Pervasive Healthcare via “The Internet of Medical Things”

G. Schreier
Austrian Institute of Technology GmbH, Graz, Austria
guenter.schreier@ait.ac.at

The demographic developments of the aging societies will lead to increasing demand for support of an increasing number of people with chronic conditions. As a consequence, new models for healthcare are needed that are less institution centered but more user centered and that are not focused primarily on (acute) treatment only but on continuity of care and prevention on various levels.

The Internet of Things (IoT) is a technological phenomenon originating from innovative developments and concepts in information and communication technology associated with concepts like Ubiquitous Communication/Connectivity, Pervasive Computing and Ambient Intelligence.

It is the logical further development of today’s Internet. Technological advancements lead to smart objects being able of identifying, locating, sensing and connecting and thus leading to new forms of communication between people and things and things themselves. The IoT will encompass technical systems that are supposed to facilitate a new healthcare concept and support elderly people and chronically ill patients and their caregivers in managing the healthcare process in a way so as to achieve an optimal health status or to avoid a worsening of the illness as long as possible.

Keep In Touch (KIT) is a concept for intuitive human computer interfacing that uses smart objects and wireless technologies like Near Field Communication (NFC) and Radio Frequency Identification (RFID). KIT enables people to exchange information with health related items of their daily life by simply touching those things with their NFC enabled mobile phones. Closed Loop Healthcare Services allow processing of the resulting data and establishing communication channels between patients, their environment and different groups of care-givers (physicians, relatives, mobile care provider, etc.). The combination of KIT (smart objects) and Closed Loop Healthcare Services add up to an IoT-based infrastructure for pervasive healthcare.
Cross-border Home-monitoring of Heart Failure Patients in Luxembourg and North Rhine-Westphalia

N. Rösch1, P. Harpes1, S. Kohler1, C. Moll1, D. Wagner2, R. Beckers3, T. Feige4, B. Gräfe4, O. Wagner4, M. Werner4, H. Körtke4
1Public Research Center Henri Tudor, norbert.roesch@tudor.lu
29, avenue John F. Kennedy, Luxembourg
2Centre Hospitalier de Luxembourg, 4 rue Barblé, Luxembourg
3ZTG Zentrum für Telematik im Gesundheitswesen GmbH, Universitätsstraße 142, D-44799 Bochum, Germany
4IFAT Institut für angewandte Telemedizin Universitätsklinik der Ruhr-Universität Bochum am Herz- und Diabeteszentrum NRW, Georgstrasse 11, D-32545 Bad Oeynhausen, Germany

Abstract: The adjustment of the Healthcare Systems to the increasing number of chronic diseases is one of the biggest challenges to the European Union. Especially in the rural regions of Europe it is not secured that all parts of the population have equal chances to get adequate care. Congestive heart failure (CHF) has become an important health problem in the western world. CHF is the leading cause of hospitalisation for patients over the age of 65. Current medical therapy has only a modest effect on morbidity and mortality. The most effective therapy for end-stage CHF is cardiac transplantation. However, because of limited donor organ supply, transplantation is limited to younger patients. Numerous scientific studies prove that telemedicine improves the observation of chronically ill patients and can lower healthcare expenses. For smaller countries like Luxembourg, cross-border telemedicine can lead to a cost-effective and improved disease management, but it requires new approaches in ambulatory care and highest standards in data security and data protection.

Introduction

The adjustment of the Healthcare Systems to the increasing number of chronic diseases is one of the biggest challenges to the European Union. Especially in the rural regions of Europe it is not completely secured that all parts of the population have equal chances to get adequate care for their diseases. The use of communication and information technologies allows offering medical services over great distances. With that, extended parts of
Moreover, additional system is prepared with collaboration of telecommunication company which allows to receive information about the nearest AED device via Short Message System (SMS) in answer to free of charge empty SMS.

Fig. 2. SMS Center (SMSC) coordinating reporting about the nearest AED.

Evaluation Process

The main term of ALS importance is high reliability of the data. Essential for ALS usability are gathering information about all devices and regular data actualization.

The rank of ALS and its influence on citizens safety are conditioned by number of users measured as activity in data input and output. Every user is allowed to add proposition of new location, which is verified by data administrator. Data may by review using internet city map or SMS system. All the information about proper cardiopulmonary resuscitation with and without AED will by available online in educational platform. The data about intervention with AED will be collected during research period to compare AED usage at baseline and after 36 months of the study.

The last part of evaluation process will be initiating ALS in selected other Polish agglomerations on ground of experience and solutions tested in the city of Warsaw.
of patient undergoing surgery, as well as performance of anesthesiologist and actions of surgical team. It provides «informational backbone» of the concept of «Real Time Telemedicine in the OR», that is built up in our center and may serve as basis for creating National anesthesia database in Russia. «Real Time Telemedicine» implies formation of the digital operating room, in which all gathered information is available to qualified user via secure Internet access from potentially any computer in the world for review, management and teaching, with using available modern communication technologies like videoconferencing and VoIP videotelephony.

