Applying a software TeleCare prototype in a real residences for older people in Colombia

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Abstract
Colombia, in common with many countries around the world, is experiencing an important demographic growth change, where the population is ageing and fewer young people are being born. The social and economic situation of older people is generally not good because it is based on a lifetime of low income. At the same time, there is a lack of TeleCare technology to support the caring services. In order to explore the introduction of TeleCare approaches for older adults in Colombia, a software prototype for a real residences for older people was developed. The main contribution of this work is the application of HCI and user-centered design practices to formulate software applications for older adults, taking into account the interaction level that this user group has in the particular scenarios in Colombia.

Author Keywords
TeleCare Prototype, Interaction, User-centered design, Human Computer Interaction, Older adults

ACM Classification Keywords
H.5.2 [User Interfaces]: Input devices and strategies (e.g., mouse, touchscreen).; H.5.2 [User Interfaces]: Prototyping.; H.5.2 [User Interfaces]: User-centered design.

INTRODUCTION

The [3] the United Nations Population Fund (UNFPA) for Colombia describes the demographic transition, where people $\geq$ 60 years old are reached around 10% of the total of population in 2012 with an evident ageing of the population in some of the most important cities in Colombia. The UNFPA report also exposes some of the difficulties that older people in Colombia face, such as low proportion of people having pension, few job opportunities for older adults, high levels of poverty among the population, high dependency on children and elderly carers, negative imaginary of the worth to older people in society, and lower educational level in this sector of the population. A particularly vulnerable sector of the population is found in the rural areas, where adult children have left older older relatives alone as they seek work in the cities. The UNFPA report promotes strategies for older people *care programs* based on previous experiences about preparating for ageing in other countries (Europe, Far East and North America). One proposed solution to the burden of scarce resources being explored extensively in these places is Telecare. This is a new domain in Colombia and thus work is an early contribution to this field.

CONTEXT

This preliminay research was performed in a specific residence for older people in the Quindío region of Colombia. This residence for older people serves very vulnerable population of adults over Sixty years old, most of whom lack financial resources, some of them have been abandoned by their families and others do not have childrens or other familiy. Currently this residence for older people has a total population of 40 older adults, including residents and day visitors.

Our work is formulated around of the hypothesis that *the applicability of TeleCare prototypes in residences for older people of Colombia (with its particular features) can improve the quality of life of the older adults*. Previous works (as the works reported in [2]) let us to induce the feasibility of our idea within the constrains exposed above. This pilot research program is starting by developing small prototypes based on technologies such as Android apps, Java applications, and connectivity of the residence for older people. We adopted a software development strategy using practices from IBM Rational Unified Process (RUP) [4] and User-Centered Design (DCU)[1] .

IMPLEMENTED SOLUTION

We have developed a software Telecare prototype for the residence for older people in order to help older adults to report a symptom, illness or need. The main challenge of the research team was the interaction of older adults with technology (devices such as laptops and mobile phones). Most of them had never previously used technology. Also, several older adults with illiteracy problems were identified. Both issues directly impact the development of our prototype necessitating the alignment of the prototype with mental models and methapors of our final users (older adults, family and professional carers). The Telecare prototype merges fuctionalities implemented as desktop applications and mobile applications over Android.

The application is started by the professional carers (nurses) of the residences for older people. They have the option of customize the information about the older adults and their assigned carers. By default the main GUI of the application is exposed. With these GUI interact the older adult. In this GUI four images are exposed, each one corresponding to four different symptoms: headache, sore throat, stomach pain and chest pain; each image is a

unique representation of an abnormal symptom. Each image has an edge of a single color in order that the older adults can differentiate the images and the boundaries between them. These four symptoms were reported by the carers as the most common illness from older adults.

In the case that any older adult feel some of these symptoms He/she chooses the image to identify the abnormal situation, and the application initiates the process of sending the alert. We use special figures to indicate the sucessfull delivery of the alert to the carers. If the alert is successfully sent to the associated carer the application displays an emerging window with an image of an smiling face in order to give some degree of comfort to the older adult. This window remains visible for 5 seconds. In the case if trouble sending the alert, a sad face us shown. This metaphor is used to indicate to the older adult that He/she must resend the alert due to problems outside of the application (firewalls, network troubles or email connection problems). Once the alert arrives to the carer's email they perfom the relevant activities according with the established protocols for each kind of emergency, and the older adults involved.

PRELIMINARY VALIDATION

Some validation procedures were performed with real patients of the residence for older people. The main goals of these procedures were to evaluate the interaction level of the older adults with the software, and the adjustment of the prototype according with the issues reported by older adults, carers and family involved. An action-research procedure [5] was performed with a group of six older adults. For each one four images were shown. Each image represents the common illness prevelant in the residences for older people. These experiment was made with the purpose detecting if older adults could associate graphic representations with their illness. Some of the population in this stage are evidenced in the Figure 1.

In order to introduce the technical devices for the experiments (most of the older adults have never interact with a smartphone or tablet), we use a laptop version of the prototype. This interaction could serve as basis for the interactions with mobile devices over a minimalist (essential) GUI.

Figure 1: Population involved in the validation process.

Some advantages and issues of the last version of the prototype were evidenced:

- Older adults recognizes the borderline of each figure as the boundary of it; it means, they associated the selection of the illness clicking inside the image.
- Some confusion between the buttons of the touchpad were detected. Any mechanism to identify each button (e.g. usage of colors) could be incorporated, so that older adults could link each color of the buttons with functionality in the prototype.

- The *happy face* methapor (Figure 2) was an important resource at interaction level. Older adults felt some degree of engagement and pleasure, and they understood the successful delivery of the notification to the carers. Emotional reactions when older adults saw the happy or sad face were evident.

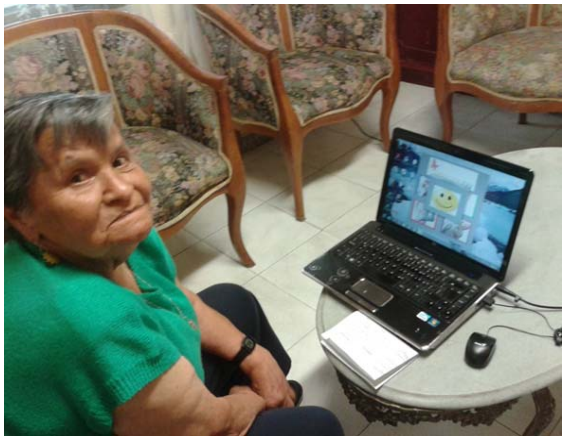

Figure 2: Notification of successful delivery of the alert and reaction of one older adult.

CONCLUSIONS AND FURTHER WORKS

The particular conditions of older adults in Colombia reflects a complex scenario where any technological support must offer the greatest degree of ease of use as possible, due mainly to the inexperience of older people in using technology. In this work we have reported the implementation and preliminay validation of a Telecare prototype application for a real residences for older people in Colombia. We use principles from HCI and User-centered design to implement a software solution with a high interaction level for older adults.

Evidenced interaction suggests that the incorporation of devices such as tablets and smartphones could improve the times for reporting alerts from older adults. However, this idea needs to be checked through more formal validation tests. A more deep work around HCI and interaction is needed due to the learning, cognitive, social and affective features that older adults have. Also, a Datawarehouse approach is projected for analysing both the generated alerts and the responses of the carers involved.

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