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Living Labs as Open-Innovation Networks

Seppo Leminen, Mika Westerlund, and Anna-Greta Nyström

> *"By living labs, we mean reconstructing the interaction space. It can be any space, anywhere, suitable for collaborative design, the application of knowledge for empowerment, uplift, and development of people and communities for the use of innovation."*
>
> An interviewee in this study

Living labs bring experimentation out of companies' R&D departments to real-life environments with the participation and co-creation of users, partners, and other parties. This study discusses living labs as four different types of networks characterized by open innovation: utilizer-driven, enabler-driven, provider-driven, and user-driven. The typology is based on interviews with the participants of 26 living labs in Finland, Sweden, Spain, and South Africa. Companies can benefit from knowing the characteristics of each type of living lab; this knowledge will help them to identify which actor drives the innovation, to anticipate likely outcomes, and to decide what kind of role they should play while "living labbing". Living labs are networks that can help them create innovations that have a superior match with user needs and can be upscaled promptly to the global market.

Introduction

Successful innovation development is nowadays dependent on understanding both existing and emerging user needs, through which business opportunities are developed. For that purpose, the use of living labs has emerged as a novel form of creating competences and competitive advantage. An increasing number of managers are interested in living labs as a way to transform their conventional R&D organizations to follow an open-innovation model (Westerlund and Leminen, 2011; timreview.ca/article/489). Open innovation builds on intense co-development with users and the end result is expected to better solve customers' needs and wants. Therefore, users are innovators, co-designers, co-producers, and entrepreneurs in regard to new products and services (Pascu and van Lieshout, 2009; tinyurl.com/cmrkjlw).

A living lab is a network that integrates both user-centered research and open innovation. The emergence of open innovation has led to the establishment of elaborate networks in which companies team up with diverse types of partners and users to generate new products, services, and technologies (Chesbrough and Appleyard, 2007; tinyurl.com/3ne6xts). These collaborative actors, innovation processes, and practices are latterly referred to as open-innovation networks. However, little is known of the multitude of types that these networks can take or the differences between the diverse types; such categorizations would help scholars and practitioners better understand how living labs work. Here, we focus on living labs as a form of open-innovation network. We describe four different types of living lab based on the type of central party whose interests dominate the network's operation.

The remainder of this article is organized as follows. After this brief introduction, we discuss the background of living labs from a network perspective. We proceed by presenting our data and the results from an empirical analysis on the four principal types of living lab. Finally, we conclude by discussing our findings and their implications for theory and practice.

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Living Labs as Networks

Living labs are an environment in which user experiences reveal future directions of product development. They draw in many aspects of the open-innovation model, which is of particular interest to many industries today. The concept of living labs (or living laboratories) emerged in the early 1990s (e.g., Bajgier et al., 1991; tinyurl.com/br3bx5w) to describe regional areas where students undertook real-world projects to solve large-scale problems. Later on, William Mitchell of MIT used the concept as a user-centric methodology for studying smart/future homes. The purpose was to sense, prototype, validate, and refine complex home technology in a real-life context.

The concept of living labs raised international interest and, in 2006, the European Commission kicked off projects to advance, coordinate, and promote a common European innovation system based on living labs (Dutilleul et al., 2011; tinyurl.com/9kce4uw). Living labs would allow firms to involve users in the development of new products, services, or applications in a process of co-creation, because the average user, equipped with the proper tools, is the most suitable candidate to design a product or service (Lynch and O'Toole, 2009; tinyurl.com/92h3tk9). Therefore, living labs offer an R&D methodology through which innovations are created and validated in collaborative real-world environments (Ericsson et al., 2006; tinyurl.com/8fv3jkp).

Living labs are composed of heterogeneous actors, resources, and activities that enable and support innovation at all phases of the lifecycle. Westerlund and Leminen (2011; timreview.ca/article/489) define living labs as physical regions or virtual realities in which stakeholders form public-private-people partnerships (4Ps) of firms, public agencies, universities, institutes, and users all collaborating for creation, prototyping, validating, and testing of new technologies, services, products, and systems in real-life contexts. Therefore, living labs have the potential to help companies rapidly commercialize and upscale an innovation to a global market.

One of the most significant characteristics of living labs is that they are open-innovation networks. Living labs offer a research "think-tank" and innovation platform, which can help companies to apply user-driven innovation practices (van der Walt et al., 2009; tinyurl.com/9vxpr8l). User-centered research can have commercial value for companies by helping alleviate the risk involved when launching a new product, technology, or service (Liedtke et al., 2012; tinyurl.com/9xv7gk6). Collaborative development platforms, such as living labs, should bring together all the relevant parties: developers, public sector agencies, exploiters, and end-users of new technologies and related products and services (cf. Ballon et al., 2005; tinyurl.com/9vfaejn).

