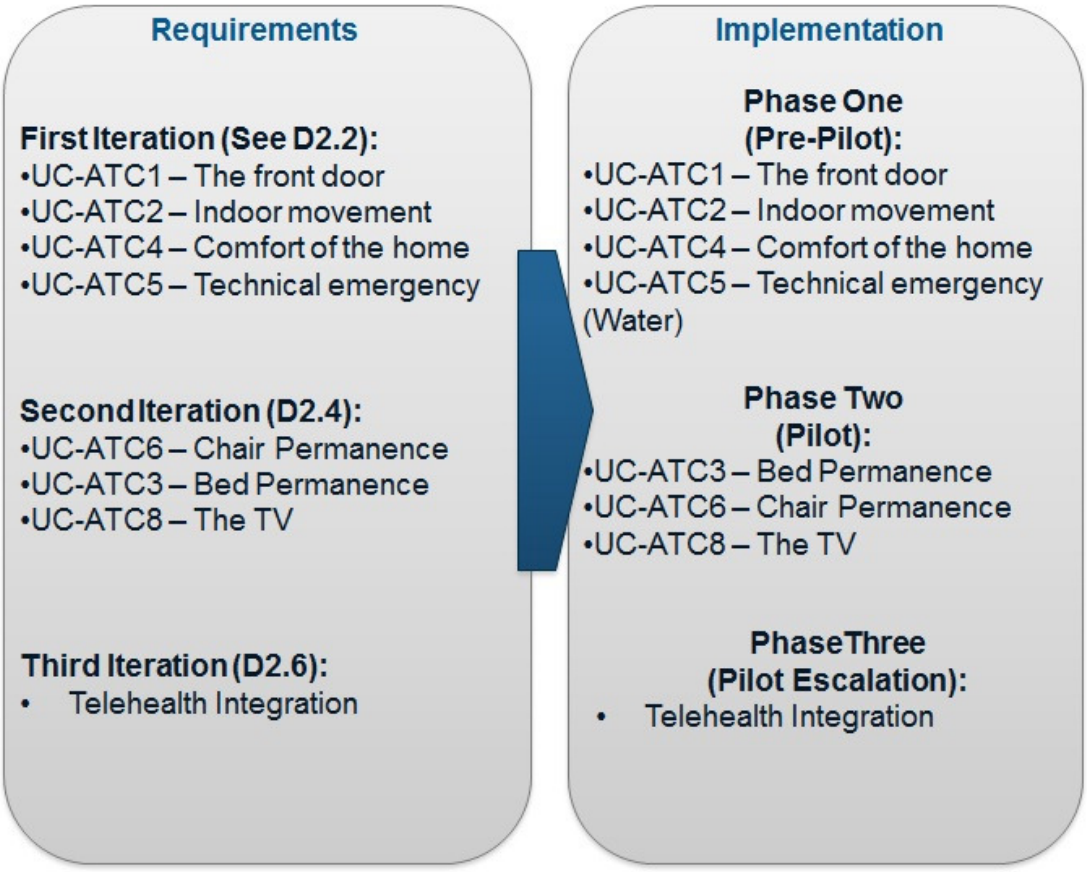

Figure 4 - ATC deployment strategy

Phase One and Phase Two have implemented most of the ATC use cases defined in D2.2 and D3.1. The choice of use cases is to a large extent related to technical constraints and the availability of the necessary sensors.

ATC was not able to start the pre-pilot phase before October 2011 due to the delay of SIG in supplying the Activity Hubs. SIG faced numerous problems in the integration of ZigBee home automation sensors. Not all of the selected sensors could be parameterized according to the standard protocol but required the implementation of sensor-specific handling. During the pre-pilot phase the AHs weren't working properly and required a lot of manual configuration.
In February 2012 SIG released a new AH firmware's version and delivered 2 AHs for testing and 22 AHs to install in users' home.
REPLY, as coordinator, asked SIG a recovery plan by February 2012, as the Hub malfunctioning affected the overall ATC pilot scheduling. SIG prepared a detailed document how to overcome the issues. They met the deadline reported in SIG recovery plan (with delay) about delivery of devices but their AH still didn't provide the required functionality. To speed up ATC pilot, REPLY studied a contingency plan to solve this issue and a backup solution built, using commercial products has

been installed in some apartments. This solution works well and from pilot users' homes, where installed, all data is received.
So it was necessary to pick out different devices, but useful for the ATC pilot architecture, that were purchased from external supplies supplier in the month of March 2012.

In Phase Three, it is envisioned to introduce one or more telehealth use cases which will involve at least one clinician (General Practitioner).

3.2 Architecture

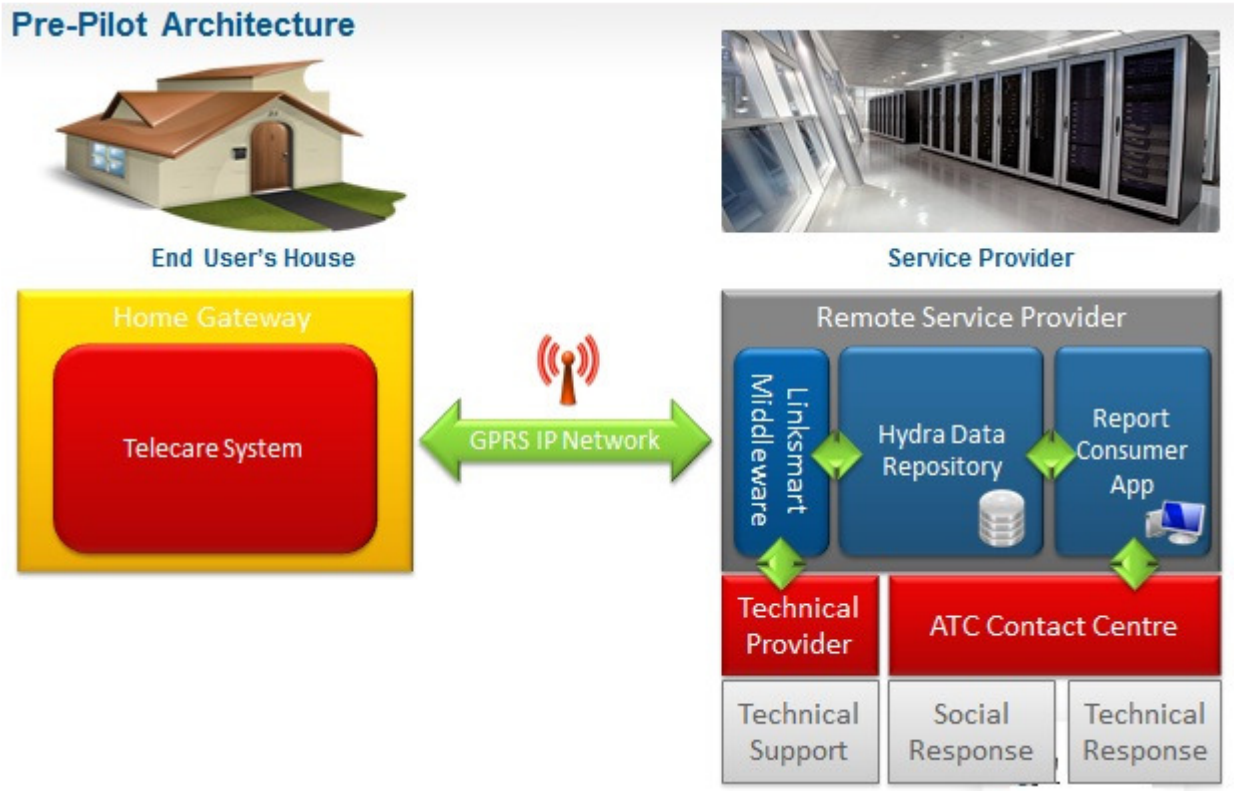

Figure 5 - ATC Pre-pilot architecture

In the pre-pilot phase the ATC pilot will have a specific architecture using the LinkSmart Middleware as the middleware layer and as a first repository for data collected by the sensors. This is because the core of the telecare component, the Smart Personal Platform, has to be correctly set to manage the incoming data and therefore it will first be tested in a lab with real data coming from the sensors before being implemented on the improved architecture for the pilot phase.

A specific Report Consumer App will be used to extract and analyse telecare data to set correctly the habits profiles for the pilot phase. A first level of social response actions will be introduced to establish relations between the project and the local social services (the users are already in close contact with social services)[1].

[1] Note: **Social Response** is provided by the Contact Centre (by calling the user) and by the Social Services (by planning intervention and visit the user); **Technical Support** concerns the status of devices and sensors (i.e. the sensor is broken, therefore the Technical Support team goes to the user's house to repair/change the sensor); **Technical Response** concerns the technical alerts

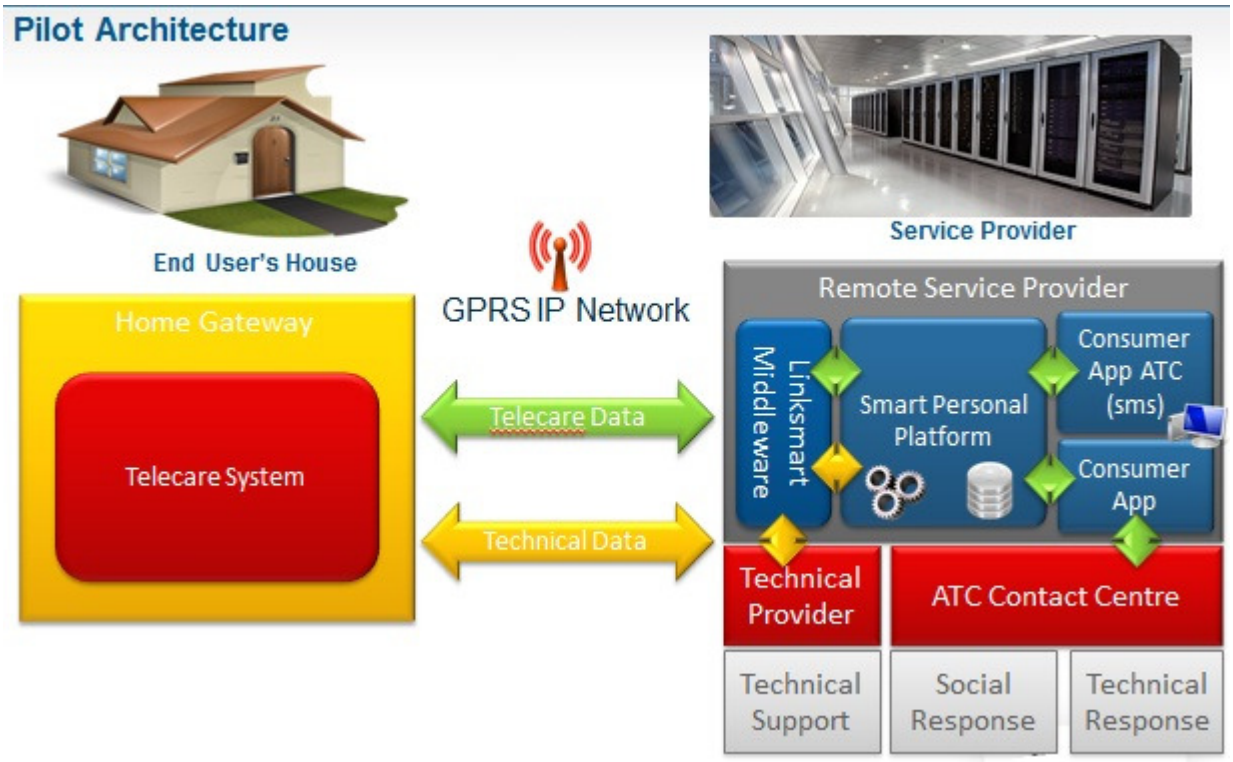

Figure 6 - ATC pilot architecture

The pilot phase for the ATC pilot will improve the inCASA architecture with the introduction of the Smart Personal Platform and different channels for monitoring of telecare data and for monitoring technical data (like battery status and sensors' failures), using the Linksmart Middleware to coordinate information. Data will be sent to the Smart Personal Platform to be analysed and stored.

Alerts and other messages will be sent from the SPP to the various consumer applications serving the ATC Contact Centre (service provider). In particular, an already existing Consumer App to send SMS to users, relatives, caregivers and operators will be integrated on the ATC pilot architecture. This is because the actual process made to engage operators is already using this application and therefore the inclusion of inCASA messages to this on-going process will not affect the usual activity of ATC operators. This will increase effectiveness and acceptance of the new services.

In parallel, a consumer application to display, manage and extract inCASA data will be introduced. Social Response, Technical Response and Technical Support actions[1] will be fully introduced to support the inCASA services delivery.

The inCASA system architecture for ATC will be hosted on a local Cloud Internet Data Centre. Data Centre basic specifications and SLA are:

- Global System Availability: 99,9%
- High security and mass storage standards (HW/SW)
- 24/7 System and Operations management
- Dedicated help desk with monitoring infrastructure and problem solving board with Customer Care Service available 24/7.

coming from the Telecare platform (i.e. in response to flood alert the technical response team goes to the user's house to repair the plumbing system).

3.3 Work plan

Pre-pilot/Pilot Users' Involvement
During the first step of implementation, the users are contacted by phone or by direct visit by the Social Services of the Municipality of Turin. A close and direct contact is the best choice instead of sending a letter. This because the specific target of the ATC pilot are elderly people (over 65 year-old) living alone, self-sufficient and not necessarily suffering of a specific disease. Usually, this group of users have unexpressed needs and the best choice to achieve their acceptance of any kind of care is to have personal contact with them, i.e. to have a trusted approach. During this first contact the social services present the project, the benefits and the related possible issues to try to have a verbal acceptance. On the same day the ATC pilot's team (technical provider with social services support) will demonstrate the service to the user, showing a working demo of the service.

It may be that the informed consent form could be signed on this occasion, however, in most cases another appointment will be made to obtain the signed informed consent.

Pre-pilot/Pilot Users' Home inspection
The technical provider (who is responsible for supply, installation and management of the devices and sensors) will evaluate the physical environment where the devices and services are going to be installed, and identify any possible issue and constraint. A representative from social services will be present to support the technical inspection and to answer any questions the user might have. This way the user will become more involved which should also help to ensure user acceptance as understanding and trusting the service are prerequisites for acceptance. Finally, at the end of the meeting, the team will collect the signed informed consent (if not already collected).

Follow-up pre-installation and Interviews with Users
During this follow-up pre-installation, the technician and social services representative will visit the user's houses once more to perform a second assessment of the environment (maybe to do specific tests) and to interview the user in order to build personal profile, the identification of problems and needs.

Training of Multidisciplinary Operations Group
During this phase the Multidisciplinary Operations Group is trained on management of the pilot and use of the interfaces. Contact Centre operators are trained in order to be able to analyse incoming data, support the users of the inCASA project and report issues. The Social Workers are trained to analyse telecare data to be able to plan for interventions based on the Telecare information. On a next phase, General Practitioners will be trained to evaluate reports to compare Telecare data with clinical information about the users.

Installation and Tests
The technician installs the specific devices in the users' house and activates the specific services. A testing session of the real installation is performed. The technicians will demonstrate the system to the user and explain how the service will work.

Pre-pilot/Pilot is running
Pre-pilot/pilot services are running.

1st to 3rd Interim pre-pilot/pilot follow-up
These cyclical steps are composed by three different but linked activities:

- **User's follow-up:** these activities would be performed directly in the user's house or on the ATC/Municipality of Turin facilities, depending on the user's profile. (Some users are more comfortable if they meet other people in their house, whereas some prefer to be in a public area);

- **Professionals' follow-up:** interviews, focus groups and/or questionnaires will be used to follow-up on involved professional users/stakeholders' experience;
- **Follow-up analysis and outcomes:** the information collected in the two activities above will be analysed and the results will be used to plan for improvements of the pilot, to deal with issues/problems (including ethical issues), to perform specific actions.

Aforementioned three activities will be all repeated several times during pre-pilot and pilot phase.

Pre-pilot end → Pilot Activities Start
This is an important phase during which the ATC pilot will introduce the final system architecture and will start running all the defined services and use cases with a progressive implementation.

3.4 Social Care and Healthcare Integration

The aim of the socio/health integration scenario in the ATC pilot will be to demonstrate the capability of professional works to change the behavior attitudes towards patients, in order to include other organizations into the process of continuity of care.
This will impact the way the "health organizations" interact with the "social organizations" and it will be enables by the technological tools provided within the project: the contact center, that will support the communication flow among different professionals, and the monitoring system, that will profile user habits according to the data coming from the environment monitoring and the human monitoring in order to intercept variations on the clinical conditions of the elderly people by comparing movement data and weight variations. The Italian pilot will therefore introduce some healthcare devices:

- Weight scale
- Pulseoxymeter
- Blood pressure monitor

This would enable the clinician to evaluate some clinical parameters compared with the telecare data (temperature, moisture, movement, activity).

So, healthcare and social care professionals (or Case managers joining both roles) will be able to make the right decision and to plan interventions to prevent social and healthcare risks for the single user (Case Management). The upgrades introduced in the ATC pilot will try to perform extended profiles correlating physiological parameters to daily life habits.

In this way, the ATC pilot seeks to incorporate the concepts, values and standards of the inCASA solution into the organizational structure and culture of the local environment, improving the quality of life for frail elderly people and the quality of work of socio-medical professionals, supporting healthy environments and actively cooperating with the social and healthcare community. It will provide local authorities with an opportunity to contribute to the public health agenda, incorporating health promotion as a daily work activity.

For the Italian environment these activities can be an essential part of social and healthcare work with the increasing prevalence of lifestyle-related and chronic diseases. Profile driven therapeutic education (single case focused) and strategies enabling patients to take an active role in chronic disease-management or motivational counseling can support better healthcare outcomes. The involvement of social services will also contribute to the maintenance and improvement of elderly people's social relations as they will have many opportunities to meet with other elderly.

