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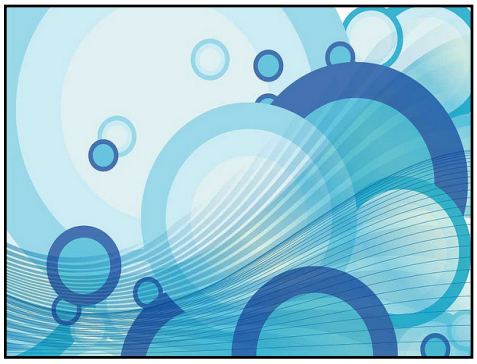

Living Labs

Welcome to the September 2012 issue of the *Technology Innovation Management Review*. The editorial theme of this issue is Living Labs. We invite your comments on the articles in this issue as well as suggestions for future article topics and issue themes.

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Overview

The *Technology Innovation Management Review* (TIM Review) provides insights about the issues and emerging trends relevant to launching and growing technology businesses. The TIM Review focuses on the theories, strategies, and tools that help small and large technology companies succeed.

Our readers are looking for practical ideas they can apply within their own organizations. The TIM Review brings together diverse viewpoints – from academics, entrepreneurs, companies of all sizes, the public sector, the third sector, and others – to bridge the gap between theory and practice. In particular, we focus on the topics of technology and global entrepreneurship in small and large companies.

Upcoming Issues

- *October:* Born Global
  Guest Editor: Tony Bailetti

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Editorial: Living Labs

Chris McPhee, Editor-in-Chief
Mika Westerlund and Seppo Leminen, Guest Editors

From the Editor-in-Chief

Welcome to the September issue of the TIM Review. This month's theme is Living Labs and it is my pleasure to welcome our guest editors, **Mika Westerlund**, Assistant Professor at Carleton University's Sprott School of Business in Ottawa, Canada, and **Seppo Leminen**, Principal Lecturer at the Laurea University of Applied Sciences and Adjunct Professor in the Aalto University School of Business in Finland.

This issue contains seven articles written by experts from Belgium, Canada, Finland, Germany, the Netherlands, Spain, and the United Kingdom, who have researched and participated in living labs. They share their research, experience, and insights to help further our understanding of the benefits, methodologies, and types of living labs.

This issue also includes a report on a recent TIM Lecture by **Louis Lamontagne**, President and CEO of LTL Global Innovations and Management, who spoke about born-global companies from the perspective of an entrepreneur in the pharmaceutical industry. The term "born global" refers to businesses that aim to address a global market from day one (Tanev, 2012; timreview.ca/article/532).

Born Global is also the theme of the October issue and the guest editor will be **Tony Bailetti**, Director of the Technology Innovation Management program (TIM; carleton.ca/tim) at Carleton University.

As always, we welcome your feedback, suggestions for future themes, and contributions of articles. We hope you enjoy this issue of the TIM Review and will share your comments on articles online. Please also feel free to contact us (timreview.ca/contact) directly with feedback or article submissions.

Chris McPhee
Editor-in-Chief

From the Guest Editors

The theme of this issue is Living Labs, which is an evolving and noteworthy topic in the field of open and user innovation. The number of living lab experiments that have emerged in recent years is substantial and continues to rise while there are currently over 300 living labs at ENoLL (European Network of Living labs) in Europe and worldwide. This is hardly a surprise, because ad-hoc types of user-driven and user-centered activities are increasingly seen as important for companies and public organizations globally as a way to generate innovative improvements and novel solutions to real-world problems. Despite the considerable business and government interests in living labs, there are few research articles on the topic available to date.

The TIM Review attempts to bridge this gap by providing both theoretically and practically oriented articles for managers and innovation developers as well as researchers and other parties of interest. The articles in this issue are representative of living lab activities taking place today in selected European countries, but readers elsewhere will identify comparable configurations from their own countries.

One of the greatest challenges today is the definition of living labs because of their variety and the continuous evolution of the related concepts and methods. We define living labs as physical regions or virtual realities, or interaction spaces, in which stakeholders form public-private-people partnerships (4Ps) of companies, public agencies, universities, users, and other stakeholders, all collaborating for creation, prototyping, validating, and testing of new technologies, services, products, and systems in real-life contexts. They are used for the development of communities for the use of innovation.

A living lab is not a testbed. A living lab turns users from observed subjects to active co-creators of value and explorers of emerging ideas, breakthrough scenarios, and innovative concepts. A living lab is an experiential environment where users are immersed in a creative social space for designing and experiencing their own future. Policy makers and citizens can use living labs to design,

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explore, experience, and refine new policies and regulations in real-life scenarios before they are implemented.

In this issue of the TIM Review, we examine the living lab phenomenon from a variety of perspectives. The authors of these seven articles provide insights into how organizations, citizens, and nations can derive value from living labs. The articles examine theoretical frameworks, categorizations, experiences, and implications related to living labs. These seven articles make a substantive contribution to our limited knowledge of living labs.

The first article, by **Seppo Leminen**, **Mika Westerlund**, and **Anna-Greta Nyström**, depicts living labs as networks characterized by open innovation. The article is based on an extensive multiple-case study that investigates network members' roles in living labs in four countries. It introduces four different types of living labs and describes their key characteristics. The article suggests that living labs designers and participants should understand the overall purpose of the living lab and which party drives the network anchored around the living lab.

In the second article, **Esteve Almirall**, **Melissa Lee**, and **Jonathan Wareham** establish a framework to map different user-innovation methodologies. The framework positions the methodologies in an innovation landscape, which is based on characteristics identified from four cases representing living lab practices in Belgium, Finland, Spain, and Sweden. The article makes a significant contribution by summarizing the most common European living labs approaches and describing their merits and appropriateness.

Bernhard R. Katzy develops in the third article a business excellence model that shows processes through which living labs deliver high-potential investment opportunities. This article is one of the first attempts to identify the business models of living labs; there are few good examples of those models to date. The article concludes that living labs provide extensive support through "lab" infrastructure and that financing remains a formidable challenge.

The fourth article by **Hans Schaffers** and **Petra Turkama** explores how living labs can form collaboration networks to support small firms and other actors to engage in cross-border collaboration and to accelerate the development and acceptance of innovations. It elaborates both strategic and operational collaboration issues. The provide lessons learned on the role of living labs in developing and operating cross-border networks for systemic innovation.

In the fifth article, **Dimitri Schuurman** and **Lieven De Marez** report the experiences of three Flemish living lab initiatives with a panel-based approach. The article provides a customer-characteristics framework that guides user involvement in living labs. The authors present three living lab cases to illustrate the characteristics of a specific type of living lab: the panel-based living lab. They conclude the work by comparing the value aspects of panel-based and traditional living lab approaches.

In the sixth article, **Ingrid Mulder** discusses "living methodologies", which are methods and tools necessary in living labbing. These methodologies address ad-hoc living activities by citizens or user communities that are not connected to existing living labs. The author reports on three cases from the Netherlands where citizens co-developed their city. The article concludes that living labbing helps in inspiring and informing the design of innovative services that aim to enrich our daily life and environment.

In the last article, **Veli-Pekka Niitamo**, **Mika Westerlund**, and **Seppo Leminen** provide insights of a small-firm perspective to innovation in living labs. The article reports a case of a small energy IT provider, which participated in an EU-funded multinational living labs initiative to develop energy-efficiency management solutions. The article describes the living lab activities that took place and discusses the perceived challenges of applying living labs for small business management.

It is evident that open innovation and user-driven methods continue to evolve and increase in popularity. There will be many exciting opportunities for companies, nonprofits, and government agencies to adopt innovative methods that help them to create novel products, services, and solutions that meet latent customer needs or improve the world together with citizens. We hope that you enjoy the issue and consider utilizing the potential and opportunities of living labs and living labbing in your organization.

Mika Westerlund and Seppo Leminen
Guest Editors

Editorial: Living Labs

Chris McPhee, Mika Westerlund, and Seppo Leminen

About the Editors

Chris McPhee is Editor-in-Chief of the Technology Innovation Management Review. Chris holds an MASc degree in Technology Innovation Management from Carleton University in Ottawa and BScH and MSc degrees in Biology from Queen's University in Kingston. He has over 15 years of management, design, and content-development experience in Canada and Scotland, primarily in the science, health, and education sectors. As an advisor and editor, he helps entrepreneurs, executives, and researchers develop and express their ideas.

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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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Mapping Living Labs in the Landscape of Innovation Methodologies

Esteve Almirall, Melissa Lee, and Jonathan Wareham

> *"Innovation is not what innovators do but what customers adopt."*
>
> Michael Schrage
> Professor and thought leader on innovation

A growing interest in living labs as a mechanism for innovation has drawn significant attention to both the different flavours of this methodology and to the organizations that put it into practice. However, little has been done to assess its impact and to compare its contribution to other innovation methodologies. This article aims to cover that gap by summarizing the most common European living labs approaches and positioning them in the landscape of user-contributed innovation methodology. The merits and appropriateness of living labs in these settings are also assessed.

Introduction

When *Time* magazine (2006; tinyurl.com/39fbyu) selected "the user" as the person of the year for its front page, it was publicly acknowledging the increasing importance of individual user collaboration and involvement in producing content and, ultimately, in driving innovation.

User involvement can take a variety of forms. Some instances position the user as the main creator, in the case of lead users (von Hippel, 1986; tinyurl.com/94oqoek) or open source communities. Others see participants operating as co-creators in practices such as design thinking (Brown, 2008; tinyurl.com/y9ehqt5). On the other end of the spectrum, participatory or user-centered design treats users as passive subjects whose insights are captured and introduced in the innovation process, such as in applied ethnography, usability, human interaction, or market validation exercises.

Living labs are situated in the fertile, middle ground of user involvement. The term "living labs" often refers to both the methodology and the instrument or agency that is created for its practice. Living labs are driven by two main ideas: i) involving users as co-creators on equal grounds with the rest of participants and ii) experimentation in real-world settings. Living labs provide structure and governance to user participation in the innovation process (Almirall and Wareham, 2008; tinyurl.com/8vwtjw2).

Understanding the merits of this methodology is highly relevant, because agents involved in innovation must select the requisite methodologies to appropriately address their respective challenges.

Research Design

The authors participated in two EU projects and one national project oriented to support living lab activities, with work packages devoted to the collection of methodologies and best practices. The research took the European Network of Living Labs (ENoLL; openlivinglabs.eu), a large network of organizations in the EU self-defined as living labs, as the point of departure. An investigation using secondary sources revealed a list of 48 living lab organizations that were considered potential candidates for the study.

Interviews were conducted with 38 senior managers and researchers including the directors of living labs corresponding to 26 different living lab organizations. The authors also actively participated in three living lab projects in the Catalan network and had significant engagement with ENoLL from 2009 to 2012.

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Living Labs Methodologies

TestBed Botnia

TestBed Botnia (testplats.com), founded in 2000, originated in the Centre for Distance-Spanning Technology, a research centre in the Luleå University of Technology. TestBed Botnia specializes in mobile services. A sizeable community of 6,500 users from all over Sweden actively participates in TestBed Botnia living labs. Users have collaborated in a wide range of trials, such as mobile queues at banks, traffic updates through SMS, targeted, location-based commercials, and streamed sporting events over the Internet.