References


Fig.1 Real Time View of the 4 Operating Rooms on the iPhone

Alexander Bankov, is a Senior research fellow at the Russian National Research Center of Surgery named after B.V. Petrovsky in Moscow, Russia. He graduated from Urals Medical Academy and received further training in Moscow, where he also studied biomedical engineering at Bauman’s Technical University. He trained and worked in Germany, UK and USA. He is interested in airway management, regional anesthesia, computer technologies in anesthesia and medical education.
mLearning for Continuing Medical Education in Peru: A Mid-term Evaluation

M. Zolfo¹, V. Suarez², C. Kiyan¹, D. Iglesias³, I. de Waard¹, J. Echevarria Z.³, L. Lynen¹

¹Institute of Tropical Medicine, Nationalestraat 155, 2000 Antwerp, Belgium, mzolfo@itg.be
²National Institute of Health, Lima, Peru
³Institute of Tropical Medicine Alexander Von Humboldt, Av. Honorio Delgado 430, Lima 31, Peru

Abstract: Health care workers have indicated the need for an autonomous mobile solution that would enable access to the latest medical information for lifelong learning with low cost material and to exchange field cases with peers through social media. We hereby present a mid-term evaluation of an innovative approach to healthcare workers’ training with utilization of mobile technology as personal learning environment in the field of HIV/AIDS care in Peru.

Introduction

Many developing countries are moving towards the use of distance learning programs, avoiding peripheral health stations being left unmanned, because of health care workers studying out of stations, for short or long training programs: mobile technology offers a unique possibility to reach these workers at the point of care and even out in the field [1-3].

In order to facilitate physicians involved in HIV/AIDS care in Peru to access the state-of-the-art in HIV treatment and care the Institute of Tropical Medicine Alexander von Humboldt in Lima (IMTAvH) and the Institute of Tropical Medicine (ITM) in Antwerp set up in 2008 an educational mobile platform allowing access to the latest medical information for continuing medical education (CME).
Managing Health Information on Mobile Devices

Claudia Tessier
mHealth Initiative, USA

More and more patients and clinicians are adopting and benefiting from mobile devices (mDevices) in healthcare. Their mHealth expectations will require organizations to adopt strategies toward mHealth integration that maximizes the benefits of mHealth while mitigating associated risks and meeting government and accreditation requirements.

Of note, it is not the voice/telephone capabilities of mDevices that are most appealing and beneficial but rather the improved electronic data communication and connectedness that they enable across the spectrum of healthcare stakeholders. mDevices offer not just portability but also real-time, anywhere communication capabilities far beyond those of EMRs.

Patients and their healthcare providers are embracing the opportunities that mDevices and related applications offer for improved disease management, triage of emergency patients while en route to the emergency center, public health collection and dissemination of disaster as well as epidemic data, easy access to expert advice from remote third world villages, and text message appointment reminders. mDevice apps also connect them with Web resources both in and outside the exam room for patient education, link them to their colleagues for advice, permit real-time eligibility determination and charge capture, and much, much more.

mDevices can be used for patient care documentation access, entry and transmission. Patients can document ODLs, observations of daily living, allowing both them and the physician to relate signs, symptoms, and treatment to the circumstances surrounding their occurrence rather than addressing them only in sporadic and brief conversations possible in an office visit. Pharmaceutical companies not only are using mDevices for clinical trials, but they are also becoming aware of the “informal clinical trial” data that come from patients sharing information and experiences online, thus alerting pharma to medication-related experiences that they might not otherwise be aware of.

This mHealth movement will profoundly change communication patterns and expectations of patients, clinicians, and other healthcare stakeholders. For example, in order that clinicians and institutions not drown in a flood of email and text messages and more from patients and among themselves, systems must be developed that prioritize and effectively manage access,
forwarded to the specialist for interpretation and analysis. The leading specialists in the field rank analyze the data and write a report to be returned promptly for download at the practice’s interface.

**Demand of telemedicine services**

Since the introduction of this service, the number of reports has grown progressively. In 2009, more than 8,000 specialist reports were channeled to about 130 health centers, private clinics, occupational health units, hospitals and laboratories. Based on the demand during 2007 – 2009, the estimated number of reports to be delivered in 2010 will exceed 9,500. To this date, approximately every third district health centre in Finland uses this service.

**Discussion**

The ease, speed, flexibility, and cost-effectiveness of the described approach are obvious. Patients benefit from prompt diagnosis: testing can be initiated in patients’ daily activities as soon as the GP has ordered a test.