Open innovation is fundamentally a self-organizing model, because the open-innovation network and its operation build on voluntary collaboration. Each participant is considered to have a similar role and relevance in the network. However, Möller and colleagues (2008; tinyurl.com/3s95gax) argue that innovation co-creation in provider-customer relationships can be producer-driven, customer-driven, or in equilibrium. That is, one party's interests may dominate the innovation co-creation, or one party may be more active in the development work. We argue that living labs are networks that comprise a number of various actors that can dominate the operation. On the basis of an empirical analysis, this study puts forward four principal types of actors that can take the lead in living labs.

Data Collection and Analyses

This study uses a qualitative research approach to investigate different types of living labs. We conducted a total of 103 semi-structured interviews with representatives of 26 living labs in four countries between 2007 and 2011. The case living labs were located in Finland, Sweden, Spain, and South Africa. To maintain confidentiality, we have omitted the identities of the interviewees and their organizations as well as the names of the living labs. The interviewees included participants in living labs from different organizations, as well as a number of end users. All interviews were carried out through face-to-face meetings or phone conversations. The interviews were recorded for transcription and analysis. In addition, our material comprised secondary data in the form of information drawn from relevant websites, bulletins, magazines, and case reports. Some issues that emerged from the interviews were detailed later through additional interviews by phone.

The study applies investigator triangulation in data analysis (cf. Denzin, 1978; tinyurl.com/8w7sdyx). Data gathered from living labs was organized by interviews (case, date and informant) and coded from original transcribed interviews. The unit of analysis was living lab actors, which were mapped and analyzed to understand their roles for the innovation. Our analysis revealed four different types of living lab, which were categorized according to the actor that drives the activities.

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Findings

Living labs can be differentiated based on which actor drives their activities, and on this premise, we propose four types of living lab: utilizer-driven, enabler-driven, provider-driven and user-driven. Each type has a different actor that plays the most active role in the initial phase or later acts as the principal promoter of innovation activities. They differ from each other in terms of activities, structure, organization, and coordination. However, as is typical in open-innovation networks, the dominant actor does not exercise superior power over the others. The four proposed living lab categories are discussed in the following sections, and their key characteristics are summarized in Table 1.

Type 1: Utilizer-driven living labs

Utilizers are companies that launch and promote living labs to develop their businesses. The focus in utilizer-driven living labs is on developing and testing firm products and services. Consequently, "living labbing" creates value predominantly for utilizers, because the whole network's operation is based on reaching objectives and resulting in concrete outcomes that will facilitate the utilizers' operations. Utilizers use living labs as a strategic tool to collect data on users or user communities of their products or services. User information on use experiences, trends, or even competitors is collected to support the firms' business development in both the short term and the long term.

Table 1. Characteristics of different types of living labs

Characteristic	**Type of Living Labs**			
	Utilizer-driven	***Enabler-driven***	***Provider-driven***	***User-driven***
Purpose	Strategic R&D activity with preset objectives	Strategy development through action	Operations development through increased knowledge	Problem solving by collaborative accomplishments
Organization	Network forms around an utilizer, who organizes action for rapid knowledge results	Network forms around a region (regional development) or a funded project (e.g., public funding)	Network forms around a provider organization(s)	Network initiated by users lacks formal coordination mechanisms
Action	Utilizer guides information collection from the users and promotes knowledge creation that supports the achievement of preset goals	Information is collected and used together and knowledge is co-created in the network	Information is collected for immediate or postponed use; new knowledge is based on the information that provider gets from the others	Information is not collected formally and builds upon users' interests; knowledge is utilized in the network to help the user community
Outcomes	New knowledge for product and business development	Guided strategy change into a preferred direction	New knowledge supporting operations development	Solutions to users' everyday-life problems
Lifespan	Short	Short/medium/long	Short/medium/long	Long

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Living labs initialized by a utilizer are linked with strategic actions in the firm's product-development function. The idea is to develop (or verify) new products and services using help from others in the network of the living lab. The utilizer guides knowledge (co-)creation in the network to ensure it yields information it will find useful, for example, relating to future user environments. Thus, the utilizer organizes living lab activities around itself to emphasize its central position in the network. However, utilizer-driven living labs are short lived, because utilizers strive for rapid results that can be easily integrated into their business strategy. They exercise the expendable "take it and use it" strategy for the co-created innovation.

Type 2: Enabler-driven living labs

Enablers include various public-sector actors, non-governmental organizations, and financiers, such as towns, municipalities, or area-development organizations. Living labs initialized by enablers are typically public-sector projects that pursue societal improvements. Development work builds on regional or societal needs. For example, enabler-driven living labs aim at developing a specific region or city area in terms of reducing local unemployment or by solving diverse social and structural problems. The enabler has the largest interest in these kinds of living labs, and the activities strive at results that are far reaching, such as the development of rural areas. Activating collaboration among the key actors may be a key outcome by itself, because regional development necessitates multi-party cooperation for an extended period of time.