Most methods used are qualitative, often focusing on needs-finding, participatory design, and lead-user involvement. FormIT, the most-used living lab methodology in TestBed Botnia, has three states of product/service development: the design of concepts, the design of prototypes, and the design of the final system (Bergvall-Kåreborn et al., 2006; tinyurl.com/9rvwwrr). The methodology evolves in spiral through these three stages (Figure 1).

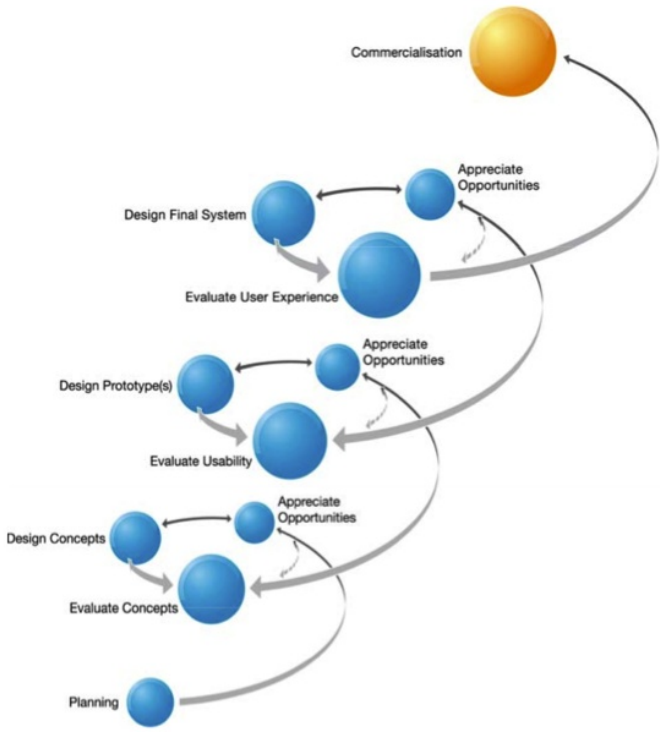

Figure 1. FormIT living labs methodology

The first phase (Design Concepts) is aimed at eliciting and prioritizing needs. Using rich narratives, users strive to find the best of "what is" and dream of "what could be". Interaction with users seeks to identify requisites and new possibilities while situated in real-life contexts. Based on the narratives developed, needs are categorized and prioritized, and initial concepts are formed. The second phase (Design Prototypes) is aimed at developing rough mock-ups and building on the results of the previous phase. The third phase (Design Final System) is aimed at concept valuation. In this phase, users test and evaluate in real-life contexts the prototypes developed in the previous phases. The iterative process often leads to changed or refined user needs with a focus on "what will be" and shaping the end product or service.

Within each stage, we can find a three-step process that begins with the appreciation of existing characteristics. Once these attributes are clearly established, the process continues with a collaborative design of concepts, prototypes and the final product/service. Real-life environment validation is maintained through the process as much as possible. This three-step process is repeated until the results are satisfactory.

iLab.o

iLab.o (ibbt.be/en/develop-test/ilab-o), in Belgium, has played an important role in the living labs community, reinforced by the presence of the Secretariat of the ENoLL in Flanders. iLab.o is the living lab division of the innovation research institute IBBT (ibbt.be/en), which was founded by the Flemish government. iLab.o provides a methodology for living lab initiatives while supplying services that facilitate their implementation.

iLab.o's methodology is based on the social construction of technology (SCOT; tinyurl.com/cgcyty) framework, which suggests that technology is shaped by the user and highlights the importance of context in the process of endowing technologies with social meanings. Users are considered the central focus and facts and meanings are the results of social processes (Sretenova, 2002: tinyurl.com/8qgmlo4; Tuomi, 2002: tinyurl.com/m73rb9).

iLab.o formalized its living lab methodology in 2005 (Pierson and Lievens, 2005; tinyurl.com/9t9sylo) and subsequently published experiences on concrete implementations of it (Ballon et al., 2005: tinyurl.com/8hox58r). The methodology consists of four phases aimed at understanding the context where the technology will be adopted and emphasizing the changes in meanings that this adoption will produce (Figure 2).

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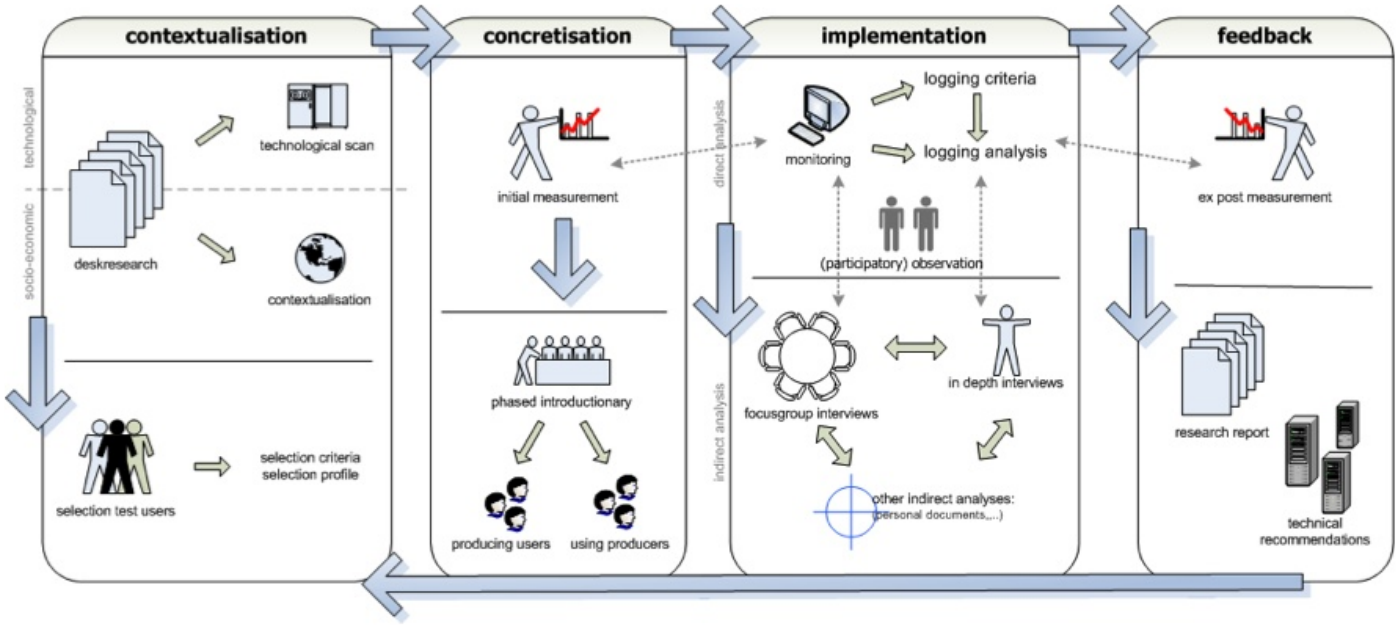

Figure 2. iLab.o living labs methodology

1. Contextualization. The contextualization phase aims to capture the relevant background information and insights around the subject of research. This information is then used to select a group of users for participation in the project.

2. Concretization. The key element of this phase is obtaining an initial, *ex ante*, snapshot of the user panel that can be later compared with one *ex post* measurement, after the introduction of the new technology or the innovation to be validated.

3. Implementation. The actual test and validation process is carried out in the implementation phase. Direct measurements are embedded in the device or in the platform and are implemented by means of logging, thereby reflecting patterns of use. Indirect measurements aim at capturing the meanings and context of use are carried out by a combination of ethnographic observation and qualitative analysis such as in-depth interviews or focus group exercises.

4. Feedback. *Ex post* measurement is conducted in this phase. The results are compared with those obtained in the contextualization and implementation phases and used to infer and produce recommendations on the concrete diffusion and implementation of the technology.

Helsinki Living Labs

Helsinki Living Labs (tinyurl.com/9dcov9n) was launched in 2007 to act as a connector between companies and the public sector interested in collaborating with living labs. The organization facilitates activities in Helsinki and surrounding cities, encompassing eight living labs, together with associated organizations of developers, enablers, and utilizers.

Helsinki living labs follows a three-phase methodology that evolves in a spiral (Figure 3). In the first phase (Grounding), stakeholders are identified and users from the community are selected. The second phase (Interactive and Iterative Co-Design) sees users explore the definition of concepts and work in the co-design of prototypes. Finally, in the third phase (Appropriation and Implementation), the final outcome is tested and feedback is gathered.

Catalan Living Labs

A living labs network was formed in Catalonia, Spain in 2006 to coordinate the different experiences and work of several research institutions using living labs methodologies. The majority of projects in Catalan are business to business. From Catalan Living Labs cases (Almirall and Wareham, 2008; tinyurl.com/8vwtjw2), we can infer a reliance on a three-phase methodology con-

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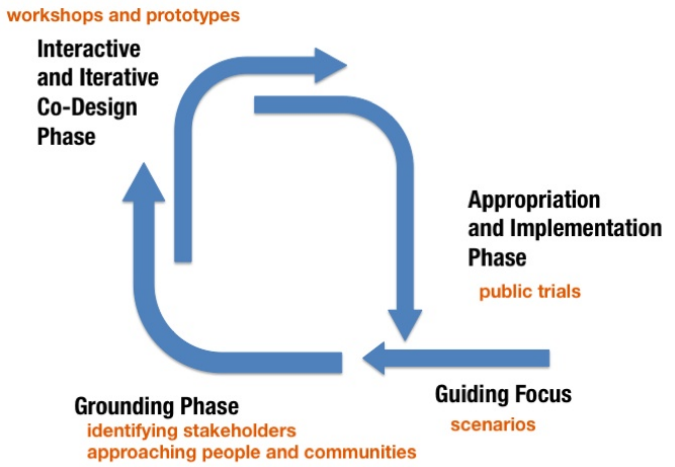

Figure 3. Helsinki Living Labs methodology

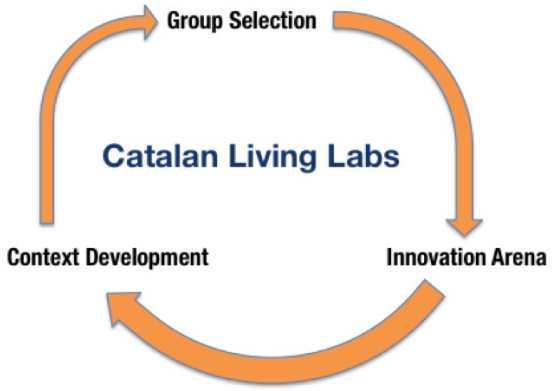

Figure 4. Catalan Living Labs methodology

ducted in a spiral, but with an important shift in focus from needs-finding and context assessment towards implementations in real-life environments that serve not only as a proof of concept but as a starting point for a public or commercial venture (Figure 4).

The first phase of Catalan Living Labs is devoted to group selection. Great care is taken to involve the relevant set of users, not only because their insights could contribute to the development of a better product or service but also because they could help in creating a wave of momentum once it has been taken to market.

The second phase is devoted to the creation of an innovation arena. This is a distinctive characteristic of the Catalan model that supports the objective of reducing uncertainty and risk by demonstrating the solution's viability in real-life environments and by fostering early demand. This often involves the use of advanced infrastructure not generally available for public use. For example, the Catalan Living Labs network relies extensively on the use of Internet2 (high-speed Internet) research networks and state-of-the-art sensor networks for experimentation.