The attending physician gets a consultation report with treatment recommendations from the special experts of the field. Often the patient can be treated in the nearest health centre. Patients and specialists benefit as they no longer have to travel to meet each other and queues to secondary
French e-Health Policy

Nathalie Ferraud-Ciandet
Grenoble Ecole de Management, 12 rue Pierre Sémard, BP 127, Grenoble, 38003 Cedex 01, France
nathalie.ferraud-ciandet@grenoble-em.com


Introduction

Your goal is to point some recent legal developments of telemedicine’s framework in France. The following subjects are presented hereafter: patient rights, health ICT standards, personal medical record, e-Health governance, and financial aspects.

Patient Rights

The Medical Privacy Act of March 4, 2002 details the ownership rights of the patient to his or her data. The transmission of personal information is authorized only between health professionals treating the same patient, and only with patient’s prior consent (article L1110-4 of the Public Health Code) [1].

Health ICT Standards and Personal Medical Record

The legal framework is the Healthcare Insurance Act of August 2004 (articles 32, 33, 34 and 67 related to telemedicine).

This act also provides for the creation of the Personal Medical record (Dossier Médical Personnel - DMP) which will facilitate the continuity of care. A special structure (Public Interest Group) was created in 2005. It is dedicated to design, supervise and organize the deployment of the DMP (Article L 161-36-1 of the Public Health Code) [2].

This structure has been dissolved in November 2009 and replaced by the Agency for Shared Information Systems in Healthcare (Agence des Systèmes d’Information Partagés de Santé – ASIP Santé). This is a milestone in French health reforms of health information systems governance. The reforms seek to consolidate the public management process and thereby encourage the development of health information
E-technologies for e-Health and Assistance for Loss of Autonomy: The Important Role of University Networks through International Joint Degrees

L. Billonnet¹, E. Desbordes², J-M. Dumas¹, B. Lapotre³
¹ University of Limoges, Limoges, France, laurent.billonnet@unilim.fr
² Jean Favard High School, Guéret, France
³ “Home automation & Health” Pole, Guéret, France

Abstract: This article deals with the role that can be played in the Silver Economy by the universities through local territory initiatives. In this frame, international degrees can be considered for international networking in these domains.

Introduction

To face the socio-economic and medico-social problems of elderly and disabled people, many territories in many countries have started local initiatives to find technical, medical, social and economical issues. In this frame, universities clearly have an increasing important role to play through many aspects:

- Universities can provide new specific trainings with new diplomas relative to assistive technologies including e-health (telecare and telemedecine) and also ICT systems (including home automation).
- Through research and academic exchange programs, university networks can provide new joint diplomas dealing with common territorial problems, for example through Erasmus and Erasmus Mundus programs.

The local initiative context

The department of Creuse today prefigures how large areas of Europe will stand within the next 20 years. The rural population of the department of Creuse is at now one of the oldest in Europe. To take benefit of this demographic reality, the district of Guéret (department of Creuse in France) [1], (19 towns for 29 000 inhabitants) decided, 3 years ago, to create the “Home automation and Health Pole”.

The aim is to drive a coherent action plan in terms of comfort, safety, autonomy and communication for the elderly and disabled people. E-
hospital admissions and also in fewer doctors’ appointments. Technologically-supported health and care services can help reduce demands on carers and provide better, more effective solutions for health and care. Governments are beginning to acknowledge the role that technology may play and are also professing a preventative agenda, to which technology could contribute.

Other factors are also driving market change. The figure below shows that the majority of the population self-manages their care. The advent of 'the professional patient', taking personal responsibility for their own health, will push towards the availability of 'elective telecare'. The technology-savvy generations will want sensor, information and communication technologies that they can purchase and access on demand.

The International Centre of Excellence in Telecare (ICE-T) was established at the end of 2009, by the South East Health Technologies Alliance (SEHTA) and the South East England Development Agency (SEEDA), to support and facilitate the establishment of sustainable businesses in telecare. In ICE-T, we define telecare as ‘the use of information, communication and sensor technologies to deliver health and
A New Model for eHealth Capacity Development in Africa

M. Mars
Dept of TeleHealth, Nelson R Mandela School of Medicine, University of KwaZulu-Natal, South Africa. mars@ukzn.ac.za

Abstract: The need to develop human capacity in the field of eHealth in Africa has been identified by both the medical informatics and telemedicine communities. There is a shortage of people with the necessary skills to teach and train people in eHealth in Africa. This paper reports the background to the development of a new model for the ehealth capacity development, based on the concept of developing the capacity to develop capacity in Universities.

