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Living Lab ActivAgeing

Developing home-based social and healthcare solutions for the elderly using participatory design

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Abstract. *An essential element in ageing well is the use of technologies to support quality of life and autonomy. Acceptability of such technologies for use by the elderly is central, with usage as a key issue to be addressed. The Living Lab ActivAgeing (LL2A) was founded by the University of Technology of Troyes (Champagne-Ardenne, France) specifically to address these issues, and to contribute to the development of relevant solutions for active and healthy ageing. The approach adopted is based on the development and evaluation of technological solutions for ambient assisted living, using participatory and iterative design methodologies. The economic model and the organisational innovation of the solutions being developed are addressed as early as possible, in terms of market relevance, acceptability, usability, and obviously ethics.*

Keywords: *living lab, usage, Ideas Lab, evaluation, ethics, participatory design, autonomy, healthy ageing*

1. Social innovation in active and healthy ageing

The Living Lab ActivAgeing (LL2A) is a participatory design laboratory, which innovates - together with the users - in the domain of services and technologies promoting health and autonomy of the elderly. LL2A specialises in i) evaluating the social appropriation of technological solutions for health and autonomy of the elderly, and ii) designing

technologies for all types of end users to improve and support actions of care and monitoring. Indeed, technologies are increasingly used by the older adults. New products and services, that lead to increased independence for elderly in society, must be designed for everyone. Given the growing number of senior users, comfort and ease of use are becoming a necessity in the design of products that accompany active ageing. Thus, our living lab is committed to understand and identify the obstacles to use a technology solution or an innovative service. The LL2A accompanies the older people every day, improving the usefulness and usability of technology with a focus on a more efficient and effective home-based health and social care. We focus on factors promoting or preserving the integration of seniors in society to prevent loneliness and social isolation, which could lead to chronic diseases, even to death.

The concept of "social" is at the centre of the approach developed to understand the acceptability of technologies to support ageing well. First, both prevention and social action centres work closely with LL2A in a holistic approach to ageing well. This idea of continuous prevention takes into account the medical, psychological and, more importantly, social aspects of ageing. The care relationship with professionals visiting older people at home is studied "in context" according to the caregiver's specificity, for instance by studying in situ the role of the nurse. In addition, understanding the work of home service professionals such as housekeepers raises questions concerning the complexity of activities related to healthy and active ageing. Second, natural caregivers are also integrated into the LL2A ecosystem. Indeed, it is essential to identify the real participation of people of the neighbourhood that occurs as a complement to that of the family circle. This involvement in the lives of the elderly is observed in two dimensions: moral support and material assistance. In LL2A, the close entourage can be extended to shopkeepers, building superintendents and even social relations created, for instance, with pharmacists.

Organisational innovation for LL2A also means combining a set of various skills and competences. We are part of several professional networks, at regional, national or international level. We have recently obtained the label ENoLL, the European Network of Living Labs. The LL2A environment is composed of "clusters" of companies, healthcare

stakeholders, and research laboratories. Interdisciplinary collaboration is emphasized, ensuring that bridges between technological // social // economic // health approaches can be built. Such an ecosystem is favourable for developing innovation through usage, with the shared objective of providing daily support to the elderly.

The key elements in the success in the LL2A's approach are:

- **Field studies:** Acquisition of physiological and biomechanical signals, associated with an analysis of social interactions, thus ensuring that all aspects of ageing and risk of frailty can be fully understood.
- **Prototyping:** Usefulness, accessibility and acceptability of technological solutions for the elderly and healthcare and home service professionals, are tested early through prototypes, with iterative improvements.
- **Video-ethnographic observations:** Specific user needs and constraints related to the technologies or services under development are observed, captured by video recordings and finely analysed before potentially being translated in recommendations. The video observations will initially take place in the controlled environment of the LL2A platform, before a phase in situ, in homes, as well as in prevention and care centres.