The final phase is devoted to context development and consists of experimentation in real-life environments, with an emphasis on developing business models that could make the project sustainable.

Living Lab Methodology Contributions

These four cases provide a description of some representative living lab methodologies that cover a wide spectrum of practices in the living labs community. Although each one has its distinctive flavour, they share some common characteristics.

In all cases, we observe the engagement of users in the early stages of the innovation process. In the case of TestBed Botnia, this engagement has a well-defined objective: to collect user needs and engage them early in a co-design exercise. A similar approach can be found in the case of the Helsinki Living Labs, however a greater emphasis is placed on the selection of users. iLab.o shares the emphasis on selecting the "right" subset of users. Additionally, they emphasize involving a large number of participants so that the emergent solutions will ultimately be favoured by the target population of end users. And, in Catalan Living Labs, selection is focused on users that best express the relevant domain expertise, providing concrete insights when interacting with the solution implementation.

Therefore, in all cases, we can find clear initiative to involve users early on in the innovation process in order to capture either market knowledge about preferences, suitability of the implementation, or more specialized domain-based knowledge. Living labs methodologies aim to incorporate and evolve this knowledge in products and services through co-creation.

Proposition 1. Living lab methodologies engage a select group of users in the innovation process to capture market and domain-based knowledge and involve them iteratively through a co-creation process.

The most distinctive characteristic of living labs methodologies is the focus on real-life environments as the locus of research. Again, we find some differences in

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how various living labs seize the opportunities that this choice provides.

In TestBed Botnia and Helsinki Living Labs, proposals are derived from user needs and transposed to real-life situations, ranging from scenarios to the actual environment as research progresses. iLab.o places even more importance on the selection and appropriateness of the context in order to allow for the emergence of new uses and meanings. And, with their focus on capturing domain-based knowledge, Catalan Living Labs see context as important because the expertise that is often tacit becomes codified when applied to a certain environment.

Real-life contexts are therefore much more than a more realistic scenario for validating proposals; they form an arena where new meanings can emerge, tacit knowledge can be captured, and the whole ecosystem can be validated.

Proposition 2. Living labs elicit new understandings and meanings, and capture tacit and domain-based knowledge by situating and evolving innovation projects in real-life contexts and taking the opportunity to involve the whole ecosystem.

The third distinctive characteristic of living lab methodologies, especially when compared with close siblings such as participatory design, is the presence of public-private-partnerships.

In TestBed Botnia and iLab.o, institutional support is provided through policy measures that encourage public institutions to foster and develop initial demand for products and services coming out of living lab exercises. The Helsinki Living Labs offer a similar case in which there is public involvement in the trials of products and services, and if successful, their adoption is encouraged by public organizations. Catalan Living Labs goes even further by leveraging partnerships in the living lab to penetrate highly regulated and complex environments, such as the public health sector.

Proposition 3. Living labs take advantage of public-private partnerships for generating an initial demand and often involve other actors such as small and medium-sized entreprises to lower barriers of entry in complex multi-stakeholder or highly regulated environments.

Table 1 summarizes how living labs are differentiated on the basis of three main characteristics (Almirall and Wareham, 2008; tinyurl.com/8vwtjw2): user involvement, real-life contexts, and public-private partnership.

Mapping User Involvement in Innovation

Understanding living labs methodologies requires recognizing their unique contributions and positioning these practices in the landscape of other user-contributed methodologies for innovation (Figure 5).

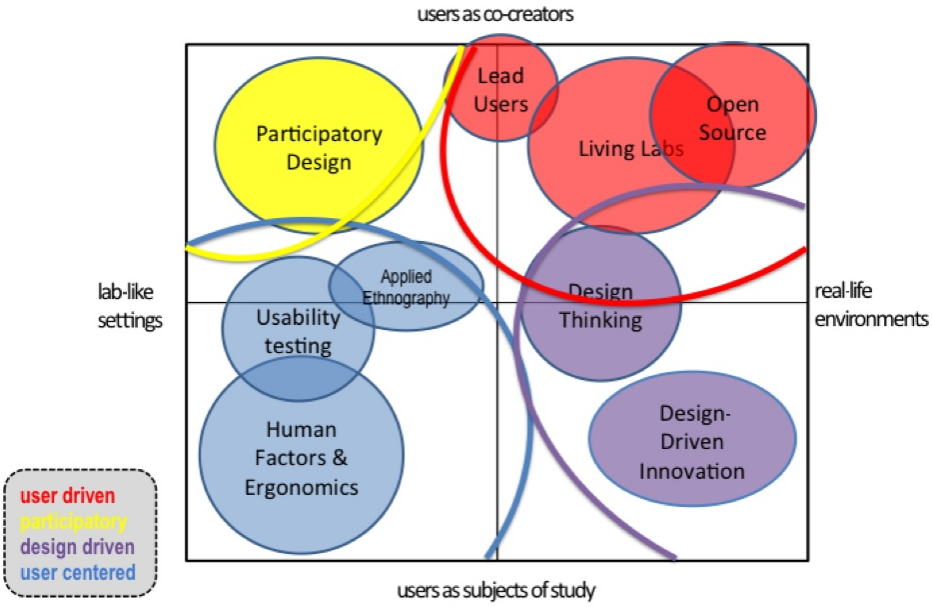

Figure 5. Mapping user-innovation methodologies

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The first dimension of interest is taken from the main characteristic of living labs: the involvement of users in a co-creative process. We can observe a diversity of practices along that dimension. On one end of the spectrum, users are regarded as subjects of observation, such as in human factors, ergonomics, or applied ethnography. On the other extreme, users are co-creators, such as in the case of lead users or open source communities. In the middle, we find the majority of methodologies, such as co-design, design thinking, and design-driven innovation.

The second dimension of interest speaks to a key aspect of living labs methodologies as well as other user-oriented innovation methodologies: whether the project is carried out in a lab-like environment or in the real-life settings in which users would typically conduct their activities.

Following the first axis – the level of user involvement in the innovation process – we divided methodologies in four different categories:

1. User centered. Users are mostly passive subjects of study. This is the case of usability testing, human factors, and applied ethnography.

2. Design driven. Designers take the lead. Design-driven methodologies normally work in real-life environments; however, they are led by designers who seek to find novel solutions.

3. Participatory. Users are considered on equal ground with the rest of the partners in a co-creative process. Participatory design, particularly the Scandinavian tradition, and generative design research belong to this category.

Table 1. Implementation of the main living lab characteristics in the four cases presented

	User Involvement	Real-Life Contexts	Public-Private Partnership
TestBed Botnia	• capture of user needs • co-design and participatory design • gathering domain and market-based knowledge	• locus for appreciation of opportunities • evaluation and validation of prototypes	• living lab is a public-private partnership • facilitates multi-stakeholder involvement in projects
iLab.o	• contextualization of prototypes for new products and services • selection of the "right users" is a key element	• focus on data gathering • attempts to capture insights from a large group of users	• living lab is a public-private partnership • facilitates multi-stakeholder involvement in projects
Helsinki Living Labs	• needs finding • co-design and participatory design	• use of geographical context for selecting users • public, open trials • validation of prototypes	• living lab is a public-private partnership • collaboration with town and local authorities facilitates trials and the uptake of new products and services
Catalan Living Labs	• selection of "relevant users" • fostering social entrepreneurs and lead users • gathering of domain and context-based knowledge	• specialized contexts: hospitals, opera theatres, etc. • large public trials together with small specialized ones • unexpected opportunities because of the real-life context	• living lab is a public-private partnership • creation of initial demand, especially in the public sector, ensuring sustainability • facilitates trials in public contexts, very relevant in highly regulated environments

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4. User driven. Where the user is the one who drives the innovation process. Such is the case of open source, lead users and living labs.

The second dimension of interest refers to the locus of innovation. Traditionally, experiments have been carried out in laboratory-like settings that allow for more control and easier data gathering. However, more recent practices favour real-life environments in spite of the loss of control that they exhibit.

Determining the best context is largely based on the type of knowledge that living labs seek from users. On one hand, if the result of user participation is the capture of domain-based knowledge, then a closed group of selected users will work well. On the other hand, a real-life environment will be more beneficial if the aim is to capture market-based knowledge, forecasting the preferences of users towards a new solution that would benefit from multiple contributions and points of view.

Conclusions

The primary conclusion drawn from our investigation of living labs is that this methodology is a process of fit. That is, living labs will be an appropriate choice of innovation methodology where the fit of a particular technology or set of technologies to a precise context is more significant. Therefore, products and services that depend more on their soft characteristics for user acceptance and economic viability seem to be more appropriate.

The second conclusion is that living labs will be more relevant where the fit is unique to a given set of users. Indeed, if the fit is more trivial, it can possibly be inferred using other methodologies, perhaps from observing users without having to involve them. At any rate, in situations with multiple stakeholders, conflicting interests, and a large space of solutions, the innovation problem may only be adequately addressed by involving all constituencies and through their active participation. Living labs provide the solution by tapping into tacit knowledge to be incorporated into products and services, and validated in real-life environments.

About the Authors

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Designing Viable Business Models for Living Labs

Bernhard R. Katzy

> *"The innovation point is the pivotal moment when talented and motivated people seek the opportunity to act on their ideas and dreams."*
>
> W. Arthur Porter
> Professor and Executive

Over 300 regions have integrated the concept of living labs into their economic development strategy since 2006, when the former Finnish Prime Minister Esko Aho launched the living lab innovation policy initiative during his term of European presidency. Despite motivating initial results, however, success cases of turning research into usable new products and services remain few and uncertainty remains on what living labs actually do and contribute. This practitioner-oriented article presents a business excellence model that shows processes of idea creation and team mobilization, new product development, user involvement, and entrepreneurship through which living labs deliver high-potential investment opportunities. Customers of living labs are identified as investors such as venture capitalists or industrial firms because living labs can generate revenue from them to create their own sustainable business model. The article concludes that living labs provide extensive support "lab" infrastructure and that it remains a formidable challenge to finance it, which calls for a more intensive debate.

Introduction

The claim of living labs is to provide new ways of involving users in (software) product development and the necessary "lab" infrastructure to do so. Living labs do not develop products, but they bring developers and users together. In short, they are intermediaries for collaborative innovation (Almirall and Warham, 2008; tinyurl.com/). Living labs are normally autonomous legal entities or separate units within larger organizations that need to finance considerable resources without which they could not execute the activities. Much of the academic writing has contributed to the conceptual understanding of the user-centricity of living labs is, what methodological innovation comes with living labs, and how they can be reconciled with rigorous research methods (e.g., Folstal, 2008; tinyurl.com/8vwtjw2). Much less has been written about their business models, which they use to create and capture value from their activities so that they can sustainably fund themselves.

Policy makers initiated – and funded – living labs with national policy objectives in mind. They aim to increase innovation performance in the European Union, a country, or region for job creation, growth, and wealth. Such policy effort is based on the idea that performance of open innovation in networks is the result of well-established and mature innovation processes with good coordination between its regional actors: small and medium entreprises and larger anchor firms, public agencies and policy makers, universities, and research centres. The ability to coordinate research and innovation into an economic development strategy is seen as a regional capacity that distinguishes successful regions (Röttmer, 2009; tinyurl.com/9vlcs8c).