Introduction

Sub-Saharan Africa (SSA) faces a disproportionate burden of disease, a shortage of healthcare professionals and limited funds for healthcare provision.[1] Information and communications technologies (ICTs) are seen as a potential means of addressing aspects of the problem: by facilitating and improving timely health data acquisition, interpretation, dissemination and storage; facilitating healthcare delivery through telemedicine; and enabling education over distance. While the potential benefits of ICT in health appear obvious, integration of ICT in healthcare has been slow. There are many reasons for this in SSA, including lack of infrastructure, high connectivity costs, illiteracy and computer illiteracy, restrictive telecommunication legislation, lack of eHealth policy and lack of human capacity in the field of eHealth. Internet penetration in SSA is ~4.5%.[2] While there may be political will to introduce eHealth in Africa, there are few people trained in medical informatics or telemedicine in Africa and few with experience in implementing eHealth solutions in resource poor settings. This deficiency has been identified by various organisations and endeavours such as the American Medical Informatics Association's Global Partnership Program, the African Academic Public Health Informatics Alliance and the International Society for Telemedicine and eHealth's basic telemedicine training programme are attempts to address this. There is need to find new models of eHealth capacity development for the developing world and SAA in particular.
Using Digital Pen and Paper to Improve Provision and Management of Home Care in Sweden

Monica Edenståhl
Solna Municipality, Stockholm, Sweden

Abstract: In the Stockholm suburb of Solna (65,000 inhabitants) the local council has deployed Digital Pen and Paper technology to improve the management of its home care services. Monica Edenståhl will explain why Solna opted for this specific technology; how it has helped save the council over Euros 1.2m annually; and how Solna’s success has led over 40 other Swedish municipalities adopting similar solutions.

In 2002, the delivery of home care in Solna was split between council staff and private home care providers. As there was no central record of carers’ work within this new structure, the council could not maintain adequate quality control over its services. It finally found an effective way of addressing this by introducing Digital Pen and Paper (DP&P), which automatically captures handwritten information and converts them into keystrokes. A tiny infrared camera at the tip of the pen tracks its movements relative to a grey dot pattern printed on the form, recording and storing what is being written. Home carers now use digital pens to record the exact time of their arrival and when they leave, the tasks performed and information about the patient’s wellbeing. This has created much greater transparency for everyone involved.

Back at Solna’s Home Help Centre, the pens are docked and the stored records are transferred to a central computer system. This means the council has an instant account of the level and quality of care provided and can confirm that care time is accurately recorded and paid for. The handwritten notes are signed and left in the home, where other carers or family members can then refer to them.

Digital Pen and Paper Solution Creates Security for Elderly

Simplicity and Security

Staff taking care of old people in their homes often do not have time to get to grips with complicated IT solutions, but as they are dealing with a group of vulnerable people the need for good documentation is paramount.

In Solna, a suburb of Stockholm, the local council has found that a solution based on Anoto Digital Pen and Paper technology has revolutionized their processes.
Developing eMedical Records For Telemedicine:
The Experience of Mongolia

Kh. Mungun-Ulzii¹, D. Mungunchimeg¹, D. Patte¹, E. Sevin², S. Becquerel²
¹Cardiovascular Diagnostic Centre Project, cardio_center@telemedicine.mn
Bayangol district, Shastin Central Hospital, Ulaanbaatar, Mongolia
²Epiconcept, e.sevin@epiconcept.fr 47 rue Charenton, 75012 Paris, France

Abstract: The paper discusses the development of an electronic medical record system through a telemedicine network, and how it modified the behavior of the distant physicians. We observed that it was mostly used to communicate from province to province, which proved to be a way to fulfill the project objective to improve the quality of the local case management.

Introduction

Mongolia is a landlocked country located between China and Russia. Specific problems are: harsh climate, sparse population, huge distances with limited communication means, and obsolete health infrastructure with limited equipments in the provinces. The low income of the rural population combined with a semi-nomadic way of life is a limiting factor to access medical services.

Under these conditions, telemedicine appeared to be the appropriate approach to improve the quality of the local case management. Given the high prevalence of cardiovascular diseases in the country, the first fully developed medical network was the Cardiovascular Diagnostic Center Project started in 2001 with the financial support of the Government of the Great Duchy of Luxembourg.

Since, the project further extended its activity to safe motherhood, and adding more medical specialties is envisioned in the near future.

Structure and Functioning of the Network

Eight provinces out of 21, potentially covering nearly 50% of the population, are enrolled in the project. The “Center” is based at the Department of Cardiology of the Shastin central hospital in Ulaanbaatar. Communication between the center and the provinces began through regular telephone lines and 56 Kb modems. They are now replaced by ADSL connections. Each province is equipped with a computer, an ECG and a simple echocardiograph. These elements are linked together as a LAN which is connected to the Internet. At the central level the scheme is similar
State-of-the-Art in Telemedicine-Telehealth in Slovenia

D. Rudel\textsuperscript{1,2}, M. J. Fisk\textsuperscript{3}

\textsuperscript{1} MKS Electronic Systems Ltd., Ljubljana, Slovenia  
\textsuperscript{2} SIMIA-The Slovenian Medical Informatics Association  
\textsuperscript{3} Insight Social Research Ltd., United Kingdom

\texttt{drago.rudel@mks.si}  
\texttt{malcolm.fisk@dsl.pipex.com}

Abstract: The paper aims to report on the state of the art in telemedicine-telehealth services in Slovenia. Such services are at their initial phase. Some applications are presented, and ways to overcome the obstacles and boost the development of services are discussed.