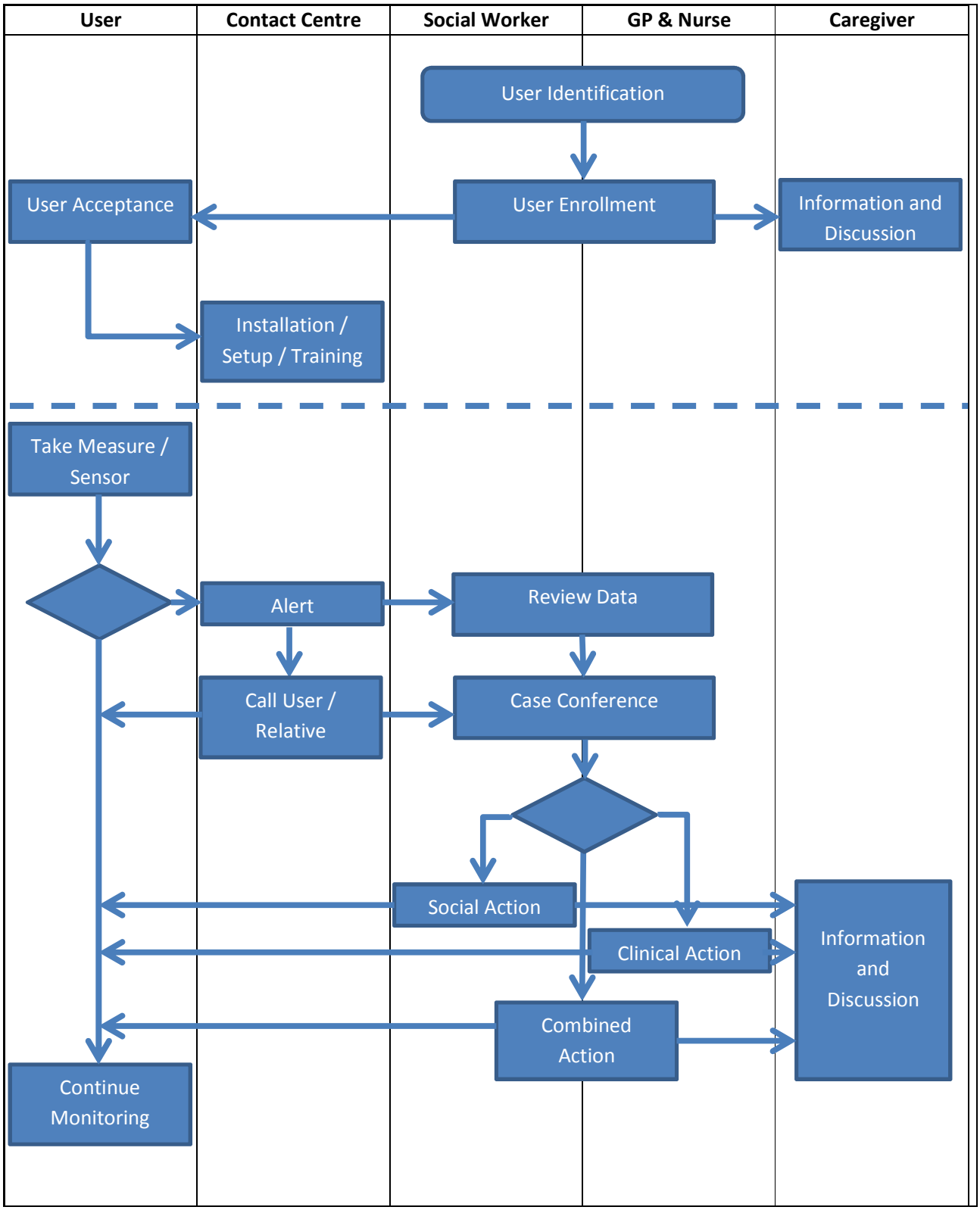

Figure 7 - ATC pilot Integrated Workflow

3.5 Pilot Schedule

This Schedule shows the milestones leading to the deployment of the ATC pre-pilot and pilot.

Date	Action
March 2011	Pre-pilot Users' Home Inspection
July 2011	Follow-up pre-installation and Interviews with Users
July - September 2011	Pre-pilot Training of Multidisciplinary Operations Group
October 2011	Pre-pilot is running
27th October 2011	1st Pre-pilot Installation
3rd November 2011	2nd Pre-pilot Installation
6th December 2011	3rd Pre-pilot Installation
March 2012	Pilot is running
8th – 9th March 2012	5 Pilot installations
26th – 17th March 2012	5 Pilot installations
29th – 30th March 2012	3 Pilot installations
28th – 29th June 2012	4 Pilot installations
July/September 2012	Involvement of General Practitioners and local authorities to identify Healthcare/Social care integrated scenarios
October 2012	Iteration 3 is running
March 2013	Conclusion of Pilot monitoring and final evaluation beginning
April-June 2013	Conclusion of evaluation and of Pilot activities overall

Table 2 – ATC Pilot Schedule

4 INSERM Pilot Blueprint

INSERM pilot is a clinical oriented pilot focusing on telehealth services. However, we aim to also integrate Telecare scenarios involving social stakeholders. The INSERM pilot is organised as shown in the diagram below:

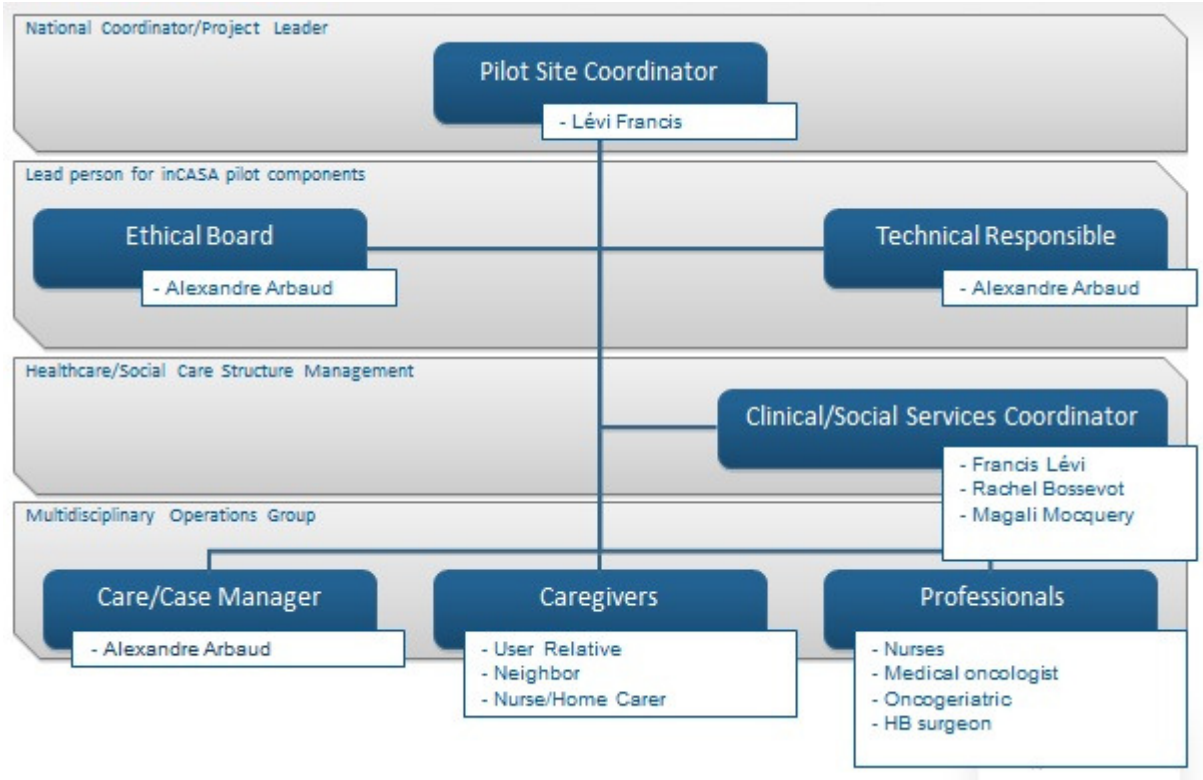

Figure 8 - INSERM Pilot Organisation

National Coordinator/Project Leader
Pilot site coordinator is Francis Levi.

Lead person for the inCASA pilot components
Alexandre Arbaud is the lead person for the inCASA components and will follow the inCASA service technical status day by day and provide support if needed.

Healthcare/Social care Structure Management
Due to the medical-social nature of the pilot, the Healthcare/Social care structure management will be held by Dr Francis Lévi, the nurses of the chronotherapy unit and the social services of the Paul Brousse hospital if needed.

Multidisciplinary operations group
Multidisciplinary operations group will be managed by the INSERM U776 and chronotherapy unit of the Paul Brousse hospital. The INSERM pilot will involve doctors, nurses, technicians, computer engineers, and social workers who will be involved with the patients. Technicians will respond to technical alerts and nurses will respond to medical alerts. Severe medical alerts will be dispatched to both nurses and physicians who will respond to them.

4.1 INSERM Pilot deployment strategy

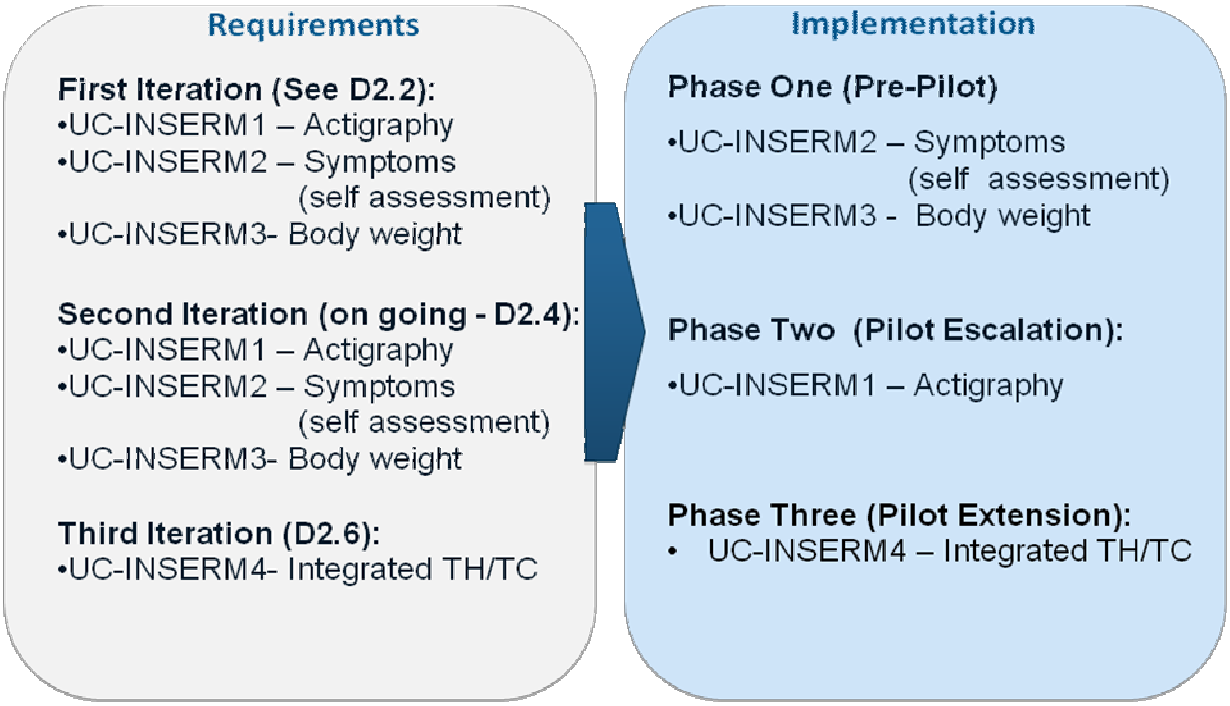

Figure 9 - INSERM deployment strategy

The INSERM pilot will implement the three phases by introducing, in phase one, some of the use cases described in D2.2 Requirements consolidation and prioritisation iteration 1.

The phase one was planned to start on November 2011 by introducing symptom self-assessment and body weight monitoring through the SARA's platform. INSERM was not able to start the pre-pilot phase before November 2011 because of the delays in the implementation of the questionnaires functionality. Actually, the INSERM pilot is by far the most different of the pilots and they required very specific functionalities to be able to start. It is important also the nuance that, unlike the other pilots which take a more gradual approach in terms of technology adoption, they didn't find acceptable to start their pilot bit by bit. As well as this, it was not completely clear from the very beginning which would be the details of adopting the Actigraph or the Questionnaires. For example, the Actigraph integration led technical partners to months of discussions with Ambulatory monitoring and a meeting in Barcelona to decide the final solution, which at some extent, was still insufficient for the INSERM because the needed some correlation scores too. For the questionnaires, we first implemented the questionnaires in the patient side (that was a MUST) but then, they wanted to enhance the representation in the medical portal.

In phase two, March 2012, the use cases have been extended with the introduction of the infrared actigraph and therefore the set of monitoring devices will be completed.

In phase three, INSERM will integrate healthcare and social care services as described in following sections. Fully integrated inCASA services will apply for patients recruited from September 2012 until pilot conclusion.

4.2 Architecture

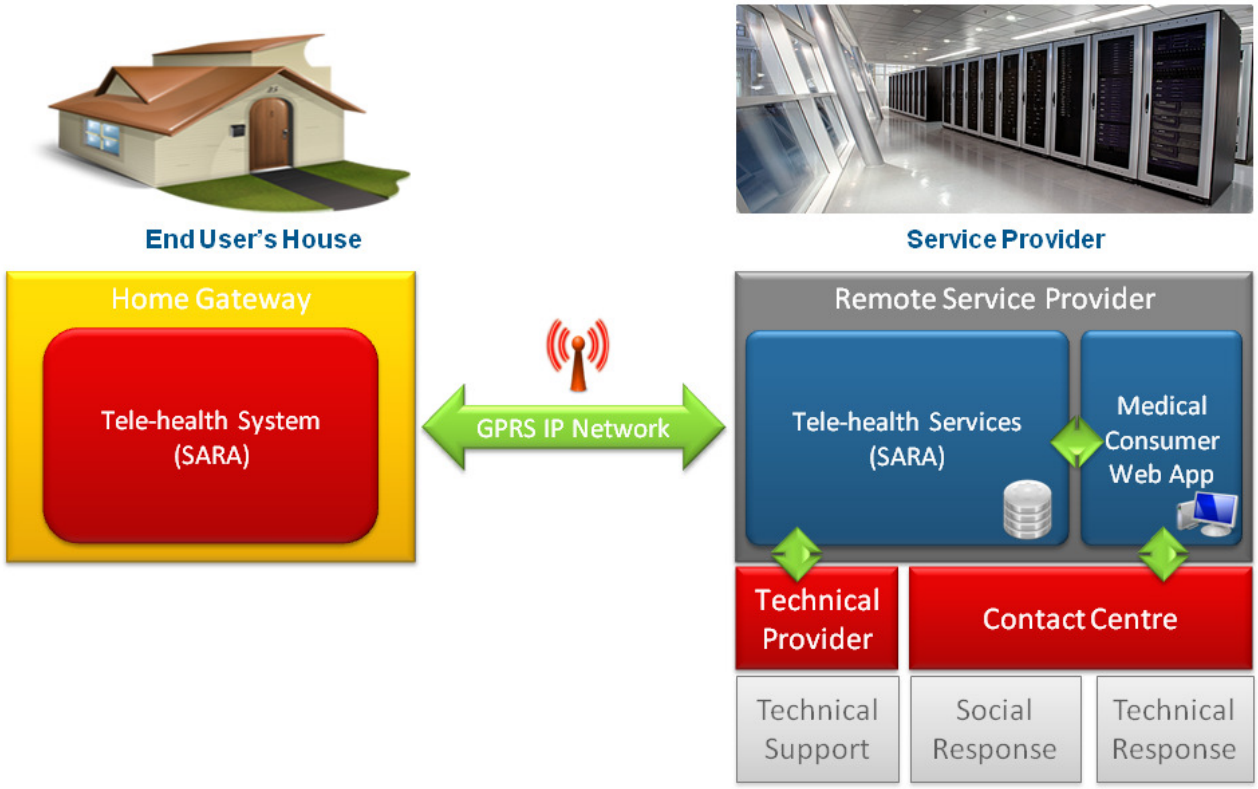

Figure 10 - INSERM pilot architecture

The inCASA system architecture for INSERM will be deployed using the listed devices:

- Monitoring Devices:
  - Infrared actigraph (Ambulatory Monitoring)
  - Weight scale (AND Medical)
  - PC platform (Asus, Eeetop ET1611)
- Home Gateway
- Data Connection device, Wireless GPRS/HSDPA
- One workstation (PC, HP compact) provided by INSERM to follow the patients data
- Host inCASA database
- Linksmart middleware (SW provided by CNET).

4.3 Work plan

The first step of the work plan is the implementation of the inCASA platform, followed by the equipment acquisition and parameterisation, on October 2011.

Recruitment of patients
Selection and recruitment of cancer patients in the chronotherapy unit of Paul Brousse hospital started on November 1, 2011. Signed informed consent forms from patients were collected.

Home inspection
No home inspection is required before installation.

Installation
Next step is the installation of the devices in the patient's house and the activation of the specific services. The patient is trained by the technical responsible to use the service. The next step is the patient monitoring and data collection.

Medical assessment and pilot recap
Finally the SARA evaluation for a single patient ends by a medical consultation and thus the feedback to the patient and pilot recap. Evaluation is done following the common methodology.

The pre-pilot ended in February 2012 and INSERM introduced the final system architecture and started with the pilot activity running all the services and use cases.

4.4 Social Care and Healthcare Integration

To achieve the integration (see Fig. 11 below) of telecare and telehealth services, INSERM will involve the hospital nurses as a primary access point for the patients. They will directly interact with the patient and point out any health problems at an early stage to the oncologist, the GP, the local nurse and/or other relevant healthcare professionals.

Depending on the type of deteriorated monitored parameter (symptom, body weight, rest-activity etc.), as indicated by a level below a pre-set threshold and her interview of the patient, the nurse will refer the patient to the relevant health professional (oncologist, geriatrist, general practitioner, homecare nurse, psychologist, dietician, physical therapist or social worker). The appointments of the patients will be managed and displayed on the SARA platform. When a patient has medical questions or is in need of a social service the nurses can be contacted by phone during office hours.

