AAL Joint Programme

Health @ Home

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Lead contractor for the deliverable: Consorzio Pisa Ricerche

Project: **H@H** – Health @ Home
Call for Proposals AAL-2008-1

Coordinating person: Alessandra Silvestri – a.silvestri@cpr.it

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Dissemination Level: PU

PU	Public
PP	Restricted to other programme participants
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CO	Confidential, only for members of the consortium

	Responsibility
Prepared by	Alesandra Silvestri
Verified by	Tony Bacchillone, Luca Fanucci
Approved by	Luca fanucci

Revision history

Version	**Date**	**Reason/Changes**	**Author**
1	31/1/2011	First Version	Alessandra Silvestri

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- *Nella maggior parte dei paesi UE, la spesa dell'assistenza sanitaria supera la crescita economica.*
- *L'evento più importante a livello di europeo di sanità elettronica, la eHealth Week (Budapest, dal 10 al 12 maggio), sottolinea la necessità che i sistemi di assistenza sanitaria si adeguino alle necessità future grazie ad un uso più esteso di soluzioni IT.*

BRUXELLES, BELGIO e BUDAPEST, UNGHERIA - (12 aprile 2011) – In un contesto di una popolazione invecchiata, di trattamenti medici all'avanguardia ma costosi e di una cittadinanza esigente e ben informata, le tecnologie dell'informazione sono viste come una pietra angolare di un servizio sanitario mondiale sostenibile in Europa. Alla eHealth Week 2011, l'incontro annuale della comunità di sanità elettronica europea, i principali protagonisti ci sveleranno come le soluzioni IT possano aiutare ad adeguare i sistemi sanitari del continente europeo alle sfide del futuro.

"Gli attuali metodi di fornitura dei servizi sanitari sono semplicemente insostenibili tenendo conto dei cambiamenti demografici e dell'ondata prevista di malattie croniche," sostiene Jeremy Bonfini, vicepresidente senior dei Servizi Globali presso HIMSS. "Abbiamo bisogno di sistemi IT che permettano, ai professionisti dell'assistenza sanitaria, di dedicare più tempo a trattare i pazienti e risparmino loro il tempo che li occupa a rincorrere scartoffie non disponibili, perse o che stanno andando a rilento."

Oltre il 30% della popolazione europea avrà più di 65 anni nel 2025. Le malattie croniche come il diabete probabilmente raddoppieranno o persino triplicheranno nei prossimi 20 anni, conducendo ad una mancanza di specialisti e personale sanitario. Già oggigiorno, si stima che i costi del personale rappresentino il 50-70% della spesa sanitaria. Dalle informazioni fornite dal governo spagnolo, i

sistemi di assistenza sanitaria attuali richiedono che i professionisti utilizzino tra il 30 e il 50% del loro tempo a svolgere compiti amministrativi piuttosto che a curare i pazienti.

La spesa del Sistema Sanitario cresce più velocemente della crescita economica

Attualmente la Francia spende l'11% del suo PIL in assistenza sanitaria, la Germania il 10.6% e il Belgio il 10.3%. Per la maggior parte dei paesi europei l'assistenza sanitaria rappresenta la percentuale più alta di crescita del loro budget in termini di spesa.

Secondo l'Organizzazione per la Cooperazione e lo Sviluppo Economico (OCSE), i sistemi sanitari europei richiedono un aumento della spesa che supera la crescita economica. Quindi, secondo gli analisti OCSE, molti governi dovranno compiere scelte difficili per sostenere i loro sistemi sanitari, e cioè frenare la crescita della spesa pubblica della sanità, tagliare i costi in altre aree o aumentare le tasse.

Gli assicuratori sanitari olandesi e il Bureau di Analisi della Politiche Pubbliche dei Paesi Bassi hanno già annunciato che il premio annuale di assicurazione sanitaria per persona si prevede che cresca di 300 euro nei prossimi quattro anni perché i costi dell'assistenza sanitaria aumenteranno di 4% all'anno, mentre per l'economia si prevede una crescita di solo un 1.25%.

"I nostri sistemi stanno andando verso un collasso sicuro se non applichiamo cambiamenti radicali," avverte Neelie Kroes, Commissaria Europea dell'Agenda Digitale. "In tempi di austerità fiscale e di aumento del deficit, una spesa intelligente è sempre più efficace dei tagli alla spesa."

L'élite europea in sanità elettronica ci indica la strada

Uno studio del caso portato avanti dal Gruppo Ospedaliero Asklepios in Germania ha dimostrato che i costi annuali per paziente potrebbero essere ridotti del 36.7% attraverso l'uso delle soluzioni di salute elettronica. Il CIO di Asklepios, Uwe Pöttgen, sarà uno dei relatori chiave della eHealth Week 2011 che si terrà a Budapest tra il 10 e il 12 maggio 2011. Dalla Francia, il Prof. Eric Lepage di AP-HP condividerà la sua esperienza sulla modernizzazione del Sistema d'Informazione Ospidaliero che coinvolge 72.000 professionisti sanitari in 37 ospedali parigini.

La eHealth Week si è rivelata come l'unica vera piattaforma paneuropea di assistenza elettronica: la Germania sarà rappresentata da dieci relatori, la Svezia da sette e la Danimarca e il Regno Unito ne avranno entrambi sei. Delegazioni di tutti gli stati membro della UE manderanno i loro responsabili alla High-Level Ministerial Conference che, per la prima volta, aprirà le sue porte a tutti i partecipanti della eHealth Week. Stanno giungendo iscrizioni da tutta l'Europa, con i paesi scandinavi primi tra tutti. La mostra The World of Health IT ha attirato alcuni degli espositori più importanti del mondo. AGFA e HP sono Diamond Sponsors dell'evento, mentre che EMC, Intel e Telekom saranno Gold Sponsors.

"Questa è l'unica settimana dell'anno in cui si riunisce la comunità eHealth europea. Ci si può concentrare di più su networking e sviluppo professionale e realizzare più business qui che in qualsiasi altra settimana dell'anno," dichiara Bonfini.
Le iscrizioni sono aperte su www.ehealthweek.org.

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Per ulteriori aggiornamenti, visitate il sito http://www.ehealthweek.org e seguiteci alla pagina http://twitter.com/EU_ehealthweek

High Level eHealth Conference 2011: Per maggiori informazioni visitate il sito http://www.ehealthweek.org .

World of Health IT Conference & Exhibition: Per maggiori informazioni visitate il sitohttp://www.worldofhealthit.org

Per maggiori informazioni contattate:

HIMSS Europa

Christina Roosen

croosen@himss.org

Tel.: +32 2 793 7633

Commissione Europea

Corinne Wenner

corinne.wenner@ec.europa.eu

Tel.: +32 2 296 4194

2 Project Fact Sheet

Name of the project, acronym, number (AAL-20NN-N-XXX):

Health@Home, H@H, AAL-2008-1-082

Coordinator:

Consorzio Pisa Ricerche - Luca Fanucci - l.fanucci@cpr.it

Duration of the project and starting date:

Duration 30 Months. Started on 01st February 2009

Partners:

Name	Type (end-users, business, SME, R&D)	Country	Web address
CONSORZIO PISA RICERCHE Scarl	**Research organisation**	**ITALY**	www.cpr.it
CARIBEL PROGRAMMAZIONE Srl	**Big company**	**ITALY**	www.caribel.it
CAEN Spa	**SME**	**ITALY**	www.caen.it
MEDIASOFT Ltd	**SME**	**SLOVENIA**	www.mediasoft.si
Fundación CITIC	**Centre of Innovation and Technology**	**SPAIN**	www.citic.es
Hospitales Universitarios "Virgen del Rocío"	**Health institution**	**SPAIN**	www.huvr.es
Fondazione Gabriele Monasterio	**Health institution**	**ITALY**	www.ifc.cnr.it/fgm
Zdravstveni Dom Koper	**Health institution**	**SLOVENIA**	www.zd-koper.si

Objective of the project (Minimum 500 characters):

The Health at Home project (H@H) aims at solving societal problems related to the provision of healthcare services for elderly citizens affected by Chronic Hearth Failure (CHF), by enabling remote self-management of the disease and connecting inhospital care of the acute syndrome with an out-of-hospital follow-up. **The overall objective of the project is to enhance the quality of life of elderly people**

and strengthen the industrial base in Europe through the use of ICT.
The new care model should allow planning, controlling and monitoring of activities carried out by patient, caregivers, social and sanitary professionals, enabling the medical staff to monitor situations at distance and take action in case of necessity by the involvement of public and private health organizations. This new strategy will decrease the acting time in cases of destabilization of CHF patients and will reduce avoidable hospital re-admissions, resulting in an improved quality of life for the patient and in a cost reduction for the National Sanitary System.