Introduction

In the field of telemedicine-telehealth Slovenia is among European countries where such services have only started to appear. That which the European Commission says in its declaration on telemedicine [1], namely that “most telemedicine initiatives are no more than one-off, small-scale projects that are not integrated into healthcare systems” is highly valid for Slovenia. This was confirmed at the first national conference in Slovenia on telemedicine – telehealth in January 2010 [2]. There are several reasons for this. Among these, the strongest reason is that, as a young country, Slovenia has gone through a series of tremendous changes that have directed efforts away from the social and the healthcare systems into other areas.

R &D Activities in Telemedicine – Telehealth

Several industrial R&D and academic groups are now seeking opportunities to develop their technological solutions in the area of telemedicine – telehealth. But not many are trying to develop services based on ICT supported solutions. Some limited funds are available each year within tenders for e-Contents or supporting schemes for innovative enterprises. Many of groups, furthermore, participate more or less successfully in international consortia, in, for instance, FP5-FP7 programmes and other funded schemes. Among them the most successful has been a specialized hospital for people with pulmonary diseases [3].

Telemedicine among Health Professional

Two services that exist in Slovenia belong to telemedicine and operate among health professionals (B2B - business to business model):
Introduction to LifeGuide: Open-source Software for Creating Online Interventions for Health Care, Health Promotion and Training

S. Williams¹, L. Yardley¹, M. Weal² and G. Wills²
¹Centre for Applications of Health Psychology, School of Psychology, University of Southampton, UK  L.Yardley@soton.ac.uk
²School of Electronics and Computer Science, University of Southampton, UK

Abstract: This presentation will introduce ‘LifeGuide’; free open-source software that allows people with no programming capabilities to develop, modify and evaluate online interventions. Online interventions are used in healthcare to assist service users to manage or change health behaviours or to provide e-learning modules to train and assess healthcare staff. The presentation will describe the software, provide examples of current LifeGuide interventions and give a brief demonstration of the tool.

Introduction

The benefits of providing healthcare interventions online are well-known. The low-cost, 24 hour availability and global accessibility make them an important resource for both the intervention user and for policy makers [1]. Furthermore, internet interventions can be made available to large numbers of people therefore researchers can collect longitudinal data on the use and effects of intervention components in large samples.

Traditionally, the development of online interventions has been resource intensive. Each intervention is normally programmed individually by a team of programmers and the initial development of an online intervention can be more expensive than for other formats (e.g. face-to-face or printed). Moreover, once an intervention has been programmed it can be difficult to modify it. In contrast, LifeGuide enables people with no programming capabilities to develop online interventions in a cost-efficient and flexible way. This opens up online intervention development to people who may not normally have the resources to do so (e.g. postgraduates and early career researchers). Moreover, the software is embedded in a virtual research environment (the LifeGuide Community website) which allows researchers to share intervention components and therefore avoid costly duplication of interventions.
drop in pain while in the cell phone pain VR environment, with significance ranging from $p < 0.05$ to $p < 0.001$, depending upon which of the three pain rating scales were used. Also, a significant decrease in heart rate ($p < 0.05$) and a significant increase in peripheral skin temperature ($p = 0.007$) while the participant was in the virtual environment substantiates the three self-reported pain ratings, indicating a reduction in levels of pain and anxiety and suggesting that VR is an effective method of reducing distress [4].

Teen Smoking

Smoking is an addiction that kills 440,000 Americans each year, yet 2,000 adolescents begin smoking every day [5]. Reaching these smokers while they still have the chance to choose to quit is of utmost importance. In an Internet-based VR program (Fig.4), it is theorized that adolescents will
Participants were 20 parents in obese families in the first study and 87 patients with diabetes mellitus in the second study. These participants were initially informed in 3 sessions about nutrition, the importance of physical activity and about the use of the telemonitoring equipment. The first study took 12 months, the second study 6 months. Both studies were controlled by an equal group of participants who were not treated with the “ABC” program.

Results

The obese parents in the first study reduced their weight after 6 months by -7.2 kg, which was almost 3 times more than in the control group (-2.6 kg) without the telemonitoring devices. After 12-months, the intervention group reduced the weight even further without a tendency for a weight regain in contrary to the control group.