It is therefore no wonder that more and more regions establish living labs with the assignment to provide process coordination for regional innovation. But policy makers mainly consider the economic effects of living labs to industry and society, and they are less con-

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cerned with how a living lab is operated internally and what it takes to make the living lab a viable business. living lab managers do have to solve this challenge.

The aim of this practitioner-oriented article is to propose a business excellence model, which describes the processes that a living lab is made of and how they contribute to the generation of revenue for the living lab. This model is derived from an analysis by living lab directors of a number of living labs and on the basis of their experiences from multiple user-involvement projects. We take a more abstract view on the organizational design of a living labs, not the individual projects, which have been described in literature (see www.ejov.org and ice-conference.org for examples). Experience has been collected through interviews and three focus-group discussions that brought several living lab directors together. In doing so, the article presents one type of living lab in the hope of stimulating further debate on alternative designs of living labs and their improvement through benchmarking.

A Business Excellence Model for Living Labs

The idea of "business excellence models" is adopted from total quality management literature, where it is established to make explicit how an organization serves its customers and to continuously improve on its performance. For examples of business excellence models, see the EFQM Excellence Model (tinyurl.com/8vqkkhv) and the Baldrige Performance Excellence Program (tinyurl.com/3yxrzd8).

We adopt this approach here because it forces us to make it explicit who are the customers and other stakeholders of living lab services. Living labs have multiple stakeholders. They involve users, who engage in the co-creation of the product or service, and they reduce development cost for companies. Users often contribute on a voluntary basis or with very little pay but have only occasionally been reported to provide revenues for living labs. Obviously, policy makers are customers in that they ask for and finance regional innovation infrastructures. It therefore does not surprise us that living labs are strongly supported by public subsidies, but with an increasingly clear assignment to generate revenues from other, commercial activities. Living labs facilitate the early stage of product development, which is a process for which many firms search external suppliers or open innovation network partners. This is in line with the experts that we involved; they were skeptical of the notion that living labs could ever cover the entire development process until the product generates revenues. Instead, they foresee handing over a project to an industrial partner when it sufficiently mature to be an interesting investment opportunity. The business excellence model of this article therefore makes a choice in that it orients living labs towards investors as the main revenue-providing customers and structures its overall activities in three main phases, which lead to measurable intermediate results on its way:

1. Ideation phase: to scout high-potential ideas, concepts, and teams from research in university and business. The phase is completed with the commitment of a development project that brings together an executing team, the financial resources, and necessary sponsors at the match-making moment. In fact, a first valuation is made by the commitments at that moment.

2. Co-creation phase: where the living lab combines product/service development, user validation, and market positioning to prepare adoption of the solution, and entrepreneurship for the creation of a new venture. The living lab contributes coordination of the concurrently executed processes. The phase is completed with a financing deal in which innovation investors take over parts (or the whole) to further grow the venture and its product or service.

3. Venturing phase: follows standard investment processes after a project graduates from the living lab and is taken over by business angels or institutional venture capitalists. It is only in that phase that the created value becomes tangible and therefore living labs need to consider it, even though they might no longer be involved.

Business excellence models further include support processes, which form the necessary infrastructure to undertake the above-described direct processes. Living labs are frequently described as innovation infrastructures, which underlines the importance of providing collaborative IT infrastructures, quality management, and fundraising and grant management processes that are mainly targeted towards the earlier ideation and co-creation phases (Figure 1).

Ideation phase

This very early process aims at stimulating ideas for the development of a new product and in mobilizing the formation of teams, which requires active coaching by the living lab. Living labs invest in dedicated instruments for this phase such as idea fairs or business plan competitions. And they provide judgement capability

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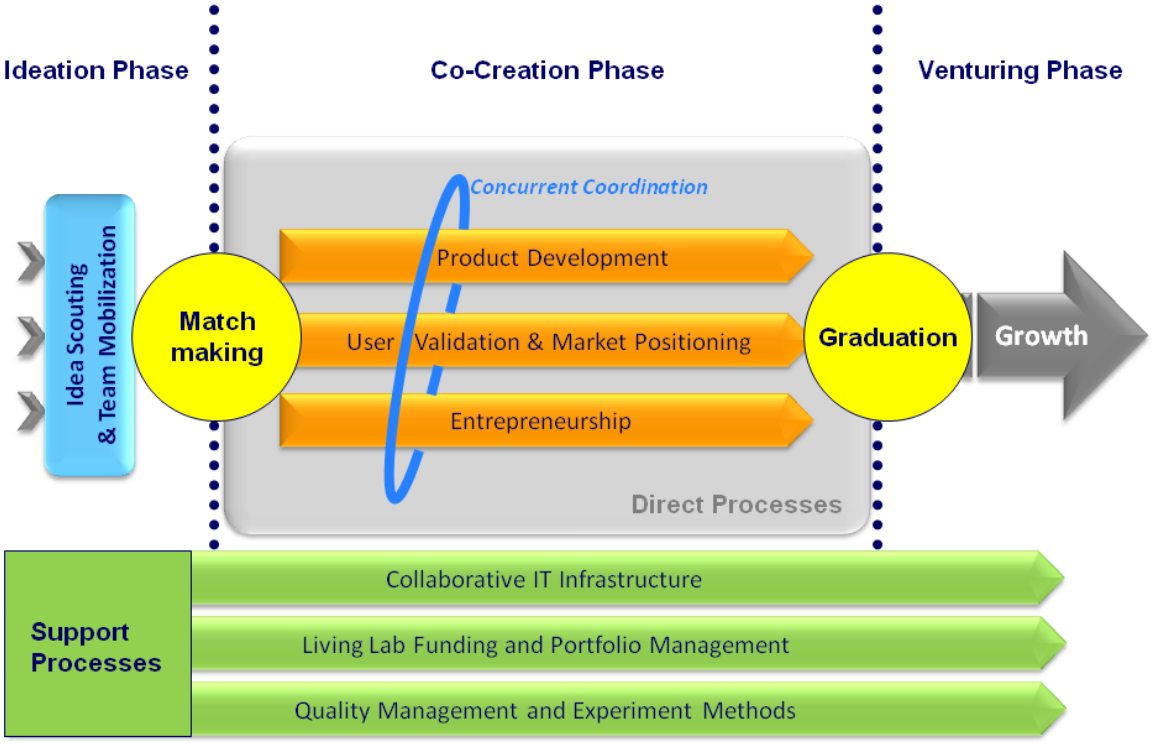

Figure 1. Living lab business excellence model

on the quality of the ideas for which expert boards, international exchange of their projects, or database research are standard instruments.

The process leads to "match making" of an investor or grant giver and a team. Experience shows that formal investment decisions create stronger team commitment and lead to a more formal structure that is beneficial to the development of the project. The living lab can enter into arrangements and be rewarded for its effort with, for example, shares of a to-be created venture.

Co-creation phase

The co-creation phase is made of three direct processes that are concurrently undertaken and therefore need tight coordination:

1. Product development support: if users shall be enabled to influence the product design, the living lab needs to provide a new product-development process that allows for rapid prototyping of ideas and concepts brought forward by users. Most development teams need access to physical tooling or software development environments that they cannot afford. FabLabs (wikipedia.org/wiki/Fab_lab) or TechShops (wikipedia.org/wiki/TechShop) are examples of labs that specialize in manufacturing technologies to create physical products while other labs specialize in software infrastructures. Living labs further provide proficiency in practices (e.g., agile development), methods, and techniques that cut down development costs and learning time. Technical consulting competencies and specialization of resources will give each living lab a unique profile and a source of revenues in form of billable professional services.

2. User validation and marketing: user involvement in the product-development process is the dominant characteristic of living labs. It addresses the typical challenge of developing high-tech products that are highly engineered, yet often with little consideration of usability and user preferences. The process of developing a good understanding of user preferences up to their involvement in product or service co-creation is little established in industrial practice (and even less in engineering education). Development and test methodologies, access to relevant user populations, and market knowledge in a certain field are dedicated investments that shape the competence profile of a living lab. This process results not only in usability of

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products but in more general business models for their commercialization, however this is a result that is difficult to sell by itself.

3. Entrepreneurship: user knowledge, business knowledge, and the technical knowledge of building the product are a complex bundle of knowledge and skills. A "naked" product without the development team in most cases can hardly be maintained or further developed. Therefore, many solely product-centred projects fail when the development team falls apart. A more promising alternative is to bundle knowledge, skills, brand value, and the team into an organizational structure by creating a new firm. Firm creation is the process of entrepreneurship. Structuring a new firm and establishing its organization takes time and should therefore be started from the earliest possible moment. Feedback from investor pitches further provides important additional insights for the development of a marketing case as well as for technical development. Coordinating product development with entrepreneurship brings the worlds of engineering and entrepreneurship closer together and provides the living labs with an opportunity to add value.

4. Coordinating process concurrency: Many interdependent activities need be coordinated to professionalize the innovation process and this coordination is the value creating opportunity for living labs. This starts with basic tasks such as enforcing simple discipline and making a team follow deadlines or managing projects. More complex is the management of linkages between the many parallel activities in the direct processes and the coordination of interdisciplinary teams from engineering, marketing, and entrepreneurship, which in the co-creation phase can be seen as a core competence of living labs.

Venturing phase
Projects need to graduate from the living lab after reasonable time (i.e., 6 to 18 months) to maintain innovation dynamics in the living lab. A good moment of graduation for a project is defined by achievements, of course, not by timelines: when the project has a working prototype, which ideally has generated initial revenue from pilot users and lead customers, and when the project has organizationally mutated into a business unit or an independent new venture, it is ready to move on.

The excellence of the living lab can be measured as deal-flow rate, which is the number of brokered growth-financing deals with private investors in a short time frame. Revenues for the living lab can be generated if such deals are structured as exit options for the living lab.

Designing and Implementing Living Labs

Business excellence models are design instruments for organizations, and they help with understanding and describing structures and process. They further facilitate continuous organizational learning and improvement processes for living lab business practices.

The excellence model proposed in this article is innovative in its adaptation to the needs of coordinating innovation in living labs. Decision makers in living labs can use the business excellence model as:

1. A place to start identifying the development state of their living lab and a basis for joint action setting in/with the living lab organization.

2. A structured collection of prior living lab experiences and industrially proven practices for benchmarking.

3. A common language to support alignment of employees and external partners involved in the innovation network.

4. A means to create a shared vision and derive a performance framework to measure achievement of a living lab's goals.

Creating Economic Viability with Business Models for Living Labs

Creating an economically viable living lab means aligning internally consistent processes of a living lab organization with the needs of its external stakeholders so that revenues are generated. Public grant and subsidy programs are a dominant market of living labs in Europe but are increasingly required to serve private markets. A revenue share of 25% to 50% from private sources is typically included in grant agreements. The business excellence models described above help living labs because, at least in Europe, the bigger challenge for living labs lies in generating revenues from private markets.

Defining private markets for early-stage innovation projects is indeed not trivial. In fact, European policy makers initiated living labs in order to push market structures for early-stage innovation. It is therefore no

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wonder that living labs face the challenges of pioneers that have to create their proper markets. An intuitive market is the provision of user validation and requirements-engineering services to other businesses. Revenues come from fees paid on a per-hour basis of professional service provision or a fixed price for a project. The advantages of this business model for living labs are low risk and relatively quick revenue generation. Some living labs generate revenues through service provision but this source of income so far remains limited because few industrial companies are willing or capable to advance investment cost both for them and the living lab. Therefore, pressure is high on living labs to share risk in the investment.

