Co-Living social Community for Elderly

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Abstract: With a rapidly increasing elderly population, keeping elderly healthy is more important than ever. Physical and social activity is closely related to people's well-being. This paper describes some of the challenges faced when activating elderly people in an organised fashion. We propose a Virtual Collaborative Social Living Community for Elderly; utilising friends, family and care-professionals connected to the elderly in achieving this goal. Challenges related to this work in progress is then presented. The paper presents experiences made in an ongoing development and deployment of a socio-technical system.

1   Introduction

The western world is scrambling to prepare for a rapidly increasing average age. Without changing the way we care for our ageing population, more and more of our workforce will need to work within the caregiver profession. This will have a dramatic effect on the output of the western economies. As the western governments realise this they seek technological and social solutions to this situation.

Researches show that people that have larger social networks (and social supports) and are better integrated into the social fibre of their communities have longer life expectancy. [AA07]

In this paper we will present some of the challenges that are present themselves when developing systems designed to activate elderly. The work presented in this paper is part of the Co-LIVING EU project[1]. The main objective of this project is as follows:

The development of an ICT-based Virtual Collaborative Social Living Community for Elderly (Co-LIVING) people, aiming to stimulate and prolong their independent and active living in an outward environment through an advancement in elderly people social interaction, contributing thus positively to their wellbeing.

The main goal of the Co-LIVING project is to improve the health and quality of life of the elderly using the system, and as a consequence, lengthen the amount of time they can

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[1]http://www.project-coliving.eu/

live in their own home. The way we want to achieve this goal is by activating the user and creating a social network around the user that can support him/her in the daily tasks.

The following lists the subgoals of the Co-LIVING project:

- In Co-LIVING, innovation emerges not only from the area of new technologies but also from the *development and support of an innovative elderly social practice-oriented community model.*

- Design and develop the Co-LIVING solution by scaling up the successfully developed and piloted IST FP6 mPower[MHF09] open source platform and make it applicable to the field of elderly social interaction context.

- Develop and integrate in the mPower platform the Co-LIVING ICT based services.

- Operation and evaluation of two pilots in Netherlands and Norway.

2 Related Work

Previous EU projects that have worked within this domain; PERSONA[Per], NETCARITY[Net], SOPRANO[Sop], MonAMI[Mon], Companiable[Com], OASIS[Oas] and SMILING[SMI] projects targeting in-house "independent" living.

The Co-LIVING solution uses and scales up the successfully developed IST FP6 mPower open source middleware platform. mPower is an open platform to simplify and speed up the process of developing services for elderly and people with cognitive disabilities. This platform provides reusable, flexible and interoperable service specifications and implementations.

The overall architecture of mPower is an adaptation of the layered model specified in the IBM SOA Reference Architecture[Ars04]. As depicted in Figure 2, the mPower architecture consists of five main layers and three sidecars. Each layer comprises a set of components that conform to specific rules and requirements [Gam95]. This enables us to easier adapt mPower's services to the Co-LIVING project. [FOC+11]

Existing mPower services will be integrated with SoCo-net and the ICT-based services and will be used for the development of new, specific parts of the virtual community network. Co-LIVING will expand mPower to offer services in the social domain.

3 Method

For the development of an innovative elderly social practice oriented community model, two communities of end-users participates in the design and evaluation of Co-LIVING through workshops and pilots. Co-LIVING is not only centred on the design and development around the elderly's needs but it includes the elderly in the process to identify their
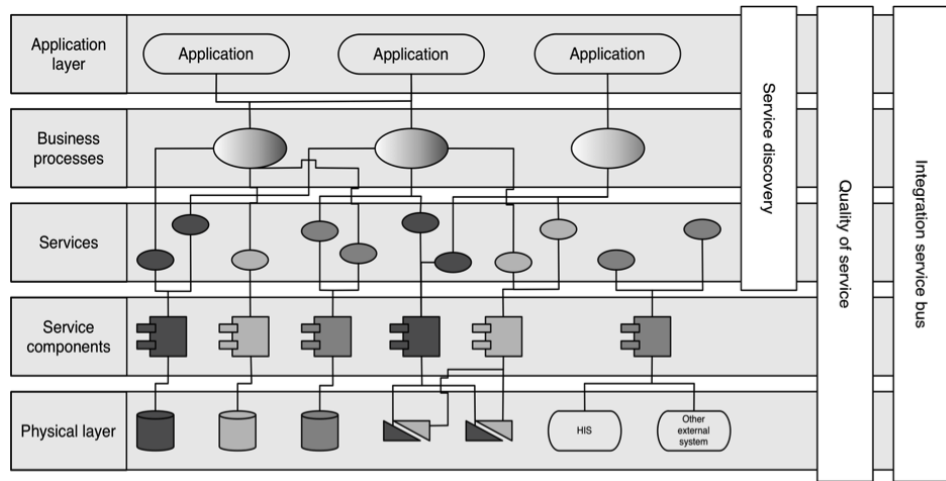
Figure 1: The mPower layer model [FOC$^+$11]