Enabler-driven living labs are usually built around a certain regional-development body or a regional-development program. In many cases, universities and other educational organizations push the development work close to the users and their daily lives. However, company participation in enabler-driven living labs has customarily been minimal. This low level of participation suggests that the potential business benefits are not clear to utilizer firms. Companies fail to see the value of participating in those kinds of living labs that target mainly enabler's objectives and focus on creating value for the enabler. Nevertheless, information is created and shared across the network through the actors in the living lab, and "living labbing" lasts a significantly longer time compared to utilizer-driven living labs.

Type 3: Provider-driven living labs

Living labs are usually either utilizer-driven or provider-driven, both of which emphasize efficiency and firms' investments. Provider-driven living labs are launched as a result of actions by various developer organizations such as educational institutes, universities, or consultants. The open-innovation network in provider-driven living labs organizes itself around those providers. They aim at promoting research and theory development, augmenting knowledge creation, and finding solutions to specific problems. For instance, some universities use living labs for educational purposes and pursue developing new research and teaching methods. Much of the innovation is about generating useful knowledge and information for everyone in the network.

Provider-driven living labs focus on improving users' everyday life in a way that allows for all participants in the network benefit from the resulted innovation. These benefits vary by the participant and they include, for example, new research outputs, practical business solutions that can be commercialized, or improved solutions to daily-use problems. Even then, providers may struggle to attract enablers and utilizers to participate in the network. Some provider-driven living labs are built around a single project, whereas others have succeeded in establishing themselves as longer-lived innovation platforms. From a duration perspective, provider-driven living labs are a challenge, because companies demand faster development cycles and rapid results. Nonetheless, knowledge created within the network is cumulated and reused in future "living labbing" within the network.

Type 4: User-driven living labs

User-driven living labs are established by user communities and focus on solving users' everyday-life problems. The aim is to solve specific problems in a way that is consistent with the values and requirements of users and user communities. User-driven living labs build upon a significant problem or a specific community of interest, such as a local housing community or a hobby group, and they stress their development needs. Value is (co-)created mainly for the user community, but the companies and society in general also benefit indirectly. User-driven living labs are long-lived, because they are built around the user community. However, these kinds of living labs are quite uncommon to date.

The activities in user-driven living labs are informally organized. Although these living labs are driven by users, users or the user community do not manage the network or its operations. Rather, the operation is facil-

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itated by a provider who influences users and their actions. This type of living lab cannot be managed as such, because user-driven living labs are characterized by the bottom-up principle. Therefore, the other actors in the network participate by supporting the users in terms of providing resources, knowledge, equipment, mentorship, or guidance. Information about the users and usage is collected and utilized in the network, whereas the resulted innovation may be later applied and commercialized by the participating companies in a different application or customer context.

Limitations

As with any study, there are limitations to the categorization presented here. Firstly, the organization and leadership in living labs may change over time. For example, one party from the network may drive a living lab at the start, but this arrangement may change in response to the proactive participation of another party at a later stage. Secondly, the purpose or expected outcomes as listed in Table 1 should not be taken as a definite guideline when launching a living lab, because one of the main characteristics of open innovation is that the importance of the intended end result is only secondary to process. In other words, the actual "doing" – in terms of collaborating and networking – is more important than any pre-conceived objective in open-innovation networks, and this approach can yield a more profitable end result in the long run. The resulting outcome is being shaped while collaborating and can ultimately take a completely different form than originally anticipated. Nevertheless, it can outperform the initial expectations. These two limitations must be considered when evaluating living labs based on their characteristics.

Conclusion

This article aimed to describe different types of living labs from a network perspective. Living labs provide physical regions or virtual realities in which a number of actors, including users, apply open-innovation principles to co-create and test innovation in real-life contexts. The main argument is that living labs are open-innovation networks of various actors collaborating to create value. Our empirical analysis shows that there are four different types of living lab, which can be categorized by the actor that drives the network's operation and innovation activities. These types are: utilizer-driven, enabler-driven, provider-driven, and user-driven living labs. The purpose, value-creation logic, and outcomes differ between the types.

Our study suggests a practical implication: anyone designing, participating in, or intending to participate in a living lab will benefit from understanding the overall purpose of the living lab and which party drives the network; this understanding helps them to comprehend the characteristics of the living lab and adopt a feasible role within the network. For example, a company can have a "take it and use it" philosophy for innovation as a driver in a in utilizer-driven networks, but they may adopt a purely "support and facilitate the others" philosophy in user-driven networks. Understanding the differences between various living lab types helps actors in deciding what they want to achieve and then designing or joining living labs of a particular type to achieve their own objectives. Participation in living labs can further help companies to create innovations that have a superior match with users' needs and can be up-scaled to a global market in a short period of time.

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