Abstract of the project (Including technology in use, end-users involvement - Min. 1500 characters):

Overview

By using wearable sensors developed by H@H, patients' physio-pathological cardiovascular and respiratory parameters are acquired and transferred to a remote server. The data collected are continuously monitored by an automatic processing system and accessible by the medical staff, who can take action in case of necessity.

The involvement of end users' since the first stages of the project was fundamental for the definition of user requirements. The rationale was to device a flexible and concrete system, taking into consideration both medical and patients' needs and expectations: for the physicians the telemonitornig system can not be an excessive overload with respect to their regular activities, on the other side, the impact on the patient must be minimal. For these reasons it was developed a system directly integrated with the Hospital Information System (HIS) based on Operating Protocol (OP). The OP consists of a set of actions that the patient must follow during the monitoring. The OP can be customized depending on the patient's needs and possible disease evolution when necessary. The actions are simple tasks like taking measurements or replying to simple questions.

H@H Architecture

The system has the typical client/server architecture (see **Errore. L'origine riferimento non è stata trovata.**). The client side is located at patient's home and consists of a home gateway and a set of biomedical sensors. The server side, installed at the health service facilities, accepts and processes data from gateways making them available in the Hospital Information System.

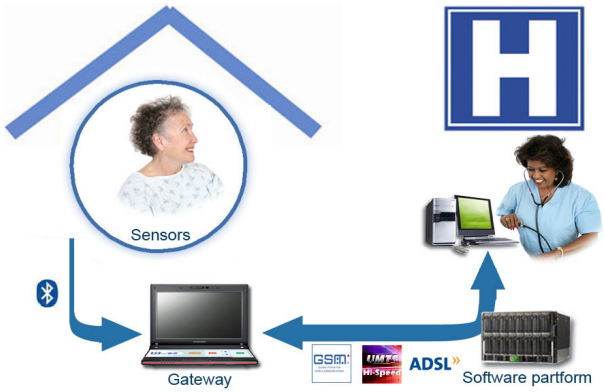

Figure 1 – System Architecture

The Bluetooth technology was chosen for the communication between the sensors and the gateway, due to the wide diffusion of available devices on the market.

On the other side, ADSL is the primary transmission channel for data communication between the gateway and the server, while the mobile broadband (GPRS/UMTS) is used as secondary data channel. Redundant access technologies, ensure flexibility and fault tolerance. Furthermore alert messages are sent as SMSs directly to the physician, the patient's relatives and the caregivers.

Sensor Devices

The sensing module consists of a set of wireless and wearable sensors to measure the main

vital signs. Most significant vital parameters a CHF patient monitoring are 3 leads ECG, SpO2, weight, blood pressure, chest impedance, respiration and posture. Resulting from a close collaboration with the clinicians partners. Table 1 shows the features of the sensor devices.

Table 1 Sensing module devices

Parameters	**Sampling**	**Level**
3 lead ECG	500 S/s/lead (12bit/S)	Basic
SpO2	3 S/s (10 bit/S)	Basic
Blood pressure	1 S/type (32bit int)	Basic
Weight	1 S (32bit float)	Basic
Chest imp	25 S/s (10 bit/S)	Advanced
Respiration	25 S/s (10 bit/S)	Advanced
Posture	3 axes * 1 S/s/axis (8 bit/S)	Advanced

In order to achieve an asset for the implementation and to reduce project risks, the sensing module was divided into two possible configurations: basic and advanced. Basic partitioning is intended as the minimum set of requirements to achieve a complete and useful telemonitoring system. In the advanced confguration additional features were considered in order to enlarge the number of patients to be enrolled into the telemonitoring.

The basic configuration involves three sensors: A&D medical UA-767BT arm cuff device for blood pressure, A&D medical UC-321PBT digital scale for weight and ECG-SpO2 device produced by CAEN-IT for acquiring synchronized 3 leads ECG and SpO2 traces.

The integration of ECG and SpO2 functionalities in a single wearable device enables the synchronized acquisition of ECG and SpO2 traces, which makes available a larger and more specific amount of information for further interpretation. Figure 2 shows a picture of the sensor and Figure. 3 shows an example of the data acquired.

Figure 2 - ECG-SPO2 Sensor

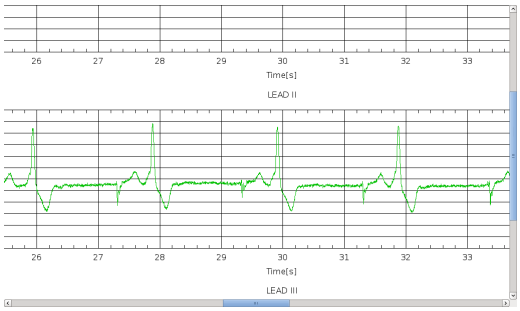

Figure 3 - Sensor: data acquired

Home Gateway

The home gateway centralizes all needed computation and communication resources. The home gateway is responsible of the acquisition, management and forwarding of data on vital signs captured by the biomedical pool of sensors. The acquisition consists of handling all the sensor-dependent communication protocols in order to receive specific data sets and extract their information content. Data management includes a first level of analysis, consisting of a comparisons with thresholds in order to detect anomalies, and the permanent storage of data waiting to be transferred, so that power supply failures do not result in data loss. Collected data are made available also for local consultations. The transmission process allows to flood data into the patient's Hospital Information System (HIS) record.

The following list summarizes all the gateway functionalities:

- Acquisition of data from wireless sensors;
- Data forwarding to a remote collection server using a safe and reliable connection;
- Reminder function, in order to help patient to follow the medical therapy and perform the planned measures;
- Detection and management of emergency events, both coming from threshold comparison on incoming data or indicated by the patient through a selectable list of symptoms;
- Execution of an operating protocol customized basing on patient's needs;
- System failure detection and management during data acquisition or data transmission to the server;

The gateway device is based on a netbook already integrating all the computation and communication requirements. In order to simplify the use of the gateway, the original keyboard of the netbook was replaced by a simpler keypad, realized as a membrane keyboard, with only few useful buttons: Yes, No, Alarm sending and Up/Down scroll buttons.

Figure 4 - Simplified keypad

Being a general purpose device, all the desired capabilities are implemented with a linux-based multithreaded software platform directly running when the netbook is switched on. It results in a very modular architecture that ensures easy maintenance and upgrades, including future extensions with new sensors or the introduction of new communication standards

The gateway follows the operating protocol and executes the tasks as scheduled by the physician. When a planned activity time is reached, an alarm calls the patient's attention and the system helps him to follow the therapy with messages and animations. To accomplish the reminder function the system has an intuitive graphical user interface (see **Errore. L'origine riferimento non è stata trovata.**) composed by three main areas: on the top the reminder textbox, a summary of the lasts measures on the left and an animation helper on the right.

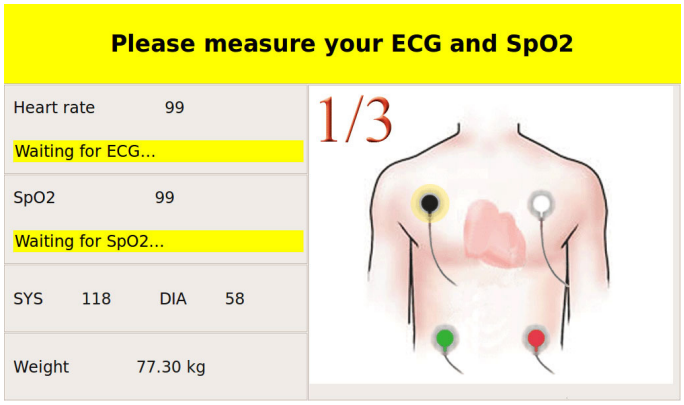

Figure 5 - Screenshot of the home gateway

The graphical helper section strictly works with the reminder: the gateway helps the patient to interact with the system through textual messages and a set of animated images showing how to wear sensors to record required measures or how to use the input interface to select a symptom from the list.

In order to minimize the patient effort, the measure acquisition simply consists of turning on the related sensor and wait until the end of the measurement process. All involved sensor devices are able to establish a connection with the home gateway to transmit the relevant data. Moreover, extra protocol measures can be performed at any time, even if not established by the OP. After the reception of an extra protocol measure, the system asks the patient the reason of the measurement by selecting the symptom from a list.

Server Module

The server side, installed at the health service facilities, accepts and processes data from the gateways making them available in the Hospital Information System. The H@H server is a

web-based application that receives data from all controlled gateways, providing a detailed process of analysis based on expert systems and finally updating the patient record in the HIS. It exports graphical interfaces that allow the clinicians to request and display: the data of a patient to detect early changes in vital signs, the historical data of a patient, monitoring the progress of the disease and to update the operating protocol.

The server platform main functions are related to the patient management since their enrolment when the physician inserts the patient data and configures the OP on the basis of the patient needs. During the monitoring period the server collects patient measurements coming from the gateway. The physician can always look through the patient clinical folder, comparing the patient heath status in different periods by means of measurement trends. The system also highlights the alarms shown during the monitoring with respect to the OP established for that patient or simply to report symptoms manually indicated by the patient.