By integrating healthcare and social care, a network of social and medical professionals is built around the patient. This will result in the most appropriate care being delivered in the shortest time possible and minimising also the burden on informal carers (mostly partners or family of the patient).

The figure below illustrates the integrated telecare/telehealth work flow:

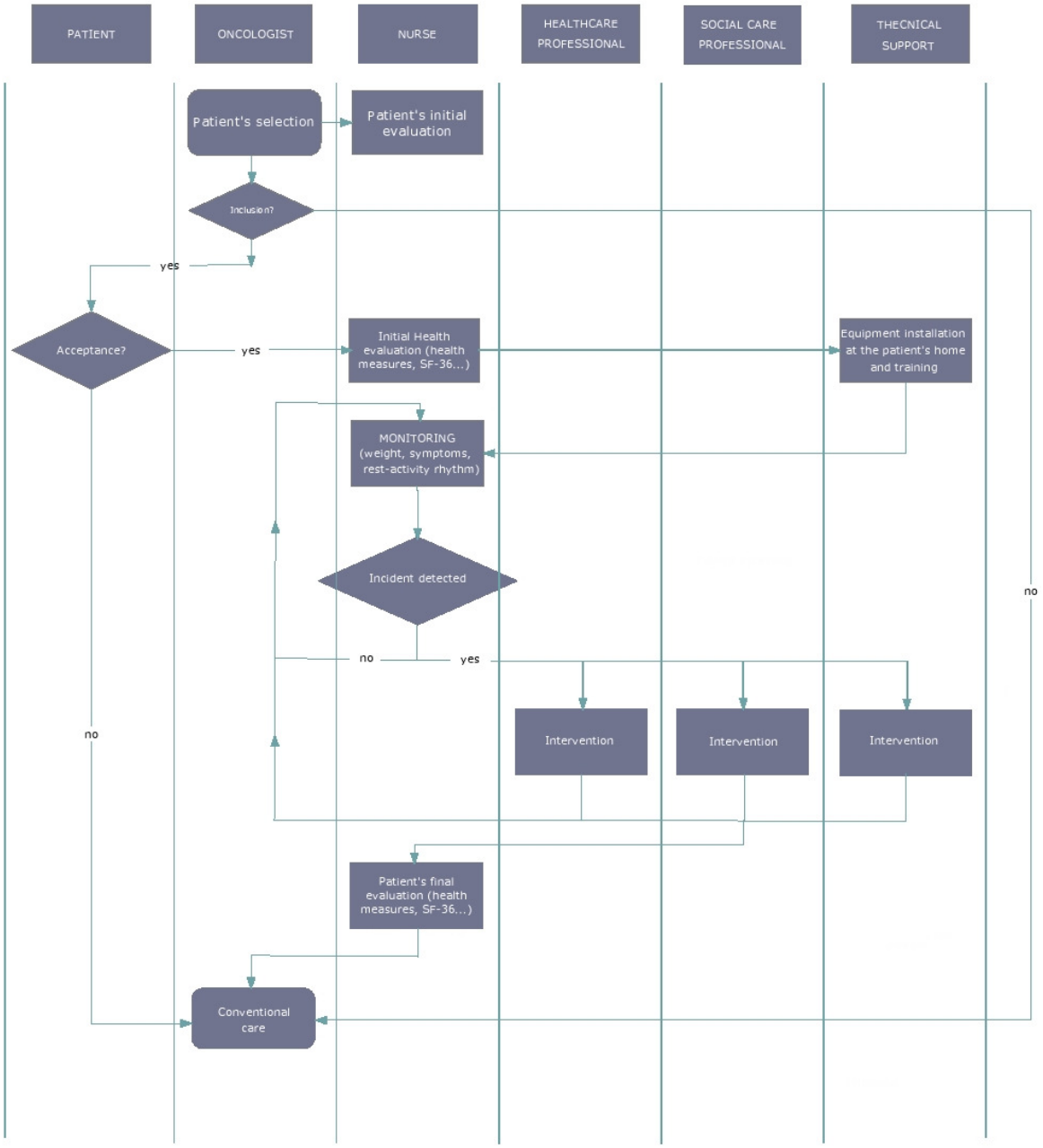

Figure 11 - INSERM pilot workflow

4.5 Pilot Schedule

Planning of pilot activities:

Date	Action
20.05.2011	Project ethic approval by the French ethical committee
04.07.2011	Equipment acquisition and parameterisation
07.07.2011	Information meeting in Paul Brousse hospital about the inCASA solution to all the hospital staff
October 2011	Selection of patient and patient acceptance signature
November 2011	Pre-pilot starts
November 2011 – February 2012	Equipment installation (PC platform and weight scale), data collection and evaluation
March 2012	Pre-pilot end- Pilot activities start
September 2012	Deployment of integrated Telecare/Telehealth services
March 2013	Conclusion of Pilot monitoring and final evaluation beginning
June 2013	Conclusion of evaluation and of Pilot activities overall

Table 3 – INSERM Pilot Schedule

5 KGHNI Pilot Blueprint

The KGHNI pilot is a mixed social care and clinical oriented pilot, thus focusing on both telecare and telehealth services. It is organised as shown in the diagram below:

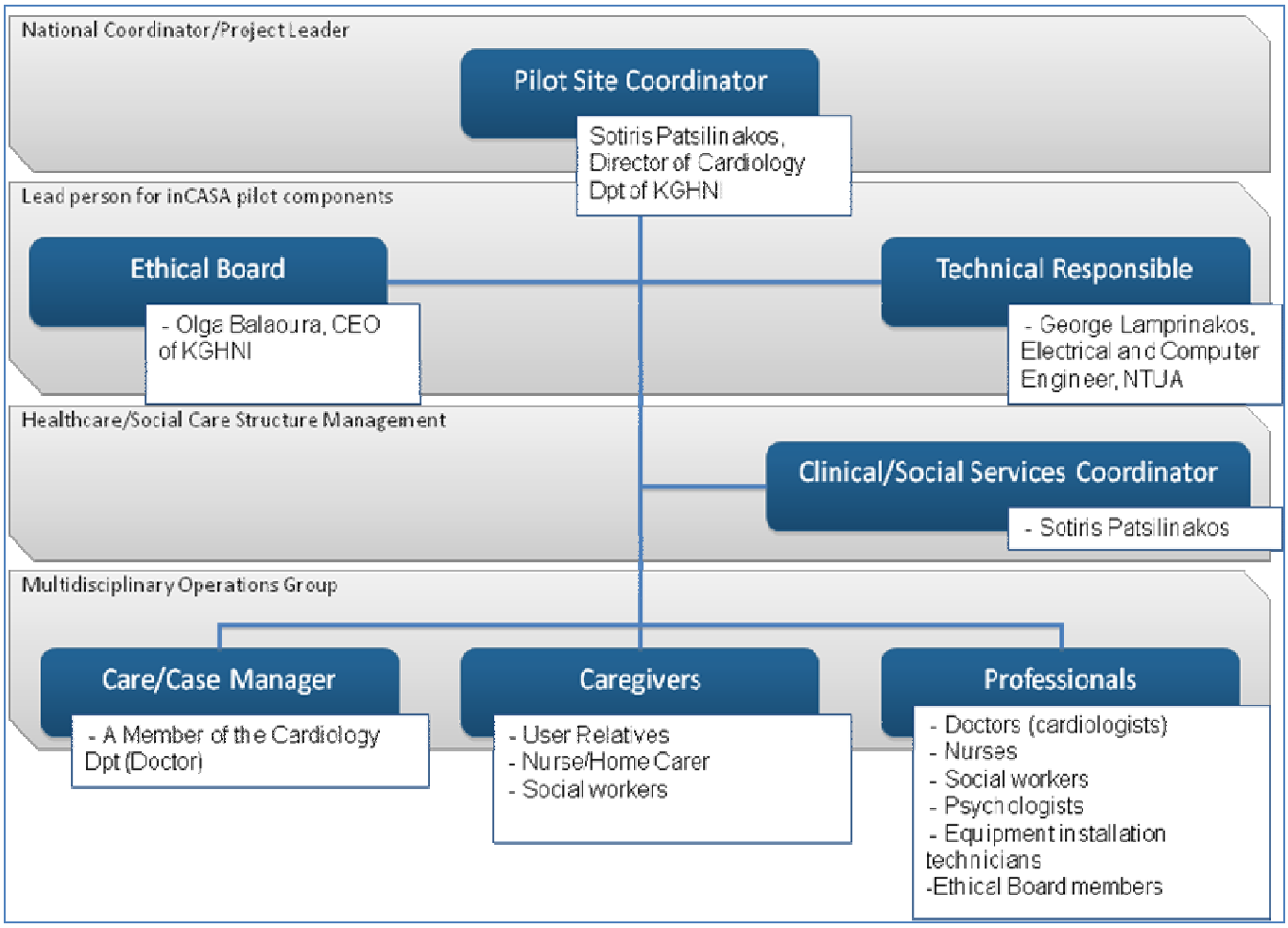

Figure 12 - KGHNI Pilot Organisation

National Coordinator/Project Leader

The lead person of the pilot is Sotiris P. Patsilinakos, currently acting as the director of the Cardiology department of KGHNI. The Cardiology clinic will coordinate all the inCASA activities of the KGHNI pilot.

During the pilot Sotiris Patsilinakos will ensure that the following objectives are met:

- improve the medical compliance of patients,
- improve medical therapy,
- increase quality of life for patients,
- reduce the need for re-hospitalisation,
- improve the quality and cost effectiveness of delivered healthcare services.

Lead person for inCASA pilot components

In order to ensure the success of the project, it is of high importance that the operation of the platform functions at a system level. George Lamprinakos (Dipl.-Ing) and NTUA team will be responsible for the end-to-end testing and deployment of the inCASA technical solution. Their tasks include:

- Equipment and software installation at users' houses.

- Web server and Software installation at KGHNI premises
- Testing, Bug-fixing, Documentation and Support concerning the inCASA platform.

Moreover, KGHNI is very concerned that no ethical issues arise from the use of the platform. Mrs Olga Balaoura, CEO of KGHNI, and the members of the internal Ethical Board of the hospital will assure this. Their responsibilities include:

- Production of an informed consent form that each patient should sign before starting using the inCASA platform
- Check that no privacy law is violated and that personal data are visible only to the relevant professionals while their use is strictly limited to the purposes of the inCASA study.
- Report any ethical issue during the Pilot duration to the inCASA Ethical Board.

Healthcare/Social care Structure Management

In Greece, healthcare services institutions are primarily oriented to the treatment of ill people and not prevention. The KGHNI pilot will help demonstrate the possibilities of enhancing the medical treatment of elderly people, using the inCASA platform facilities, on the level of healthcare service provision, reduction of the re-hospitalization rate and prevention. For that purpose, during the KGHNI pilot the following hospital resources will be used:

- Doctors of the Cardiology clinic who will be responsible for patients' examination in a dedicated out-patient clinic and validation of the inCASA platform produced data.
- Nurses will be available to support the operation of the out-patient clinic and will act as a first level support for the inCASA system operation and alerts delegation to the appropriate professionals.

Dr. Patsilinakos will supervise the quality of health-care services provided to elderly patients participating in the KGHNI pilot and coordinate involved health-care personnel.

One of the KGHNI pilot's significant goal is to demonstrate the smooth integration of social services and psychological support to the participating elderly patients. For this purpose, the following KGHNI resources will be used:

- Social workers, responsible for direct communication of the patient when this is needed (scheduled phone conference, appointment fix, medication change etc.)
- Psychologists, available to the participating patients, while visiting the dedicated out-patient clinic.

Dr. Patsilinakos will also supervise the social care service provision and consult with psychologists to determine the positive effects of the inCASA platform to the patients' psychological condition due to reduced hospitalization and improvement in their quality of life.

Multidisciplinary operations group

For the overall inCASA platform operation, additional people will be directly involved to meet the pilot objectives:

- The KGHNI Ethical Board, in cooperation with the inCASA Ethical Board, will monitor the pilot execution, making sure that the statements of the informed consent form are not violated at any point.
- Case management will be handled by doctors of the Cardiology department. Each patient will have one case manager.
- Social workers will act as a first level support and perform appointment fixing with the patients
- Nurses, psychologists and doctors all have distinct roles in the flow of KGHNI health-care and social-care provisioning
- Users' relatives will help the elderly people with the use of modern technologies and they will also be informed in emergency cases (e.g. by an automated SMS) in order to prevent risky situations as soon as possible

- Equipment installation and technical support during the pilot will be provided by NTUA.

5.1 KGHNI Pilot deployment strategy

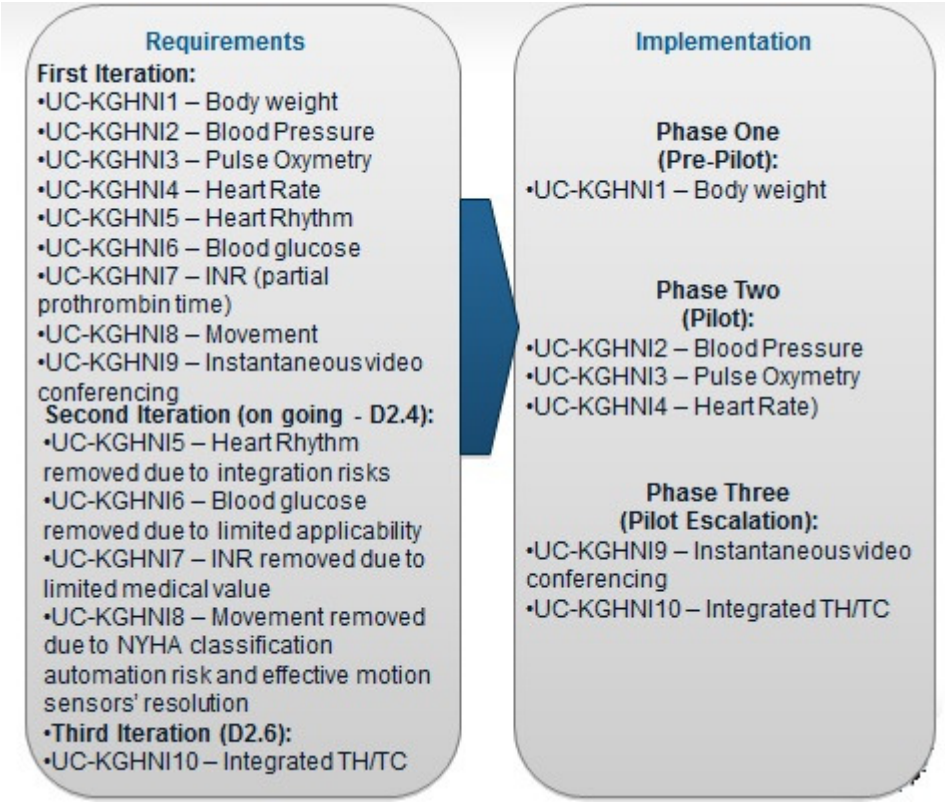

Figure 13 - KGHNI deployment strategy

5.1.1 Phase one

The KGHNI pilot originally defined a total of nine use cases in D2.2 Requirements consolidation and prioritisation iteration 1 which were planned to be implemented during the inCASA project.

KGHNI implemented one of the use cases (Body weight) in Phase One (Pre-Pilot). Body weight measurement was selected as it is the most common use-case among the inCASA pilots in order to give to the project a common basic layer in this first phase. Due to delays, the pilot Phase One was finally initiated on October 2011 and was concluded on December 2011Three patients participated in the pre-pilot phase. They all already had good rapport with the doctors and were willing to provide feedback.

The deployment of the pre-pilot was based on the SARA platform (see the next section) and supported by TID (software) and NTUA (installations). KGHNI tested the platform with the use of body weight scales and user-friendly touch screen PCs supporting the operation of SARA platform. The feedback provided by doctors and patients helped to propose enhancements regarding deployment and the usability of the client measurements software. Also, the experiences gathered and lessons learned during the pre-pilot were internalized in the KGHNI cardiology department and enabled the specification of more robust operational procedures for the main pilot phase (please refer to D6.2 Pre-Pilot Installation Reports for more details).

5.1.2 Phase Two

The next planned step of KGHNI was to start its main pilot phase, including the full Telehealth solution, in January 2012. One month delay in the equipment procurement due to administrative reasons caused the Pilot Phase to start successfully at the beginning of March 2012. The

deployment of the Pilot escalation was also based on the SARA platform seeing also the introduction of additional use cases.
According to the original planning, the KGHNI escalation would see the gradual introduction of the remaining use cases (Blood Pressure, Pulse Oximetry, Heart Rate, Heart Rhythm, Blood Glucose, INR and Movement) along with the implementation of Instantaneous Video Conferencing capabilities. The second iteration of the requirements in order to consolidate and prioritise them provided a good opportunity to better specify and make adjustments to the previously defined use cases. At this stage it was decided that the following use cases will not be implemented during the KGHNI pilot for the following reasons:

1. UC-KGHNI-5 Heart Rhythm: due to high equipment cost, limited availability (only one device), not controlled measurement environment, reluctance of patients to wear a device 24 hours a day, high implementation risk in interfacing the inCASA platform with the specialized KGHNI cardiology clinic software.
2. UC-KGHNI-6 Blood Glucose: due to limited applicability in practice; so far no patients were recruited that also suffer from diabetes mellitus and this use case is no longer prioritized.
3. UC-KGHNI-7 INR: due to limited practicality; this test is superseded by other more accurate clinical measurements.
4. UC-KGHNI-8 Movement: due to limited motion sensor accuracy and implementation risks in automating the NYHA classification using also real measurements data. Nevertheless the movement sensor will be used in the combined Telehealth/Telecare scenario deployment to complement the other TC data feeds (chair and TV usage sensors).

Another important factor that introduced changes to Phase Two KGHNI pilot planning is the planned transition to an integrated Telehealth/Telecare inCASA solution from an all SARA platform deployment. Although this change will not affect the patients' user experience (the SARA client UI will be retained after the transition), it will result in an upgrade to the inCASA platform installation capabilities in terms of automatically generating user habits models that will complement the view on their clinical condition and enable the provision of enhanced social care-healthcare services.

