

Living Lab services promoting health in the community through participation

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Abstract

In the time of urban growth, people should be at the heart of development, too often they are forgotten. However, growth poses also a great possibility. Cities can transform into open innovation Living Labs, places to experiment and co-create with creative ideas to improve people's health and wellbeing.

Open innovation Living Lab is one-step for city towards smart and healthy society. This requires bold political choices, strategic level approach, open-minded governance and new operational models. The City of Kuopio has taken this opportunity into action together with Kuopio University Hospital.

Living Lab operates as an authentic co-creation environment to enable collaboration between citizens, industry, academia and public sector (Quadruple Helix Open Innovation model). This was implemented through primary health care services bringing together community and citizens' homes for co-creation of new solutions, which helps people, live longer in their homes and increase the quality of life.

The elderly and their close relatives have been enthusiastically involved in the services. Participation opportunities and the feeling of social cohesion have increased. Critical success factors are support from strategic level, well-coordinated services, governance, a broad customer base and solutions made from the genuine need.

Collaboration between all stakeholders has made it possible to provide better products and services that can improve health and wellbeing of the community in all sectors of life. At the same time, it promotes citizens' participation and supports co-creation of new ideas arising from the community and the growth of healthy city.

Keywords: ehealth, patient's experience, healthcare personnel's support, health technology

Introduction

We are living in an age of great global change. The United Nations 193 member states agreed 2015 unanimously the 2030 Agenda for Sustainable Development [1]. Agenda is a plan of action for people, planet, prosperity, peace and partnership. The 2030 Agenda establishes 17 Sustainable Development Goals (SDGs), which have health and well-being for all at their core.

The WHO Healthy Cities network, including thousands of cities worldwide in all WHO regions, recognizes cities as key stakeholders in the implementation of the 2030 Agenda with a focus on a bottom-up approach of empowerment [2]. Cities are places where planning and policy-making is closest to people and communities.

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However, growth poses also a great possibility. Cities can transform into open innovation Living Labs [3], places to experiment and co-create with creative ideas to improve people's health and wellbeing. Open innovation Living Lab is one-step for city towards smart and healthy society as well as a way to implement the 2030 agenda SDGs. This requires bold political choices, strategic level approach, open-minded governance and new operational models. The City of Kuopio has taken this opportunity into action together with Kuopio University Hospital.

The City of Kuopio, 9th largest city in Finland with 118 000 citizens, is one of Finland's leading cities in the fields of health, wellness and safety. The City of Kuopio has been an active member of the WHO Healthy Cities Network since 2005 promoting wellbeing and health for all. City of Kuopio's strategic vision is to be the capital, where the good life lives. The City of Kuopio's strategy comprises four fundamental properties: growing Kuopio, happy and healthy Kuopio, resource-wise Kuopio and progressive Kuopio [4]. Kuopio has categorized the success factors accordingly. Digitalization, internationality and partnership are three additional themes integrated in all levels of the strategy.

Kuopio University Hospital is one of the five university hospitals in Finland providing specialised medical care in an area of 248,000 inhabitants and is responsible for the advanced specialised medical care of nearly a million people in Eastern and Central Finland.

The City of Kuopio has implemented together with Kuopio University Hospital a strategic project "Development Center of Health and Wellbeing Technology" (2016-2018) to build an operational model for open innovation Living Lab for new wellbeing and health solutions.

Material

Finland is a relatively sparsely populated country (5.5 million inhabitants) with a highly advanced technological infrastructure [5] and one of the oldest populations in the World, in 2017 over 27% aged 60 years or over

[6]. Like in other Nordic countries, the health care system in Finland is mainly based on public health care providers. As the population is rapidly ageing, Finland needs new services and solutions for citizens' wellbeing more than ever. Finnish government has defined guidelines and operational plan to support the participation of older people, self-determination and empowerment, e.g. the Finnish Elderly Services Act and the key project "Improved home care for older persons and enhanced informal care in all age groups" (I&O) [7]. As well as the Finnish Quality Recommendation on Good Aging and Improving Services in 2017-2019 highlights several recommendations, one of which is utilization of technology in the provision of elderly services [8]. Implementing these goals will require novel customer-centric co-creation models that will make it easier to bring new innovations and technologies to everyday life. This is also a market possibility for new innovative businesses in Finnish cities. Living Lab can be one platform for cities to achieve these goals.