wishes and needs in terms of what factors, relationships and communication issues are meaningful and generate the greatest impact on their social life.

The two end-users communities are:

ORBIS Hoogstaete

Hoogstaete is a unique integrated living village concept in Sittard, the Netherlands. The Orbis medical and healthcare group has developed an integrated neighbourhood where sheltered housing, care, wellness, leisure and education services are provided in an integrated fashion. The complex, around the Highveld Park, aims to encourage the cooperation within the district and integrate young and old communities together to stimulate an active live of the latter. Caregivers and elderly people who live in these facilities (with different ICT skills levels) are involved in the design and testing of Co-LIVING in order to create a system that is fully adapted to the real needs of an elderly community.

Trondheim Kommune

On the other hand, Trondheim represents the physical neighbourhood trial. Trondheim is the third largest Norwegian municipality with a population of 176,348 inhabitants. A wide range of services are offered by the municipality in the health sector. One of these initiatives is the Service Centre for Seniors established in 2003 to "enable seniors to improve/maintain their functionality level (social and physical) so that they can live an independent life as long as possible". The Services Centre for Seniors is used for the Norway pilot. Elderly (with different ICT skills levels) and workers of the health system are part of the testbeds.

3.1 Trial Structure

The formal interaction between the system development and the trial subjects is structured into several (at least three) development cycles and their subsequent trials. Before the first development cycle, the project conducted a pre-trial that identified the needs and wishes of the users that had signed up for the trials.

A first version of the Co-LIVING system has already been tested with a sample of real end-users involving elderly and caregivers. The feedback from these trials will be used for the redesign and improvement of the Co-LIVING architecture and services in the second phase of the project.

4 Results

Based on the the input we received in the pre-trials (see section 3.1.) the system is designed to activate the user in two ways:

- By reminding the user about interesting (determined by previous history and the social network) events and asking the user if he or she has been active today.

- By drawing more directly on the social network; if your friend is planning to attend an event (or taking a walk) the system will facilitate your partaking in the event.

There are several challenges related to setting up a Virtual Collaborative Social Living Community for Elderly.

- Motivating the elderly to be active.

- Getting the elderly to use the system.

- Create usable and easy-to-use interface adapted to the needs of the elderly.

Mobile wellness applications can motivate people to exercise more because of their ubiquitous presence and suitable technological possibilities. Wellness applications utilise several factors that can increase physical activity levels of users, e.g., data tracking, social sharing and playfulness. [AH10]

The Co-LIVING solution is a collaborative and social platform for the elderly that fosters the community life and encourages them to interact socially and participate in outward activities. Co-LIVING takes into account that the networks of an aged person consist of people of different ages (young and old) and roles (relatives, friends, neighbours, care professionals, etc.).

Co-LIVING is based on an innovative Social Community network (SoCo-net), an elderly centric web based network that manages and constitutes social care teams around the elderly in order to provide them with personalised care considering that these groups are:

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Home | Activities | Friends | My Activities | Weather | Logout