5.1.3 Phase Three

The extended and final phase of the Pilot that includes combination of Telehealth and Telecare measurements and integration of KGHNI's health and social services is planned to start in September 2012.
The transition to an integrated social-health care delivery model will be preceded by a pilot installation of the related inCASA services for a single test user throughout August 2012. The remaining scheduled groups of patients (September 2012 until pilot conclusion) will see the deployment of the fully integrated inCASA services (description in the following sections).

5.2 Architecture

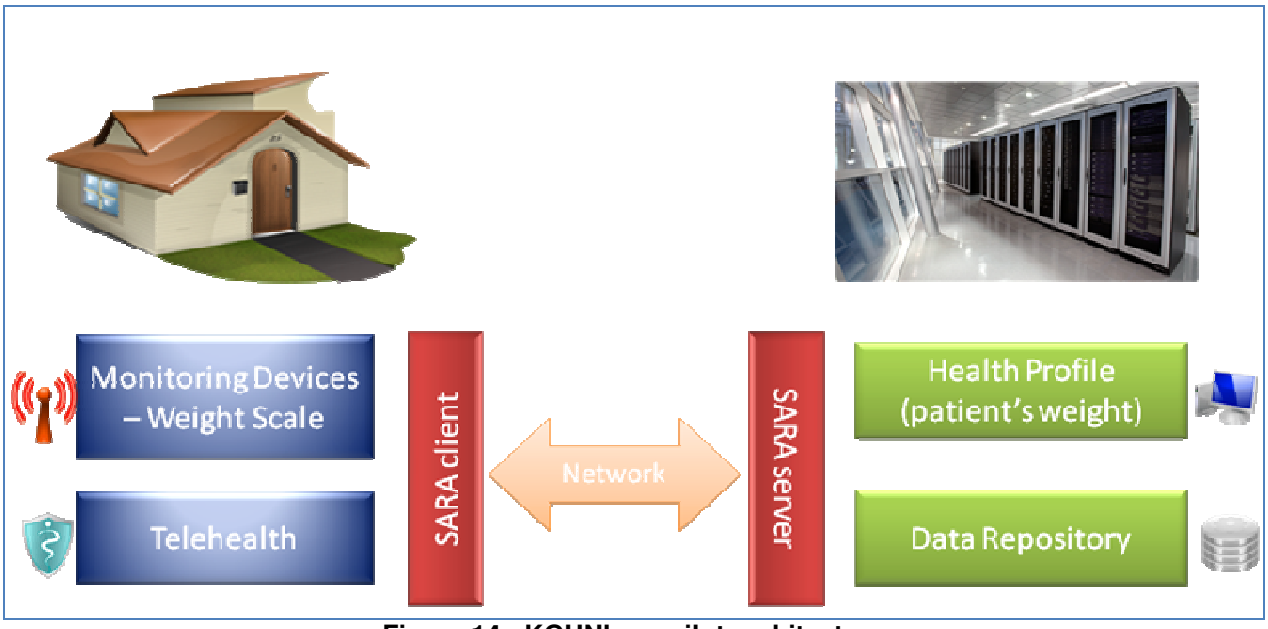

Figure 14 - KGHNI pre-pilot architecture

In the pre-pilot phase, KGHNI deployed the solution as shown in Figure 14. The basic monitored variable was the patient's weight. The weight scales used, manufactured by A&D, supported the wireless transmission of measured data through Bluetooth. These data were received by the Telehealth Gateway (SARA client) which is embedded in a portable PC that was used by the users. These computers have also a touchable screen in order to improve user experience and facilitate the process of medical measurements.

The next step in the data flow is the transmission of data from user premises to the remote service provided server through the Internet. During the pre-pilot phase, the remote server was the SARA server which had been already tested by TID in combination with the SARA client. The SARA server is located in TID's premises and store incoming data in its database. The stored data are visible as a report from a secured web page where authorized KGHNI doctors can see and analyze the retrieved patient's data (at this case, his/her weight trend).

As an extra feature, independent from the inCASA architecture, KGHNI aims with a lower priority to install Video Conference tools at user's house in order to directly communicate with the hospital professional users (social workers, nurses, doctors).

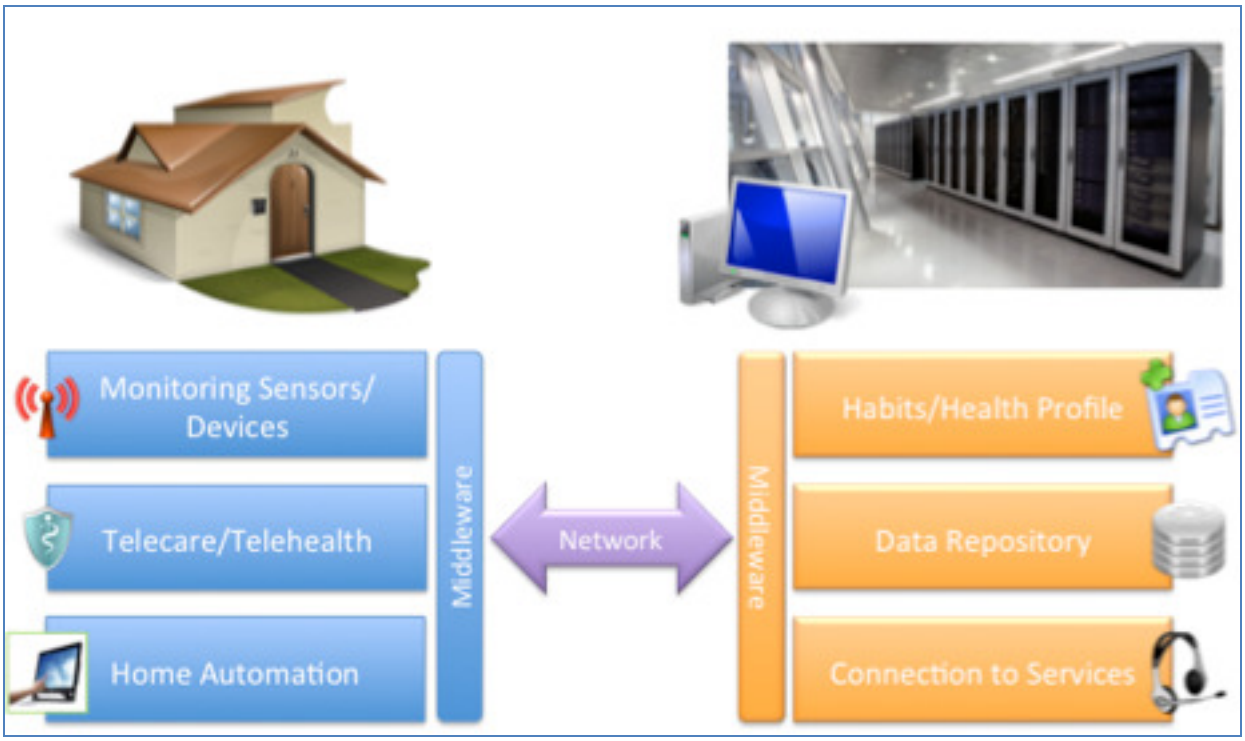

Figure 15 - KGHNI pilot architecture

The full inCASA solution will be deployed during the Phase Three of the Pilot. Below, the relevant components are listed:

Component	Getting data from	Sending data to
Sensor Devices (Movement/Temperature, Chair, TV usage)	Direct measurement	Telecare Gateway
Vital sign monitoring devices	Direct measurement	Telehealth Gateway
Telecare Gateway	Sensor Devices	Client - side Linksmart middleware (Home premises)
Telehealth Gateway	Vital sign monitoring devices	Client - side Linksmart middleware (Home premises)
Client - side Linksmart middleware	Both Telecare and Telehealth Gateways	Smart Personal Platform
Smart Personal Platform	Client - side Linksmart middleware	Consumer Applications and EPR repository
Consumer Applications	Smart Personal Platform	End user's screen (Web Portal)

Table 4 – KGHNI Architecture Components

Hospital servers should be installed by NTUA technicians and be able to:

- Run SPP (software provided by Reply)
- Run Consumer Applications (software provided by NTUA)
- Host inCASA database

5.3 Work plan

Patient Recruitment
2 real patients and 1 "demo" patient, i.e. a member of the technical team, were recruited for the pre-pilot phase. After the pre-pilot solution's successful deployment and completion, a continuous process of recruiting patients began (target is to recruit 25 patients in total). KGHNI will invite patients to participate in the inCASA project and will call them for interviews and demonstrations. KGHNI will make use of its large list of patients as a pool to select the candidates.

All finally selected patients will have to pass the Screening Phase where doctors will decide whether or not a patient meets the desired criteria as far as the inCASA goals are concerned.

In general, KGHNI selects CHF patients especially for the pre-pilot phase where the platform was tested from a technical point of view. The selected patients had good rapport with the doctors and were willing to cooperate and provide extensive feedback.

At the time of writing (August 2012), 20 out of a targeted total of 25 patients have been already recruited for the inCASA pilot participation. From this set of 20 patients, 15 have already been included in the program. The monitoring period has ended and equipment de-installation has been performed for ten of these 15 patients.

Patient Induction Meeting
All participants are invited to attend a Patient Induction Meeting. This meeting is held at KGHNI. It includes the following topics:

- Describe the project goals and platform – Power Point Presentation
- Presentation from the part of the Cardiology Clinic that will be the heart of the inCASA project in KGHNI
- Describe the patients' role in the program and how they may benefit
- Demonstrate the technology
- Describe the Informed Consent form
- Ask/answer any questions.

Patient Informed Consent
Each patient is asked to read and sign an informed consent form. On this form, KGHNI will provide the following information:

- Nature and purpose of the study / project
- Procedures of the project
- Dangers from the use of the platform, if any
- Withdrawal process
- Privacy and confidentiality of collected data
- Patient benefits from the participation in inCASA project.

Equipment Installation
Equipment installation at the user's premises is conducted by NTUA technicians. A social worker is also there in order to explain to the elderly person how to use the equipment and make him/her to feel confident with the inCASA platform.

De-installation
After a patient cycle has finished concerning his/her participation in the inCASA project, the process of de-installing the equipment is taking place. KGHNI aims to split its patients into 5 groups in order to re-use the equipment, reducing in this way the project costs.

The de-installation is also performed by NTUA technicians.

Staff Training
Staff training took place as soon as necessary components were available. NTUA helped in the explanation of platform's use and will also provide the needed documentation to the lead doctors of the Cardiology Clinic. Then, the lead doctors shared the knowledge with the rest of the doctors and nurses, as well as with the social workers who are mainly responsible for providing a comprehensive guidance of the inCASA platform usage to the elderly people.

5.4 Social Care and Healthcare Integration

The main objective of the integrated KGHNI Telecare/Telehealth services is to substantially contribute to the quality of life of chronic patients suffering from congestive heart failure (CHF). This can be achieved by:

- Mitigating the risk of suffering from serious and potentially life threating episodes by capitalizing on available contextual Telecare (TC) and habits profiling information in addition to the Telehealth (TH) measurements already being conducted. The scope is to exemplify how combined inCASA TH/TC views can materially help doctors identify early on a possible deterioration in the health of individual patients.
- Supporting patients' everyday life, particularly in cases where their physical/social/in-home activities are also impaired by their psychological condition and/or societal circumstances. Within this context the inCASA technical facilities can be viewed as a starting point for triggering Social Care services (internal or even external to the hospital) and Psychology Clinic resources to offer additional assistance to these patients.

The organizational units involved in the integrated service of KGHNI include the following:

- Cardiology clinic. As already stated, the KGHNI pilot is coordinated by the Cardiology clinic of the hospital. The appointed cardiologists and nurses who participate in the project will have the overall case management for every CHF patient monitored via the inCASA solution. Some of their tasks are: measurements monitoring, trend analysis, alerts management, interventions, medication change decisions etc.
- Social services: KGHNI social workers will have an active role in the framework of the inCASA project. They are responsible for the communication with patients and for making them feel that the inCASA solution as user-friendly as possible. The social workers may call the patient asking him/her to come to the hospital if doctors judge so. Moreover, they are asked to perform conferences with the patients in order to determine their psychological status and alert the doctors / psychologists if there is a need to. The latter will be achieved via the usage of specific questions, produced by experts from the Psychiatric Clinic, which will make it possible to extract useful information about the patient's mental and social well-being.
- Psychiatric clinic: KGHNI psychiatrists / psychologists define the questions posed to the patients by the social workers during their conference. These questions are formed with respect to the scientific standards of this domain. Moreover, KGHNI psychiatrists / psychologists are part of the inCASA chain, in terms of patient's psychological status evaluation through the analysis of the inCASA platform data. Last but not least, they perform face-to-face interviews with patients who are considered to face non-negligible social and psychological difficulties.

The following pathway (see Figure 16 below) exemplifies the different levels of intervention required when new health-related symptoms are consolidated from observed deviations in the

patient's habits or additional psychological/social factors are deduced to have a detrimental influence in their quality of life and everyday activities:

1. Habits change detected: case of reduced mobility / activity of the monitored elderly patient at home (TV usage and chair permanence increase over a short period of time while motion detector indicating reduced mobility in the premises).
2. The system automatically produces an alert and the KGHNI professional user (Doctor / Nurse) monitoring the inCASA Portal acknowledges it.
3. The assigned Doctor checks if the patient's monitored health parameters (BP, Oxygen Saturation, Weight, Pulse) have also changed:
    a. The trends over monitored parameters indicate that the patient's medical condition may be deteriorating, but at a rate that didn't result in the automatic triggering of the health-related alerts by the inCASA platform.
    b. Monitored health parameters seem largely unchanged and the habit's change cannot be safely attributed to changes in medication or other registered interventions (if any recent).
4. Both cases require the Doctor to ask the patient to visit the outpatient clinic for further examinations (possibly expediting an already scheduled appointment with the patient). The doctor's experience over the years has shown that sometimes a chronic patient's condition is getting worse for no apparent (at the time) reason or that people close to the patient often fail to recognize signs of deterioration (usually able to identify such signs in retrospect, after a serious incident has taken place – often dismissing too easily complaints from the elderly patient).
5. The Doctor interviews the patient regarding his daily life (i.e. feeling depressed or isolated, increasingly in need for assistance for initiating/completing everyday functions), activities (i.e. loss of interest or pleasure), level of comfort or discomfort (i.e. during sleep or movement) to properly assess if new health-related symptoms have emerged and their relevance to his/her current condition (i.e. an increase in weight not rapid enough to be attributed to diuretics dosage but that can be related to reduced physical activity) or other societal/psychological factors may have also come into play. This informal interview is crucial in helping the doctor to determine whether:
    a. further medical examinations should be ordered for the patient and/or the medication should be adjusted,
    b. the patient should (also) be referred to the psychological/social services internal to the hospital.
6. In the first case, a thorough evaluation of the medical condition of the patient warrants that the risk of a future medical emergency or need for re-hospitalization is reduced.
7. If the latter case is also applicable, a Social Worker makes the first approach to the patient (as a result of the Doctor referral) and fixes an appointment for the patient with a Psychologist in the hospital.
8. The Psychologist reviews the patient case having also access to the medical records of the patient and recommendations provided by the Doctor along with the Telecare data accessible through the inCASA Consumer Applications. The Psychologist interviews the patient and employs standardized questionnaires or other methods to identify the underlying mental condition (if present) with greater specificity (i.e. depression - not to be confused with adjustment disorders; additional disorder examples: anxiety, phobias, compulsive behaviours).
    a. If the Psychologist can provide a solution (psychological support during a number of sessions, medication) then he/she can proceed with it. In the specific case where a depressive episode is diagnosed, the Psychologist may apply non-pharmacological interventions, such as cognitive behaviour therapy (CBT), or prescribe anti-depression medication after consulting the assigned cardiology Doctor to minimize the risk of side-effects from medication.
    b. Effective treatment of a psychological condition, such as depression, may also help mitigate the risk of associated conditions like sleep apnoea syndromes or low heart rate variability (HRV); both conditions have adverse prognostic implications in heart failure patients.

c. If the psychological condition diagnosed constitutes a barrier to effective heart failure self-care, increases the risk of patient non-compliance with prescribed medication, or induces impairments in one or more important areas of functioning (social, occupational etc.) the Psychologist may consider complementing the patient's treatment with assistance offered by social services and/or educate people that are close to the patient (i.e. family, informal carers, etc.).

d. Even if no psychological condition is diagnosed, the Psychologist may nevertheless seek the assistance of Social Services, especially if the patient has been proven to have significant social problems (poor and/or frail and/or without strong familiar support).

9. The most appropriate level of social care intervention is decided in coordination with the Hospital Social Care service: i.e. direct assistance to the patient may be better accommodated by referring patients to nation-wide or regional social services such as "Help at Home" (http://www.50plus.gr/en/helpathome) rather than employing the comparatively constrained resources of the hospital internal services.
10. In the latter case, the social services of the hospital help elderly patients to prepare their inclusion application (eligibility criteria, notifying external social service), and communicates the pertinent details to the external services.