The 87 diabetic patients (BMI=35.3kg/m², mean age 59 years) showed a mean weight reduction by 10.3 kg after 6 months. Concomitantly, their glucose and HbA1c fell by 1.6 mmol/l and 0.9 % percentage points, respectively. The proportion of patients with HbA1c > 7% was reduced from 66% to 27%. An anti-diabetic drug was discontinued in 26 patients and reduced in 33 patients, which resulted in a reduction of treatment costs by 117 EURO per patient and 6 months.

Table 1: Results in patients with diabetes mellitus type 2

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<td>Weight reduction</td>
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<td>HbA1c reduction</td>
<td>- 0.9 %</td>
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<td>Percentage of patients in whom the anti-diabetic drug treatment was reduced or discontinued</td>
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the University Hospitals attending 100 Municipalities in each state, yielding 900 operational at the moment.

**Advanced Network Infrastructure**

RUTE implements communication infrastructure in university and teaching hospitals in the largest 53 cities in Brazil, enabling the establishment of telemedicine and telehealth centers with investments on equipment, connectivity and ambience preparation. The goal of the project is allowing all participating hospitals to use the National Network for Education and Research in order to operate applications on telemedicine and telehealth, including video and webconference for exchanging information, talks, continuing education, second opinion and teleconsultation, creating a base for collaboration among hospitals and training them for remote collaboration.

The R&E Metropolitan Community Networks (Redecomep) implements communication infrastructure in the 27 brazilian capital cities through its Points of Presence (PoPs - www.redecomep.rnp.br ). It expands now to 10 more cities. The goal of the project is to connect all main public universities and research centers in the country, with optical fiber managed by a local consortia made up of these institutions and RNP. However, the participation of state and municipal governments on R&E networks is opening up possibilities including public schools and health care centers.

These metropolitan networks are being installed and full operation is expected by 2010 in the capital cities (Fig. 1). Currently, sixteen capital cities operate the Redecomeps with 290 institutions.

**Fig. 1 – RNP national backbone and Redecomep R&E City Network. 607 municipalities covered by the Minas Telehealth in the state of Minas Gerais**

Metropolitan networks are connected nationally by the National R&E Network backbone with current Gigabit connection capability in ten PoPs (10Gbps for Rio de Janeiro, São Paulo, Brasília and Belo Horizonte and 2,5
Information on Open Source Solutions in Healthcare - the OSSHealth Repository

H. Demski¹, C. Hildebrand¹, A. Jossif², R. Engelbrecht³

¹ Helmholtz Zentrum München, German Research Center for Environmental Health, demski@helmholtz-muenchen.de
Ingolstädter Landstraße 1, 85764 Neuherberg, Germany

² „Paedi“ Center for Specialized Pediatrics, 120 Athalassis Ave., 2024 Strovolos, Cyprus

³ National ProRec Centre, Glaslweg 33, 85737 Ismaning, Germany

Abstract: The application of open source (OS) software in healthcare offers various advantages with respect to independency, affordability, maintainability and reuse. The OSSHealth Repository wants to provide information about existing projects and thus help to select the right software according to the users’ needs. It aims to serve as a single access point, providing uniform information on OS solutions in healthcare. An interactive search and user-friendly listing of the repository's content supports users interested in OS software discovering, comparing and selecting appropriate solutions.

Introduction

The OSSHealth project is developing an interactive repository on open source (OS) software for healthcare. OS software offers the following rights to the user: to make copies of the program and distribute these copies; access to the software's source code and to adapt the program [1]. This results in an independency from vendors, an improvement on the maintainability of systems, and encourages the reuse of existing works [2].

At present it is hard to get comprehensive information on existing OS solutions. As developers host their projects at many different platforms or even in a lot of cases at proprietary websites, it is cumbersome and time consuming to get details on existing projects. As projects are presented in a different way the records are not suited for a direct comparison and on top of that the information found is often incomplete.

The OSSHealth online repository aims to be a unique place for gaining knowledge about OS software. It complements existing information sources that are sparse or not specific to the healthcare sector. Targeting the users and especially the developers of eHealth solutions it wants to provide the
Technological Frameworks for Mobile Home Health Care

Mark Hoeller, Thomas Karopka
IT Science Center Ruegen gGmbH,
hoeller@it-science-center.de; karopka@it-science-center.de
Circus 14, 18581 Putbus, Germany