2. End-user involvement

The involvement of "peers" in every step of the innovation undertaken by the living lab is an essential component of the system. The close link between all actors in the value chain offers significant advantages in the field of elderly autonomy. The living lab promotes user involvement in the development of innovative technologies and services that facilitate autonomy and avoid frailty in older citizens via two approaches:

- **Participatory design**

Health and autonomy of older people is a demanding domain of intervention in terms of acceptability and use of technologies that can

aid in living and ageing well. Within the Champagne-Ardenne region, LL2A has developed a user-centred approach to design and evaluate solutions that support autonomy. The "user" can be the older person or the entire ecosystem. The participatory ecosystem of LL2A consists of: active elderly, frail elderly, health care providers, family members, health professionals, biomedical research companies, health insurance companies, prevention and social action centres and entrepreneurs.

LL2A brings together primary and secondary users, industrial research, and scientific institutes, with the aim of facilitating scientific research and application-driven solutions. Accordingly, the members of LL2A include an elderly end-user organisation, a centre for social prevention, home-care providers, and the local council directly responsible for the organisation of care for the elderly in the local area. These organisations will contribute to participant recruitment and grant access to a large community of potential users. Companies and institutions can test their product or service innovations with end-users in real environments.

Indeed, users participate actively in implementation and evaluation. People are actors of the process. So, through our approach, and the relevant methods used, a major aim is to understand the benefits of a product or service for the user. The idea is indeed to question desirability in terms of users' needs, but also other aspects - like technical feasibility and financial viability. Having a global questioning of relevant issues facilitates the introduction of new products into the market. Therefore, we question technical feasibility and financial viability together with the enterprises/companies. The added value that the Living Lab brings and its core competence is on studying users' needs: Deeply understanding users' needs and using their feedback to make iterative improvements through the detailed and objective understanding of underlying needs of the user.

- Iterative development

The iterative development adopted by LL2A involves a large group of actors who will all participate in the development of technologies and services for the elderly at risk of losing physical and/or social autonomy. Each project includes the involvement of end users in the initial

stages to gather requirements, from the point of view of the users themselves. The ecosystem of autonomy differs depending on the context in which the user lives, either at home or in a residential facility. These actors include health professionals involved in a gerontology network as well as non-professionals. Existing products can also be re-evaluated and re-appropriated by the users themselves, and are thus integrated in a new design cycle to improve the usefulness and usability of such a technology.

The reason of such a focus on social usage is that the elderly population is growing at the same time as barriers to technology access are decreasing among the elderly. The specificity of the elderly usage of technology means that comfort and ease of use for this population group is a vital element in the design of products that support active ageing. The designers' aim is to provide older adults with ways to interact with each other and keep in touch. The LL2A's "ideas' lab" enables to give instruments to communicate, be creative, share insights. Users envision their own ideas. With an early prototype for a service, a group of people can understand and identify the obstacles to the use of a technology or service solution. Products are reviewed, and misappropriation of objects by the user himself, are incorporated into a new design cycle. Furthermore, the LL2A accompanies elderly in daily activities that give meaning, purpose, and pleasure to everyday life. Devices and services that increase autonomy can be materialised and incorporated into the objects of the home environment. For instance, a bathroom scale was modified to measure balance quality at home, with data transmission by mobile phone. So far, the devices, services and solutions designed have all been based on indicators of physical frailty, such as grip strength, walking speed, inactivity, and weight loss, all of which were co-conceived with elderly end-users, thus ensuring their acceptability and usage.

The inclusion of the elderly in real-life contexts is essential:

- * to evaluate acceptability and social appropriation of technological solutions in the domain of Health and Autonomy of elders
- * to understand how relational social networks work and how they help older people in maintaining independence.

The new research platform of the LL2A premises enables organizational innovation, sharing specialized equipment for further research on Health & Autonomy solutions. On our platform, we have recreated the space of the home, in order to analyze elders' daily activities, through real-life observations and measures. These studies are based on the conviction that, by means of a continuous evaluation and improvement of solutions, user driven innovation offers significant timesaving in terms of the design of technologies and services as well as access to the market.

3. Acknowledgement

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