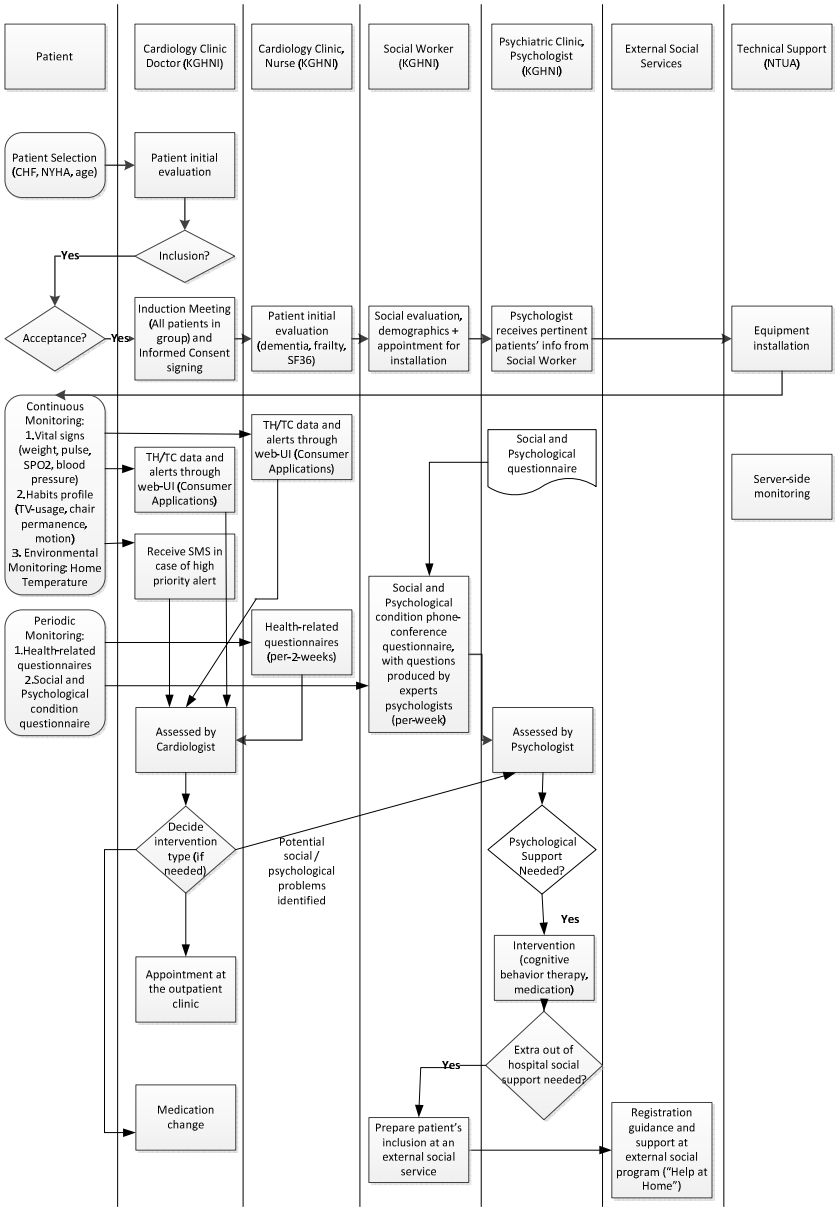

Figure 16 - KGHNI pilot workflow

5.5 Pilot Schedule

The pilot planning activities which, at the time of writing, foresee a project extension to M39 (June 2013) are presented in the table below:

Date	Action
October 2011	Pilot activities start
1st week of October 2011	Pre-Pilot Equipment Installation, Training and Testing
October 2011 – December 2011	Pre-Pilot Platform is running. Platform usability tested and improvements proposed.
January, February 2012	1st Evaluation of inCASA installation, usability and Pilot procedures.
March 2012	Pilot Start (Phase 2 – escalation)
1st week of March 2012	Pilot Users' Home Inspection and Consent Forms (1st group of 5 patients)
2nd week of March 2012	Pilot Equipment Installation, Training and Testing
3rd and 4th week March 2012	Patient Questionnaires / Patients started taking measurements
April 2012	End of participation for 1st group
May 2012	2nd group initiated
3rd and 4th week of June	End of participation for 2nd group
July 2012	3rd group initiated (on-going)
August 2012	Testing Integrated TH/TC inCASA platform (1 patient)
3rd and 4th week of August	End of participation for 3rd group
4th week of August	Evaluation of pilot escalation (Phase 2)
September 2012	Pilot with Integrated TH/TC services begins (Phase 3) 4th group is initiated
End of November 2012	End of participation for 4th group
December 2012	5th and final group is initiated
April 2012	Conclusion of Pilot monitoring and final evaluation beginning
May-June 2013	Conclusion of evaluation and of Pilot activities overall

Table 5 – KGHNI Pilot Schedule

6 CHC Pilot Blueprint

The Chorleywood pilot in the UK will develop an integrated service delivery model that will combine health and social care in responding to the needs of frail older people with long term conditions. This service integration is driven by both health and social care. Information about the patient and data from the remote monitoring will be shared and exchanged between the general practice and social services. It is organised as shown in the diagram below:

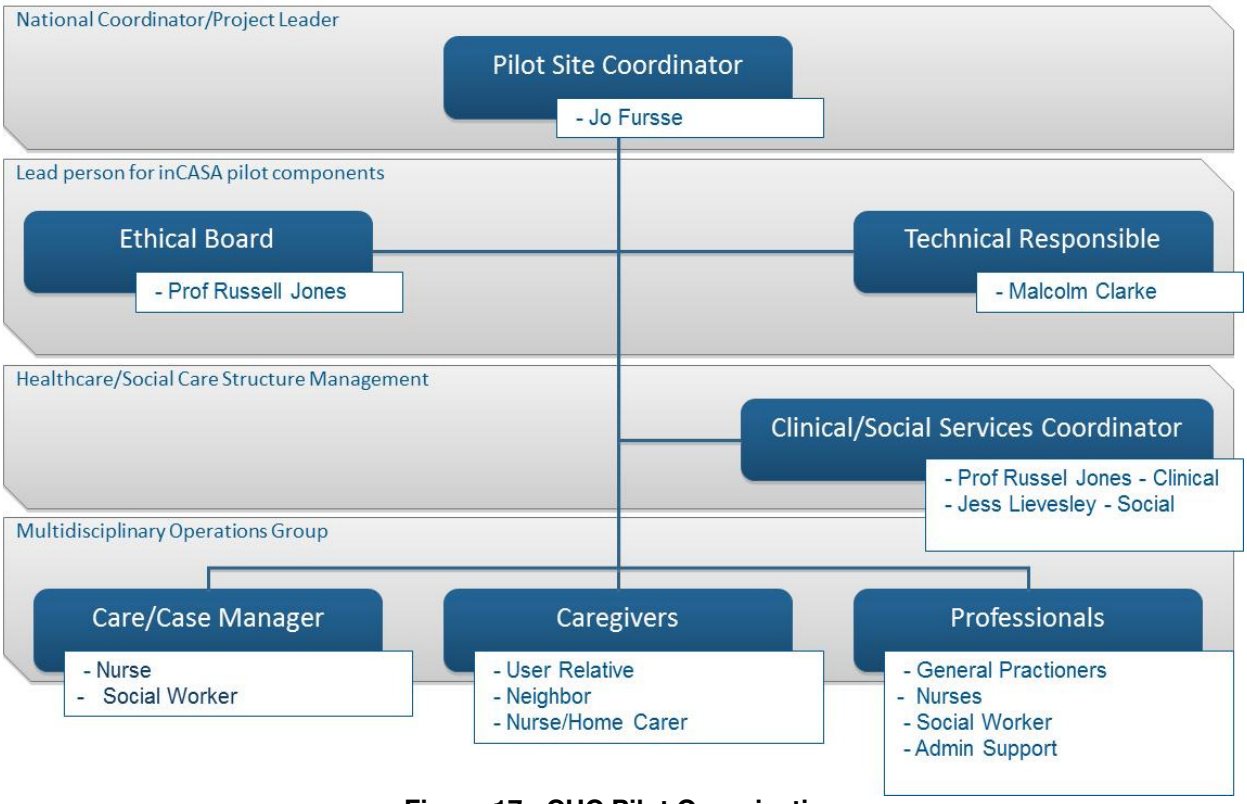

Figure 17 - CHC Pilot Organisation

National Coordinator/Project Leader
Professor Russell Jones is the National Coordinator for the UK pilot site to be conducted at Chorleywood Health Centre. Prof Jones will have the overall responsibility for bringing together the different entities and stakeholders e.g. clinical services, social services, patients who will participate to the pilot implementation. Prof Jones will also oversee the evaluation of the pilot and provide feedback.

Lead person for inCASA pilot components:
There are three main components within the inCASA pilot, Clinical Monitoring; Habits Monitoring and the Technical Management. Jo Fursse will act as project coordinator / lead for the project.

Healthcare /Social Care Management Component – The integrated health and social service model will be delivered by joint working with Chorleywood Health Centre with Prof Russell Jones as the clinical lead and Jess Lievesley from Hertfordshire Social Services as the Social Services lead.

.
Technical Management Component, Dr Malcolm Clarke from Brunel University will assist in the technical management for the pilot.

Multidisciplinary operations group:
The pilot will be supported by a number of different teams including **Case Management** which will be provided by the clinical team at Chorleywood Health Centre. This team is made up of:

- **Research Nurses** – **Chorleywood Health Centre**: The nurses will be responsible for recruitment, training, installation reviewing data, participating in joint clinical and social case conferences and responding to intervention needs.
- **Social Workers – Hertfordshire Adult Social Services:** Key social workers will be responsible for reviewing data, participating in joint clinical and social case conferences and responding to intervention needs.
- **General Practitioners**: The GP's will be responsible for reviewing data, participating in joint clinical and social case conferences and responding to intervention needs.
- **Administrative Support Team**: will provide administrative support to the pilot including record keeping and telephone support.

6.1 CHC Pilot deployment strategy

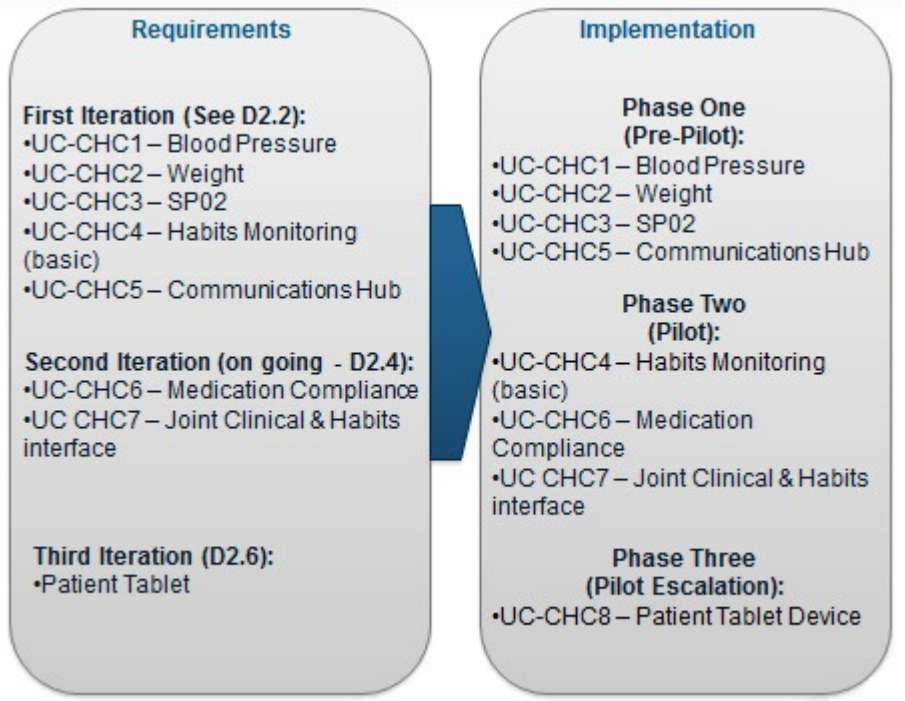

Figure 18 - CHC deployment strategy

The CHC pilot is being implemented in three phases. The Pre-pilot introduced a telehealth monitoring device to the patient's participating in the pre-pilot phase. This phase was mainly used to support the testing of the technology as it was made ready by our technical partner.

The main objectives of the pre-pilot phase were to:

- Test functionality of the equipment
- Develop clinical interface with the users
- Provide feedback to the technical teams on additional requirements
- Develop basic habits monitoring protocol
- Train clinical users on equipment and clinical interface
- Refine monitoring and clinical protocols
- Use information gained to inform the ethical approval
- Gain a better understanding of how the effectively evaluate the service

The pre-pilot lasted from October 2011 to June 2012. The CHC delay has been predominantly due to availability of technology that would be suitable to use within the pilot phases.
Despite the delay in the initial user requirement collection, CHC had a clear understanding the technology that would be required to deliver the integrated service however it became clear during the 1st year that we were not able to find a supplier of the required technology.
During the early planning of the pilot, talks were held with one of the technology partners to provide an integrated telehealth and telecare platform. The requirements were clear in that we needed a system that would integrate both telecare and telehealth so that users did not have multiple technologies in their home as well as data integration, processing and display for the professionals. Despite numerous attempts which involved face to face meetings and conference calls, including those with senior members of the organisation we were not able to secure agreement that the required integration based on the user requirements would be possible. A further meeting with a UK telecare supplier was also unsuccessful in finding a solution that would support the pilot.
As a result it was decided to work with our technology partner, Brunel University who had been developing standards based system in another project and that would enable the integration of the sensors that would ultimately support the system. The pre-pilot initially began in April 2011 but had to be cancelled due to a number of reliability problems with the technology. The pre-pilot phase started again in October 2011 with a subset of telehealth devices and using an existing Smart Meter gateway to transmit data. This was reported in D6.2. The pre-pilot phase was extended in order to include and test the final inCASA integrated health and care sensor solution.

.

Phase two saw the introduction of habits monitoring to the platform as well as a combined clinical and habits monitoring interface. The platform and sensors that are being used have been procured from Acute Technology The devices are Continua and ZigBee Alliance certified. All devices work through a simple to use home gateway that accepts ZigBee ZHCP compliant devices and transmits data over GPRS using IHE-PCD01 standard messages. This will integrate directly to the Reply reasoning engine.

The integrated platform underwent robust and rigorous field tests in order to ensure reliability and usability by both professional and patient groups. In March 2012, the pre-pilot phase was extended and a further 9 additional patients were recruited in order to complete the pre-pilot phase.

Phase two will also see the introduction of the integrated health and social working practices beginning in September 2012. Information generated from the devices will be shared amongst health and social professionals. Joint working practices and learning will be developed in order to react to the data in an appropriate way. The new integrated social and health service model was described and put into practice. A total of 25 patients will be included in the pilot phase and will on the service for 6 months.
For phase three, a patient tablet will be introduced where it is suitable. This will enable patients to view the data that they are sending each day. Information can also be feedback to the patient. This may include educational and helpful resource information for both health and social care.

As an extension, family and carers could also be given access to the information being collected. The patient portal can be viewed via a URL which can be accessed via any device that has an internet connection. It is envisaged that relatives and or carers would be able to monitor data if they are concerned or live far away.