If necessary, the physician can modify the OP in any time by producing an automatic and transparent update of the gateway.

Server-Gateway Communication

As data exchanged between the gateway and the server involves the public Internet, the HTTPS protocol uses HTTP messages over an SSL channel established after certificate validation, fitting completely the requirements of confidentiality, authenticity and integrity for the data traffic and the webservice interaction.

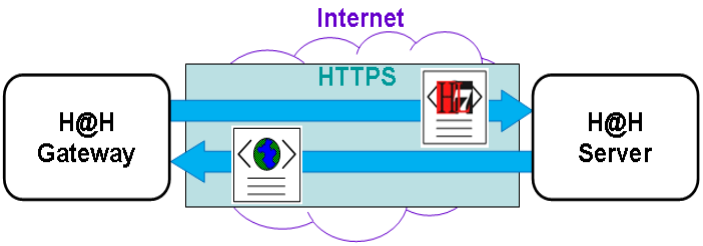

Figure 6 - Gateway – Server Connection

The request message sent by the home gateway at any transmission time contains all patient data (vital signs and events) mapped with HL7 CDA standard blocks, while the response includes the actual XML operating protocol description.

H@H Demonstration

The H@H consortium has currently finalized the integration and technical validation of the whole system, including sensors, home gateway, expert processing system and clinical platform.

The final project demonstration will be performed on 30 patients in the three countries involved in the project. CHF patients will be selected taking into consideration their medical history, features and personal profiles.

Expected results and impact (Minimum 500 characters):

The H@H system is expected to enhance the quality of life of CHF patients (at present 14 million of European Citizens with an incidence of 3,6 million of new cases per

year), to improve the effectiveness and cost management of specialized centres thus reducing costs for the public sanitary system. H@H ICT technologies have been successfully proved through an initial demonstration phase, while the clinical validity and the economic analysis for this new healthcare model has to be validated on a wider number of patients.

Images or graphic (Logo, images or photos showing the product or service):
Images or photographs (also graphics where needed) are mandatory. Send ftp link or esp file.

Website link(s):

http://www.health-at-home.eu/

Contact person (e-mail, phone, address):

Luca Fanucci l.fanucci@cpr.it**, +39 050 2217668**
Corso Italia, 116 – 56125 Pisa, Italy

3 A flexible telemedicine platform integrated with the Hospital Information System for patients affected by chronic heart failure

Luca Fanucci, *Member, IEEE*, Sergio Saponara, Tony Bacchillone, Massimiliano Donati, Claudio Passino, Filippo Costalli, Isabel Sanchez-Tato

***Abstract*—Chronic heart failure (CHF) affects an ever-growing segment of population and is the major cause of hospitalization for elderly citizens. The considerable impact on patient quality of life, the resources congestion and the high economic costs is recently attracting the attention of physicians and administrators, which identify telemonitoring as a strategy to provide effective and cost efficient out-of-hospital healthcare services for CHF patients. The current healthcare model is mostly in-hospital based and consists of periodic visits. To overcome the limits of the actual model, a flexible telecare platform integrated with the Hospital Information System (HIS) is proposed, enabling CHF patients to daily collect vital signs at home and automatically send them to the medical facilities. As proved by first medical tests, it allows an early detection of destabilization, reducing the acting time in case of necessity and re-hospitalizations. The proposed platform has two parts. The patient-side consists of a pool of wireless, non-invasive biomedical sensors and the home gateway that executes a new operating protocol tailored at the beginning of the monitoring period and remotely updatable. The server-side, installed at hospital, accepts and processes data from the gateways making them available in the usual HIS and finally allowing the management of all patients' data since their enrolment.**

***Index Terms*— e-health, telemonitorig platform, telemedicine, chronic heart failure (CHF).**

INTRODUCTION

ACCORDING to the American Heart Association definition CHF "is a progressive condition in which the heart muscle is unable to pump enough blood through the heart to meet the body's needs for blood and oxygen". The typical features of this syndrome are: breathlessness, fatigue, tachycardia, tachypnoea, signs of fluid retention such as pulmonary congestion or ankle swelling and objective evidence of a structural or functional abnormality of the heart at rest [1]. Furthermore, co-morbidity is highly prevalent in heart failure. CHF represents one of the most relevant chronic disease in all industrialized countries, affecting approximately 15 million people in Europe and more than 5 million Americans, with a prevalence ranging from 1% to 2% and an incidence of 3.6 million new cases each year in Europe and 550.000 cases in America [2], [3], [4]. It is the leading cause of hospital admission especially for older adults reaching a prevalence of 1.3%, 1.5%, and 8.4% in 55–64 years old, 65–74 years and 75 years or older segments respectively [3]. CHF has a progressive evolution, with a variable duration depending on the severity of clinical status at the time of the diagnosis. It is associated to a 1 year death rate of 10%, 20% and 40% for patients in class New York Heart Association (NYHA) II, III, and IV respectively. Admission to hospital with heart failure has more than doubled in the last 20 years [2]; CHF continues to increase in both prevalence and incidence, as result of the general aging of population [5], and it is expected that CHF patients will double in 2030. Hospital admissions caused by CHF results in a large societal an economic issue accounting for 2% of all hospitalizations [6]. The CHF management accounts for 2% of the total healthcare expenditure [7] [8] and hospitalizations represent the costliest (more than two thirds) share of such expenditure [4]. Along with these direct costs there are also some indirect costs, primary due to the lost of productivity. In this scenario the economic burden of the CHF may become unsustainable in few years and thus it requires the introduction of cost-efficient healthcare services/treatments and moreover preventive strategies migrating towards more suitable outpatient follow-up management programs [9].

The current healthcare model is mostly in-hospital based and consists of periodic visits, mostly monthly or larger, which however have a low capability to early diagnose the typical signs of decompensation that precede the acute syndrome, leading to a large number of re-hospitalization. The length of stay and costs increase for subsequent hospitalizations. Studies point out that in patients with a discharge diagnosis of heart failure the probability of a readmission in the following 30 days is about 0.25, with the readmission rate that approaches 45% within 6 months [11]. Besides the important problem of poor quality of life (QoL) of surviving patients and their caregivers [10], this number of re-hospitalizations leads to high congestion in specialized centre and pose financial problems to National Health Systems. There is also evidence that a large portion of readmission related to heart-failure could be avoidable via better post-discharge treatment program [9]. The characteristics of the disease show symptoms and changes in vital signs before the aggravation becomes irreversible, thus an almost continuous monitoring would ensure early diagnosis and treatments, reducing acting time in case of destabilization and avoidable hospitalizations. This regular observation can not be done at medical facilities due to lack of resources. The use of ICT has been identified by physicians and administrator as valid support to overcome this limit providing effective and cost efficient health care services for CHF patients. There is in literature some evidence that a multidisciplinary management program [9] [12] including a home-based follow-up strategy, i.e. telemonitoring or structured telephone support, can improve the outcomes in heart failure patients such as reductions in mortality, hospital readmissions, lengths of hospital stays, and increased patient satisfaction [13]-[15].

To this aim a CHF telemonitoring integrated with the HIS is presented in this work, allowing for the collection of vital

parameters at home and automatically send them to the medical center, where patients' signs and symptoms can be received remotely by healthcare providers, and aggravations can be quickly detected and addressed. More frequent (usually daily) assessment of clinical parameters than in conventional practice is permitted [16]. The benefits extend beyond the early detection of clinical exacerbation to optimising specialized resources scheduling and to reduce unnecessary travel to hospital. The proposed telecare system has been developed in the framework of the Health at Home project (H@H) of the Ambient Assisted Living Programme (AAL). The H@H project introduces a new flexible and high configurable platform for domestic vital signs acquisition and processing along with a management scheme able to support in integrated and coordinated fashion the whole treatment of CHF patients since their enrolment in the system. The H@H platform aims at connecting in-hospital care of the acute syndrome with out-of-hospital follow-up by patient/family caregiver, being directly integrated with the usual HIS. The requirements of the system come from a close collaboration with the end users with the rationale to develop a flexible and at the same time a concrete system, taking into consideration: medical and patients needs and expectations, not excessive overhead with respect to regular activities and minimal impact to the user. The use of international standard for data communication to improve the interoperability with existing HIS, the remote configurability of the behaviour of the home system to meet patients needs, the on-board data processing for alarm detection along with the reminder, the assisted procedure for scheduled activities on home system and finally the open software platform ease to extend to cope other chronic disease besides heart failure are among the main breakpoints refer to the state of the art.