Welfare and health industry is one of the rare industries where business has been growing in recent years. Finland's welfare is dependent on export and the growth, where health technology has become one of the biggest high technology export sector. Over 80% of health technology products manufactured in Finland are exported [9]. Nevertheless, companies have a need to develop their solutions in Finland in local authentic health care environments together with communities. Finnish public health care, cities and hospital districts are key stakeholders in this, but such experimentation culture has been quite rare and new operational models needs to be developed. Today, Finland government promotes the implementation of experimentation culture in every level of public services to find innovative solutions, improve services, promote self-help and entrepreneurship and reinforce local and regional policy-making and collaboration with citizens [10].

Methods

European Network of Living Labs (ENoLL) describes Living Lab as follows: "Living Labs are defined as user-centred, open innovation ecosystems based on system-

atic user co-creation approach, integrating research and innovation processes in real life communities and settings. Living Labs are both practice-driven organisations that facilitate and foster open, collaborative innovation, as well as real-life environments or arenas where both open innovation and user innovation processes can be studied and subject to experiments and where new solutions are developed. Living Labs have common elements but multiple different implementations.” [11]

In this project, we adopted definition as follows: “Living Lab operates as an authentic co-creation environment to enable collaboration between citizens, industry, academia and public sector.” We see this four-tier definition as Open Innovation 2.0 or Quadruple Helix approach [12]. This approach removes the traditional silos between the four stakeholders, bringing multidisciplinary viewpoints together in an environment that promotes co-creation and the sharing of ideas. This provides a new approach for tackling the complex challenges we face in our societies. By working together, this quadruple helix approach can create shared value that benefits all stakeholders.

The City of Kuopio and Kuopio University Hospital Living Lab services started in the beginning of 2016 with the aim that companies developing future healthcare solutions could use to test and improve their products and services in an authentic healthcare environment together with end users. The City of Kuopio Living Lab is operating in primary health care services, focusing in geriatric and home care environments. The Kuopio University Hospital Living Lab is operating in specialised medical care environments within the hospital. Living Labs acts also as co-operation platforms between primary health care and specialised medical care. The Living Lab services consists of among others product and IT innovation, co-creation, testing, research collaboration and clinical trials.

The project created systematic operational model that starts with contact point to Living Lab. Company (or a person) fills out a structured contact form via internet (www.kuopiohealth.fi) including basic information about company (or a person) as well as needs and expectations for collaboration.