6.2 Architecture

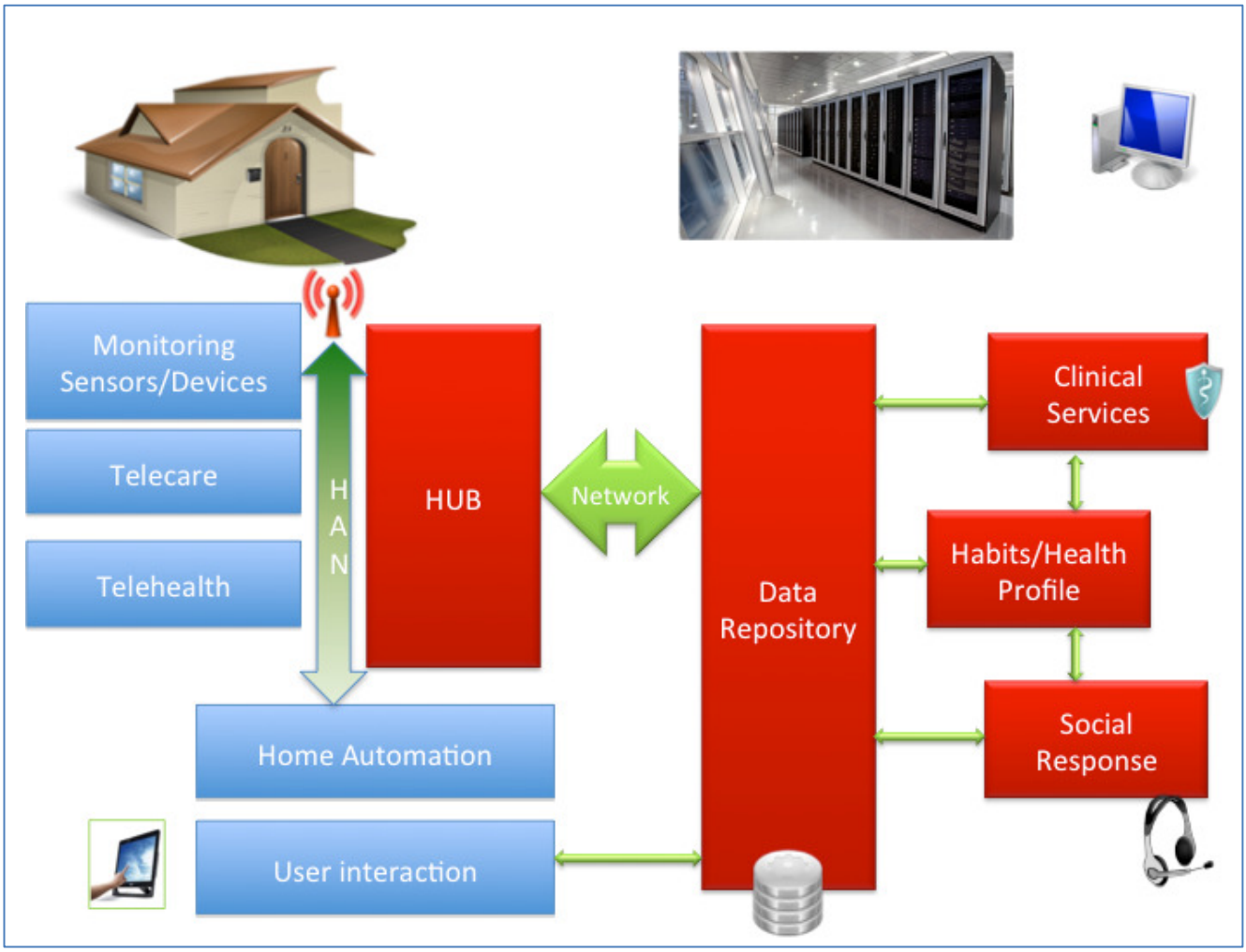

Figure 19 - CHC pilot overall architecture

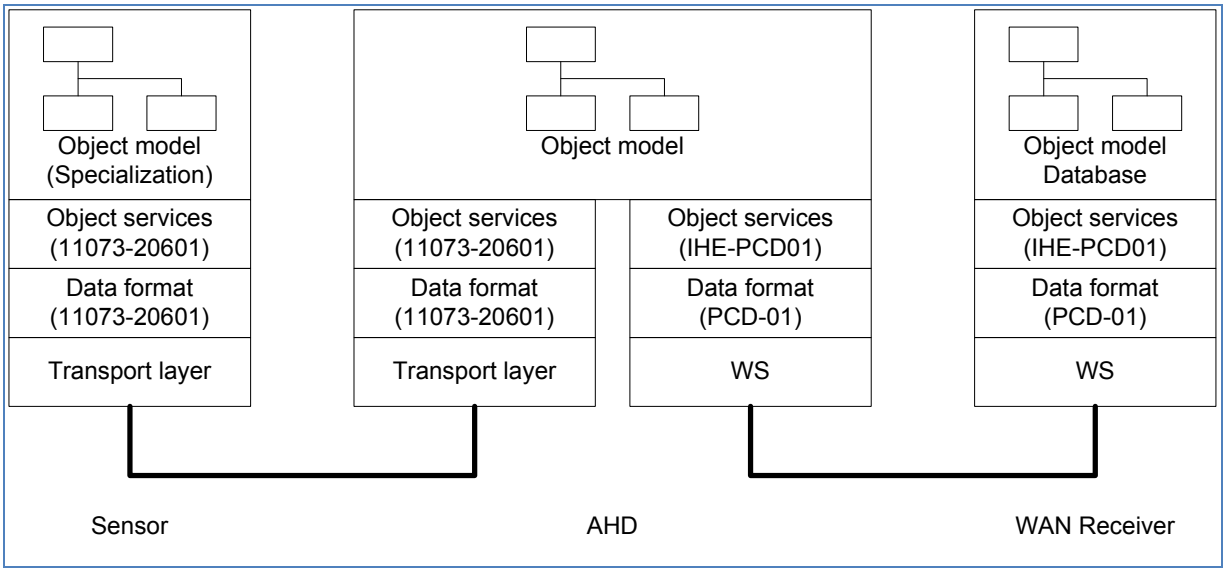

Figure 20 CHC pilot protocol architecture

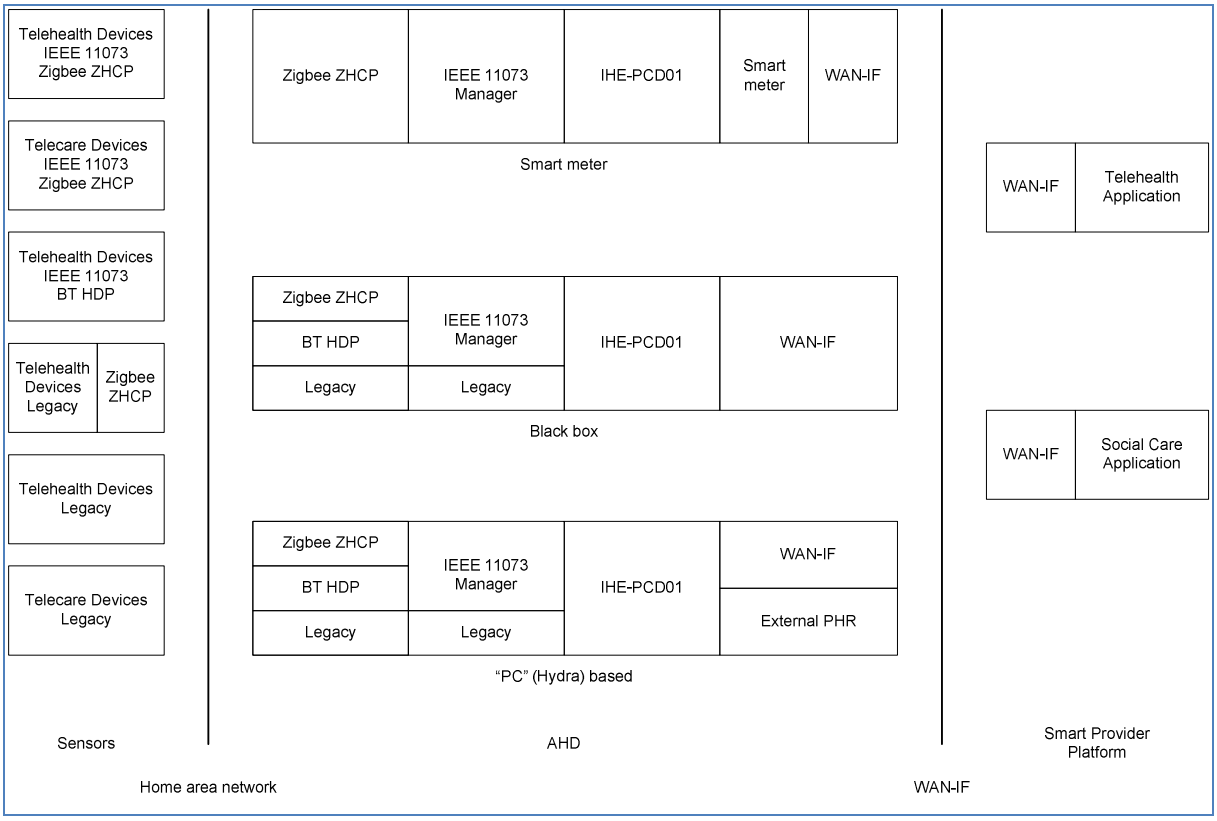

Figure 21 CHC pilot detailed architecture

The inCASA architecture for CHC will be based on the architecture as defined by the Continua Alliance and utilise standards for each of the interfaces. The Home Area Network (HAN) will use IEEE11073-20601 as underlying protocol for sensor to AHD communication of data, and use Zigbee Health Care Profile as wireless connection. These support object model descriptions of the sensor and its data that self-describe. This will simplify maintenance of the AHD as no software upgrades will be necessary as new sensors are added. Transmission of data from the home to the server at Chorleywood Health Centre will be based on IHE-PCD01 as transaction message for payload and be carried over the WAN-IF as defined by the technology.

The platform and sensors have been procured from Acute Technology as pre-commercialisation prototypes; sensors are based on commercial devices including BP and weight sensors from A&D, medication dispenser from Pivotell, motion sensor from Optex and bed/chair sensor from Tynetec. Each integrates a ZigBee wireless module using the ZHCP protocol and IEEE 11073 PHD standards.

The devices are Continua and ZigBee Alliance certified. All devices work through a simple to use home gateway that accepts ZigBee ZHCP compliant devices and transmits data over GPRS using IHE-PCD01 standard messages. This will integrate directly to the Reply reasoning engine. We have asked Acute Technology and they have agreed to investigate the integration of these platforms. We will use the clinician portal that accompanies the Acute Technology platform to manage data and users.

As shown in Figure 21 CHC pilot detailed architecture Figure 21, the architecture supports equally sensors for telehealth and telecare on the common platform; sensors are semantically interoperable; sensors are plug and play; it is an end to end architecture; the AHD acts only as a gateway and requires no upgrade as new sensors are added.

6.3 Work plan

The following provides information on the operational protocols that are being followed during the inCASA pilot.

The project will monitor 25 frail older patients who are currently on the chronic disease register at Chorleywood Health Centre.

Each patient will be provided with a monitor in their home that will capture and transmit a number of different physiological measurements (see table below) on a daily basis. In parallel to the clinical monitoring, the patients will also be provided with environmental sensors (see table below) that will monitor and capture trend information about the patient's movements while in the home in order to develop an activity template. We will not be monitoring for alerts. Intervention will be determined when data indicates a change from the patient's normal routine.

User Group	BP	Weight	Spo2	Chair Sensor	Bed Sensor	PIR
CHF	X	X		X	X	X
COPD	X		X	X	X	X
Dementia	X			X	X	X

Pre-Pilot Phase

The original pilot phase began in April 2011. 3 patients were recruited for a period of 3 weeks. Due to technical problems with the equipment, the pre-pilot phase was cancelled. Between April and December of 2012, further development work was undertaken on the equipment. The pre-pilot phase started again in December with 3 patients. In March 2012, a further 10 patients were recruited to take part in the pre-pilot phase. This phase saw the roll out of the gateway which replaced the smart meter that had been used in the earlier stages.

Patient Recruitment Updated

Those participants meeting the inclusion criteria are sent a letter of invitation, a demonstration information Form and the inCASA press release, which describes the project.

2 days after the letters are sent, a follow up phone call is made to each patient who has been contacted. The call is used to:

- Further explain the demonstration
- Describe what the impact will be on the patient e.g. time / disruption during installation as well as monitoring requirements
- Answer patients questions
- Confirm whether the patient is willing to participate and can attend the demonstration induction meeting.
- Confirm dates / availability for induction meeting.

Details and results of the phone calls will be recorded on the Recruitment Control Form. Responsibility for the follow up calls will be with the CHC Research Team.

Patient Consent

Each patient will be asked to read and sign a consent form. This form ensures that the patient is aware of why they are participating in the project and how their participation in the project will impact on them. This includes – understanding what the project is about, understanding the correct use of the technology e.g. not emergency devices and to inform them that they have the right to withdraw at any time.

Booking the installation of Monitoring Equipment
Patients will be contacted by the CHC research team.

Installations are normally carried out within the hours of 9am and 5pm, Monday - Friday, however where there is a specific requirement, out of hours installation will take place
.

Installation of Monitoring Equipment
The installations will be carried out by a member of the CHC research team.

Installation Process
During the installation, the installer will:

- Provide an overview of the demonstration
- Review and fill in the consent form (if not already completed)
- Ensure the patient is aware that the equipment is not an emergency device and if they feel unwell during the time they are being monitored they should contact their GP or dial 999 in an emergency as per usual
- Carry out a site inspection to ensure a suitable location is found for the medical devices e.g. scales and the habits monitoring devices e.g. chair, bed sensor.
- Install the monitoring devices as required
- Train the patient on using the monitoring devices
- Watch the patient use the monitoring devices
- Carry out further training if required
- Provide the patient with a monitoring device user guide
- Provide the patient with contact information
- Send a test transmission and confirm receipt either via laptop with mobile internet connection or contact CHC and confirm with one of the research team
- Complete the installation form and ask the patient to sign
- Return installation form to CHC.

De-installation
Patients will be contacted by the CHC research team 1 week prior to the due date of de-installation. Appointments will be made with each patient to carry out the de-installations. In the event of a failed de-installation, the reason for the failure will be recorded. These may include:

- Patient issue
- CHC reschedule
- Other Issue.

De-Installations will normally be carried out within the hours of 9am and 5pm, Monday - Friday, however where there is a specific requirement, out of hours de- installations will take place.

A de-installation form will be prepared by the person doing the de-installation. This form contains information concerning:

- Name and address and contact details of patient
- Date and time of de- Installation
- Pertinent information
- Description and serial number of equipment to be de-installed
- Confirmation and details of site inspection after de-installation has been completed

- Signature of Installer to confirm the above
- Signature of patient to confirm the above
- Questionnaire?
    - Patient satisfaction?
    - Quality of Life?
    - Usability?

The de-installations will be carried out by a member of the CHC research team:

During the de - installation, the installer will:

- Collect all monitoring equipment and place in a clear plastic bag.
- Review the de-installation form to ensure all equipment has been collected
- Carry out a site inspection to ensure no damage has occurred during the de-installation process
- Sign the de-installation form
- Ask the patient to sign the de-installation form
- Return de-installation form to CHC
- Unassigned equipment from the patient on the monitoring system.

Technical Support

In the event of a technical fault being identified by the CHC research nurses during the review of patient data, the technical issue protocol will be followed in order to determine if the problem is a local medical device problem or a wider communications problem.

- In the event that it is a local medical device issue, a member of the CHC research team will visit the patient within 24 hours (Monday – Friday) and either fix the problem on site or replace the equipment.

The patients will be asked (as per information provided to them on installation) to contact the Support Number in the event that they have a problem with the medical device or communications. This will be a single number for both device and communication faults and will be the CHC reception number.

The CHC reception team will log the call on a Fault Call Form and will forward the call to one of the CHC Research Team:

- A member of the support team with contact the patient within 2 hours of a call being logged. In the event that it is a local medical device issue, a member of the CHC research team will visit the patient within 24 hours (Monday – Friday) and either fix the problem on site or replace the equipment.

Patients will be provided with an out of hours call number for device or communication problems

Outcomes of all maintenance / faulty calls that are logged on the system for evaluation purposes.

Staff Training

Staff training will take place as soon as equipment / software becomes available.

All Staff will be trained on:

- Medical Devices – Jo Fursse
    - Operation
    - Installation
    - Trouble Shooting
    - Decontamination
    - Maintenance

- Habits Monitoring Devices
  - Operation
  - Installation
  - Trouble Shooting
  - Decontamination
  - Maintenance

- Monitoring Software – Jo Fursse
  - Managing Data
  - Review Data
  - Setting alert limits
  - Trouble Shooting
  - Habits Monitoring

- Clinical Protocols – Jo Fursse / Russell Jones
  - No data received
  - Within Limits
  - Above Limits
  - Technical Issues

The following documents will be prepared for users' training purposes:
- Medical device – Professional Guide
- Medical device – Patient Guide
- Habits Monitoring Device –Professional Guide
- Habits Monitoring Device – Patient Guide.

6.4 Social Care and Healthcare Integration

The goal of the inCASA model is to combine health and social care in responding to the needs of frail older people with long term conditions. This service integration is driven by both health and social care.

Currently health and social services are separate. Adult services are organised by Hertfordshire County Council and Chorleywood Health Centre provides primary care to over 6000 residents within the area. While work elsewhere in the county is looking at integrating health and social care, it has not yet been accepted as a model by West Hertfordshire where Chorleywood Health Centre is located. Referral between health and social care is currently carried out by referral letter and by phone. Social workers are then assigned to the patient directly and no further communication between health and social care takes place.

There are two main challenges that impact on the older frail person and the use of social services. Firstly carer breakdown, which is when the informal carer (unpaid carer) can no longer cope with the needs of the person they are caring for. Secondly it is when hospitals choose to discharge elderly frail patients into residential care rather than enable the person to return to their own home.

For health providers the challenge is to identify those of its frail older patients who are at most risk from deteriorating and requiring costly and avoidable admissions to hospital. While there are measures in place such as the Quality Outcome Framework (QOF) which supports the tracking of chronic disease every six months, measures of frailty are not recorded within primary care. However, it is the older frail patients that are at most risk of sudden deterioration and which can go undetected until the condition deteriorates and hospital admission is unavoidable.

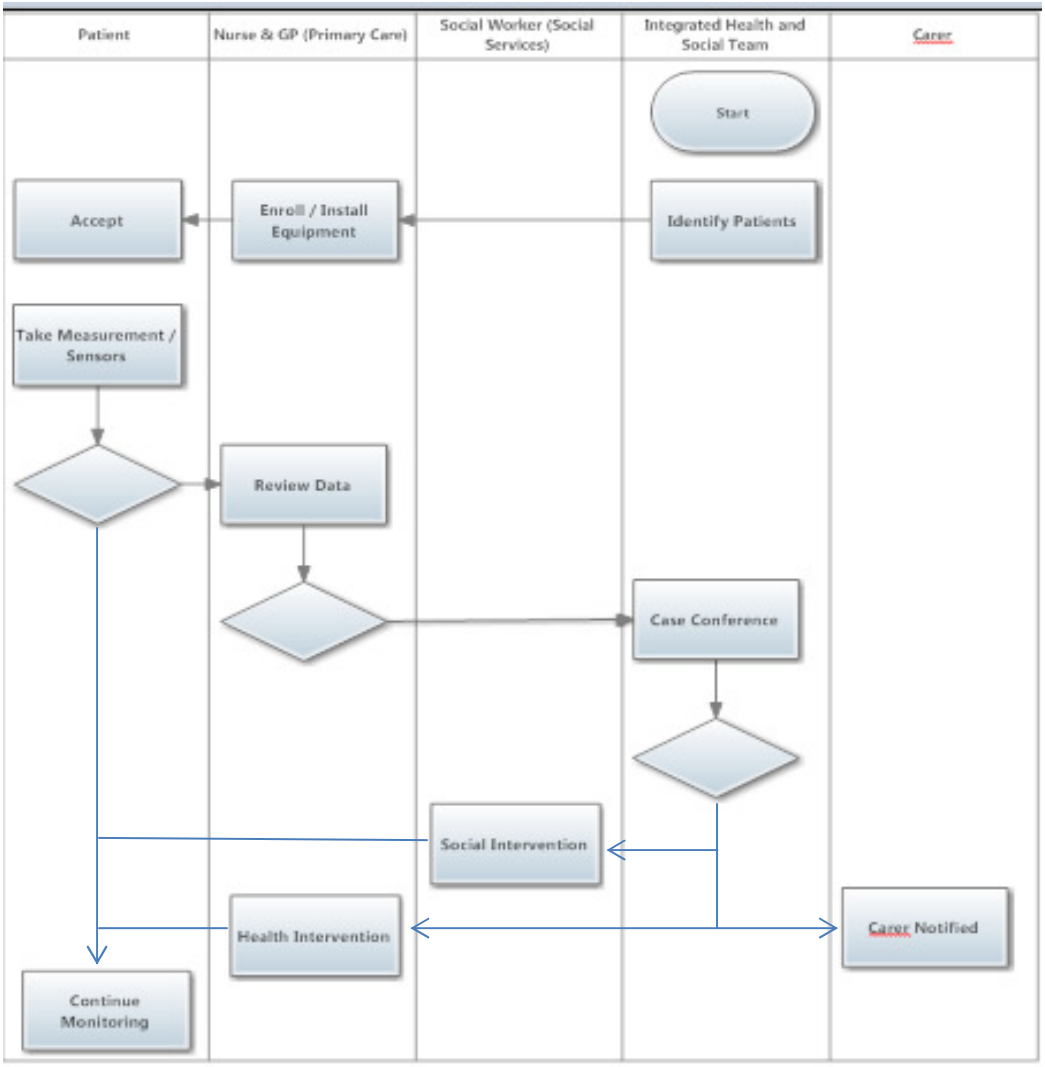

Figure 22 - CHC pilot workflow

This integrated service model supports the identification and monitoring of those frail patients with chronic disease who are at risk of sudden deterioration so that they can be treated and supported in their own home. The integrated health and social team can monitor, review and respond to the patients' needs as they change by providing comprehensive support covering a range of services. Costly hospital admissions can be avoided and the number of bed days can be reduced and early discharge can be enabled. Frail older patients who are at risk of sudden deterioration can remain safe and independent in their own home.