The section II will review the state of the art. The H@H system architecture is introduced in Section III. Sections IV and V will describe respectively the home module and the server module. Communication details will be explained in Section VI. The section VII will describe the testing validation phase. Finally conclusions are drawn in Section VIII.

state of the art Review

Considering the Ambient Assisted Living (AAL) Roadmap [17] that draws the guidelines to develop efficient strategy and system to face the aging of population, along with the actual trends and the future challenges in telecare [18] and some recent studies conducted on AAL solutions [19], especially for telemonitoring [20] the desirable features of a monitoring platform for chronic disease are:

1) health monitoring service using wearable/portable sensors for non-invasive measure of vital signs and activity level and symptoms signalling,
2) reasoning and data processing to detect emergency situation or behaviour,
3) secure and reliable communication of data,
4) interconnection between stationary home care and acute medical treatment,
5) integration with existing solutions and components,
6) modular structure of the solution to ensure easy maintenance and future extensions,
7) high degree of interoperability accomplished by the use of well-know communication standards,
8) flexibility to face the wide range of patients' status and the progress of chronic diseases,
9) interfaces and system requirements defined taking into account the individuality of the end user group.

Today there are many system of telemedicine available on the market [21]-[27], specific for CHF or suitable for this kind of disease, together with many dedicated prototypes and project trial [28]-[30]. Discarding systems based on telephone calls or web-portal to report symptoms and outcomes of the measure for scalability and usability issues respectively, but considering instead systems in which measures are performed by the patient and automatically transmitted to remote node, it is difficult to find a solution that completely agrees with all the previous points. Despite all platforms exchange data in secure way allowing the use of multi-vendor wired or wireless sensing modules and performing alarm management; most of them use a dedicated collection database failing the point 4 and partially the point 5. This way data collected at home are not flowed into the existing HIS that in turn contains only data related to acute syndrome. All solutions have a gateway that receives analyses and forwards data coming from sensors. This device is often realized using a smartphone or PDA, a set of box or a PC. Small screens and rich application interfaces does not meet the requirements of older users > 65 years with comorbidity and possibly cognitive or sensorial deficit, lowering the acceptance/usability of the system. Finally, all considered systems do not include a formal method to adapt and monitor the follow-up activities to be performed at home by the patient. The H@H telecare platform, described in detail in the following sections, represents a complete and flexible ICT solution developed taking into consideration the guidelines discussed.

Telecare System overview

The H@H development Consortium is composed by industrial, research and clinical partners with qualified competences in sensing and data processing and very important healthcare provider. Users' involvement since the first project stages (Hospitales Virgen del Rocio, Spain; Dom Koper Hospital in Slovenia and the research clinical center Fondazione Gabriele Monasterio in Italy) was fundamental for the user requirements definition. The rationale was to device a flexible and at the same time a concrete system, taking into consideration both medical expectation, patients' features (elderly, with numerous comorbidity and cognitive deficit) and the progressive nature of the disease. For the physicians the telecare system must not introduce an excessive overhead with respect to their regular activities, on the other side it must be as simple as possible to use minimizing impact with the patient. For these reasons we propose a system directly integrated with the HIS based on a very configurable follow-up Operating Protocol (OP). The newly developed OP consists

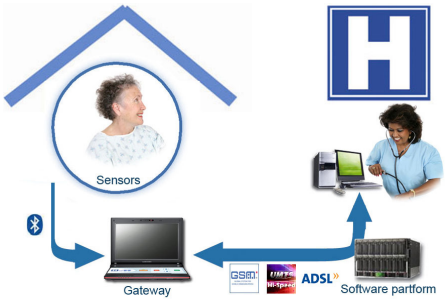

Fig. 1 H@H System Architecture

on a set of actions, like taking measurements or replying to simple questions, that the patient must follow during the monitoring period. The OP can be customized depending on the patient needs and possible disease evolution if necessary.

The system has a client/server architecture (see Fig. 1). The client side is located at patient's home and consists of a set of wireless and wearable sensors to measure the main vital signs and an additional device, the home gateway that centralizes all needed computation and communication resources. The server side, installed at health service facilities, accepts and processes data from gateways making them available in the HIS and finally allows the management of all patients' data since their enrolment. The subsystem located at the patients' home has itself client/server structure in which sensors act as clients of the collection point represented by the gateway.

Sensor data are collected via wireless connection, in that sense we selected the Bluetooth 2.0 technology due to his wide diffusion in biomedical devices. The home gateway processes the received data to detect dangerous alteration (see data processing paragraph in Section IV) and then forwards them to the hospital server through ADSL or mobile Broadband. As the coverage of GSM is near to 99% the system reach a very high degree of connectivity. In the worst case the GPRS upload data rate of 20Kbps is sufficient to transmit all data in few minutes. Surely better performance becomes available with EDGE, and UMTS. Furthermore the gateway is able to exploit the GSM network to send SMSs to the physician, patient's relatives and caregivers in case of alert situation. The availability of multiple communication paths ensure a good adaptability of the system in overall operating areas and improves the fault tolerance.

HOME GATEWAY SENSOR RESOURCES

Parameters	Sampling	Basic	Advanced
3 lead ECG	500 S/s/lead (12bit/S)	√	
SpO2	3 S/s (10 bit/S)	√	
Blood pressure	1 S/type (32bit int)	√	
Weight	1 S (32bit float)	√	
Chest imp	25 S/s (10 bit/S)		√
Respiration	25 S/s (10 bit/S)		√
Posture	3 axes x 1 S/s/axis (8 bit/S)		√

Home monitoring module

The home monitoring module includes a sensing part to allow the measurement of the main vital signs and a home gateway devoted to the acquisition, management and forwarding of data. Upon discharge the patient is trained about the system and all devices are provided in a single bag, with the dimension of those carrying 15" laptop computer, and an overall weight of 2,8 kg to be transportable everywhere.

Sensors

Biomedical sensors supplied to the patients have been chosen to be wearable, non invasive and battery powered. They are worn / used only for the duration of the measures, resulting in a solution with limited impact to the patient. As results of the requirement analysis carried out by the physician partners involved in the H@H project most significant vital parameters to monitor in a CHF patient are ECG, SpO2, weight, blood pressure, chest impedance, respiration and posture. To achieve an asset for the implementation and to increase scalability of the system the sensing modules have been clustered into two possible configurations: basic and advanced. Basic partitioning is intended as the minimum set of requirements to achieve a complete and useful telecare system. As advanced we refer to additional features in order to widen the kind of patients to be possibly enrolled into the telemonitoring. TABLE I shows the features of the sensor devices and the composition of the basic and advanced version of the system. This way different trade-offs are possible between cost and easy use of the system on one side, and complexity of the amount of data transmitted to the remote HIS on the other. As discussed in Section II, the complexity of use is one of the main cause of failure for the acceptance of telecare systems by CHF patients and caregivers, and since the basic configuration already provides to the HIS the needed data set for accurate CHF telemonitoring, then the basic set in Table I is the one implemented and used for the medical technology test reported in Section VII. The basic configuration involves three sensors able to initiate concurrent connections to the home gateway in order to transmit relevant data using the Bluetooth SPP profile. In this way a measure acquisition simply consists of turning on the related sensor and wait until the end of the measurement process without any preventive interaction with the system, introducing also benefits in battery saving. The sensors send only raw data and all forms of processing are demanded to the gateway. With respect to other alternatives such as Zigbee or point-to-point WiFi links, Bluetooth provides the desired trade-off between available bandwidth, security and reliability of the connection, cost and power consumption of the node, link distance. Indeed the nominal data rate is 430Kbps against ~18Kbps required by the ECG-SpO2 device. Peering procedure between gateway and sensors are required whereas encryption is optional.

TABLE I

A&D medicalUA-767BT arm cuff device for blood pressure and A&D medicalUC-321PBT digital scale for weight are commercial products that transmits data at the end of acquisition each using a dedicated channel. ECG-SpO2 device by CAEN is ad-hoc developed device to acquire synchronized ECG and SpO2 traces. It is based on Cardic chip by CAEN and ChipOX OEM assembled on single broad with Bluetooth capabilities. The two signals are sent real-time in interleaved way on a single channel. In accordance with the physicians analysis only 3 leads of ECG are considered sufficient for our purposes and not excessively dependant on the transducer positioning.

Home Gateway

The home gateway contains all data collection and communication capabilities, centralizing and automating acquisition and transmission processes of vital signs, in order to minimize patient efforts. It accepts connections and handles all sensor- dependent communication protocol to receive data packet from wireless biomedical sensors and extract their content. The gathered information are then analyzed to early detection of critical alterations and forwarded to the remote server system to be further analyzed and flowed into the usual HIS, enabling the medical staff to monitor patients at distance and take actions in case of necessity.

The gateway follows the OP and guides the patient in performing the activities as scheduled by the physician. In addition to the planned measures the system can receive others spontaneously performed by the patient. In this case it is requested to select the reason of the measurement from a list, still ensuring the analysis process. Finally it is possible to signal alarms manually from a selectable list when an abnormal symptom is perceived (i.e. dyspnoea, palpitation, breathlessness, etc). In such case the OP may provide some suggested measures that are immediately scheduled.