The creation of revenues through marketing of a product or service could be an alternative business model. Apart from the fact that this requires the financial capacity to bear cost until the project breaks even in their markets, the living lab would quickly focus on a few successful projects only and thus mutate from being a living lab into a supplier of these products and services. The business excellence model therefore opts for the third alternative to hand over projects to investors at them moment that they reached defined levels of maturity.

In this alternative, a living lab receives funding from individual business angels, corporate investors, or institutional venture capitalists, which are in search of investment opportunities. This model offers several advantages for both investors and living labs. For investors, living labs can lower the search costs for investable projects and teams. For living labs, projects can find investors long before they are fully developed or gain market success. Win-win constellations emerge where investors provide insights such as market knowledge on top of their financial contribution, which increases a project's chances for success. Tapping into this market, however, requires structuring projects in an appropriate way to make them investable.

What matters, therefore, for the success of the living labs is the early start of the entrepreneurship process, which creates investable projects and matches them with investors while user validation and product development are still on-going. Engineers and product developers are not normally acquainted with investors. They are unaware of potential investors and lack knowledge on how to negotiate with them, or what they need to make an investment possible. Therefore, undertaking this process is a dedicated competence to be built by the living lab.

Conclusion

Decision makers in policy and industry increasingly understand that innovation is better organized in inter-organizational cooperation, characterized by open innovation, innovation networks, triple helix processes, or clusters. Cooperation, however, is a more complex management task than purchasing through market transaction and creates challenges of its own nature. Living labs can be innovation intermediaries that provide services to make cooperation possible.

This article presents a business excellence model based on the experience of living lab directors and their reflection on their own project experience. User orientation is a necessary dimension of living labs, but it is an intangible result and not sufficient for its own economic viability. Viable business models are based on end-to-end delivery of value created for customers that are willing and able to pay for it. Not many firms can advance project investments to directly pay for living lab services. Products need be introduced into markets long before they create sales revenues. Entrepreneurship therefore emerges as a process to bridge the time gap, both for the individual development projects and for sustaining the living lab itself.

In the seed phase, and later in the growth phase, financial investors need be engaged before value becomes visible enough for customers to pay for it. Obviously user-validated products are more likely to be successful in the market, but without actual market proof, financial valuations are difficult. Creating investable projects and matching them with investors is a more feasible option. Products as such, in most cases, are not economically interesting, but require the context of their development and marketing team, intellectual properties, and brand name, a bundle that is often best valuated as a separate entity. Entrepreneurship and venturing are the two processes that bring living labs closer to such measurable valuations and a sustainable business model for themselves.

The business excellence model presented here is a practical guide for designing the organization of a living lab and the implementation of its capabilities. Maturing the competencies to execute those processes requires practice and time, often many years. To living lab founders and managers, the business excellence model provides a framework for continuous improvement of their living lab; to researchers, it provides a framework to open the “black box” of a living lab and understand the internal fabric of its organization.

Designing Viable Business Models for Living Labs

Bernhard R. Katzy

Recommended Reading

- Special issue on living labs in the *Journal of Organizational Virtualness* (eJOV): (tinyurl.com/8t69drt)

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Living Labs for Cross-Border Systemic Innovation

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> *"Lack of consensus among players in a complex system is one of the biggest barriers to innovation. One subgroup's innovation is another subgroup's loss of control."*
>
> Rosabeth Moss Kanter
> Professor, management consultant, and author

Innovation is increasingly taking place in cross-border collaborative networks, which are shaped by the characteristics of systemic innovation, the strategies and objectives of main actors, and the dynamics of the innovation process. Participation in such networks is of high importance for small firms, but requires long-term investments and a diverse range of collaboration and innovation capabilities. This article explores how living labs, understood as innovation projects based on open and user-centric innovation methodologies, can form collaboration networks to support small firms and other actors to engage in cross-border collaboration and to accelerate the development and acceptance of innovations. Based on the lessons learned from a major living lab project, APOLLON, we conclude that adopting the living labs networking approach requires thorough understanding of each party's objectives and drivers, the alignment of operational processes, establishment of open and collaborative culture, as well as competences, methods, and tools for supporting cooperation and community building.

Introduction

Healthcare transformation, urban renewal, enhancement of public services, and modernization of production systems are examples of today's important societal challenges; they are also examples of changes in complex systems (tinyurl.com/kdw3h). Addressing these challenges requires not just the adoption of technological innovations, but broader consideration of the wider context of open and systemic innovation (Maula et al., 2006; tinyurl.com/942oa9v). Systemic innovation comprises interrelated technological, organizational, financial, legal, and institutional adaptations as well as changes in human behaviours and practices. Change and innovation in complex systems is often very difficult to accomplish and time consuming due to the many actors and interests involved (Herzlinger, 2006: tinyurl.com/8e8s37l; Moss Kanter, 2011; tinyurl.com/6dcs3fn), their interactions and dependencies within such systems, and consequently the difficulty in identifying causes and predicting impacts of interventions (tinyurl.com/3zp58y7). Therefore, it is important to understand the characteristics of complex systems as well as the systemic nature of required interventions leading to innovation and change.

The fact that innovation activities are increasingly taking place through collaborative networks (Gloor, 2006; tinyurl.com/d4ewb78) is increasingly shaping the management of innovation cycles. This is due to the systemic character of innovations and the ongoing forces of globalization and competition, reflecting the trend towards connected and global markets and the increasingly network-based nature of the economy and society. Networks, and the interactions, exchanges, and collaborations they facilitate, constitute the backbone of innovation ecosystems (Jackson, 2011; tinyurl.com/7u4t4jh; Andersen, 2011; tinyurl.com/7u4t4jh). The resources, facilities, and competences shared among the various actors form the core of such networks and ecosystems and define their innovation potential. The complexity of the innovation ecosystems is further amplified by the fact

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that the networks are increasingly open and cross-border by nature, and they are governed by open business models (Chesbrough, 2006; tinyurl.com/c5p6s85).

Within this context, there is a need for smart innovation instruments that reflect the networked and systemic character of innovations, and can act as catalyzers of systemic change. The concept of living labs, understood as environments of open and user-centric innovation (e.g., Bergvall-Kåreborn et al., 2009; tinyurl.com/9nqmrdy), offers a promise to fulfill that role. In our recent work on living labs (e.g., Schaffers et al., 2010; tinyurl.com/9noft6f; Budweg et al., 2011; tinyurl.com/8u3yhvv), we understand living labs as constituting a setting for collaborative innovation by offering a collaborative platform for research, development, and experimentation with product and service innovations in real-life contexts, based on specific methodologies and tools, and implemented through concrete innovation projects and community-building activities. The focus is on mature technologies and operating close to market, which indicates that acceptance and integration of the developed technologies and services are major research topics. The living labs concept has been further developed, experimented, and demonstrated during the last five years within a series of Europe-wide projects in the European Commission Framework Programmes as well as in national initiatives. The concept was further institutionalized as the European Network of Living Labs (openlivinglabs.eu), which comprises more than 300 living labs in 2012. While the gradually maturing concept has generated a valuable stream of conceptual, methodological, and practical work, there is still need for more empirically tested evidence regarding the impact, effectiveness, and maturity of living labs. Based on available surveys, the sustainability perspective of current living lab models seems to remain underdeveloped because most living labs are dependent on public funding and service offerings are limited (Eschenbaecher et al., 2010; tinyurl.com/d3zolxa).

In this context, living labs need to demonstrate professional and specialized work processes, practices, and methods to fulfill the role of innovation-network catalyzer. Living labs also need better integration within the innovation ecosystem and articulation of their value proposition. Based on our research work in a major living labs project, APOLLON (apollon-pilot.eu), this article aims to specify the role and potential added value of living labs in systemic innovation and innovation networks. We propose practical guidelines on how the living lab concept should be further developed and practically implemented in order to effectively guide and accelerate systemic innovation in collaborative networks.

Innovation Networks and Systemic Change

There is growing evidence that the autonomous activities of single organizations cannot produce the cross-disciplinary systemic innovations that would sufficiently address the increasingly sophisticated needs of the market (Maula et al., 2006; tinyurl.com/942oa9v). Consequently, innovation processes are increasingly driven by open-collaboration networks where companies enable systemic innovations through strategic pooling of resources, sharing risks, and leveraging competitive positions. These collaborative networks usually are driven by strong industry partners, but increasingly involve also small and medium entreprises and entrepreneurs.

Theoretical work on innovation networks has mostly focused on understanding network characteristics and has largely neglected designing, managing, and steering processes for collaborative networks. Recent work on collaborative networked organizations has defined specific procedures for the setting up and planning of networks including detailed processes such as partner selection, negotiation, agreement definition, and intellectual-property management (Camarinha-Matos et al., 2008, tinyurl.com/cfwnfvp). In exploring the orchestrating role of living labs within collaborative networks of innovation, this framework is useful as starting point for identifying the methods, processes, and tools that can be applied in such networks.

Innovation networks addressing systemic innovation must also consider the role of living labs in initiating and catalyzing change. Transition management (tinyurl.com/bu4xoum) is a relevant field of work for living labs methodologies. It describes how to catalyze change in complex systems and focuses on resolving complex large-scale societal problems such as sustainable energy transitions. Transition management builds on the notions of "niche", "regime", and "transition arena". Much comparable with the role of Christensen's concept of disruptive innovation (tinyurl.com/54poe6), a "niche" is an experimental environment where new innovations, including innovations in policy instruments, can incubate and where learning takes place. Such niches can grow and gradually transform the current "regime", which is the existing dominant set of business structures, rules, and policies. In addition, transition management proposes a "transition arena", which

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comprises a neutral dialogue space and focuses on identifying and realizing strategies and conditions for large-scale systems change.

In comparison to transition management, living labs methodologies are more practically oriented to setting up and conducting user-centric innovation projects in open-innovation settings. In this context, the action-research paradigm provides a valuable framework for participative ICT-based innovation and change (Baskerville, 1999; tinyurl.com/8cta6db). Creating dialogues between stakeholders, including developers and end users, can be considered as practical implementation of transition management. In this sense, living labs activities often start with creating innovation communities and partnerships, which act as "transition arenas" that establish strategic and practical dialogue between the stakeholders involved.

Such dialogue also forms the basis to arrange for institutional change to effectively catalyze systemic innovation (Turkama and Mattila, 2012; tinyurl.com/96jd8yy). Service innovation has been studied through numerous theoretical approaches and conceptual frameworks. In our view, most approaches have failed to adequately recognize the importance of the innovations' adaptation to the existing institutional environments, or alternatively, the need for institutional change in the ecosystem. Research has focused on impartialness and neutrality of the institutional environment rather than on the dynamism and change. Hence, we consider systemic innovations as changes in the local socio-technical regimes that need to be supported by adjustments in related processes, arrangements, values, and institutional logics. We contemplate the living lab approach as a means to model the characteristics and interdependencies of ecosystems, as well as potential implementation barriers and sources of resistance.

Living Labs as Innovation Catalysts

Based on the previous analysis, we conclude that, in order to act as innovation catalysts, living labs need to recognize the systemic character of innovation. Living labs will also benefit from adopting methods, processes, and tools that have been proposed for collaborative networked organizations. These conditions fulfilled, living labs can act as open-innovation and community-building-based transition arenas for overcoming institutional inertia and catalyzing for change.