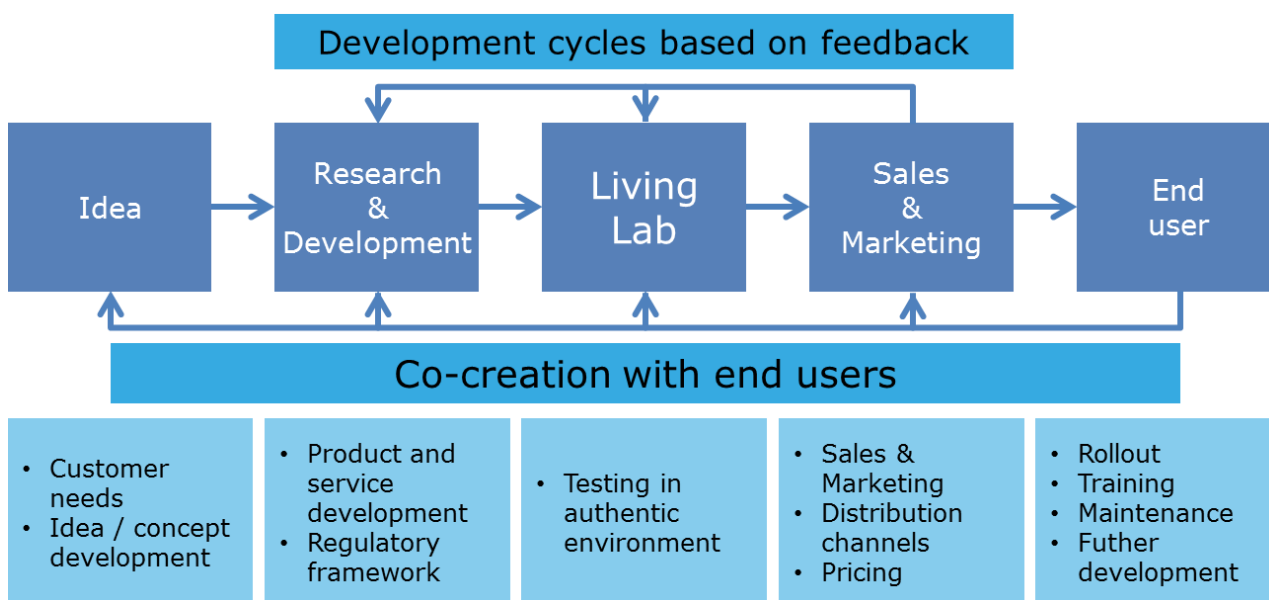


Figure 1. Living Lab in research, development and innovation process.



Figure 2. Living Lab three-step access model.

Both City of Kuopio and Kuopio University Hospital have a Living Lab coordinator whose responsibility is to organise the whole testing process in co-operation with other participants. Living Lab coordinator team goes through the contact forms weekly and contact the senders with a service-promise to reply within two weeks. Face-to-face meeting (can be also via video call) is arranged and the planning of the needed services begin. Planning includes the definition of concrete goal of the collaboration as well as each participant’s responsibilities during planning, implementation and evaluation. In the core of Living Lab processes is the inclusion of all participating actors: people, organisations staff (nurses, doctors etc.), Living Lab coordinator

and the company or research institution. Living Lab coordinator is involved in every step by giving support to participants and enables direct dialogue with users and developing company. This makes it possible to implement changes to products at early stage of development.

One of the first City of Kuopio’ Living Lab environments was Mäntykampus age-friendly living area. Mäntykampus acts also as a reference site for the European innovation partnerships of Europe’s Active and Healthy Aging (EIP AHA) [13]. The aim of the EIP AHA network is to respond to the challenges of Europe’s aging with the use of various innovative solutions.

