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Oldes & E-Health for the Elderly: An Affordable and Customisable Telecardiology System

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Background on Telemedicine- Related EU Policies

A European Commission Communication, adopted on the 04/11/2008 (COM – 2008 - 689 final), advocates the development and use of telemedicine services, including diagnosis, treatment and monitoring at a distance across Europe. The Communication highlights how, in an ageing Europe, where more and more citizens live with chronic health diseases, telemedicine represents an important tool. Developing reliable and sustainable systems, offering consistent effectiveness, interoperability and compatibility with national care systems should become a key means for garnering social and economic benefits throughout the European territory in the short to medium term. The OLDES project, through its customisable, low-cost and collaborative approach, tackles the challenges proposed by this European legislation, facilitating broader inclusion and providing improved public services and quality of life to citizens, securing at the same time, lower future social security costs. The details of this project are reported below.

The European "Older People's e-Services at Home" (OLDES) project, funded by the sixth EU Framework Programme, aims at tackling some of the challenges that E for the elderly has to face today, due to exponential growth in the ageing population in Western European countries and E-Care solutions scrambling to create adaptable solutions to different medical situations and typologies of diseases. Developing a comprehensive solution to these demands is quite complex, considering the personal needs and constraints of the individual patient, as well as the role and interests that different stakeholders have in such a dimension. In the context of the OLDES approach,

E-Care system stakeholders include:

I. Health providers and social carers;

II. Those in need of care and their families;

III. Volunteers and related associations; and

IV. Service managers, commissioners, policy makers, industry and the research community.

The approach proposed by OLDES, based on concepts such as participative design and co-production, foresees the development of an accessible and logical platform for the elderly and the involvement of potential interested actors not only in the implementation of the system, but also in the design and validation phases. The use of a low-cost PC (OLDES is based on a low cost easy-to-use, plug and-play system costing around 100 euros per person) in the functional architecture of the platform, combined with essential telesupport and telemedicine services, make OLDES a viable model for future similar service providers and regional social services interested in setting up a programme for remote cardiological services for the elderly.

Context

One of the most significant problems that actors in such municipalities, healthcare providers and other related service providers have to face in creating e-Care systems is presented by the different kinds of audiences that need these services, and the need to tailor them through affordable and accessible services. If such systems are to be strongly grounded in practice (providing stable and reliable monitoring mechanisms), they also have to be sufficiently generic to be adaptable to different social and medical contexts. With this premise, attempts to provide patients such as the elderly, with high levels of independence through easyto- use and customisable systems, plays a crucial role in the design of e-Care systems.Thus, the design of such a platform (e.g. graphical interface, integrated devices, sensors, functionalities) has to be very well analysed and conceived in advance, in order to efficiently put older people at the centre and make their needs the main priority in all related developments. As such, OLDES provides one such remote healthcare model that has widened the number and typology of potential users.

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Platform Design

Given the lack of familiarity of the elderly with technological devices, the usability and accessibility-related aspects of e-health systems have always represented an important dimension in the implementation of teleassistance platforms. During the last decades much attention has been devoted to this aspect, trying to improve the usability of the systems through customisable solutions potentially replicable in different care situations. In the case of OLDES, the classic keyboard has been substituted with a remote controller, developed especially for the project, in order to ease the interaction between the patient and the system.

A user-centred approach allows testing of the usability and adherence of the proposed tool to elderly needs and capacities, changing the configuration of the Graphical User Interface (GUI) on the basis of the tests carried out alongside the elderly. The whole platform is based on two different levels, namely: a local hub, receiving physiological data and sending them through Voice-IP modality to the central hub, receiving and monitoring information in a personal health agenda, set-up for each patient. Health services and physicians are therefore able to receive, store and compare medical data and, in urgent cases, promptly respond to alarms.

The selected medical devices used for capturing medical data are easy to use for an old person and are as minimally invasive as possible. Data are communicated to the PC through wireless connections (mainly through blue tooth) so as to limit as much as possible the required inputs or technical interactions by the elderly. The following devices and sensors have been tested in the design and development of OLDES platform: an adapted version of a sphygmomanometer for obtaining elderly blood pressure, ECG belts for monitoring blood pressure, a life scan for glucose level, together with some scales for weight and daily diet monitoring. Furthermore, some ambient monitoring systems (for patients' home temperature and humidity) are being tested in order to check patients' living conditions, mainly in the summer periods when rising temperatures may have serious consequences for health amongst the elderly.

The Pilot Programmes: Telecardiology in Action

In order to test and validate the OLDES platform, two different pilots are currently being implemented: one in Prague focused on 10 diabetes patients and one in Bologna, targeted at 100 patients. With regards to the Prague pilot programme, this is focused on older persons suffering from type-2 diabetes mellitus. In this context, the project offers users the possibility to control their diet, allowing the carer or the physician to check physiological functions and diabetes diagnosis on an "online modality". Since a critical aspect of diabetic compensation is their diet, patients require a

strict follow up of nutrient and energy intake, which tends to be a problem, especially for the elderly.

Scale Monitors Food Consumption

A programmable and interactive scale that is incorporated into the OLDES platform calculates the amount of energy and nutrients in a particular piece of food. Its memory will store data about calories, saccharides, proteins and lipids taken in throughout the day and calculate the maximal daily dose of various food sorts that the particular person is allowed to consume.

This process is implemented though the use of wireless scales installed at patients' homes where the food is weighed and assessed with regards to its nutritional values. Patients are invited to measure their weight once a day, blood pressure three times per day and glucose level three times per day. After data are sent through the OLDES platform, the physician is able to make recommendations or, if necessary, raise medical alarms. The pilot is coordinated by the Charles University in Prague through the technical support of the Czech Technical University in Prague/CVUT.

Bologna's pilot aims at testing the OLDES platform on a range of 100 patients. Further to the tele-support services provided to the complete range of patients, 10 of these, suffering from cardiological problems, are being monitored through sensors for the remote monitoring of physiological parameters (body weight, blood pressure, blood oxygen saturation, ECG).

The other 90 "testers" of the OLDES tele-support services platform are selected by the social services unit of the Savena District (Municipality of Bologna) together with an ad-hoc established tele-support working group composed of technical representatives of the local partners, while the ten cardiopathic patients are currently under treatment at the Cardiology Division of Bellaria Hospital in Bologna. The main actors involved in this pilot are the Municipality of Bologna, The Local Health Authority of Bologna, the company "CUP 2000" and the University of Bologna.

Considerations

Through a 'federated' design, meaning that it spans a number of different agencies and institutions, OLDES supports and offers an innovative and collaborative approach to the delivery of welfare services to the elderly. Following the EU's recommendations (that the benefits go beyond improving patient care and healthcare system efficiency, whereby telemedicine can also make a significant contribution to the EU economy), OLDES is designed to be scalable, highly customisable and governable by service providers, users and commissioners in response to dynamic and emergent needs and priorities. In the OLDES vision, many elderly people can be supported in their own homes by means of networked connections and services, contributing greatly to the quality and the cost effectiveness of their care, and to their independence and wellbeing.

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