Abstract: Many countries are facing the challenge of an aging society. Especially in rural areas new models of home health care are needed to guarantee a basic level of primary health care in the future. Information and communication technology (ICT) tools that support the documentation and communication between health professionals involved in patient management are already highly prevalent in the clinical context. Recent advancements in mobile devices as well as in wireless broadband technologies have opened the way to extend the use of ICT tools to primary health care for immobile patients in remote areas. New research areas like Ambient Assisted Living (AAL), mHealth, Personal Health Systems (PHS) are emerging. Several systems to support mobile home health care have been developed in the last decade. However, these systems have not yet been applied on a broad scale. The gap between research and practice is still very large. The authors will give an overview of systems developed for mobile home health care in Europe in the last decade from a technological point of view. Besides the technical problems there is the problem of sustainability. A system will only be applied successfully in the long run if it is economically feasible. The authors argue that it is a prerequisite for a sustainable system to create a win(n)-situation i.e. all stakeholders gain from the application of the system. One way to accomplish this goal is the use of Free/Libre Open Source Software (FLOSS). FLOSS provides a way of lowering the total-cost-of-ownership (TCO) and providing a modular, flexible, high quality system. The aim of this paper is to describe the challenges and possible solutions for a mobile sustainable platform for primary health care. A special focus will be on the question of how FLOSS can be applied for patient centered home health care. To illustrate a possible solution a prototypical platform based on the open source system MEDICAL will be presented.

Introduction

In Europe almost all countries are facing the challenge of an aging society. The number of people aged 65 years or over is projected to rise from 84.6 million (17.1%) in 2008 to 151.5 million (30.0%) in 2060 [1].

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Benefits of a National Electronic Radiological Record

A. Jahnen¹, C. Pruski¹, H. Bouzid¹, N. Jerusalem², R. Krippes², U. Roth¹, S. Benzschawel¹, C. Back²

¹Centre de Recherche Public Henri Tudor, CR SANTEC, Luxembourg
²Ministry of Health Luxembourg, Radioprotection, Luxembourg

andreas.jahnen@tudor.lu

Introduction

In 2005 the Luxembourg Ministry of Health initiated the development of a nationwide electronic radiological record (ERR; Project Title: CARA – Carnet Radiologique [1]). In the first phase, carried out in 2006 and 2007, a feasibly study – including a demonstration prototype at a pilot site – was carried out. In the currently running second phase the promising results [1] lead to the design of an overall concept for the implementation of this application in the framework of the national eHealth program. The concept does not only focus on the different involved IT systems, but also on structuring of the available information. An implementation of the CARA platform with limited functionality is planned to be operational at the end of the year 2010. This paper deals with the benefits of the CARA project for the health professionals and the patients.

Materials and Methods

The implementation of the electronic radiological record cannot be done independent of other related applications in the medical domain. It has to be assured that different applications in the same domain are able to exchange data and provide unified access for the users. For example, the access to laboratory results has similar requirements at technical and organizational level. In Luxembourg, the eHealth program is coordinating and developing different national eHealth activities with the implementation of a common eHealth platform [2]. This platform will provide common services that will be used for several applications. It includes services dealing with data encryption, health professional identification, cross-organizational patient identification, data exchange and a common backup strategy.

As a specific application within this program, the CARA project is providing information about all radiological examinations (figure 1). Access
A Model Framework for Understanding Telecare and Telehealth

M. J. Fisk
Telecare Services Association, United Kingdom
malcolm.fisk@dsl.pipex.com

Abstract: The development of telecare and telehealth technologies and services has been compromised by different understandings of their role. The different understandings follow the growing experience of providers in relation to varying user needs – whether for the lifestyles of younger or the frailties of older people. The different understandings relate to divergent professional experiences and the differential use of labels for telecare and telehealth services. This paper argues the case for a shared understanding linked to the need to pursue the objective of personal well-being – where social and health interventions both contribute. A model framework is offered to facilitate that shared understanding.

Introduction

The shape of future services that carry the labels ‘telecare’ and ‘telehealth’ remain uncertain. What is clear, however, is that there is confusion about these labels or terms; and that there is some different use of labels in support of particular professional perspectives. The clearest difference in the labels relates, it is argued, to the social and healthcare dimensions of care – with the social care professionals being adherents to the term telecare, and healthcare professionals using the term telehealth.

These labels or terms do not, however, stand alone. There are the related terms such as telemedicine and eHealth (both assuredly on the telehealth side of any equation); and a growing recognition of the role of social alarms and other devices as ‘assistive technologies’. The terms eHealth (embracing services that facilitate the communication of health information often between clinicians and other health professionals) and assistive technologies (helping people, whether or not they are service users, to undertake activities and/or compensating for disability) provide us with what are the main broad categories that can encapsulate many of the other terms. This gives us a ‘background’ on which we can superimpose and consider other terms. The overlap between eHealth and assistive technologies then becomes the main battlefield for competing understandings.
The range of telecare and telehealth applications is now becoming clearer. A typology for telehealth was presented at the 2009 Med-e-Tel Conference [1]. This included the social care elements that are generally embraced by the term ‘telecare’. It broadly speaking subdivided telehealth applications in relation to health conditions (where certain technologies were typically used); and the extent to which users could decide for themselves regarding the services and technologies they accessed. There was, in addition, a nod towards some of the issues around technology intrusiveness that has subsequently been well explored by Schermer [2].