Living labs offer a comprehensive service platform including testbeds, trials, competences in user-driven innovation, and access to user communities. The outputs from living lab pilots are less predictable and tangible than investing in infrastructure and services, because the focus is on mature technologies, integration to prevailing systems, and user acceptance of innovations. Recent findings from European Living Lab projects, such as APOLLON (apollon-pilot.eu) and Save Energy (ict4saveenergy.eu), support the notion that the approach is probably best suited for cases that call for user-behaviour transformation, crowdsourcing, or business model innovation. The living lab environment creates a platform for simulating business models and go-to-market strategies in low-risk, but yet real-life environments. Recent smart-city pilot projects have further indicated that the approach could also yield more value in terms of competence development and re-defining the roles and relationships between the public and private entities than for product or service development. This further validates the assumption for living labs potential as catalysts for broader societal and industrial transformations.

However, more evidence and success cases are needed for the analysis of living labs best positioning and "value add". The living labs organized within the mentioned European Network of Living Labs may find a special mission in supporting small firms' innovation and international market development ambitions. So far, living labs have mostly acted as single entities in urban, regional, or rural innovation contexts. Our previous work in the Collaboration@Rural project related to collaboration among living labs across rural areas was limited to providing a common technology platform facilitating the sharing and reusing of collaboration services and tools across the living labs (Schaffers et al., 2010; tinyurl.com/9noft6f). In other European living labs projects, networking among living labs remains mostly at the level of exchanging experiences, practices, and methods. We conclude that a new challenge for living labs networking is to elaborate and adopt mechanisms, processes, and tools to support small firms to engage in cross-border collaboration and innovation networks, focusing on systemic innovation.

Cross-Border Networks of Living Labs

The cross-border challenge has been addressed by the APOLLON project, which ran from 2009-2012. The project focused on experimenting with the setting up and running of cross-border networks of living labs in real-life pilots in four thematic domains of systemic innovation: homecare and independent living, energy efficiency, manufacturing networks, and citizen

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participation. During the project, and in close interaction with the real-life pilot activities, we developed, introduced, and validated a methodology for cross-border networking and collaboration of living labs that is based on key principles of collaborative networked organizations (Lievens et al., 2011; tinyurl.com/brcppxl).

The project provided evidence that the role of living labs in setting up cross-border collaboration for innovation and market creation involves a wide range of issues. Supporting small firms to exploit a new technology in homecare and assisted living internationally is highly different from collaboration between small and medium entreprises and large manufacturers in a business-innovation network. Aspects to be addressed include the particular product or service innovation, but also contextual factors such as language and culture, organizational and regulatory settings and more. For this reason, our approach in APOLLON started with defining high-level scenario storylines in order to structure the process of setting up, planning, and running a cross-border living labs network and identifying collaboration needs within the evolving cross-border networks.

The living labs network-development process starts when international business opportunities emerge for the small firm; thereafter, the small firm contacts a local living lab, which establishes collaboration with other living labs across borders and with foreign partners. A next step is to define the innovation or market-development project and arrange for collaboration agreements. The cross-border collaborative-networking project is then implemented, managed, and finally concluded. In summary, the following major phases can be identified:

1. Connecting: identifying opportunities for joint innovation and market development, and identifying potential partners for collaboration

2. Planning: defining partner roles and responsibilities, building and planning the network, and finalizing agreements and contracts

3. Support: conducting collaborative testing, innovation, and market-development activities

4. A fourth and final phase, which is not considered in this article, is to assess the achieved benefits and impacts that the network has created.

The APOLLON approach was to first understand the collaboration needs of partners involved (e.g., small firms, living labs, larger companies, local governments, agencies) and to develop a process of introducing, adopting, and evaluating methods, tools, and guidelines to enhance collaboration in cross-border living labs networks (Schaffers et al., 2012; tinyurl.com/cdchh99). Table 1 presents the main collaboration issues as a framework defined by the dimensions of phases (connecting, planning, and supporting) and scope levels (strategic and operational).

Table 1. Strategic and operational collaboration issues in cross-border living labs networking

Scope	Phase 1: Connecting	Phase 2: Planning	Phase 3: Support
Strategic level of collaboration	• finding potential partners • agreeing on common goals and approaches • dialogue building and negotiation support • business models • intellectual-property principles	• organizing the cross-border living lab planning and development process • partnership structuring, contracting frameworks • elaborating a common plan and approach, defining responsibilities and roles	• governance models structuring living labs operation and collaboration in the network • defining the processes and tools for project management and coordination
Operational level of collaboration	• collaboration procedures and processes for the connect phase • Internet-based tools for communication and collaboration	• detailed planning processes and procedures • tools for collaborating in the planning phase (e.g., using shared workspaces)	• processes and tools for living labs collaboration during support phase (e.g. web-conferencing tools and shared workspaces)

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Table 1 demonstrates that collaboration encompasses a wide range of different operational and strategic aspects, covering the processes related to collaboration as well as collaboration arrangements (e.g., business models, partnership agreements) and tools to support collaboration and communication in networks. It highlights the crucial role of the connect and planning phases as success factors of cross-border living labs networks, and it also brings to the foreground the importance of a shared vision and strategy regarding the objectives and implementation of such networks.

Based on the three-year real-life pilots conducted in APOLLON in the four selected domains of homecare and independent living, energy efficiency, manufacturing, and citizen participation, a range of collaboration bottlenecks related to systemic innovation were identified. For example, the homecare and independent living pilot encompasses a cross-border network of living labs, small and medium entreprises, and other actors facilitating the transfer of a homecare solution from one country to another. The pilot made clear that, for such solutions to be successfully transferred and adopted, they must be embedded in local ecosystems comprising organizational, regulatory, and institutional arrangements.

We conclude this section by highlighting some lessons as regards the role of living labs in developing and operating cross-border collaborative-innovation networks for systemic innovation:

1. Developing such networks requires a phased approach where both strategic and operational issues are addressed and a shared vision is built. Living labs engaging in collaborative cross-border networks must be aware of the importance of carefully building an ecosystem that implements this approach.

2. It is important to define collaboration agreements as part of the connect phase. Important agreements to be made during the connect phase relate to the business model, intellectual property rights, the business proposition, and contractual agreements. Sometimes, it is necessary to be prepared for changes in the composition of the collaborative network (i.e., entry or exit of partners).

3. Defining clear roles and responsibilities of living labs, small firms, and other network partners is important. Role definition, in particular regarding the role of living labs in the network, may avoid project delays and conflicts in later stages of the project. One example is to define a clear leading role for one of the living labs.

4. The definitions of roles and responsibilities imply that living labs should possess the necessary competencies, expertise, and skills.

5. Before a networked project starts, partners should agree on a common understanding of the business case. This will avoid difficulties in engaging the partners and ensures commitment. Objectives, results to be achieved, time frames, and needs and expectations of partners must be clearly defined and aligned to the project goals before the pilot starts. A win-win for all parties involved should be negotiated before the actual start. The pilot should be part of the roadmap and it should target clear business opportunities after the project ends.

6. Adequate project planning and project management should be ensured. Setting up and running a cross-border living labs network must be considered as a complex project. Sound project definition, project management, and the use of project management tools are preconditions for success. Collaborative workspaces and communication tools will support the project community and facilitate communication, interaction, and commitment.

7. Utilizing technologies in cross-border settings requires that technologies to be tested or used in other contexts are compatible. Technologies that have been developed in one context often are not compatible in another environment. Additionally, legal, cultural, social, and organizational issues may hinder the adoption of a technology solution in a different context than originally envisaged.

Conclusion

The living labs concept comprises one particular approach for accelerating systemic innovation in collaborative innovation networks. We will need to further explore with different systemic innovation instruments and learn from experience in the years to come. While living labs may potentially act as initiators and catalyzers of systemic innovation, many living labs are not yet sufficiently well positioned to fulfill this potential. Many living labs are not sufficiently integrated in regional innovation ecosystems. To achieve the full potential, concepts related to living labs, such as open innovation and user engagement, must become better

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embedded into existing innovation networks and ecosystems and their instruments. This article contributed to that objective by presenting a practice-based typology of the collaboration issues that need to be considered in establishing cross-border networks of living labs.

The living lab approach itself faces several risks such as the lack of standardization and inadequate criteria for living labs methodologies and performance. Moreover, there is the risk that the value proposition becomes impossible to communicate, because the term "living ab" can mean different things in different contexts and for different target groups. Additionally, most living labs lack sustainable business models, since they operate on project-based funding or as a part of universities or regional development agencies. The European Network of Living Labs is tackling this concern through tight criteria for living labs that can carry the European Network of Living Labs “brand”, as well as through establishing thematically focused sub-networks, where the added value and focus are clearly defined.

An overall conclusion is that systemic innovation in cross-border collaborative networks requires adequate open-innovation partnership models. Findings from the APOLLON project support the notion that living labs can assume a coordinating role in such networks. The living labs approach is probably best suited for cases that call for user-behaviour transformation or business-model innovation. Living lab environments create platforms for simulating and experimenting business models and go-to-market strategies in a managed, low-risk, but yet real-life environment. In that capacity, living labs and their ecosystems act as learning environments for catalyzing systemic innovations that may gradually transform existing instruments and networks of innovation.

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Structuring User Involvement in Panel-Based Living Labs

Dimitri Schuurman and Lieven De Marez

> *"I just invent, then wait until man comes around to needing what I've invented."*
>
> R. Buckminster Fuller (1895–1983)
> Designer, author, and inventor

A shift towards open innovation approaches with systematic user involvement has occurred within media and ICT. One of the emerging frameworks structuring these initiatives is the "living lab" approach. Despite the growing evidence of the beneficial nature of customer involvement in product development, research into specific user characteristics for innovation is still scarce, particularly in living labs, with the notable exception of literature on lead users. Especially within the context of living labs for ICT and media innovation, an application of the lead-user framework looks promising as a way to structure and facilitate user involvement. This article is based on the experiences of three Flemish living lab initiatives with a panel-based approach and provides a customer characteristics framework that guides user involvement in living labs.

Introduction

Although the quotation topping this article may sound dated, this line of reasoning is closely associated with the technology-push paradigm and has dominated the view on innovation for a long time. The market-pull paradigm, dating back to the 1960s, shifted the focus from pure invention and development of technology towards the eventual adopter and user of the innovation. With the recent advent of the open-innovation paradigm, end-users have reclaimed their place within innovation processes, particularly in new media and ICT. This is reflected in popular concepts such as *open source*, *crowdsourcing*, and *user generated content*. One of the most recent methodologies for user-centered innovation is the living lab approach, which has gained momentum especially in Europe through the support of EU-policy (tinyurl.com/8u5c6k8) and various international joint initiatives, such as the European Network of Living Labs (ENoLL; openlivinglabs.eu/livinglabs), which together consist of over 500 living labs worldwide.

Although living labs provide a way to structure and facilitate user involvement in new media and ICT innovation (Almirall and Wareham, 2009; tinyurl.com/8rp4v4m), few attempts have been made to couple the user and customer involvement literature with living labs. This article sheds light on the question of which users to involve in a living lab project by providing a framework for customer characteristics in innovation. It builds upon lead-user characteristics and the concrete application will be demonstrated by means of multiple cases from three Flemish ICT Living Labs: LeYLAB (leylab.be/english), Vlaams Proeftuin Platform (vlaamsproeftuinplatform.be/en), and Mediatuin (mediatuin.be). It is suggested that a panel-based living lab approach might facilitate and optimize this kind of user involvement and some key lessons are abstracted out of concrete practice.

