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ICT services for prolonging independent living of the elderly with cognitive impairments - IN LIFE concept

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Abstract. Older people with cognitive impairment need support in their everyday living. IN LIFE an EC co-funded project aims to organize large-scale and multi-country pilot applications, by providing interoperable, open, personalised and seamless ICT solutions that support older persons in all key home activities, communication, health maintenance, travel, mobility and socialisation tasks, with novel, scalable and viable business models.

Keywords. Elderly, cognitive impairment, independent living, ICT

1. Introduction

Cognitive related conditions are abundant in the elderly population and are anticipated to be more prevalent in the near future due to economic crisis and hardship. Those who live through economic recessions in early to mid-life might be at higher risk of cognitive decline after the age of 50 [1]. Most elderly people with cognitive impairments want to live independently for as long as possible, but currently, roughly 30% of the elderly with dementia live alone and this figure varies according to the type of the cognitive impairment of each elderly group [2].

New technologies can support living independently at home and significant activities of daily life. To maximize the effectiveness of tools intended for older people in general, it is of paramount importance to explore the acceptance of technical systems by these groups as users - within service delivery employing an experimental protocol and as customers within the European and international market. Therefore, the IN LIFE project (co-funded by the European Commission), is a newly started project under the Horizon 2020 Framework, that aims to organize large-scale and multi-country pilot, by providing interoperable, open, personalised and seamless ICT solutions that support the older persons in all key home activities, communication, health maintenance, travel, mobility and socialisation tasks, with novel, scalable and viable business models.

2. IN LIFE approach and methodology

The main idea is to address the challenge of turning existing research efforts to reality for older people across Europe. Existing ICT solutions could assist elderly users with cognitive impairments in organising, carrying out and successfully completing everyday tasks that are critical for continuing to be and feeling independent. IN LIFE will offer personalised, multi-faceted, flexible existing ICT solutions and services addressing diverse daily activities (eating, physical activity, commuting, mental

stimulation, communication, social interaction, etc.) to users with cognitive impairments living in their own home or in sheltered homes, as well as to their formal and informal carers. Emphasis is put on elderly and carer interactions, communications and care scheduling and monitoring.

IN LIFE is based on a mature architectural concept that has been piloted widely with the healthy elderly, e.g. in OASIS [3], PERSONA [4] projects. It has been extended to elderly with various impairments (including cognitive ones) within REMOTE AAL [5]. But user numbers were limited as most of those projects were research and development in nature. Thus, it considered to be of Technology Readiness Level (TRL) 6 and moving with IN LIFE to TRL 8 [6]. The connected services at each pilot site are diverse in maturity, but are all above TRL level 5 and are expected through the wide real-life pilots of the project to reach TRL level 7 to 9.

In order to meet its objectives, IN LIFE will set up a technical infrastructure that will undertake the following functionalities:

- Monitor user activities and preferences in an unobtrusive way (only those related to the use cases and services to be supported).
- Support elderly people with cognitive impairments in a variety of indoor and outdoor activities.
- Provide help and instructions to care givers.
- Enable service/application providers to easily integrate their products in the IN LIFE framework.
- Enable easy, transparent, personalised and contextualised access to IN LIFE services and applications through an application centre.
- To operate so that any personal information is securely protected and always anonymised for external use or whenever possible.

The starting point of IN LIFE are the activity modules listed below, each of which exist and are owned by one of the IN LIFE partners. Each will be extended and adapted further, according to the project pilots findings:

- Daily Functions Assistant
- Activity monitoring and coaching
- Mental training
- Virtual gaming
- e-Doorman
- Fall detection and behavioural monitoring module
- Car driving ability assessment and enhancement
- Trip planning and routing support
- Public Transport support
- Leisure support
- Socialisation and communication support
- Interaction strategies
- Multilingual and multicultural support
- Care giving monitoring and supervision

- Care giver scheduling and reminding
- Teleconsultation
- Patient management and complaints monitoring

2.1. User groups

IN LIFE will identify the needs and requirements for the addressed user groups at an early stage of the project within an extended and flexible evaluation framework. This will be done by drawing on the expertise of the consortium mainly embodied in the pilot sites, from published works and through local workshops that will be organized at the pilot sites (Greece, The Netherlands, Slovenia, Spain, Sweden, UK) with the elderly, carers, medical personnel, etc. The main targeted user groups are:

1. People with Mild Cognitive Impairment (MCI) are usually elderly who have lost cognitive functioning on at least one aspect with no sign of dementia and still functioning in daily activities [7]. People with MCI are estimated to account for 20% of the elderly population over 65 years old [8]. ICT solutions as interventions might have more potential for people with mild cognitive impairment as users are still at early stages of forgetting, are still active, eager to continue living in their homes and participate in everyday activities (i.e. travel) and can more readily learn new functionalities (i.e. use of ICT services).
2. Early and middle stages of Dementia: people have been diagnosed with dementia but they are still maintaining some aspects of their daily functions (early signs of dementia are apparent) and users have been diagnosed by specialists (i.e. neurologist, neuropsychologist) and might be under medication. The improvement in daily functioning is usually rather limited compared to the deteriorating effects of the disease. Early and middle stage dementia users can still carry out certain activities with assistance.
3. Cognitive impairment and co-morbid condition: users with other conditions and diseases with cognitive impairment is not uncommon in the elderly population. Increased medical co-morbidity is also evident amongst the elderly. In particular, high rates of medical co-morbidity are evident living at large urban areas due to low socio-economic status (SES) and poorer access to health services.
4. Caregivers, either formal (i.e. healthcare, social, etc.), or informal (i.e. family members and friends) that need to be empowered with knowledge and tools to support the elderly at their everyday life activities. Informal caregivers often struggle combining work and caring for their relatives resulting in strains in their own health and coping mechanisms.

In addition, there are many other stakeholders with an interest in, but not a direct involvement in day-to-day care provision. Some main stakeholders, and the way they are connected to IN LIFE, are regulatory authorities on local, national or international level, user interest organisations, standardisation organisations, public bodies, insurance companies and care organisations.

3. Expected impacts

The primary and most significant impact of the project is going to be the quality of life of the elderly citizens with cognitive impairment and their carers and will be of societal nature. IN LIFE will develop viable business models, scenarios and opportunities for Industry and SMEs with consideration for Best Practices and recommendations:

- SME's are given better access to global markets via the IN LIFE store
- Service developers will gain access to (and probably pay for) de-identified actual use data for a large pool of users.
- Search information revealing unfulfilled user needs and non-verbally expressed user wants.
- Novel business models developed and assessed in Pilots that match user clusters and take into account socioeconomic conditions.

Also, IN LIFE will provide users with services built and individually personalised according to the user model, user preferences, context-of-use and actual service use. Moreover, key impact is expected in the innovation field, by transforming previous open architectures in the AAL sector (from past projects) into the cloud, thus making the new services more cost-efficient, with enhanced data storage, exchange capacity and seamless provision.

4. Conclusion

The issue of promoting the quality of life of elderly citizens with cognitive impairments and prolonging their autonomy and independent living capacity call for Europe-wide, sustainable solutions; the competences needed for this project are distributed all over Europe. The step change expected from delivering ICT based services at scale requires innovation. IN LIFE innovation includes technological advances but these are not the main outcome of the project. Rather main innovation comes from their utilization for a large scale pilot conducted within an integrated architecture and framework.

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References

- [1] Survey of Health, Ageing & Retirement in Europe – SHARE (FP5-2001-00360) www.share-project.org
- [2] www.alzheimer.co.uk, 2014.
- [3] Open architecture for accessible services integration & standardization – OASIS (215754) www.oasis-project.eu/

- [4] Tazari M-R., Furfari F., Ramos JP, Ferro E. *The PERSONA Service Platform for AAL Spaces*. In H. Nakashima et al. (eds.), *Handbook of Ambient Intelligence and Smart Environment*, DOI 10.1007/978-0-387-93808-0_43, pp1171-1199. Springer Science+Business Media, LLC 2010.
- [5] Remote health and social care for independent living of isolated elderly with chronic conditions – REMOTE (AAL-2008-01). www.remote-project.eu/
- [6] European Commission, H2020, Extract from Part 19 - Commission Decision C(2014)4995 http://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/annexes/h2020-wp1415-annex-g-tr1_en.pdf
- [7] Luis CA, Lowenstein DA, Acevedo A, Barker WW, Duara R. *Mild cognitive impairment directions for future research*. *Neurology*. 2003;61:438-444.
- [8] Petersen, R. C. (2011). Mild Cognitive Impairment. *N Engl. J Med*, 364, 2227-2234.