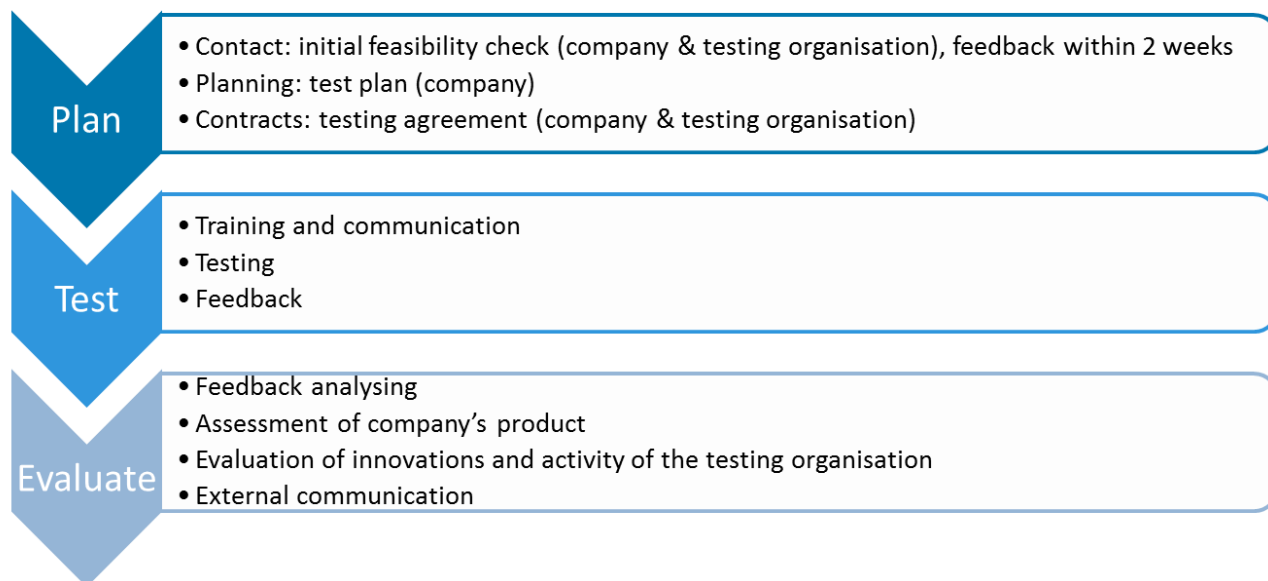


Figure 3. Living Lab operational process.

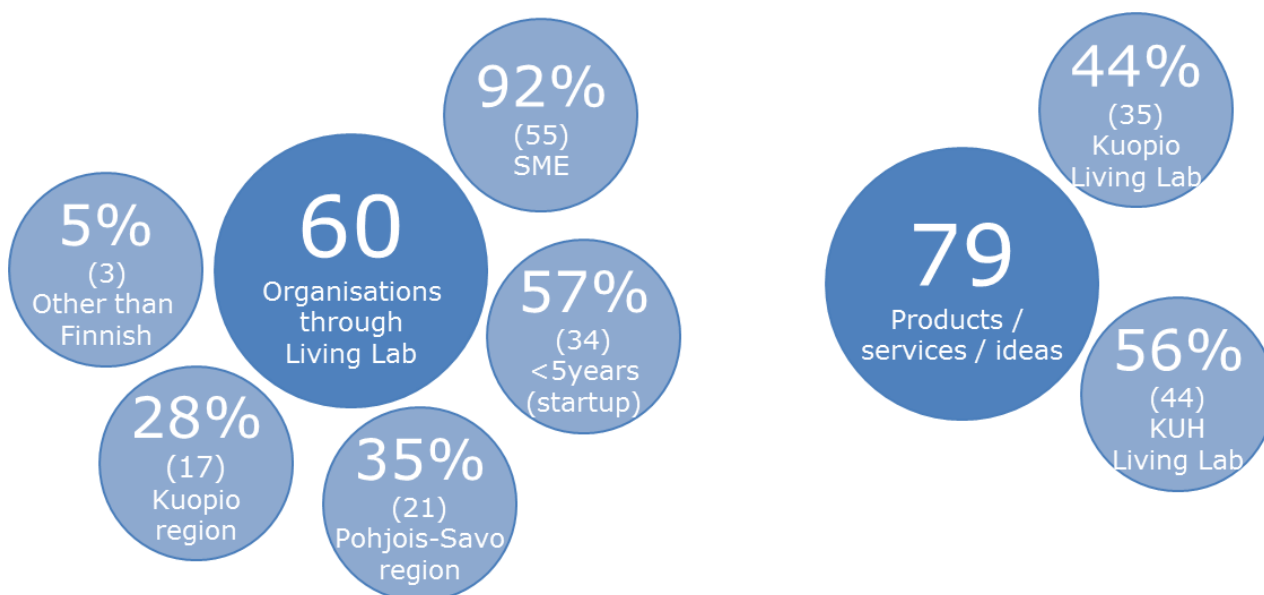


Figure 4. Living Lab in numbers during 1/2016-6/2018.

Results

Living Lab project (2016-2018) successfully modelled operational model for two innovation platforms, City of Kuopio Living Lab and Kuopio University Hospital Living Lab. During the creation of Living Lab operational model, the aim was to co-create 10 different solutions, products and services. However, the project finally co-created almost eight times more than original aim, 79

solutions, products and services in different stages (35 in City of Kuopio Living Lab and 44 in Kuopio University Hospital Living Lab). Solutions originated from 60 different organisations that includes 57 private companies, 1 research organization, 1 university of applied sciences and 1 municipally owned company. The majority of companies, 96%, were innovative SMEs and startups. Co-created solutions ranged from software applications (e.g. mobile health apps and games for

health) to physical medical devices (e.g. portable-ecg) and tools supporting active independent living. The large number of co-created solutions gives indication to the need for public sector Living Lab services from the industry. During the project, there were over 200 people participating to Living Lab process.