A frail older patient will be monitored by a combination of health and habits sensors in their own home (blood pressure, weight, spo2, blood glucose, bed, chair PIR sensors). Sensor data is transferred from the home to the health care team in the general practice and to a key social worker in social services. Data can be viewed on a combined health and social care interface. Aided by algorithms, changes in usual clinical measurements and levels of activity are measured.

Incoming data will be monitored by the health care team at Chorleywood Health Centre. Patterns of behaviour and physiological data, including in-bed restlessness, habits and deviations from habits, toilet visits, eating patterns, rapid weight loss or gain, medication adherence, blood pressure, weight ,spo2 and blood glucose will be assessed to provide decision support for the

health and social care professionals for cases such as Loss of autonomy or early detection of clinical deterioration.

Responses to the information will be managed by joint case conference between health professionals at Chorleywood Health Centre and social workers from Hertfordshire Adult Social Services. These will be held weekly or sooner if deemed necessary and facilitated by means of video conferencing or teleconferences.

Appropriate social and/ or medical interventions can then be determined by the joint team. Calls and visits can be made to the patient by either social or health care and details recorded on the integrated system. Interventions may either be changes in medical treatment or in support services able to maintain the independence of an older person in their own home (see Figure 22 above).

Examples of social intervention

- Home Help
- Meals of Wheels
- Home Care Services
- Adaptation to Homes
- Recreational Activities

Examples of Clinical Intervention

- Investigations
- Medication referrals
- Clinical Treatment

6.5 Pilot Schedule

Date	Action
October 2011	Pre-Pilot Commences
February 2012	D6.2 Pre-Pilot Report - Telehealth
March 2012	Pre-Pilot Extension – New Gateway,Telecare sensors, Combined Clinical Habits
July 2012	Pilot Commences,
September 2012	Integrated and Social Service Model Commences
September 2012	Installation Report
October 2012	Interim Report
March2013	Pilot Ends
June 2013	Evaluation Report

Table 6 – CHC Pilot Schedule

7 FHC Pilot Blueprint

FHC pilot is a clinical oriented pilot focusing on telehealth services. However, we aim to also integrate Telecare scenarios involving social stakeholders. It is organised as shown in the diagram below:

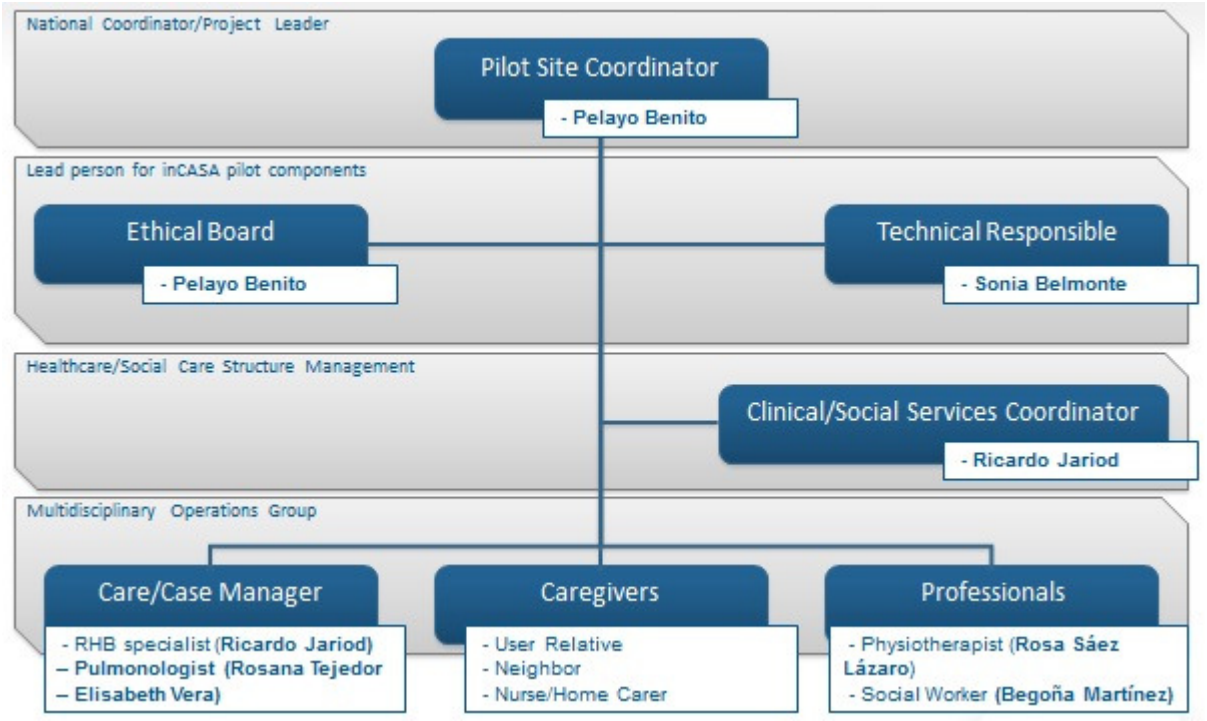

Figure 23 - FHC Pilot Organisation

National Coordinator/Project Leader
Pilot Site Coordinator is Pelayo Benito.

Lead person for the inCASA pilot components
Due to his wide experience, Pelayo Benito, currently head of the Quality Health Unit at FHC, is going to be both the Pilot Site Coordinator and leader of the Ethical Board. Meanwhile, Sonia Belmonte has participated in several projects at the European level and will be the Technical responsible.

Healthcare/Social care Structure Management
Ricardo Jariod (medical specialist in rehabilitation and Manager of Physical Rehabilitation Processes) will simultaneously supervise clinical and social services related to the project. He is also in charge of the development of clinical requirements for the pilot.

Multidisciplinary operations group
Nurse and Manager of the Hospitalization at Home Unit have been simultaneously appointed Care/Case Managers within the Multidisciplinary operations group, which will involve social workers for intervention in the outcome of the habits monitoring activities; technicians will hold an important role whenever a problem with the system occurs; General Practitioners will be involved in the analysis of the monitoring data retrieved during the pilot under a clinical perspective, to plan for right processes and actions.

7.1 FHC Pilot deployment strategy

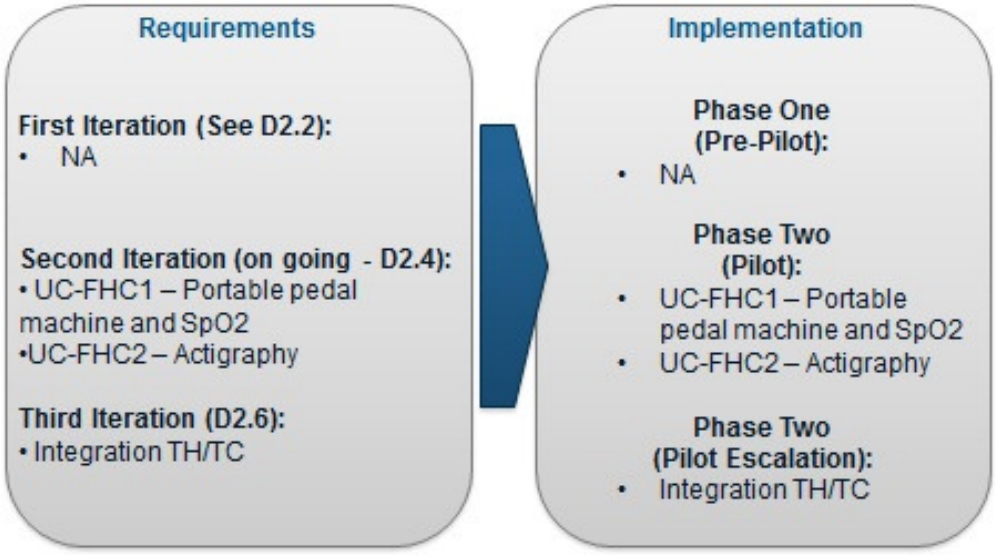

Figure 24 - FHC deployment strategy

FHC enters the project by the second iteration of inCASA User Requirements consolidation and prioritisation, due to internal issues.

The FHC didn't undergo a pre-pilot phase, instead it will implement the three phases by introducing, in Phase Two, the use case described in D2.1 Preliminary requirements investigation (Annex – FHC) and the use cases defined in D2.4 Requirements consolidation and prioritisation iteration 2.

Pilot starts at December 2012, installing equipment's at home at home. Reasons for FHC delays are basically dye to Technical problems. The day when the first group of patients involved in the pilot started was delayed due to the final date of competition of the acquisition of required kits (for example, 1 of the pulsioximeter had to be changed due to malfunction). Secondly, as per the observation of first "patient zero" iteration with the real kit at FHC facility held on November 2011, it was established that a mobile base was needed to put the tactile screen in the proper way to complete the prescribed exercises; a specific model of mobile base was designed with the help of subcontracted technicians in charge of installation of the equipment at patients' homes (it was studied how to adjust the length and height parameters for each patient in an easy and safe way, for example. First complete equipment was installed successfully at first patient's home on January13th, 2012 (previously, the patient had to complete a four weeks training period at hospital gym by using the same kit).

Second main reason for observed delays was caused by different problems, both technical an ethical ones, as described in the previous point:

Technical problems are mainly related to failure of connection between wrist pulsioximeter and tactile screen, as there are three different devices involved in the data gathering activity: tactile screen (with no Bluetooth capability), Bluetooth device connected to tactile screen and wrist pulsioximeter. Internet connection was expected to be a problem due to low range of internet services coverture within the region, but finally it has not been the most important one. Unexpected power shutdown due to local restraints has happened but has been solved by adding a specific device to inCASA kits to avoid data missing, too. One more kit was acquired to complete scheduled activities (two kits are installed at hospital gym, while four more kits are installed-desinstalled and installed again every 6 weeks according to patients' needs –date of finishing of training period at hospital gym, absences due to deplacements, etc.-), as well as to include actigraph within the FHC pilot sites activities, as it was established with the rest of the partners (TID), although it was not ready to use till April 2012. Ethical problems have arised the need of redesigning the pilot in order to include both social and care issues in a better way.

Further, the following has been introduced in Phase Two:

- a pulseoxymeter to increase the quality of the evaluation (related to use case 1) and to improve the user's profile with data on blood oxygenation during exercise;
- infrared actigraph.

Finally, in Phase Three, FHC will introduce other variables that the other pilot sites have been monitoring, thus drawing from and gaining from their experiences, as it is explained in the Social and Health Integration point.

7.2 Architecture

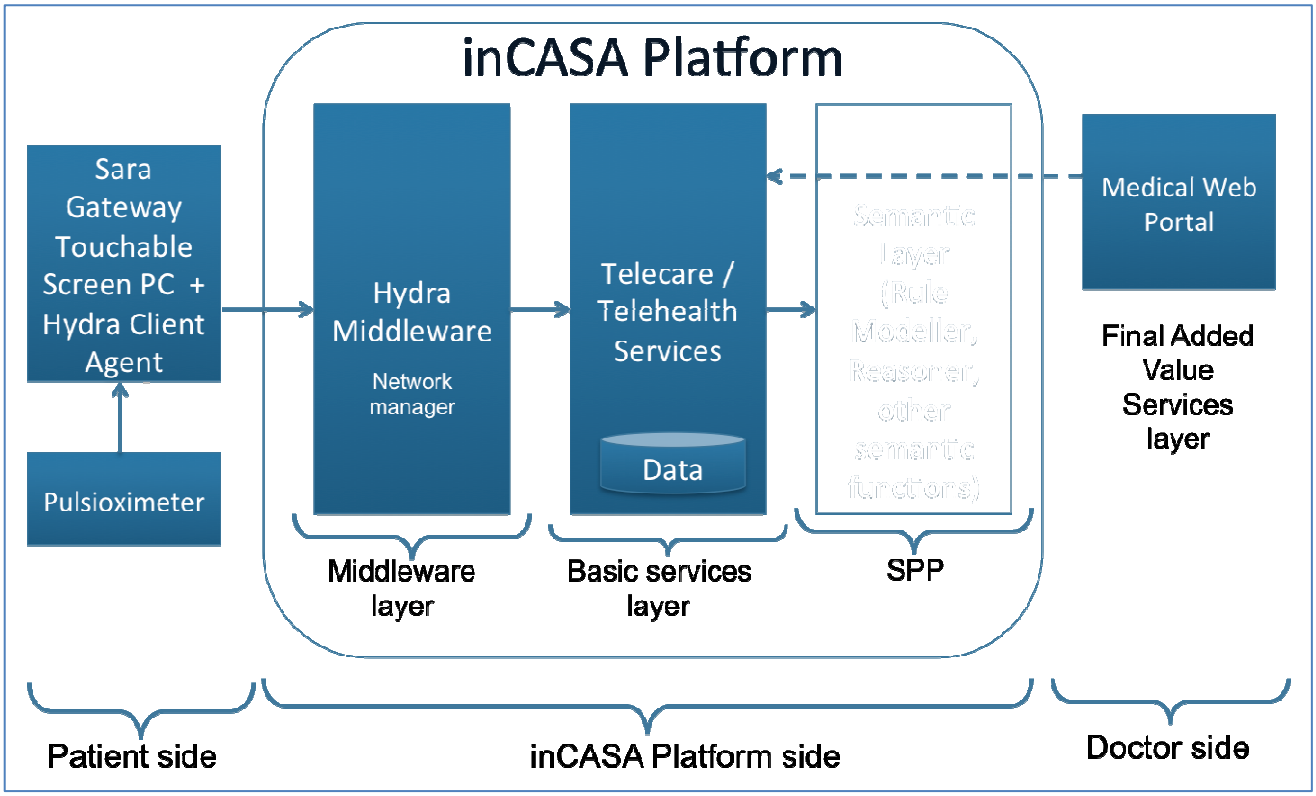

Figure 25 - FHC pilot architecture

As indicated in the diagram, the patient is using a pulse oximeter that communicates automatically and constantly (every 30 or 60 seconds) via Bluetooth with a tablet PC where both SARA and a Linksmart Client Agent are installed. The use of an actigraph at the FHC pilot site in accordance with INSERM and TID was decided, too. Its aim is to get a better understanding of the activity patterns of those patients who cannot do the in-home care initially prescribed due to different reasons (please see below paragraph 7.4).

Then, SARA uses specific Web Services to send information to the server, where it is saved through the Telehealth platform services.

Once there, doctors can access the information by simply going to the Medical Web Portal, which lets them receive the data directly on their computer, again thanks to specific web services provided by the platform.

The global system follows a 3-layer architecture:

1. A middleware layer to connect the software components such us sensors (in this case, a pulse oximeter plus, and in certain cases an actigraph) and human input with the underlying logic of the system;
2. Basic telehealth and telecare information services;
3. Semantic processing layer.

These three layers' capabilities will be delivered through Applications as Web Services.

7.3 Work plan

Patient evaluation (4 weeks)
Involves the agreement between the Internal Medicine Unit and the Physiatry Unit about patients to be included in the pilot, first medical consultation with the physiatrist, general information for the patient and informed consent.

Training at the hospital (2 weeks)
Includes specific training in the exercises that will be performed and the devices that the patient will use at home. This phase was cut down from originally four weeks to two weeks period due to advices given by the colleagues of a FHC rehabilitation specialist at a meeting held in Madrid (Spain) on January 2012 where inCASA project (FHC pilot site) was presented.

SARA evaluation from home (6 weeks)
This phase includes transportation and installation of the monitoring devices and, of course, the remote monitoring of exercise for at least 4 weeks, withdrawal of the equipment after finishing the pilot and (very important) patient supervision by home care professionals to guarantee the implementation of activities that ultimately are agreed according to pilot results.

Physiatric Evaluation (1 week)
Final evaluation by the physiatrist through standardised and ad hoc questionnaires (SF-36, St. George, BODE index). The Edmonton frailty scale was also included in response to conclusions made at the pilots' meeting held at INSERM on September 2011. A FHC Neumologist specialist has also been involved during the monitoring of a post-phase at the end of the inCASA project for patients due to their needs as chronic patients (it will include the monitoring of FEV1 levels)

All of the steps defined above will be repeated for each group of 5 patients subsequently. A control group was added to get data gathered from patients who are not attended to in their own homes but only at the hospital gym. They used the same inCASA kits as patients doing prescribed training exercises at home. The aim for this particular activity was mentioned in one of the pilot meeting held during the development of the pilot phase and it is expected to strength the quality of clinical evaluation at the end of FHC pilot site.