Customer Characteristics for User Involvement

For quite some time, studies have been investigating characteristics for user involvement. Eric von Hippel (web.mit.edu/evhippel/www/) came up with his influential lead-user concept in the 1970s. He considered using lead users as a counter weight for traditional market research, which focuses on users at the centre of the market. Instead, the lead-user approach looks for users at the leading edge of the target market or even at users from other markets, who face similar problems as the

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target market, but in a more extreme form. According to von Hippel, these lead users display two main characteristics: i) they face needs long before the others in the market and ii) they expect to have a significant benefit when they obtain a solution to these needs.

Recently, this dichotomy has been challenged by pleading for a more collaborative mode of user participation in innovation processes. This has been given names such as "design by customers", "open innovation with customers" or "collaborative new product development" (e.g., Piller and Ihl, 2009; tinyurl.com/38wxcax). Instead of looking for lead users and lead-user innovation or simply surveying users from the centre of the target market, collaboration with users or customers during various stages of the new product development process is put forward as best practice. This has led to studies investigating customer characteristics for involvement in innovation processes. Out of these studies, we deduct four main dimensions on which we will build our framework and which will be further explored in the section on user characteristics:

1. User expertise: consists of product-related knowledge and user knowledge. This dimension is abstracted from research by Lüthje and Herstatt (2004; tinyurl.com/9xmjx43), who demonstrated that the ability of lead users to be effective contributors to the innovation process is related to two major characteristics: adequate technological expertise and superior knowledge of the user domain and "use experience". User expertise thus implies that the user has specific knowledge or expertise with regards to the innovation or the domain in which a company wants to innovate.

2. Usage intensity: measures the experience of the user, including both the duration and diversity of the usage (Shih and Venkatesh, 2004; tinyurl.com/94wcevj). Research has showed that extreme usage and use innovativeness aids the innovation process by foreshadowing changing and emerging usage behaviour (Pichyangkul et al., 2012; tinyurl.com/8uwwnk8).

3. New needs: refers to the fact that the user has emerging needs that cannot be fulfilled by the current market offering. This dimension is abstracted from the classical lead-user definition and can be detected by two proxies. A first proxy is dissatisfaction with the current offering, which leads the user to become an ex-customer. Research by Duverger and Hassan (2011; tinyurl.com/9c9fw75) mentioned the innovative capacities of these "defectors" and demonstrated that this kind of "ex-user" is able to generate radical new product or service ideas. A second proxy is user innovation, because studies have shown that lead users are likely to solve their unmet needs by innovating themselves (e.g., Lüthje and Herstatt, 2004; tinyurl.com/9xmjx43).

4. User innovativeness: can be measured through the rate of adoption of technology and innovations in a certain domain. This is based on the diffusion-of-innovations framework by Rogers (1962; tinyurl.com/8dsfwqv), which illustrated that users show unique characteristics based upon time of adoption.

Panel-Based Living Labs

Living labs have been defined from different angles and with different outcomes in the literature. Schuurman and colleagues (2012; tinyurl.com/9hy85po) extensively discussed various bottom-up and top-down conceptualizations out of concrete living labs practices with various results. However, we chose the following definition, inspired by Almirall and Wareham (2008; tinyurl.com/9etgbjn): living labs can be seen as innovation arenas or "innovation intermediaries" because they build a *multi-stakeholder* ecosystem where users are subjected to a combination of research methodologies while they test new technologies that are still in development with the focus on accessing the ideas and knowledge of the users regarding the tested technology. Therefore, living labs are capable of providing structure to user participation in innovation processes.

Living labs are seen as separate from other innovation approaches by means of two dimensions: a high degree of realism and a high degree of (user) involvement (Table 1). Living labs offer both realism and an active user involvement, because the user is regarded as a partner in the innovation process during which the needs, aspirations, and motives of users emerge in their everyday context in an active and iterative manner. Living lab settings are used to perform quantitative and

Table 1. Living Labs versus other research methods

	High Realism	**Low Realism**
Active user involvement	***Living Labs***	Prototyping/testing platforms
Passive user involvement	Field trials Market pilots	Voice of the customer methods (e.g., surveys, focus groups)

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qualitative research methods on the users' ideas, skills, knowledge, and experiences.

A panel-based approach is yet another element that can be added to living labs. This approach differentiates itself from "traditional" living labs because it implies a more permanent living lab infrastructure, as opposed to one-shot living lab applications, in which the most important and central "infrastructure" consists of a thematically recruited and profiled panel of users. It can be argued that instead of putting "the user" or " the customer" at the centre of the innovation process, a well-described and thematically focused panel is put in the centre of the process. In terms of the stages in the setting-up of a living lab, as defined by Pierson and Lievens (2005; tinyurl.com/8zyuwww), a panel-based living lab approach yields many benefits; these benefits are listed in Table 2.

Table 2. Added value of a panel-based living lab approach

Stages	"Traditional" Living Labs	Panel-Based Living Labs
Contextualization	• an exploration of the technological and social implications of the technology or service under investigation; technological scan and state-of-the-art study that identifies the relevant concepts	• through the longitudinal data the panel generates, a permanent "contextualization" is taking place for the surveyed topics. The recurring surveys also allow easy integration of a "new" topic for contextualizing purposes.
Selection	• identifying potential users or user groups; this can be done on a socio-demographic level, based on selective or criterion sampling; this allows for theoretical variation of previously defined concepts	• the identification of potential users or user groups is only a matter of selecting the right profiles out of the panel database. This avoids the time-consuming and costly surveying and recruiting of relevant user profiles.
Concretization	• an initial measurement of the selected users on current characteristics, behaviour, and perceptions regarding the research focus in order to enable an *ex post* measurement after the implementation phase	• the initial measurement of the selected users on current characteristics, behaviour, and perceptions regarding the research focus is in most cases (partly) already present within the panel data, so only a brief extra survey needs to be filled out by a selected set of panel members. This consists mostly of an estimation of the attitude and adoption intention towards the innovation concept (see text).
Implementation	• the operationally running test phase of the living lab; research methods: direct analysis of usage by means of remote data collection techniques (e.g., logging), indirect analysis based on, for example, focus groups, interviews, self-reporting techniques	• the operationally running test phase of the living lab is also made a lot easier by the panel approach because accurate and up-to-date data is available, which allows for an optimal selection and setting up of the trial phase with less worries regarding privacy and related concerns, because all panel members have "opted in". A better collaboration is also guaranteed because users have already agreed to be part of a research panel.
Feedback	• an *ex post* measurement of the users (same techniques of initial measurement) and a set of technological recommendations from the analysis of data gathered during the implementation phase	• an *ex post* measurement of the users can possibly be integrated with the existing surveys sent out to the panel members. The fact that, after a living lab project, the users remain part of the panel and the research data is added to the existing data ensures a broader picture over the different living lab projects.

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We will illustrate this panel-based approach by means of iLab.o (ibbt.be/en/develop-test/ilab-o), the living lab division of the Interdisciplinary Institute for BroadBand Technology (IBBT), which is a founding member and secretary for ENoLL. In practice, iLab.o sets up medium to large-scale trials outside the lab environment involving different stakeholders. Within these trials, representative users have the chance to test ICT innovations over a longer period of time in their daily professional and private environments. This allows for researchers to assemble user feedback and to systematically observe, monitor, and analyze user behaviour in a natural environment. iLab.o's panel-based approach consists of recurring recruitment activities to gather panel members who are willing to cooperate in living lab research. The recruitment consists of a large intake survey that looks at the respondent's usage and adoption of (media) technologies, adjusted to the thematic focus of the specific living lab. This way, there is a constant inflow of panel members with up-to-date data regarding their habits, usage, and adoption of specific products, technologies, and services. For the recruitment of respondents, quota samples are used to ensure the representativeness of the survey population. All this data is stored and managed by the Living Lab Integrated Data Collection and Aggregation Model (LLADA), which is a piece of software specially created for living lab panel management. Besides data from the recurring intake surveys (for an example, see Digimeter: digimeter.be), all data from living lab research is collected with this tool. This way, the user profiles of the living lab panel members are updated every time they participate in living lab research. A necessary prerequisite for this panel approach to function optimally is rigorous panel management. iLab.o is the research partner in three ICT-related living labs in the geographical area of Flanders, all of them partly being financed by the Flemish government. Table 3 compares these three living labs, which are further described in Boxes 1 to 3.

Through the profiling of the test users for the relevant domains and for the chosen focus, the panels from the three living labs can be considered as an essential part of the "living" infrastructure of these labs. This makes it easy and quick to gather a relevant set of respondents or test users for a concrete living lab project being carried out in the living lab. Also, by running different projects, further data and knowledge regarding these panel members are generated, which refreshes and updates the database, thereby adding even more depth to the profiles.

Box 1. LeYLab (leylab.be/english)

LeYLab was set up in September 2010 following a public call in Flanders for living labs with "converged broadband access networks" as the central theme. LeYLab was operational by July 2011 and its fibre network is located in two geographically restricted areas (Buda and Overleie) in the City of Kortrijk. The goal of LeYLab is to stimulate innovation and to measure the relevance of new services for the personal lifestyle and living environment of the test users. The consortium of LeYLab consists of 11 industrial partners and the research partner IBBT-iLab.o. The living lab focuses on three thematic domains: e-care, multimedia, and gaming. The fibre internet connection functions as a facilitator for the testing of innovative services and products. In January 2011, a large communication and recruitment action was set up to motivate people living in the selected areas to participate in the living lab. Eventually, 115 addresses were connected to the fibre network; the addresses are mostly residential but also include cultural organizations, schools, and companies. In order to facilitate testing of different services for different devices, the consortium decided to provide some of the connected homes with extra devices (e.g., Android tablets, mini-PCs connected to flatscreen TVs) besides the fibre connection. All connected addresses received multiple surveys in order to allow profiling of the test users for the relevant thematic domains and all data and actions running on the LeYLab fibre network were monitored and logged.

User Characteristics in Living Labs

We will now provide some examples from living lab projects where user characteristics, abstracted from the living lab panels' user profiles, were used to select and recruit users for involvement in different research steps. These examples will illustrate the added value of employing our framework for user selection over random or general user selection or recruitment by means of practice-based evidence.

Dimension 1: User expertise
Within a LeYLab project, users were recruited for a co-creation and co-design session in order to develop a

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Table 3. Characteristics of the three panel-based living labs

Living Lab	Domains	Aim	Infrastructure	Number of Test Users
LeYLab	• multimedia • e-homecare • gaming	• experimenting with new applications that request a fast Internet connection • digital inclusion, bringing any multimedia service to everyone on any device • optimizing the life of care-demanding citizens through new technologies	• fibre internet connection • 43 Android tablets • 36 mini-PCs connected to flatscreen TVs • project-based infrastructure	• core panel of 115 connected addresses with +/- 200 profiled panel members
Vlaams Proeftuin Platform	• smart grids • smart media • smart cities	• energy management and energy reduction • user research on smart media applications and services to evaluate innovative media experience • increasing the self-sustain of elderly people	• no permanent infrastructure, only project based	• 2015 profiled panel members
Mediatuin	• cross-media innovation	• co-creating and validating cross media innovations and formats	• no permanent infrastructure, only project based	• dataset of 7000 respondents of which 2057 consented to be panel members

second-screen tablet application for a regional broadcaster's popular quiz program. The selection of users was based upon their experience with second-screen applications and social media and their interest in quiz programs. This data was captured during the intake survey that had to be filled out by every LeYLab panel member. This way, we were able to quickly gather a relevant group of people for the co-creation session, moderated by a researcher but also with active participation of the application developer and a representative from the quiz program. The developer and the quiz program's representative already had basic ideas for how the application would function, but after the co-creation session, these ideas were changed quite radically and a paper mock-up was developed, from which the actual application was developed later in the project. Because of their user expertise, the participants were able to confront the developer's ideas with their own usage experience and provide concrete suggestions and comments that were directly implementable. Their knowledge also aided in co-designing the actual user interface of the application.