The system provides a permanent storage of pending data waiting for transmission so that power supply failures do not result in data loss. Thus considering all vital signs, along with weekly deferred sending, at least 16 MB of memory are required.

To achieve a fully compliance of requirements, taking into account flexibility, robustness and user-friendliness and at the same time reducing costs and project risks, several hardware solutions have been considered. Full custom platform presents some advantages but long development and testing time. Moreover the number of device for early demonstration is very low, resulting in a high cost per unit. Mobile phone has too small display and keys, limited memory space and comes with only mobile broadband connectivity. In Smartphone potentially the allocation of memory and the computational resources meets the demands. However it is not the better solution due to the size of display and also because, being born to telephony, running applications are placed on hold/delayed status, giving priority to calls. Bluetooth access points are used to realize bluetooth network typically in proximity marketing. Some of them allow customizing its functionality thanks to a Linux software platform and specific SDKs. These products are upgradeable with a series of interfaces with USB connection such as GSM/UMTS or Wifi modules. The degree of customization reachable without incurring the cost of SDK, inferred by tests, is not adequate for the project needs.

TABLE I
HOME GATEWAY HARDWARE RESOURCES

Intel ATOM N450 1,66 GHz
Memory RAM 1 GB DDR2
Hard Disk Sata 250GB
Display 10,1"
Ethernet 10 / 100 LAN
Wireless 802.11bg/n
Bluetooth 3.0
GSM/GPRS/EDGE and UMTS/HSPA
Built-in audio
Ad-hoc 5 keys keypad

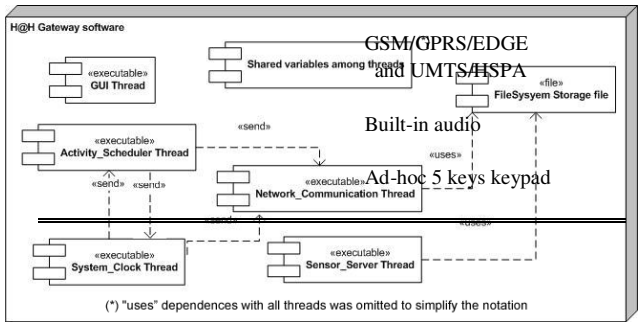

Fig. 2 Components diagram of the gateway application software

A netbook represents the best trade-off among development risks, costs, friendliness and requirements compliance. It is designed for wireless communication, thus typically includes most of the needed resources: Wifi, Bluetooth, modem, 9-10 inches screen, speakers, low-power x86-compatible processor, storage space, etc. All missing interfaces, or future extensions, can be added by USB connector. The only drawback is the keyboard, whose keys are too small and too many respect to the request. So we developed a custom keypad in replacement of the native one for the selected netbook (Samsung N150) including only the required buttons: Yes, No, Alarm sending and Up/Down scroll buttons. (see TABLE II).

The operating system chosen for the gateway is based on Linux kernel 2.6.27 or higher, customized with the addition of a lightweight window manager and deprived of unnecessary services, applications and kernel modules. The H@H software runs directly when netbook is switched on. It is implemented in C language using respectively libbluetooth, libSSL, libXML, libgtk to support Bluetooth management, security, XML parsing and graphical development. The software architecture is represented in the Fig. 2 using UML diagram:

i. the sensor server manages incoming connections over Bluetooth interface to receive raw data from sensors,
ii. the network communicator manages the available channels to forward both collected information to the server and alert SMS to caregivers/physicians,

iii. the clock and the scheduler ensure scheduling and reminder of all the therapeutic activities,
iv. the Graphical user interface handles both events throw during interaction with the keypad and the visualization of messages in the application window.

The main concerns of the system were implemented in separated threads to ensure a high modularity and the maximum flexibility when combining them in any arbitrary operating protocol. This modular architecture ensures easy maintenance and upgrades, including future extensions with new sensors or the introduction of new communication standards.

Operating protocol

The operating protocol describes the behaviour of the home gateway in terms of types and frequencies of measurements transmission policy, selectable symptoms, comparison thresholds and phone numbers for each alarm. The OP is tailored by the physician at the beginning of the monitoring period and it can be remotely updated in progress according to the patient conditions. In fact at the end of any data transmission, if necessary, the server is able to update the current operating protocol by sending the new one to the gateway. The OP update and the consequently reconfiguration of the gateway is totally transparent to the user. Usual value for measure frequencies and ranges for alarms detection are shown in TABLE III , but clinicians can configure up to three daily measurements for each parameter and modify the range.

Data processing and alarm management

Data processing involves in general three main steps: pre-processing, analysis and cry wolf avoidance. The pre-processing consists of the filtering of raw data provided by the sensors, removal of noise and main interference, and the extraction/gathering of meaningful information. In case of ECG signal a filtering chain is applied including baseline drift correction, 50/60 Hz notch to remove powerline interference and moving average to improve the legibility of the track. The processing is held in the time domain with digital FIR filters (e.g. a 3 tap filter is used for 50-Hz noise removal from ECG acquisitions). The required arithmetic precision is compliant with a real-time implementation on a 32-bit single-core processor. Then a specific algorithm extracts the R-wave envelope as indication of the respiratory activity and it calculates the average heart rate using windowing technique [31]. Whereas for weight and blood pressure it is not required, a low-pass FIR filter is used to retrieve the average oxygen saturation. The analysis step compares the outcome of the preprocessing with the thresholds (configurable, also remotely, by the physicians) that establish the admissibility range for punctual values or trends over a medium period. The last step ensures the presence of abnormal values, typically by requesting again the same measurement, before rising alarms and contacting either caregiver or health professionals via SMS when abnormal values or situations are confirmed.

THE OPERATING PROTOCOL

Data	Schedule	Alarm level
3 lead ECG	1-2 / day (5 min)	50 < HR <100 bpm
SpO2	1-2 / day (5 min)	> 90%
Blood pressure	2-3 / day	85<sys<160 mmHg 50<dia<100 mmHg
Weight	1-2 / day	Gain < 1 kg/day Gain < 3 kg/week
Chest imp	1 / day (5 min)	Fluctuation < 30%
Respiration	1 / day (5 min)	12 < R < 25 bpm
Posture	continuous	No activity / fall
Therapy reminder	1-2 / day	3 faults in a week

TABLE III

User interface

The user interface has an essential role in this application having to guide the patient in following the scheduled measurements or drugs assumptions. The developed home gateway provides an intuitive user interface able to display guide images, reminder messages and sounds when a planned activity time is reached. Fig. 3 shows the appearance of the graphical interface. Patients can read the last measured values of weight, blood pressure, heart rate and oxygen saturation. At the top of Fig. 3 the reminder textbox indicates the requested activity, along with the graphical helper that shows the correct actions to be done as gif animation. The other textboxes report the status of the related sensor, included battery charge. Green, yellow and red textboxes background colours are used for information, warning and error messages respectively. In idle state the time of the next activity is visualized.

The customarily designed keypad allows to navigate and confirm symptoms in case of manual alarm or extra measure and to answer questions about pills therapy.

The gateway provides also the possibility to store in a local database all collected vital signs occupying less than 1 Gb for

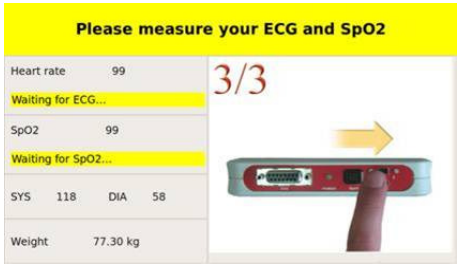

Fig. 3 Example of the graphical user interface requesting a me

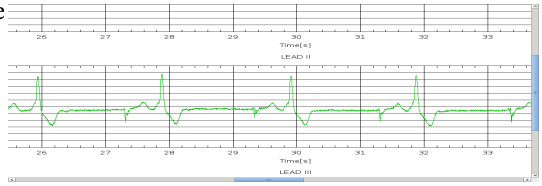

Fig. 4 ECG track consultation in the local gateway repository

one year observation. This functionality allows visualizing specific date graphs for ECG tracks, R-Wave envelops, SpO2 tracks and PPG waves or trend graphs for weight, blood pressure, heart rate and SpO2. This is particular useful when medical staff is present at patient's home and need to consult the measurements repository on site (see Fig. 4).

Server module

The H@H server platform is a web-based application that receives data from all controlled gateways, providing a detailed process of analysis based on expert systems and finally updating the patient record in the HIS. It exports graphical interfaces that allow the clinicians to request and display: the data of a patient to detect early changes in vital signs, the historical data of a patient, monitoring the progress of the disease and to update the operating protocol. The software platform is composed of two main parts: the core and the frontend. The frontend represents the human machine for the physicians (see Fig. 5), its main functions are related to the patient management since their enrolment when the physician inserts the patient data and configures his OP. At any time the physician is able to look through the patient clinical folder, comparing the patient health status in different periods by means of measurement trends. The system is able to highlight the alarms encountered during the monitoring with respect to the OP established for that patient or simply to report symptoms manually signaled by the patient. If necessary the physician can modify the OP at any time, this will produce and automatic and transparent update of the gateway.