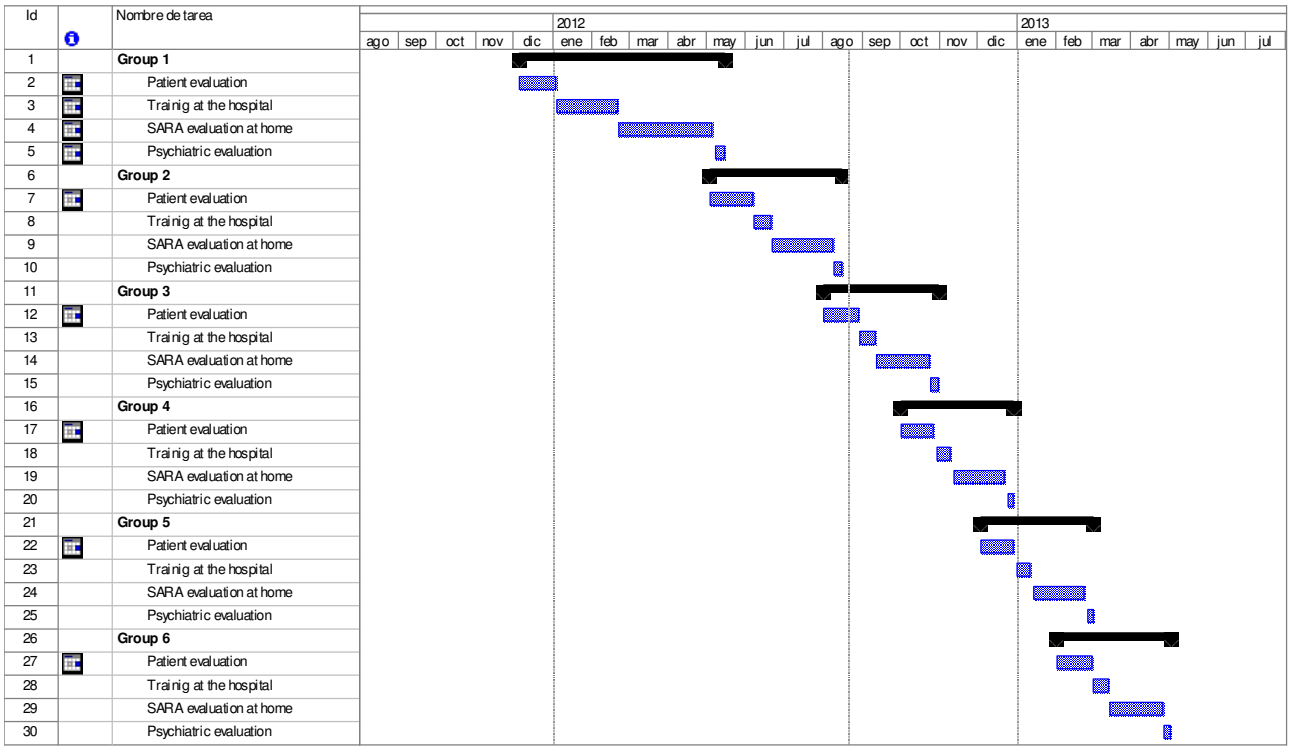

Figure 26 - FHC pilot deployment progression

7.4 Social Care and Healthcare Integration

During the development of the pilot at FHC pilot site, a significant number of preselected patients did not completed the programme initially prescribed:

- Some of them did not want to participate in the initial interview with the clinicians due to different reasons such as feeling depressed , due to the chronic character of their condition; it often causes a lack of interest to the effort required by the program for the changes in the habits of living, and other unknown social determinants (social environmental pressures, acknowledge of the determinants of their own illness)
- Other patients have declined the invitation to participate because they or their relatives did not want to do the prescribed exercises, which required them to undergo to pre-tests (spirometries, Body Mass Index calculation, tobacco withdrawal, etc.).
- Despite of their willingness to take part in the pilot, some patients have no way of transport to the hospital or no one to accompany them regularly during the period of pre-training (one hour for two or three sessions per week, in a continuous period from two to four weeks). Thus, factors such as isolation, solitude, place and conditions of residence (to far from the hospital, lack of own home, etc.) made it impossible for them to participate. Finally, in some cases the health of the patient made it unadvisable for them to do the exercises initially proposed. This was either because they are too elderly or because the comorbidity related to their condition could not guarantee that the treatment would result in more benefits than inconveniencies to their state of health (in one case the patient had completed the initial phase of training at the FHC gym but he died just before he could continue with the home treatment due to his complex clinic status).

From a general point of view, it is evident, both with patients who decide to participate in the treatment and with those who decline to do it, that the patients' clinical condition is highly influenced by their life habits and possibly by their social environment too. Their life style (daily activity degree, autonomy, healthiness of the environment, diet guidelines, social life, etc.) is a determinant factor both in the appearance and in the evolution of the illness (chronic obstruction pulmonary disease).

Consequently, it has been determined that the initial design of the pilot must be changed in order to include with a higher determination in the offered service to the patients' aspects related specifically with both care and social issues that can influence in their medical status. The availability of alternatives has been checked by health professionals directly involved in the project; regional authorities in charge of providing of both social and health services have also been consulted about their availability to include those aspects.

The main conclusion obtained after the review of FHC pilot´s content is that it is indispensable to introduce a new role in the pilot, called "social worker", that would allow attending to the new needs detected which are related to social status of each patient.

FHC is a county hospital oriented to specialized assistance for acute patients, mainly consisting of an outpatient surgery. Therefore, FHC suffers from the lack of pre-existing integrated services that combine both social and health aspects . The redefinition of the organizational aspects of the FHC pilot means that it must be equipped with an initial minimal level of expertise in social questions is then needed.

In order to achieve this, the management board at FHC has decided in the first place to establish cooperation guidelines with the units that are in charge of providing social services within the regional public organization. Secondly, FHC has decided to redefine the roles for some of their staff whose tasks nowadays are to attend to patients and users (management of complains and claims) and who only occasionally carry out social tasks. They will be part of the project and will play an active role.

The measures that have been considered more effective according to the current evolution of the project at FHC pilot site and the foreseen time frame are expressed below:

The introduction of the social worker role must be characterized for the following notes:

- Execution of the evaluation reports regarding the status of the patient from a social perspective by the professionals who are qualified in the field (social workers).
    - Possibility to use the current health management system of FHC, common to the rest of La Rioja´s health care system (called ”Selene” and powered by Siemens &Telefónica) to prescibe the request of execution of an specific ”social status valueing” report.
    - The execution of this report will be responsibility of the social worker attached to FHC or of those social workers that are currently developing their activity in the primary attention level (FHC belongs to the second attention level –specialized services to be offered by hospitalarial oprganizations-). The total number of patients estimated to be included in the social report activity in the period from August 2012 to December 2012 is 42, and according to this distribution:
        - 32 patients who have completed the telerehabilitation program, or are carrying out it or could do it in the future.
        - 4 patients that only do the treatment at the hospital’s gym (control group).
        - 3 patients who didn’t want to participate in the home treatment.
        - 1 patient who has been excluded because he does not live in a private home but in a nursing home for elderly people.
        - 2 patients excluded due to comorbidity risks (Charlson>3, dementia).
    - FHC’s social worker will be the interlocutor between the health professionals of FHC and the social workers at primary care level, and will coordinate the execution of these reports which will concern both patients who have finished with the treatments and those who are currently carrying it out.
- The motoring of the patients during the execution of the treatment at home will be done by the social worker and will consist of:
    - Control phone calls twice a month during the period of six weeks while the patient does prescribed exercises at home (this period of in-home treatment can eventually be repeated in case it is needed according to clinical evaluation of patient’s status – they are chronic ones-).
    - Visits to patients’ homes in case of necessity (depending on development: hourly availability, ways of transport, etc.).
    - Coordination between the physiotherapist in charge of home care assistance (who teaches the patients how to do the exercises properly, how to use the technology involved, and who is also in charge of in-home monitoring of the patient by making weekly visits to patients’ homes) and the social worker in charge of the evaluation activity previously described will be necessary. The inclusion of the social worker can demand the introduction of changes for other involved professionals (e.g. the technical team, health care professionals, social workers of city councils and primary care level). Nowadays the physiotherapist is the one who rules contacts with patients, for example by warning when there are technical problems which may require a visit to any particular home. For now on, it could be assumed and developed by FHC social worker.
- Inclusion of any kind of remote monitoring of the physical activity carried out by the patient, in substitution of the monitoring of the execution of the prescribe exercises (when the patient can not do exercises because of his/her bad health conditions) or as a way to understand better the implications and results of the execution of those exercises (by storing information related to the regular level of activity before and after the training prescribed at home).

- In order to complete this task an actigraph will be used. It allows compiling and transmitting information of the daily physical activity carried out by the patient in significant periods of time. Two possible scenarios have been defined:
  - Patients who cannot complete the training plan at home: These patients will use the actigraph during a continuous period of five-to-ten days to obtain information about his/her behavioural habits, which will allow healthcare staff to design a treatment plan accordingly.
  - Patients who can complete the training plan at home: These patients will use the actigraph during a period of four-to-five days prior to the execution of the exercises at home, plus another four-to-five days after having completed it all to check the possible degree of influence of the treatment prescribed according to the life style of the patient.
- FHC has a borrowed one actigraph and a touchable screen authorized to send the data of the actigraph online. To be able to do this, it was necessary to transfer part of the investment initially obtained by FHC in the inCASA project (1PM) to TID. Interoperability is necessary between the actigraph and the touchable screen, and the remote delivery of data for this query from FHC is a prerequisite in order to be able to complete the remote monitoring in a successful way.

In order to begin the above social and healthcare integration two actions are necessary:

- To be specific about the details regarding the new role of social worker with the people in charge of the unit and the staff involved at FHC (in progress, a meeting is planned for the first week of August). A meeting is also planned with the regional authorities in charge of the primary care level social workers (beginning of August). Contact will be established with the social workers of the city councils who are involved in the project and with the patients who are included in the project and who live there. This task will be put in progress by organising meetings between the FHC social worker and other social workers who work in the municipalities in order to inform them about the project. These meeting are also planned to take place August and the first two weeks of September.
- To ensure the availability of the needed technology (actigraph) aforementioned.

The flow chart below (Figure 27 graphically describes the Healthcare/Social care service integration for FHC pilot:

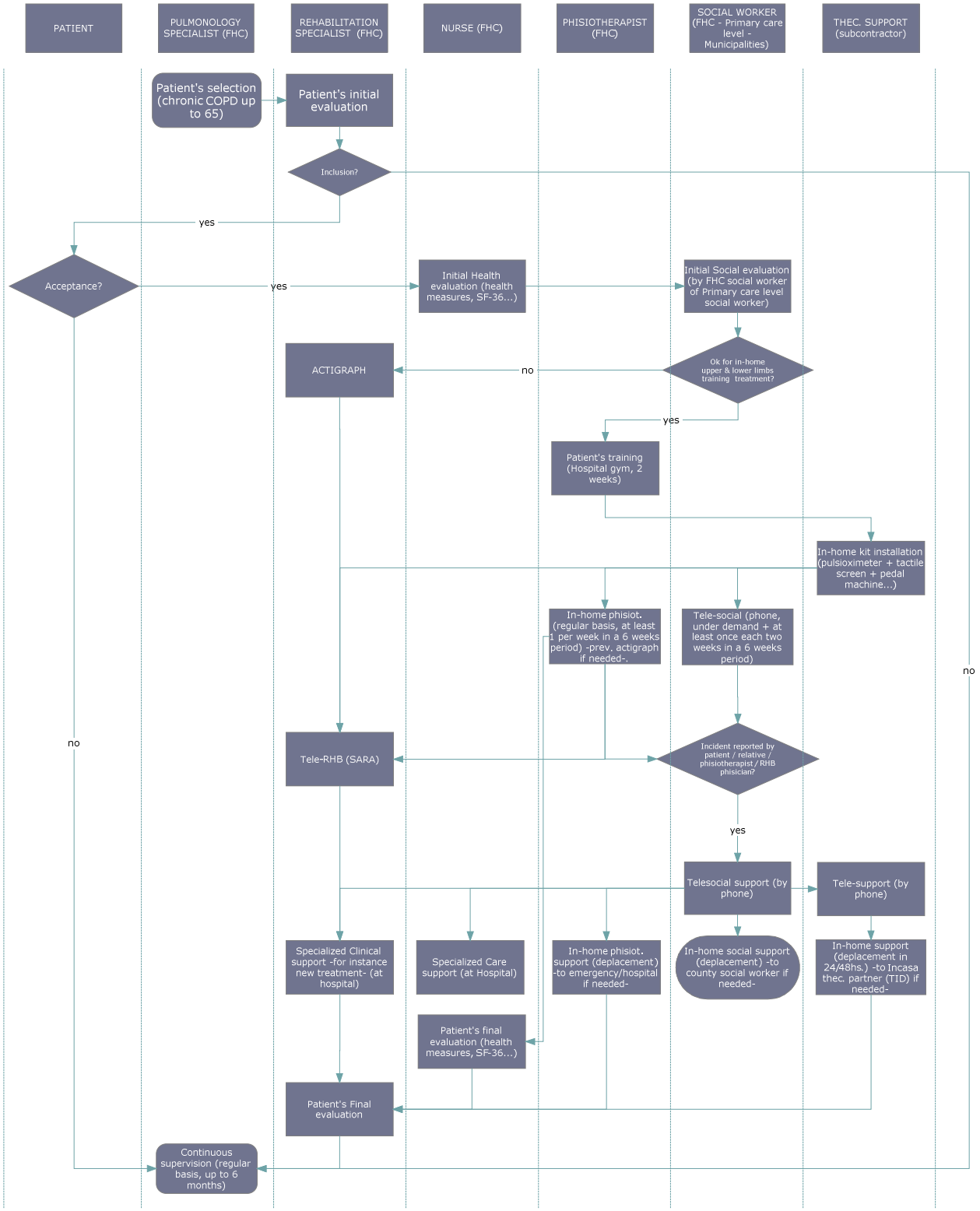

Figure 27 - FHC pilot workflow

7.5 Pilot Schedule

Date	Action

05.2010	Project ethics approved by the Committee for Ethics in Clinical Research in La Rioja (CEICLAR)
09.2010	Equipment acquisition and parameterisation completed
12.2011	Pilot phase starts
01.2012	Group 1 pilot started
05.2012	Group 2 pilot started
08.2012	Group 3 pilot started
09.2012	Group 4 pilot started
10.2012	Group 5 pilot started
11.2012	Group 6 pilot started
11.2012	Escalation phase starts
03.2013	Pilot Ends
04/06.2013	Evaluation Report

Table 7 – FHC Pilot Schedule

Finally, first complete equipment was installed successfully at first patient's home on January13th, 2012 (previously, the patient had to complete a four weeks training period at hospital gym by using the same kit).

Nine patients completed their in-home training period in July 2012. Three additional patients are expected to finish their in-home training by mid-August 2012.

The six original patient groups have been split into seven groups plus one control group. This was done to ease the patients' introduction to the use of an actigraph and in order to recover the participation of some patients that declined to participate or were not able to do so due to their specific health and social determinants.

8 Conclusion

In conclusion the national Blueprints, by showing schematically the deployment of each of the five pilot sites involved in the inCASA project, aim to demonstrate what is in common across the various countries.

In order to increase the efficiency of the project, four pilot sites (ATC, INSERM, KGHNI, CHC) decided to introduce a pre-pilot phase with the aim of improving the quality of the service testing framework. As a result, both technical and service related parts of the project can be introduced progressively and more successfully.

Pilots are progressing, following the same organization and the same methodology, within a common technological framework that leaves “open” different implementations at a local level.

The updated situation of the pilot progress is the following.

Pilot	Start Date of Pre Pilot	Start date of Pilot	Pilot Escalation	Pilot End Date	Pilot Evaluation Report	Total number of Users	Number Recruited to date	Current Users	Number of Users Ended
ATC	Oct 2011	March 2012	October 2012	March 2013	June 2013	20	20	20	0
CHC	Oct 2011	Sept 2012	Sept 2012	March 2013	June 2013	25	12 (pre-pilot) 5 pilot	2	12 (pre-pilot)
FHC	N/A	2nd December 2011	November 2012	March 2013	June 2013	30	29	12	6
INSERM	Nov 2011	March 2012	Sept 2012	March 2013	June 2013	30	8	6	2
KGHNI	Oct 2011	March 2012	Sept 2012	April 2013	June 2013	25	15	5	0

Appendix A: The devices

This table shows the list of devices to be included in the deployment plan of the inCASA solution, including the number of devices to be bought for each pilot site:

Device		Pre-pilot	Number	Pilot	Number	Total
Brand - Model	Type					
Netvox Z-B01C	Motion Detection / Photo Sensor / Temperature Sensor	ATC	12	ATC	60	72
				KGHNI	10	10
Tynetec	PIR/Motion Sensor	CHC	3	CHC	22	25
Tynetec	Bed sensor	CHC	3	CHC	22	25
				KGHNI	5	5
Tynetec	Chair sensor			KGHNI	5	
		CHC	3	CHC	22	25
Tynetec	Personal Identification/Fall detection	CHC	3	CHC	22	25
Funkstuhl MatControl	Bed Sensor			ATC	10	10
Funkstuhl Transmitting Chair	Chair Sensor			ATC	20	20
Netvox Z-800	Activity sensor (Power Socket with Power Consumption Monitoring)			KGHNI	5	5
				ATC	20	20
A&D Medical UA-767-PBT	Blood Pressure Monitor			KGHNI	5	5
		CHC	3	CHC	22	25
A&D Medical UC-321-PBT	Weight Scale	KGHNI	5	KGHNI	5	5[2]
		CHC	3	CHC	22	25
		INSERM	5	INSERM	5	10
Nonin Onyx II 9560	Pulseoximeter			KGHNI	5	5
		CHC	3	CHC	22	10
				FHC	5	5
Pivotell	Medication Monitor	CHC	3	CHC	22	25
LifeScan OneTouch Ultra 2	Glucometer			KGHNI	5	5
Zephyr HxM BT	Heart Rate Monitor			KGHNI	5	5
Infrared Actigraph	infrared actigraph			INSERM	10	10
Equivital EQ-01 2009 SEM	2-lead ECG, Pulse, Body temperature, respiratory rate, motion (3-axial accelerometer)			KGHNI	1	1
TBD (Data manually inserted on a tablet) – e.g. Hemosense INRatio	INR monitor			KGHNI	1	1
Sparkfun Witilt 3.0	Accelerometer (motion detector)			KGHNI	1	1
TID – SARA Symptoms self assessment	Tablet provided to patient	INSERM	5	INSERM	5	10
				KGHNI	1	1

[2] KGHNI will use the same number of weightscales on the Pilot phase, transferring them one to another user.

Device		Pre-pilot	Number	Pilot	Number	Total
Brand - Model	Type					
ASUS EeeTop ET1610PT	All-in-one Personal Computer with touchscreen provided to patient	KGHNI	5	KGHNI	5	5[2]
Ergo-fit – Cardio line 400	Cycloergometer			FHC	2	2
Netvox - Z-711 Temperature and Humidity Sensor (Indoor)	Temperature and Humidity Sensor	ATC	4	ATC	20	24
Netvox - Z-302A Window/Door Sensor	Window/Door Sensor	ATC	4	ATC	20	24
Netvox - Z-801WLS Flood Sensor	Flood Sensor	ATC	1	ATC	10	11
Steinbeis Activity Hub	Activity Hub	ATC	4	ATC	20	24
				KGHNI	5	5
				INSERM	10	10

Table 8 – inCASA Pilots devices quantification