The three areas cited for telehealth applications in the earlier typology were (a) responses and event recognition; (b) medication compliance or concordance; and (c) the monitoring of well-being. Ensuing experience means that we can now expand these areas as follows. At least three of these now characterise many ‘telecare’ services and are directly supportive of the health aspect of well-being:

- Response and event recognition (including use of social alarms, fall detectors and seizure detectors);
- Medication compliance (including use of pill dispensers and automated prompting);
- Disease management (including use of vital signs monitors - notably for users with long-term conditions);
- Care management (including use of activity monitoring to monitor well-being and assess user needs);
- Health and fitness (including use of telephone and video consultation and dialogue in relation to lifestyles, health and motivational coaching); and
- Enhancing the home (including use of environmental controllers and home adaptations such as those relating to access and lighting).

Two of the above areas, viz. disease management and health and fitness, echo the Continua Health Alliance’s ‘personal telehealth domain’. These would have contributed to ‘monitoring of well-being’ [3]. Four of the above telehealth areas have been, furthermore, offered as the framework for developing a European code of practice for telehealth services within a project titled ‘TeleSCoPE’. This project, lead by the Health Design and Technology Institute at Coventry University, commences in 2010.

Towards a Model Framework
Telemedicine Applications in Body-related Technologies: Ethical Issues

Katsiaryna Laryionava, Dominik Groß, Sabrina Kreucher
Institute for History, Theory and Ethics in Medicine, RWTH Aachen University, University Hospital, Wendlingweg 2, 52074 Aachen, Germany
klaryionava@ukaachen.de

Abstract: telemedicine has recently started playing an increasing role in body-related technologies. The aim of this study is to identify key ethical issues raised by telemedicine application in various types of these technologies. Firstly, it distinguishes them according to their degree of invasiveness into the human body (e.g., attached/wearable, penetrating, and implantable devices). Furthermore, the study identifies already existing and potential telemedicine applications of body-related technologies as well as their risks and benefits. It concludes with a discussion of the ethical implications and social consequences of telemedical concepts for those technologies regarding the grade of their obtrusiveness and the purpose of use.

Introduction

Due to advances in micro/ nanotechnology, mobile and wireless telecommunications and data treatment, telemedicine has recently started playing an increasing role in body-related technologies. These technologies can be worn, attached, or fully incorporated into the human body [1]. In conjunction with telemedicine, they enable continuous real-time monitoring of a patient’s vital information and health parameters 24 hours a day. On one hand, telemedicine in body-related technologies offers a large benefit to patients and caregivers alike. It promises to provide a higher quality of care, especially to high-risk patient groups such as elderly people and chronically ill patients. It can contribute to support of pre- and post-hospital health services, provide better follow-up of patients by offering help for prevention and early detection of diseases, as well as to assist in managing healthy lifestyle. Last, but not least of the advantages is lowering of overall costs as a result of fewer hospital visits to the doctor’s office. Despite the many promising benefits of telemedicine application in body-related technologies, its usage raises not only medico-legal, but also considerable ethical concerns both on the individual and the societal level.
The U.S./NATO Teleconsultation System in Afghanistan – A Demonstration of Successful Multinational Teleconsultation

David Lam1,2, Ronald Poropatich1, Charles Lappan3
1 US Army Telemedicine and Advanced Technology Research Center
   Fort Detrick, Maryland 21701 USA
2 University of Maryland Medical School (National Study Center for Trauma and Emergency Medical Services) Baltimore,
   Maryland 21201 USA
3 Southern Regional Medical Command (Provisional), Attn: MCSR-IM
   Fort Sam Houston, Texas 78234 USA

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Abstract: The use of transnational medical teleconsultation services has attracted a lot of attention in recent years, especially in disaster settings. It has been postulated that technical, cultural, and training issues are the major problems impeding the successful use of multinational teleconsultation, in addition to language problems. The United States Army and NATO have recently established an agreement permitting deployed NATO forces in Afghanistan to use the U.S. Army teleconsultation program which has been deployed for several years. The NATO – U.S Army program has been in use for a year. The metrics on its clinical success and acceptability have been collected, involving both patients and providers from multiple nations. The system involves U.S. consultants providing teleconsultation on patients to NATO practitioners in Afghanistan. It has been most successful in avoiding unnecessary evacuations, facilitating needed evacuations, and returning many patients to duty without the necessity of evacuating them simply for evaluation. We will discuss consult types, physician acceptance of the system, and some inherent problems in using such a system in a cross-cultural setting. Critical issues are the training of users, and ensuring that the training transfers to new practitioners upon personnel rotations. Quality of consultations and their acceptance have not been a problem. Usage drop-offs occurring with routine personnel changes will be discussed, along with mechanisms implemented by NATO to ensure that this does not happen in the future. The acceptability and usability of the system have been such that one nation has requested permission to use the program to support