The frontend is based on the Rich client technology which allows defining a simple user interface with high performances from the user interactivity point of view. The architecture is able to completely decouple application logic from data displaying, in order to make the interface fast, flexible and usable by the user. Conceptually, the browser is not used as a simple html viewer, but as a graphic engine, providing the features of a desktop application but accessible from the Internet without installing any add-on. The visual components, written in JavaScript, are downloaded at runtime and run locally (very fast) into the browser.

During the monitoring period the core accepts patient measurements collected and sent by the gateway through a

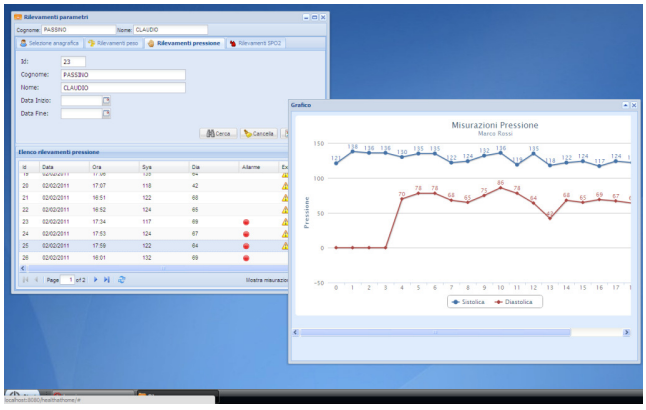

Fig. 5 Appearance of the physician frontend

dedicated web service. The data received flows in the usual HIS, the communication between the core and the legacy application is based on the ANSI HL7-RIM Clinical Document Architecture standard [32][33]. At the same time the core is responsible for data retrieval from the HIS when requested by the frontend. Data between the core and the frontend is exchanged through JSON (JavaScript Object Notation), a text format that is completely independent of programming language. Finally the core exposes an additional service useful when a gateway has to be customized for a new user. The core is based on the Spring Framework, an open source, lightweight, application framework that is intended to help structure entire applications in a consistent manner, pulling together best of breed single-tier frameworks in a coherent architecture.

Gateway-Server Communication

WAN technologies are used to communicate with the collection server, in particular ADSL trough Ethernet or WiFi, while mobile broadband modem is used for SMS sending and also as data transmission channel. Multiple independent transmission channels allow to have a redundant and flexible system and to cope with patient's home without ADSL or mobile services. Since the remote collection server is implemented as a webservice, the secure HTTPS protocol was selected to transport service requests and responses that are further encapsulated using SOAP protocol. As data exchanged between gateway and server involves the public Internet, the use of HTTP messages over an SSL channel established after certificate validation, fits completely the requirements of confidentiality, authenticity and integrity for the data traffic and the webservice interaction. The request-response nature of HTTPS suits completely the need of sending data to the server and receiving its confirmation. The request message contains all pending results and events in its body, coded according to the HL7-CDA. The response includes the XML description of the new operating protocol, allowing remote updates after each transmission.

Transmission occurs according to the OP, at the end of an activity, or on time-base (i.e. daily or weekly), and always after an alarm either manually signaled or automatically detected.

Communication occurs also when the gateway has to be configured for a new patient. A dedicated interface allows to completely configure the home gateway or to modify the current configuration status about patient's information, server IPs and ports, names of the collection and configuration service and regionalization. The gateway contacts the configuration endpoint indicating the patient's ID. The server replies with all the information of the given patient and the personal OP. Now the configuration is complete, the reachability of the endpoints is tested and the monitoring can start. Using this procedure, patient information and operating protocol are defined only once at server-side, reducing the possibility of mistakes.

test

The technical validation of the system involved 30 patients with CHF disease in NYHA class III and IV, recently hospitalized in the facilities of the three involved healthcare providers, to be monitored by physician for a minimum period of one month. A group of selected cardiologists checked out information arrival in HIS, evaluating the coherence of data collected at home and relevant alarms. A specific testing protocol and a questionnaire for test feedbacks have been developed to gather patients, caregivers and physicians feedbacks. The ergonomic of patient's interface was evaluated as a key point of system functionalities, as well as the general end-user usability. On the other hand the robustness of data transmission and the effectiveness from the medical point of view was evaluated. A positive feedback and good satisfaction level were reported by every patient in the questionnaire compiled at the end of the monitoring period. Most of them highlight the friendliness of the solution and the easiness to follow the daily therapy. The results show a very limited number of activity misses, mostly in the first days of monitoring, confirming also the property of such system to improve the therapy compliance. Physicians reported that the use of this platform does not account in significant way their regular activity, representing a valid means to control at distance the evolution of the followed patients.

Due to the complete success of the H@H technology test under medical control, a clinical validation, including an economical evaluation, with more than 500 patients has been already planned in the Italian Regional Tuscany Health System.

Conclusions

The H@H system proposes a home care model for the CHF patients by designing an integrated platform provided with software tools and technologies for telecare to support the whole process of the patient treatment connecting in-hospital care with out-of-hospital follow up. The system definition was completely driven by the end-users resulting in a platform particularly effective and practical with respect to other telemonitoring trials and state-of-art products. The system was developed around an OP with a per-patient granularity allowing generating a really meaningful database for every patient. The use of international standards for data exchange and the selection of the well-know technologies improves the interoperability favoring the integration / interaction of the platform with others systems or biomedical sensors, as long as standard compliancy. The most important similar solutions already available often use proprietary protocols for data transmission making impossible an easy integration with the existing HIS or present a limited degree of customization; generally they miss the reminder function or present usability issues. First technology assessment in a real medical scenario with tens of patients affected by CHF disease NYHA class III and IV, under remote control for some months of cardiologists using their usual HIS, prove the effectiveness of the telecare system from both patients and caregivers point of view.

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A homecare model…

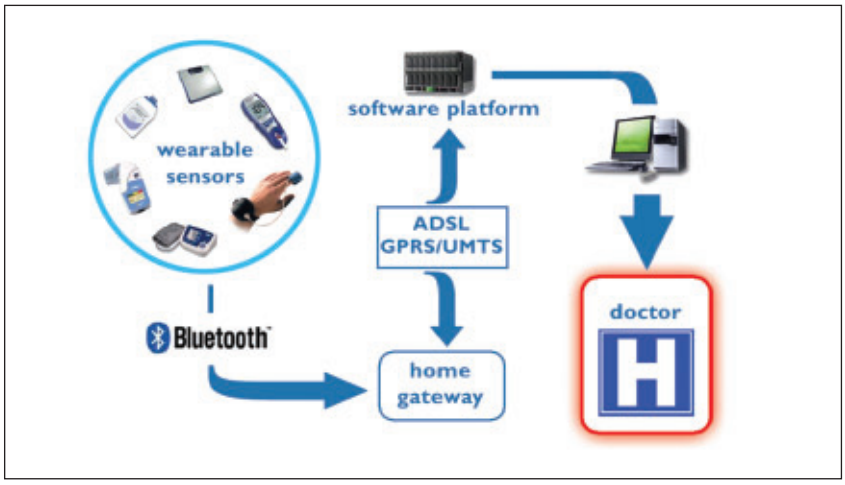
…for patients with chronic heart failure…

The Health @ Home project (H@H) aims to solve societal problems related to the provision of healthcare services for elderly citizens affected by Chronic Hearth Failure (CHF), by enabling remote self-management of the chronic disease.

"The overall objective of the project is to enhance the quality of life of elderly people and strengthen the industrial base in Europe through the use of ICT," says Luca Fanucci, Health @ Home Project Coordinator.

Among chronic conditions, CHF is particularly relevant, recently attracting the attention of physicians and administrators, as it represents the most common cause of hospitalisation in persons older than 65, with a consequent need of resources. This is partially connected to the large number of patients suffering from CHF, around 14 million in Europe, and to the peculiar features of the patient affected by this chronic condition: elderly with numerous co-morbidities, cognitive deficit, scarce therapeutic compliance, frequent social uneasiness, all elements that can determine a high tendency to relapses.

H@H started in February 2009 and is co-funded by the European AAL Joint Programme. H@H consortium is composed of six EU partners from Italy, Slovenia and Spain: three industrial partners (Caribel Programmazione-IT, Caen-IT, Mediasoft-SLO) and three research institutions (Consorzio Pisa Ricerche-IT, Fundación CITIC-ES, Fondazione Gabriele Monasterio-IT) with qualified scientific competences in hardware/software technologies, as well as in the emerging international standards, which is a key element for the future adoption by European national healthcare systems.



By using wearable sensors developed by H@H, patients' physio-pathological cardiovascular and respiratory parameters are acquired and transferred to a remote server. Collected data are continuously monitored by an automatic processing system and are accessible by the medical staff, who can take action in case of necessity.

