
Living Labs For In-situ Open Innovation: From Idea To Product Validation And Beyond

Dimitri Schuurman

iMinds-MICT-UGent
Korte Meer 7-9-11
Ghent, 9000 BELGIUM
dimitri.schuurman@iminds.be

Bram Lievens

iMinds-SMIT-VUB
Pleinlaan 9
Brussels, 1050 BELGIUM
bram.lievens@vub.ac.be

Lynn Coorevits

iMinds-MICT-UGent
Korte Meer 7-9-11
Ghent, 9000 BELGIUM
lynn.coorevits@ugent.be

Jonas De Meulenare

iMinds-SMIT-VUB
Pleinlaan 9
Brussels, 1050 BELGIUM
jdemeule@vub.ac.be

Annabel Georges

iMinds-MICT-UGent
Korte Meer 7-9-11
Ghent, 9000 BELGIUM
annabel.georges@ugent.be

Karel Vandenbroucke

iMinds-MICT-UGent
Korte Meer 7-9-11
Ghent, 9000 BELGIUM
karela.vandenbroucke@ugent.be

Bastiaan Baccarne

iMinds-MICT-UGent
Korte Meer 7-9-11
Ghent, 9000 BELGIUM
bastiaan.baccarne@ugent.be

Abstract

In this paper we present the Living Lab methodology as an overall framework for in-situ open innovation involving the end-user as equal participant in the innovation process. As a specific form of distributed innovation, relying on co-creation, we demonstrate the applicability of the Living Lab-approach for home ICT innovation by means of four innovation projects in different stages of maturity. We describe the used research methodologies and reflect on the role of the user.

Author Keywords

Living Labs, In-situ research, Open innovation, User innovation, User involvement

ACM Classification Keywords

H.1.2 User/Machine Systems: Human factors.
H.5.2 User Interfaces: User-centered design.
I.3.6 Methodology and Techniques: Interaction techniques.

Introduction

A shift in the dominant mode of innovation – from vertically integrated innovation towards a more distributed mode of innovation – has forced companies to alter both their research and development processes and their approach to innovation management. Bogers and West identified two major research streams linked to the phenomenon of distributed innovation that study both modes from a different perspective [1]. The open innovation paradigm takes the firm's perspective and examines the financial benefits of engaging in distributed innovation [2]. In contrast, the user innovation stream looks at distributed innovation processes from the perspective of the user [3]. However, both perspectives rely on a process of collaboration for innovation and shared value creation, something which has been referred to as the act of co-creation [4]. In other words, within the context of distributed innovation, co-creation can be seen as a bridge between the open and user innovation perspectives, as it indicates shared value creation between users and firms, which makes co-creation a strategy for firms to tap into user innovativeness and extend their own knowledge base. Within this distributed view on innovation, Living Labs have emerged as an innovation approach relying on co-creation [5]. The popularity of the approach increased significantly since the European Commission started stimulating projects to advance, coordinate and promote a common European innovation system based on Living Labs in 2006, which also led to the establishment of the European Network of Living Labs [6].

Within this positioning paper, we give an overview of concrete implementations of the Living Lab

methodology in four ICT-innovation cases for home contexts facilitated by iLab.o, the Living Lab division of iMinds, which holds the secretary position of the ENoLL, and carried out by user researchers from the iMinds research groups MICT (Ghent University) and SMIT (Free University Brussels)¹. The Living Lab-approach advocated and practiced within iMinds consists of a large toolbox of methods and techniques to involve end-users. Depending on the type and maturity of the innovation, a mix of research steps is carried out, resulting in iterative innovation development. The user involvement within these iLab.o projects is structured around a panel-based approach with to this date close to 20.000 end-users having already participated in one or more Living Lab-activities [7]. A panel-based Living Lab refers to the fact that not a technology or material infrastructure as such is central in Living Lab activities, but that the users themselves are considered as an immaterial infrastructure and a central asset within the Living Lab environment. The four innovation projects are chosen based on the maturity of the innovation project (idea - concept - prototype - pre-launch innovation - post-launch innovation).

From idea to concept

The earliest phase in which a user can be engaged in the innovation process is when generating innovative ideas in order to develop new concepts. In the AllThingsTalk² Living Lab-project, the company involved is looking for practical use-cases for a home consumer market that show the added value of their Internet-of-Things platform. The project started off with an ideation

¹ For more information, see www.mict.be, www.smit.vub.ac.be and www.iminds.be/en/develop-test/ilab-o

² www.allthingstalk.com

workshop a mass amount of ideas are being generated by a set of student participants with an interest in new media and ICT, but without a deep technological knowledge. These ideas serve as a first indication of general user needs and wants, and of potential innovative ideas for the later use-cases. These ideas are assessed on a larger scale in an online pre-survey, which also investigates the general habits and practices as well as the users' attitudes towards the innovation under investigation. This is complemented with online crowdsourcing techniques. This online co-creation phase is used to further develop the data from the ideation. Subsequently, in order to turn the selected ideas from previous research steps into more concrete user scenarios, a probe research is set-up. This deals with a heterogeneous set of users, selected from the survey respondents based on their innovation-related characteristics, that are engaged in practical and creative assignments regarding the ideas. They are forced to turn these ideas into more concrete user scenarios and use-cases and to give creative input to further shape and delineate them. Once these concepts have been shaped, the outcomes are brought back to a wider community of test-users by organizing co-creation through an online platform, moderated by researchers. Here the users within the Living Lab can contribute to the development of the product prototype. This is a four phases-process: discussion, conceptualization, evaluation and analysis. In the end, this series of research activities leads to three very specific use cases and proof-of-concepts that can be further tested and validated within a Living Lab setting.