Activity overview

Time	Activity	Location
22/02/2012 11:00	Pus med støvler	Prinsen kino
28/02/2012 17:00	Ditty Group	Kattem helse- og velferdssenter
28/02/2012 18:00	Allsang med Håkon Renanger og Per-Olof Green.	Sverresborg Trøndelag Folkemuseum
28/02/2012 19:00	Test	Sted A
02/03/2012 12:00	Da Capo-Show og Ti i skuddet-mimring!	Rockheim
19/03/2012 11:00	Henning Sommerro og Jon Pål Inderberg	Tiller helse- og velferdssenter
19/03/2012 14:00	Henning Sommerro og Jon Pål Inderberg	Bakklandet Menighets omsorgssenter
20/03/2012 12:00	KOSMORAMA: "Noma på kokepunktet"	Nova Kinosenter
20/03/2012 17:00	Ditty Group	Tempe helse- og velferdssenter
20/03/2012 18:00	KOSMORAMA: "Lorax: Skogens vokter"	Nova Kinosenter
21/03/2012 11:00	Henning Sommerro og Jon Pål Inderberg	Trondhjems Hospital
21/03/2012 14:00	Henning Sommerro og Jon Pål Inderberg	Sjetne Grendahus
22/03/2012 11:00	Henning Sommerro og Jon Pål Inderberg	Valentinlyst helse- og velferdssenter
22/03/2012 14:00	Henning Sommerro og Jon Pål Inderberg	Zion helse- og velferdssenter
27/03/2012 13:00	Swing og gammeldans	Kaaret Othilienborgtunet

Figure 2: A screenshot of the Co-LIVING system, displaying a list of possible activities to the user

- Virtual, they assist and provide care to the elderly without being together physically.

- Dynamic, the teams are dynamically adjusted, due to availability, preferences and status of the users.

- Collaborative, as combining different people together as needed and combine their knowledge to provide effective care.

Detecting changes in the behaviour of the elderly is a key factor to anticipate their physical and psychological deterioration and take proactive actions to prolong their active life. SoCo-net is provided with adaptive user profiling techniques and intelligent adaptive interfaces to detect these changes and update user's profile consequently. These adaptive mechanisms make use of user's context and user's behaviour data to identify deviations in elderly's daily activities as they age (Behaviour Analysis component). The Behaviour Analysis component will adapt, based on historical data, the elderly's profile (preferences, capabilities) to provide appropriate services for the current user's status. This compo-
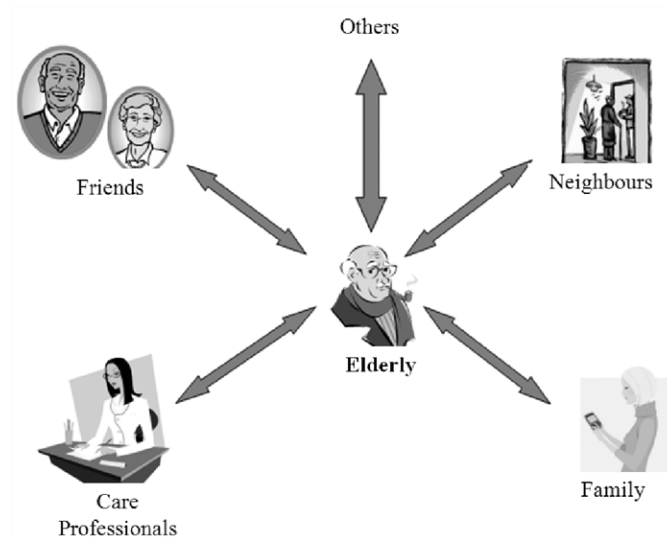
Figure 3: Virtual Care Teams build around the elderly

nent will suggest and motivate elderly to participate and maintain an active social life if a deterioration of their social participation is detected.
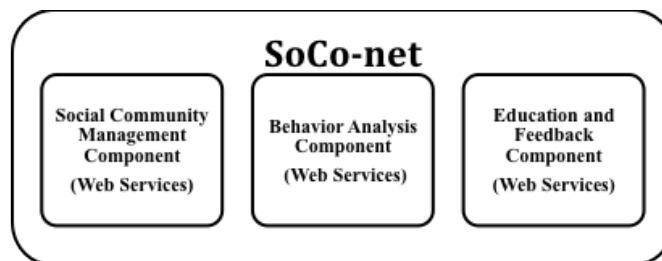

Figure 4: SoCo-net can be thought of as three different components; Social Community Management Component, Behaviour Analysis Component and Education and Feeeback Component.