H@H key features:

- A comfortable and easy-to-use system for the acquisition, processing, transmission and recording of medical information (ECG, respiration, weight, SpO2, blood pressure, etc.);
- An expert monitoring system capable of immediately visualising the level of criticality of the situation, alerting the healthcare providers, by analysing the clinical and monitored data of the patient;
- A new architecture of the socio-sanitary assistance services for patients suffering from CHF, taking into account emerging international standards (HL7-RIM, CEN 13606) and EU indications and regulations for the socio-sanitary field, still maintaining the specificities of the single European countries.

The H@H will strongly involve users to guarantee the incorporation of the perspective patient and physicians in the product development. Both end-users have played an active role in the project since its first steps, thus having the opportunity to directly participate in the definition and revision of the product to be developed.

The final product validation will be performed on 10 patients in each country. CHF patients will be carefully selected, taking into consideration their medical history, features and personal profiles.

Luca Fanucci
Health @ Home Project Coordinator

Consorzio Pisa Ricerche (CPR)
C.so Italia 116
56125 Pisa
Italy

Tel: +39 050 93 16 11
Fax: +39 050 93 16 40

l.fanucci@cpr.it
www.cpr.it
www.health-at-home.eu

UP ZRS - CENTER ZA SODELOVANJE Z GOSPODARSTVOM

UP ZRS
Center za sodelovanje z gospodarstvom
Garibaldijeva 18, 6000 Koper
Telefon: 05/663 77 80
E-mail: een@zrs.upr.si
Spletna stran:
http://csg.zrs-kp.si, www.een.si

Poslovni nasvet pred vašimi vrati

S pomočjo mreže Enterprise Europe Network podjetje MEDIASOFT d.o.o. iz Kopra uspešno sodeluje že v dveh mednarodnih projektih EU-programa Ambient Assisted Living

Podjetje Mediasoft d.o.o., ki se ukvarja z razvojem internetnih tehnologij ter podjetniških portalov, je s pomočjo storitev podjetniške podporne mreže »Enterprise Europe Network« kot partner vstopilo v 3 mednarodne projekte, v okviru EU-programa »Ambient Assisted Living«, od katerih sta dva že v teku, tretji pa je trenutno v postopku ocenjevanja.

Podjetje Mediasoft d.o.o. iz Prad pri Kopru, ki ga vodi g. Zlatko Vuković, je nastalo leta 2002 z odcepitvijo iz "tehnološkega" inkubatorja, ki ga je v Sloveniji ustanovila mešana slovensko-italijanska družba E-tree, skupine Etnoteam (eden večjih sistemskih integratorjev v Italiji).

Mediasoft je specializirano podjetje za razvoj podjetniških portalov (enterprise portals) za optimizacijo poslovnih procesov srednjih ali večjih podjetih v vseh sektorjih industrije ter tudi v drugih ne-industrijskih sektorjih. Podjetje nudi celovito standardno portalsko platformo svetovno uveljavljenega proizvajalca ATG (art technology group) iz ZDA in je edina slovenska družba s statusom distributerja in avtoriziranega razvijalca/vzdrževalca aplikacij na platformi ATG.

V želji po internacionalizaciji svojega poslovanja so se za pomoč obrnili na Center za sodelovanje z gospodarstvom, ki deluje v okviru Univerze na Primorskem, Znanstveno-raziskovalnega središča Koper (UP ZRS-CSG), in je član največje evropske podjetniške podporne mreže Enterprise Europe Network. Na podlagi predstavljenih storitev mreže Enterprise Europe Network se je podjetje odločilo za prejemanje profilov aktualnih tehnoloških ponudb in povpraševanj na področju IKT iz mednarodne tehnološke borze ter prejemanje aktualnih ponudb za sodelovanje v mednarodnih raziskovalno-razvojnih projektih na področju IKT iz mednarodne borze projektnih partnerstev.

V zadnjih 3 letih so na podlagi tovrstnih prejetih tehnoloških ponudb in projektnih povpraševanj po partnerjih že velikokrat vzpostavljali stike z različnimi tujimi podjetji, univerzami in raziskovalnimi inštitucijami širom Evropske unije. V treh primerih so se tovrstne priložnosti tudi udejanjile v obliki 3 mednarodnih raziskovalno-razvojnih projektov v katere je podjetje vstopilo kot projektni partner. Dva projekta sta že odobrena in se trenutno izvajata, tretji projektni predlog pa je trenutno v evalvaciji.

V obeh primerih gre za mednarodne raziskovalno-razvojne projekte, ki so so-financirani iz programa»Ambient Assisted Living«, ki podpira razvojne projekte, ki razvijajo inovativna IKT orodja, aplikacije in pripomočke za pomoč in asistenco starejšim ter bolnikom. So-financiranje projekta poteka na nacionalni ravni, ki ga zagotavlja Ministrstvo za visoko šolstvo, znanost in tehnologijo.

V okviru prvega projekta, ki se imenuje »HEALTH@HOME bodo skupaj s partnerji razvili prototipni IKT sistem, ki bo omogočal zdravstvene storitve na domu s pomočjo prenosnih senzorjev, predvsem meritve različnih zdravstvenih parametrov (ECG, dihanje, teža SpO2, krvni pritisk) ter shranjevanje in analizo tovrstnih informacij zdravstvenega stanja starejših s kroničnim srčnim popuščanjem. Sistem bo omogočal tudi takojšnjo vizualizacijo situacije in kritičnih nivojev posameznih merjenih parametrov. Več o projektu si lahko preberete na spletni strani: www.health-at-home.eu.

Drugi projekt pri katerem sodeluje Mediasoft se imenuje »SoMedAll-Social Media for All elderly people«. Gre za projekt, v okviru katerega bo razvit prilagojen sistem za starejše, ki bo omogočal, da bodo lahko uporabljali IKT socialne medije na domu za njim prilagojene potrebe ter jim tako omogočali varnost, socialno povezanost, druženje, druge socialne aktivnosti in povezave prek jezikovnih meja, spodbujal mentalne in fizične aktivnosti, izobraževanje ter nove hobije. Več informacij o projektu je na voljo na spletni strani: http://somedall.vtt.fi/

O uspešnem sodelovanju med UP ZRS SCG in podjetjem Mediasoft direktor podjetja Zlatko Vuković pravi: »Center za sodelovanje z gospodarstvom, ki deluje v okviru Univerze na Primorskem, Znanstveno-raziskovalno središče Koper nam je kot član mreže Enterprise Europe Network olajšal dostop in odprl hitre povezave do potencialnih partnerjev v mednarodnih projektih, ki se danes kažejo kot nuja in edina možnost za slovensko gospodarstvo, predvsem za mala podjetja. S sodelovanjem in razvojem novih tehnologij v omenjenih projektih bomo postali solastniki programskih rešitev, ki jih bomo po zaključku projektov uspešno tržili pri zdravstevnih domovih, bolnišnicah in domovih za starostnike.«

Podjetje Mediasoft je prepoznalo dodano vrednost storitev mreže Enterprise Europe Network ter storitve, ki jih ponuja mreža EEN izkoristilo v svoj prid z vključevanjem v mednarodne projekte ter tako pridobilo nove poslovne stike in razvojne priložnosti ter vstopilo v nišni sektor IKT tehnologij v podporo starajoči se družbi.

Pripravil: Sebastjan Rosa

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Monthly news for Network partners March 2011

enterprise europe network

Business Support on Your Doorstep

In Focus

Two networks sharing one goal

Network partners can optimise services to SME clients by joining forces with the European BIC Network, made up of 152 Business and Innovation Centres

SINCE THE ENTERPRISE Europe Network was created in 2008, it has teamed up with several European and national business groups with relevant expertise as Associate Members. Among them is the European BIC Network (EBN), which includes 152 Business and Innovation Centres (BICs) offering incubation and innovation services in 200 locations.

BICs support start-ups and existing companies by helping with business plans, pointing them to funding and finance sources and providing office space and translation support, among other services. Naturally, there are synergies with the Network's mission of helping European entrepreneurs innovate and realise their full business potential. This fosters close links between BICs and Network partners on several fronts including regular information exchanges and joint participation in events or presentations of EU programmes.

But this collaboration can go much deeper, in areas such as international technology transfer (with BICs forwarding technology offers for posting in the Network's partnership tools), as well as advising companies on intellectual property rights and contractual issues.

There are several regions in Europe where Network partners work hand- in-hand with local BICs, such as the west of Ireland and Plzeň in the Czech Republic.

One in five BICs are also Network partners, such as Spain's Beaz Bizkaia in the Basque Country.

Through the Biokabi business incubator, Beaz Bizakia and three other Network partners support innovative biotechnology companies such as Genetadi, an SME that develops diagnostic tools used in gynaecology and oncology.