City of Kuopio Living Lab has had several companies specializing in the field of ageing life technology for co-creation, such as an application for family-related communication and drug-related solutions. The elderly and their close relatives have been enthusiastically involved in the co-creation process. Participation opportunities and the feeling of social cohesion have increased.

Example case – Secure home care communication solution

City of Kuopio Living Lab conducted co-creation case of a communication solution where home care customer's relatives can communicate with home care personnel via internet-based mobile application. The personnel and relatives exchanged information in a secure form. The company that developed the application wanted to improve the information flow between home care customers, their relatives and home care staff, since there can be gaps that can jeopardize the safety of home care customers. The application proofed to be as a good and efficient way in giving and receiving every-day information on how the customer is doing. During the co-creation, company got direct feedback from all the participants how they wished the application to be improved. This co-creation case and the results were important also to the home care services of the City of Kuopio. The procurement of family-related communication solution will take place in the coming year.

Example case – Mobile application for radiotherapy unit patients

Kuopio University Hospital Living Lab conducted co-creation case of a mobile communication solution for radiotherapy unit patients. Patients tested the use of

the mobile application at home and received their radiotherapy care instructions and appointment information. Patients saw the benefit of the mobile application important because the phone is always with them, so the instructions and the appointment times are as well with them unlike paper versions.

Success criteria

The willingness of the organisation's personnel to participate in the co-creation of new solutions as part of their own work is one of the key success criteria for Living Lab services functioning in authentic health care environments. The project conducted a survey for City of Kuopio and Kuopio University Hospital personnel in April 2018 (n=847). Based on survey most of the personnel (78,2%) are interested in health technology and its development, and 64% are interested in providing own professional expertise in development work, for example by participating in trial work or by providing suggestions for development.

The companies that participated to Living Lab process evaluated project success via survey in June 2018. The most of the companies (94,4%) involved in Living Lab services are very, or quite satisfied with the services. Most companies (90,9%) found the services useful and almost all of them (95,2%) thought that those were very good or good quality. All companies would work very or quite likely with Living Lab services in the future.

During the project, Living Lab services have become an essential part of Kuopio's regional KuopioHealth network [14] that is committed to promoting health technology expertise, research, business life and health awareness. The network promotes development, research and new innovations from customers' needs and serves as a platform for new products and services. Kuopio Living Lab is also a part of Finnish national Living Lab and Test Bed network, which aims to create nationally coherent and effective development activities.

Discussion

Collaboration between all stakeholders has made it possible to provide better products and services that can improve health and wellbeing of the community in all sectors of life. At the same time, it promotes citizens' participation and supports co-creation of new ideas arising from the community and the growth of healthy city.

Living Lab's further development aims to expand services regionally and thematically. The aim is to expand Living Lab environments more widely around hospital district, to new areas like to social services, school environments and learning environments. Organizations and social actors are interested in getting new tools for their action.

Social exclusion and loneliness have alarmingly increased in Finland and new solutions to these problems are sought. Living Lab model, co-creation with people in an authentic environment can provide a way to find new solutions that can help people's actual needs to improve their social exclusion, the fear of social situations and loneliness.

The project has brought the knowledge of experimentation culture, agile and efficient development. The co-creation main aim needs to be goal-oriented, short and compact in design, execution and evaluation. This co-creation model, slightly modified, has been implemented to other areas of developing healthcare processes. City of Kuopio's elderly services are at the forefront of first-hand information on new future solutions that can meet the needs of society with cost-effectiveness and high quality in service.

Living Lab services aim to promote health technology expertise, research, business life and health awareness. Living Lab services have made it possible to establish close regional co-operation for the development of a prosperous and successful Kuopio and thus the strong knowledge and production of citizens' services. Critical success factors for a sustainable Living Lab environment are support from strategic level, well-coordinated ser-

vices, governance, a broad customer base and solutions made from the genuine need.