From concept to prototype

For advancing from concept to the building of a prototype, users can be involved on different levels and

throughout various stages, by means of triangulating different methods and techniques. This was the case in Webinos³, a European project aiming at the creation of a swiping application which will allow different devices to connect with each other without needing one source device. For example, content from your computer would be accessible via your smartphone and swiped onto a nearby TV-screen. To develop the application prototypes tailored towards actual user needs, personas and scenarios were developed in a first phase by means of qualitative interviews with corresponding possible scenarios. Based on the personas and user scenarios from the previous research activities, a set of co-creation workshops were organized to shape and design the concept and service. This was done by clustering potential users within the Living Lab, based on the persona descriptions. All this input was translated towards and provided to the technical development team to develop a first series of prototypes of the application that could be tested in a controlled field setting. However, before 'going live' with this proof-of-concepts (PoC) they were being tested in a 'home-lab' – which is a reflection of the domestic or natural environment of the user (such as a living room) installed in a research laboratory. Here the users can play, test and evaluate the service (in pre-defined scripts) with an extensive monitoring (recordings, blinded observation room). By adopting this approach the development becomes a continuous, iterative process in parallel with the scenario development and the prototype development. It allows to adapt the prototypes accordingly and moves the Webinos swiping application from concept to testable prototype.

³ www.webinos.org

From prototype to pre-launch: ethnographic research

In order to proceed from the home-lab validated prototype towards a market-ready product or service, a real-world field trial with end-users can provide the necessary contextual assessment and evaluation in order to fine tune the innovation. The Living Lab environment lends itself to conduct ethnographic, observational research and this way allows gathering valuable, contextual and 'unpredictable' information. A key element in the set-up of the Living Lab are monitoring instruments that enable the researcher to follow-up the actions of a user. When performing such observatory research (in a Living Lab setting), three elements need to be clearly distinguished [8]: *participation, presence* and *awareness*. The first refers to the degree of participation of the observer itself during the observation. In terms of presence one can be a direct or indirect observer. This has of course also an impact on the third element, awareness. This refers to the extent a user is aware of being observed or part of the research. This can result in a research participation that is either *overt* (aware) or *covert* (not aware). Ideally, a Living Lab tries to conduct this observational research on a permanent base, both direct and indirect. Due to this ongoing process the boundaries between direct and indirect as well as being aware or not aware are blurred. The user might still be aware of the fact that they are participating in a research track, but not being conscious that every action or move is being monitored (and part of the innovation process). This also stresses the need for field trials that last for a longer time period. Within the WeePeeTV project⁴, users were equipped with a set-top

⁴ www.weeppee.tv

box including the WeePeeTV application, allowing to watch over-the-top streaming television. These boxes were installed in the homes of selected people from the LeYLab Living Lab⁵. The ethnographic method used was observer as participant, and consisted of visiting the test-users, interviewing them in their real life use context and observing them while using the set-top box. The roll-out and implementation with the Fibre-to-the-Home network of LeYLab offered a technical test of the functioning and stability of the app and the boxes, while the ethnographic methods allowed for an in-depth contextual evaluation of the actual usage. This allowed WeePeeTV to proceed from prototype to pre-launch market-ready innovation.

Post-launch innovation: home placement

The Living Lab as a research methodology also offers the proper environment to learn and explore bottom-up from the users based on existing 'post launch' innovations taking into account the domestication and actual usage of these innovations. This can lead to incremental innovation or this can even be the start of a whole new innovation process based on the insights gathered. Bogers refers to this as the user as post-implementation adapter [1]. One method is to introduce new technologies or services in the domestic sphere of the user, which is called *home placement*. In the 3DTV Living Lab project⁶ we aimed to get insight in how stereoscopic 3D (S-3D) and 3DTV fit within current social viewing practices and on the meaning and added value of S-3D and 3DTV. Therefore we placed 17 TV sets in 17 different households for a period of 12 weeks.