The company's managing director, originally a BIC client, has found international partners through the Network and regularly attends Network events. "This is a shining example of how the support and services of both networks can complement each other," says Javier Gabilondo, Network project manager at SPRI. "The result is better service to all our clients."

Get in touch

Javier Gabilondo
jgabilondo@spri.es

More information

www.ebn.be

NetView

New year, new countries

HELPING EUROPEAN SMES expand abroad is one of the Network's core goals. This also means opening up opportunities in important third countries.

Among the most recent newcomers are Mexico, represented by four partner organisations, and Japan, with two partners in Tokyo. Elsewhere in Asia, the Network has six branches in South Korea.

In China, 10 contact points cover central and south-eastern regions. In future, the Network will extend to north-eastern and western China. New consortia in India and Brazil are expected to complete the Network's coverage of the so-called BRIC countries, which offer huge growth potential for European firms.

Closer to home, the examples of countries like Morocco or Tunisia have inspired interest in the Network in the other countries covered by the

European Neighbourhood Policy.

Although located outside the EU, third-country partners are committed to serving European SMEs and working with EU Network partners. The main focus of the Network is always on Europe. For those of you who have not yet welcomed your newest colleagues, drop them a line or pick up the phone – and start brainstorming about blazing new trails for your clients.

More information

Intranet > Network Directory > Who's who database

NetView

Clustering across borders

Italian and Spanish environment and energy clusters brainstorm at a unique brokerage event in Rimini, Italy

'CLUSTER THE CLUSTERS' took place last November during Economondo, a major international green technology trade fair.

Marco Mangiantini, in charge of the innovation and technology transfer office at the Unioncamere Piemonte, says that given similar business cultures in Italy and Spain it makes sense for clusters to work together.

"Clusters group together companies and research institutes with a similar innovation and technology focus," says Marco. "We approached our Spanish colleagues about cooperation possibilities, starting with the dynamic environment and energy sectors."

The Rimini event, co-organised with the Instituto Tecnológico de Aragón and all Spanish consortia, proved a

huge success – luring 10 Italian and four Spanish clusters.

The plan is to extend similar events in the future to clusters from other industry sectors. "We are off to a very promising start," Marco says.

Get in touch

Marco Mangiantini
alps-een-coordination@pie.camcom.it

@EACI

Stéphanie Bocca

Communications and Network support, Unit C

Helping oversee NetLife is one of Stéphanie's many responsibilities. She likens her job to that of an orchestra conductor.

"There is a lot of coordination work involved, and I enjoy it when everybody plays in harmony," she says.

The Namur, Belgium, native has devoted her career to communications since graduating from the Université Libre de Bruxelles. She joined the agency in March 2010 with a good grounding in the Network, having worked for a partner organisation.

At the EACI, she works on a wide range of publications and promotional materials, from editorial through production to distribution.

Stéphanie spends most of her free time with her 18-month-old daughter.

For job profiles of all EACI staff see: Intranet>Who's who>EACI and DG ENTR

@pointment

Vally Fidelman has been appointed Business Project Manager by the EACI.

Her main tasks are representing the interests of the different users and stakeholders of the Enterprise Europe Network services and IT system and ensuring that the Enterprise Europe Network members are in a position to deliver high-quality services.

Intranet>Who's who>EACI and DG ENTR

Corrigendum

In Netlife 13, Turkey and Russia were mistakenly omitted from the third-countries partners' list. We apologise for this error.

Success Story

High-tech healthcare for the elderly

The Network helps Slovenian SME secure EU research funding for innovative ICT project

MEDIASOFT, A 26-EMPLOYEE ICT firm in the coastal town of Koper, turned to the Network to help it access European funding.

With the support of the local partner organisation, the University of Primorska Science and Research Centre of Koper, Mediasoft prepared a successful application to take part in Health@Home, its first-ever EU research project.

Mediasoft was awarded €44 000 in European funding and will design an ICT platform for remotely monitoring chronic heart patients' vital signs. "Later, we plan to sell the software to clinics, hospitals and nursing homes," explains Mediasoft CEO Zlatko Vukovic.

Health@Home is funded by the EU's Ambient Assisted Living Programme, which aims to enhance elderly citizens' quality of life through the use of ICT. The Network has since helped Mediasoft win funding for at least one additional project under the same programme. "This is an innovative firm with a lot to offer," says Koper-based Network project manager Sebastjan Rosa.

Get in touch

Sebastjan Rosa
Sebastjan.Rosa@zrs.upr.si

Submit your success stories

FirstClass > Conferences > Network Daily > Network Forum > Success stories

Good Practice

SME feedback made easy in Bristol

Get a steer on listening to clients at an interactive training session developed by the Enterprise Europe Network in the South West of England

AS PART OF their service to SMEs, all Network partners are required to collect clients' feedback on European regulatory issues and communicate their responses to the European Commission. This includes the SME Feedback Database, business panels and online consultations.

To help colleagues with this challenging task, Bristol-based Network partner Enterprise Europe Network South West has developed a training session that aims to demystify the whole process.

"We had high targets in our work programme, so I was eager to share the knowledge," says Claudia Lock-Fürst. She also chairs the Network's SME Feedback Working Group, which has published a guide for Network partners.

The first two training sessions were a hit. They featured lively discussion and plenty of time for networking.

"It is a good balance between theory and training," says Emilie Vicq, of CCI Midi-Pyrenées, which is hosting the next decentralised training session on SME Feedback. It takes place in Toulouse, France, from 31 March to 1 April.

SME feedback Working Group: helping the Network listen to companies

Get in touch

Claudia Lock-Fürst
Claudia.Lock-Fuerst@enterpriseeuropesw.org.uk

Emilie Vicq
Emilie.vicq@midi-pyrenees.cci.fr

To register for the training session in Toulouse please contact :
corinne.bonnet@midi-pyrenees.cci.fr

Submit your good practices

FirstClass > Conferences > Network Daily > Network Forum > Good practice

The Network in Estonia

Up close and personal

Strong links with business key in the small Baltic nation

"WE EMPHASISE PERSONALISED services for all our clients," says Lea Aasaama, Estonia's country coordinator who works at the Estonian Chamber of Commerce and Industry in Tallinn.

The fact that the average Estonian company has just nine employees means that most rely heavily on outside support. The Network provides that through five partners covering the 1.3 million-strong population.

Within the ESTINNO-NET consortium, the Chamber of Commerce and the country's two main science parks are key players in the national innovation support structure for business advice, technology transfer and internationalisation. Rounding off the consortium are Invent Baltics and the Baltic Innovation Agency, who focus on business consulting, technology transfer and research funding.

Although there is a large proportion of clients from high tech industries, the Chamber of Commerce, and other partners, also ensure that more traditional industries have full access to Network services and tailor-made support. Since Estonia joined the EU in 2004 and the euro at the start of 2011, its SMEs – active in ICT, electronics, chemicals and other sectors – have a greater incentive to exploit the single European market.

So far, most partnership agreements inked by Estonian Network clients have been with ICT and biotech firms in the United Kingdom, as well as Germany, France and Sweden.

Get your skates on: Estonian companies are turning to the EU market

Among the many Estonian SMEs the Network has successfully helped find new partners is specialty chemicals maker Multi Protect, whose environmentally friendly fire retardant is now being sold internationally by UK-based International Chemical Markets. The Network also hooked up chemical compound maker TBD-Biodiscovery with Cambridge-based drug-development specialist ChemPharmaServe. Numerous other partnership agreements have been signed.

"In the future," promises Lea, "we hope to enhance the capacity of Estonian SMEs to innovate and raise

Get in touch

Lea Aasamaa
lea@koda.ee

Tip of the Month

A brand-new Network identity

The Enterprise Europe Network is more than meets the eye – it's a brand! Under the new Specific Grant Agreement, partners are now obliged to use the Network's visual identity in all external communications, from the logo to the curve graphic and colours.

But don't despair – the Network's communication experts and brand champions are ready to help and equip you with a new branding toolbox, to go online soon. A full range of messages, templates and visuals will also be available.

More information
FirstClass>Conferences>Communication

Training

E-learning module for Network newcomers

New to the Network and feeling lost? 'Start your Network experience' is a fun and easy web-based e-learning course just for you! Through storytelling and games, online guide Kate explains key concepts and demonstrates how the Network helps entrepreneurs and businesses, even walking you through a real success story.
The EACI recommends that all partners try the module during their first few days of work. After finishing the 30-minute session, please give the Agency your feedback.

More information on this and other e-learning modules
Intranet>Network management>Training>E-learning

Videos

The Network's new videos have been watched by over 4.3 million viewers! The international channel Euronews as well as TV stations from Serbia, Cyprus, Malta, Slovenia, Lithuania and Germany have already showcased the Network's way of working.

Check the videos in our dedicated You Tube page: *http://www.youtube.com/user/enterpriseeurope*

European Commission
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cip competitiveness and innovation framework programme 2007-2013