Majority and growing proportion of the world's population is now living in urban areas. Healthy cities approach, which brings human development and health equity to the forefront, offers a great opportunity to address emerging challenges in cities as well as to advance the global Agenda 2030 sustainable development goals (SDGs). New global partnerships will bring together a range of stakeholders where Living labs can be powerful instruments to speed up joint development.

Acknowledgments

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References

- [1] United Nations. Transforming our world: the 2030 Agenda for Sustainable Development. UN General Assembly Resolution A/RES/70/1, 21 October 2015. United Nations; 2015.
- [2] 2017 Healthy Cities Pécs Declaration. Outcome of the WHO European Healthy Cities Network Annual Business and Technical Conference, Pécs, Hungary, 1–3 March 2017. Copenhagen: World Health Organization Regional office for Europe; 2017. Available from: <http://www.euro.who.int/en/health-topics/environment-and-health/urban-health/publications/2017/healthy-cities-pecs-declaration-2017>.
- [3] Leminen S. Living Labs as Open Innovation Networks - Networks, Roles and Innovation Outcomes. Aalto University publication series doctoral dissertations, 132/2015. Aalto University, Department of Industrial Engineering and Management; 2015. Available from: <http://urn.fi/URN:ISBN:978-952-60-6375-1>.
- [4] Kuopio's strategy until 2030. City of Kuopio; 2017 [cited 14.8.2018]. Available from: <https://www.kuopio.fi/en/strategia>.

- [5] Peer Review eHealth Strategy and Action Plan of Finland in a European Context. Ministry of Social Affairs and Health, Finland. Reports and Memorandums 2013:11. Available from: <http://urn.fi/URN:ISBN:978-952-00-3300-2>
- [6] United Nations. World Population Ageing 2017 – Highlights. United Nations, Department of Economic and Social Affairs, Population Division; 2017 (ST/ESA/SER.A/397). Available from: http://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2017_Highlights.pdf.
- [7] Ministry of Social Affairs and Health. Improved home care for older persons and enhanced informal care in all age groups, Government Key Project. Ministry of Social Affairs and Health [cited 10.8.2018]. Available from: <https://stm.fi/en/improved-home-care-for-older-persons-and-enhanced-support-for-all-aged-informal-carers>.
- [8] Ministry of Social Affairs and Health and Local Finland. Quality Recommendation to Guarantee a Good Quality of Life and Improved Services for Older Persons 2017-2019. Ministry of Social Affairs and Health 2017:6. Available from: <http://urn.fi/URN:ISBN:978-952-00-3960-8>.
- [9] Healthtech Finland 2018, Healthtech Finland publication 5/2018. Available from: https://healthtech.teknologiateollisuus.fi/sites/healthtech/files/file_attachments/ht-vuosijulkaisu_2018_eng_04.pdf.
- [10] Finnish Government. Implementation of the Government Programme. Government Key Projects: Digitilisation, Experimentation and Deregulation. Helsinki: Finnish Government, updated 25 May 2018 [cited 13.8.2018]. Available from: <https://valtioneuvosto.fi/en/implementation-of-the-government-programme>.
- [11] What are Living Labs. European Network of Living Labs (EnoLL). Brussels: The European Network of Living Labs (ENoLL) [cited 1.8.2018]. Available from: <https://enoll.org/about-us/>.
- [12] Carayannis EG, Rakhmatullin R. The Quadruple/Quintuple Innovation Helixes and Smart Specialisation Strategies for Sustainable and Inclusive Growth in Europe and Beyond. *Journal of the Knowledge Economy* 2014;5(2):212-239. <https://doi.org/10.1007/s13132-014-0185-8>
- [13] European Commission. Study on support to scaling-up of innovations in Active and Healthy Ageing, Final Report. European Commission SMART 2015/0039. Available from: http://www.scale-aha.eu/fileadmin/scaleaha/documents/scaleaha_d5.4_finalstudyreport.pdf.
- [14] City of Kuopio. KuopioHealth. [cited 10.8.2018]. Available from: www.kuopiohealth.fi.