⁵ www.leylab.be/english

⁶ www.iminds.be/userfiles/files/icon/3DTVleaflet.pdf

When recruiting these households we aimed for a variation in household composition, acquaintance with S-3D viewing and attitude towards S-3D. As such we could investigate how S-3D and 3DTV align with this variety of viewer profiles. Next, our research questions included the meaning of S-3D on a TV-set and in the home, the reasons for watching S-3D in a home context and what bottlenecks exist, and how S-3D fits in the current social viewing practices. In order to tackle these questions we opted for a longitudinal approach. This allowed us to get beyond the initial excitement respondents may have about the newly available technology to the point where the actual domestication process starts. Very often when a new technology or ICT enters the household, users explore and experiment with all functionalities (novelty effect) and have certain expectations about the usage and place of that technology. Only after a certain period of time, the actual user practices are revealed. Jouet calls this the 'disenchantment' of technology [9]. Besides this disenchantment, the prolonged research period allows the application of a variety of research methods with one specific sample. To grasp how and why 3DTV started to fit in the everyday life (or not), we applied the following research methods: a benchmarking interview, time and event based diaries, interviews, a subjective test, and a survey. The benchmarking interview allowed us to position the household and its household members in terms of the aforementioned variables. We used the diaries as an indirect observational tool to gain insight in the general viewing behavior as well as specific S-3D viewing. These diaries served as an input for the interviews. These interviews were situated in the middle and at the end of the home placement period. All this combined served as input for

the closing questionnaire which validated the qualitative findings.

This multitude of methods implies that there was regular contact between the researchers and the participating households. The researchers were also the main contact persons if issues arose with the TV-sets. The iterative game of data collection and processing within a short time interval, combined with several practicalities that come along with and arose during this specific research period, makes this a very work intensive period. Therefore, when planning for a study that involves a home placement, as a researcher one should carefully plan not only for the specific moments of data collection, but for the whole practical organization that encompasses such a study, and try to anticipate for issues that may arise before the study starts.

Conclusions

In this paper we have provided some insights on how the Living Lab – as an open innovation instrument relying on co-creation – enables user involvement and user engagement in the innovation process. A set of research steps and methodologies has been listed based on concrete practice in four home-related ICT innovation projects. These cases range from an early idea to concepts over prototype testing to pre-launch innovation and beyond. The 'uniqueness' and at the same time the big challenge in this Living Lab approach is to take along the user throughout the whole process and for the researcher to mediate between the user and the developer to allow iterative development. In other words, the used methods and techniques should be chosen and implemented to accordingly facilitate value creation for all the stakeholders involved: users,

developers and researchers. For the users this is mainly on the level of recognition as well as to direct, visible result of the feedback they provided. The involvement of these stakeholders and the set-up of such long-term Living Lab environment raises a lot of operational issues. Ogonowski et al. [10] listed a number of challenges (on the level of recruitment, participation, collaboration) that need to be tackled in order to enable an optimal user involvement. However, the Living Lab appears to be a suitable instrument to get the user strongly involved in the innovation process within a real-life, domestic setting, searching for the right balance between active (interviews, ideation, co-

creation...) and passive (monitoring, observation, logging...) research activities in order to capture the full spectrum of contextualized feedback. By alternating between in-depth qualitative methods and validating quantitative research methods, and by purposefully selecting users based on their characteristics, a balance between breadth and depth of the user input is facilitated. A necessary pre-condition is to consider the user as equal participant in the innovation process. In practice however, there still remains a lot of work to be done in further delineating the concept theoretically and sharing best practices as well as failed initiatives in order to advance the field and to mature the discipline.

References

- [1] Bogers, Marcel, and Joel West. "Managing distributed innovation: strategic utilization of open and user innovation." *Creativity and innovation management* 21, no. 1 (2012): 61-75.
- [2] West, Joel, and Marcel Bogers. "Leveraging external sources of innovation: a review of research on open innovation." *Journal of Product Innovation Management*, Forthcoming (2013).
- [3] Von Hippel, Eric. "Democratizing innovation: the evolving phenomenon of user innovation." *International Journal of Innovation Science* 1, no. 1 (2009): 29-40.
- [4] Prahalad, Coimbatore K., and Venkat Ramaswamy. "Co-creation experiences: The next practice in value creation." *Journal of interactive marketing* 18, no. 3 (2004): 5-14.
- [5] Schuurman, Dimitri, Lieven De Marez, and Pieter Ballon. "Open Innovation Processes in Living Lab Innovation Systems: Insights from the LeYLab." *Technology Innovation Management Review* 2013: (November 2013: Living Labs):28-36.

- [6] Mensink, Wouter, Frans AJ Birrer, and Benoît Dutilleul. "Unpacking european living labs: analysing innovation's social dimensions." *Central European journal of public policy* 1 (2010): 60-85.
- [7] Schuurman, Dimitri, Bram Lievens, Lieven De Marez, and Pieter Ballon. "Towards optimal user involvement in innovation processes: a panel-centered living lab-approach." In *Technology Management for Emerging Technologies (PICMET)*, 2012 Proceedings of PICMET'12:; pp. 2046-2054. IEEE, 2012.
- [8] Cooper, Janet, Rachael Lewis, and Christine Urquhart. "Using participant or non-participant observation to explain information behaviour." *Information Research* (2004).
- [9] Jouët, Josiane. "Retour critique sur la sociologie des usages." *Réseaux* 18, no. 100 (2000): 487-521.
- [10] Ogonowski, C., Ley, B., Hess, J., Wan, L., & Wulf, V. (2013). Designing for the living room: long-term user involvement in a living lab. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 1539-1548).