SoCo-net will also detect behaviour patterns regarding the use of the Co-LIVING system and it will try to stimulate elderly to use it in order to maintain an active social life. SoCo-net is provided with intelligent decision making techniques on user's context and historical data and intelligent explanation generation systems to train and maintain the interest of the users (Education and Feedback component). The Education and Feedback component will encourage the elderly to make use of the Co-LIVING system if a decrease of the activity is detected and assist them in the use of services, adapting the interfaces to their current needs.

Co-LIVING aims at the development of different ICT-based services, which will make use of the virtual social care team management and organisation tool provided by SoCo-net,

to stimulate the elderly to maintain an independent and active life for longer. The Co-LIVING ICT-based services address the three main areas of the elderly social interaction context:

- Care & Wellness
  The **physical activity** service investigates how information on the individual's actual physical and psychological status can be optimally combined to define a challenging yet realistic physical activity schedule. Instead of adapting the physical activity schedule only based on the physical status or progress in performance, the person's psychological status is also included. For example when the person gets less motivated, the system may invite the user to select and do other exercises (targeted towards the same physical goal), or to slightly increase (or decrease) the intensity or duration of the exercises.
  The **group leisure activities** service uses SoCo-net to create groups to share activities with the elderly, by taking into consideration the members' preferences and capabilities. The elderly creates an invitation for a specific activity and shares it with the members of his/her Social Community Network.
  The **competence/knowledge/skills exchange** service allows the elderly to register his/her expertise in the system and other members of the Social Community Network can make requests for support.

- Guidance
  Daily tasks assistance provide to the elderly direction indications, explanations on how to perform different tasks, or even instructions on how to call for human assistance by making use of SoCo-net.
  Cognitive failure assistance provides memory help reminders i.e., accessories such as stick, eye-glasses, medication, planned activities or appointments, directions indications to a place, etc. The services are designed not to be a blind guide, providing all the instructions, but rather as assistance with increasing levels of social elderly care provision.

- Mobility Monitoring
  Services for the **early detection of limitations** are based both on wireless sensors providing real time monitoring of mobility and activity of the elderly, like GPS and accelerometer sensors and on physical status information entered through developed questionnaires. All information is analysed and services are developed as regards the provision of care to the elderly by providing direct feedback to him or by informing his care givers. Additionally localisation based monitoring services not only identify the position of the user in real time, but also obtain and correlate information regarding the surrounding environment of the user.
  Services for **Daily activity follow up** enable the elderly to set up his daily schedule with various activities. The time, place and group members that may be involved in each activity are defined. The daily timetable is transmitted to the group member that is responsible for the follow up of the activities. At any time during the day the group member may contact the elderly and enquire variations in the schedule (i.e., delay or absence from a meeting).
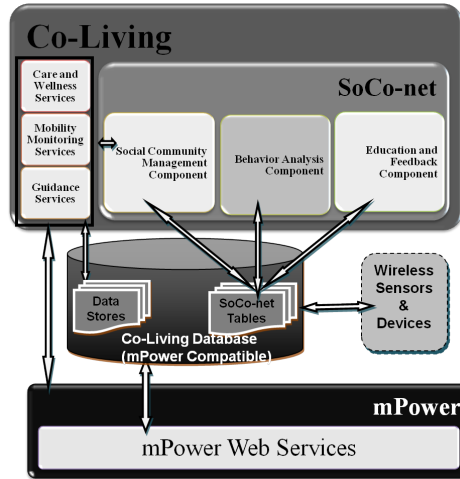
Figure 5: Co-LIVING Architecture

5   Conclusions and Future Work

In section 2 we listed challenges relating to activating elderly. We proposed that several of these challenges could be addressed through an ICT-based Virtual Collaborative Social Living Community (Co-LIVING).

Trials have tested the positive outcome of Co-LIVING in terms of the increase of the socialisation of the elderly and Co-LIVING consortium keeps on working in the development of the different components to reach a complete solution that will foster an active life through the networks with friends, family and care-professionals that older people maintain.

As mentioned in section 3, Co-LIVING is currently in the first of three planned stages of iterative development. The feedback we received during the development and testing in this first phase will be included when entering the next stage.

Acknowledgements

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[2]http://www.project-coliving.eu/

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