Box 2. Vlaams Proeftuin Platform (vlaamsproeftuinplatform.be/en)

The Vlaams Proeftuin Platform (Flemish Living Lab Platform) officially started in October 2010 to support the development of innovative information, communication, and entertainment (ICE) products and services. Its mission is to boost the valorisation of ICE research and development in Flanders and to support joint value creation for all stakeholders. Vlaams Proeftuin Platform is a consortium of four industrial partners and the research department IBBT-iLab.o. The living lab focuses on three domains: Smart Cities, Smart Grids, and Smart Media. A large panel of 2015 users has been built up and has been thoroughly profiled within the three domains through bi-monthly domain-specific surveys.

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Dimension 2: Usage intensity
With Mediatuin, usage data from a beta version of an online application was gathered through log files. This way, test users could be segmented based upon their usage intensity. This segmentation was enriched with survey data before the actual usage of the innovative application, which allowed for a comparison between usage intention and actual usage. Users matching the different segments were assembled within a co-creation session that resulted in a lot of very specific feedback ranging from enthusiastic users that were disappointed with the actual beta version to skeptical users that were positively surprised by the functionality of the application. This way, a broad range of feedback could be captured with only a limited set of divergent test users. Usage intensity was in this case used as a criterion for a co-creation session after the actual testing of the innovation and referred to the usage of the innovation itself. By comparing actual behaviour with intended behaviour before the field trial (see below), captured during the contextualization stage, discrepancies can be detected. Test users with a positive discrepancy (low usage intention, high actual usage) are key to discovering certain drivers for adoption and usage by user groups that at first sight did not find much appeal in the innovation. The other way round, a negative discrepancy (high use intention, low actual usage) can highlight the barriers that can impede adoption and usage by possible earlier adopters.

Dimension 3: New needs
With Vlaams Proeftuin Platform, a sample of youngsters was selected for participation in a live field trial of an online advertising platform for youngsters. Through logging, the usage of these test users could be assessed. Some of the youngsters only logged in to the platform once and never came back after their first usage, although some of them had showed interest in it during the pre-testing evaluation of the concept.. We considered this to be an indicator of dissatisfaction and thus of new or unmet needs with regards to the innovation. These users were contacted for participation in the co-creation sessions. Apparently, during the actual testing, some aspects of the platform left them dissatisfied, which led to their abandonment after one usage session. These users provided valuable feedback to the platform developers. Dissatisfied users are especially able to provide information regarding certain needs that are currently unsatisfied. After a field trial, the dissatisfied test users are able to identify the barriers or flaws resulting in their dissatisfaction. This finding establishes a connection with the previous dimension, because low usage intensity might be an indicator of dissatisfaction.

Box 3. Mediatuin (mediatuin.be)

Mediatuin (or *media garden*) started in October 2010 to optimize, co-create, and validate media innovation with a cross-media focus. The Mediatuin consortium consists of three industrial partners (SonicAngel, Netlog, and Telenet), the research department IBBT-iLab.o, and REC Radiocentrum (a non-profit organization aimed at stimulating and educating young media talents). The thematic focus of Mediatuin is media, with special attention given to radio and music. By means of a large intake survey, a dataset of more than 7000 respondents was collected with more than 2000 people willing to be involved in living lab projects as test users. This survey was very detailed and focused on the thematic domains of Mediatuin, thus offering a lot of relevant data for the projects that were set up.

In Mediatuin, we used the detection of "user innovation" as a proxy to identify new needs within a project for an online radio recording service. We included an open question regarding users' current habits and practices for recording radio within the recruitment survey to assess interest in the concept. Besides some general answers, we identified one user who had programmed his own online recording solution for Linux. He simply wrote down the lines of code he had used to create his own solution. This user innovator was used later on in the development process of the online radio recording service. User innovators can provide relevant input to the innovation process because these users clearly have new needs and also user expertise. User innovation can thus be seen as a proxy to identify users with new needs and with high user expertise, in other words the so-called lead users that can generate valuable information during the whole innovation trajectory and that also can be engaged in more profound and technical co-creation activities.

Dimension 4: User innovativeness
This final dimension is utilized in nearly all living lab projects, as within the "concretization stage" (see Table 2), the adoption intention of the innovation in development is surveyed by means of the product-specific adoption intention (PSAP) method (De Marez and Verleye, 2004; tinyurl.com/9ksb7gu). For the selection of test users, a variation in terms of user innovativeness guarantees a broader picture because users identified as potential later adopters are likely to show different

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usage patterns than potential early adopters or visionaries. With Mediatuin and Vlaams Proeftuin Platform, discrepancies between innovativeness and actual usage intensity identified dissatisfaction. However, user innovativeness towards technologies in a given target domain can also be used, for example, in the LeYLab case. Early adoption of tablets and second-screen services was used as an indicator of user expertise with regards to the innovation in development.

Conclusion

Living labs are being used to structure user participation in real-life settings. However, to optimize this participation, we firmly believe the customer and user characteristics of test users should be taken into account. This article suggested four different dimensions for user involvement in innovation processes in light of the panel-based living lab approach. We will now formulate key lessons that can aid innovation managers and living lab organizers when setting up a living lab infrastructure or a concrete living lab innovation project. These findings are also of interest to companies willing to engage end-users in their innovation efforts, because they provide some insight into how this can be done.

In order to use the user expertise criterion for user selection, it is necessary to recruit or utilize *thematic panels* with a specific focus. When the profiling is not sufficient, or not enough panel members have the right criteria or characteristics, extra intake is needed. However, this extra intake is also an opportunity to refresh and enlarge your existing living lab panel. When your panel has a mismatch with the living lab project and there is an insufficient number of users with relevant user expertise available, it is better not to use the living lab for that particular project.

For the usage intensity dimension, it is necessary to *capture user behaviour*. This can be done through self-assessment of panel members (e.g., surveys), but this should be complemented with unobtrusive logging data registering usage behaviour. A permanent infrastructure with logging facilities, such as in the case of LeYLab, provides the best opportunities to gather and utilize the data in order to recruit test users based on usage intensity.

In order to use the dissatisfaction criterion, which is associated with the user type, surveys are the most obvious technique, but there is also the possibility to look for and analyze indicators of dissatisfaction, such as a decreasing usage intensity. Again, logging can be used successfully here, because one or a few usage moments in the beginning of the test phase within a living lab followed by no activity at all might be an indicator of dissatisfaction with the tested product or service.

The new-needs criterion is most closely associated with the classic lead-user concept. Dissatisfaction with the current offering can be an indicator of new needs, which makes it necessary to measure the *degree of satisfaction* in order to identify possible "defectors". Scanning for user innovation is another way to detect new needs. This can be done by *simply asking for examples of user innovation* in a survey or during interviews because a lot of innovating users are happy to share their innovation with you. Home or site visits can also reveal user innovation.

Finally, the user innovativeness dimension, which was associated with the diffusion-of-innovations framework, allows for user segmentation when the time of adoption is predicted for the innovation concept in development. This *predicted adoption potential* also allows researchers to identify discrepancies with actual usage behaviour during the live phase of the living lab. A detailed profiling of the panel in terms of innovativeness with regards to a certain thematic domain is also advised. The *speed and number of adoptions* with regards to relevant technologies and services already available in the target market domain should be surveyed.

In sum, a panel-based living lab facilitates user recruitment based on specific characteristics related to the innovation being developed and tested in the living lab. However, recruiting and managing this panel requires a lot of time and effort and should be done with careful consideration. Living lab projects should fit the scope of the panel; otherwise the added value of the living lab will be lost. However, when projects fit the scope, it will keep the panel alive and up to date, and it will improve the added value of the living lab through the continuous data generation. It is also apparent that the four identified dimensions of the user-characteristics framework are far from independent . A lot of the criteria and proxy measures are mostly interrelated, so the framework should be used in a dynamic way, adapting it to the specific target domain in which the living lab activities will run and carefully selecting variables and proxies to identify the different characteristics. Further exploration and implementation of this framework is definitely a subject for future research.

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About the Authors

Dimitri Schuurman is a PhD Candidate at Ghent University, where he started working for the MICT (Media & ICT) research group at in November 2005 and received a position as a principal living lab researcher for IBBT-iLab.o in the Mediatuin and LeYLab living labs in 2010. Dimitri's research mainly involves methods for ICT innovation. He focuses on the ways the user can be involved within various innovation methods and techniques (lead user methodology, Living Labs, panel studies), and especially which users to use at what stage within the innovation process, rather than simply involving "the user". Furthermore, he devotes special attention to the specific role of media content within the process of adoption and diffusion of ICTs.

Lieven De Marez is Research Director at MICT and teaches innovation research and new communication technologies at the department of Communication Sciences in Ghent University. Previously, he worked as a research assistant on methodology and statistics at the Department of Communication Sciences of Ghent University after obtaining his Master's degree in Communication Sciences (1999) and Marketing (2000). Through his subsequent PhD research, he developed a segmentation-forecasting tool for prior-to-launch prediction of adoption potential and created a blueprint for better introduction strategies for ICT innovations in today's volatile market environment. Within the interdisciplinary institute for BroadBand Technology (IBBT), of which MICT is one of the 16 research groups, Lieven is also part of the management team of iLab.o, IBBT's facilitating infrastructure for Living Lab research.

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Living Labbing the Rotterdam Way: Co-Creation as an Enabler for Urban Innovation

Ingrid Mulder

> *"Living in cities is an art, and we need the vocabulary of art, of style, to describe the peculiar relationship between man and material that exists in the continual creative play of urban living. The city as we imagine it, then, soft city of illusion, myth, aspiration, and nightmare, is as real, maybe more real, than the hard city one can locate on maps in statistics, in monographs on urban sociology and demography and architecture."*
>
> Jonathan Raban
> Novelist and travel writer

The living lab concept seems appropriate to study the design and evaluation of innovative services that enrich everyday life. This article elaborates on "living methodologies", methods and tools necessary in "living labbing". Living methodologies address the social dynamics of everyday life that are essential for understanding living labs, not only conceptually, but also as mature methodologies for fostering innovation in real-life contexts. We report on three cases from Rotterdam in the Netherlands, where "living labbing" was used to enable citizens to co-develop their city. These cases utilized visual ethnography as a research method and prototyping and co-creating as design tools. The cases not only inspire citizen participation, but also inform social innovation and city's policy-making. The user-driven approach, do-it-yourself mindset, and the participatory character perfectly fit with the down-to-earth attitude of Rotterdam residents.

Introduction

The living lab approach is a research methodology for sensing, prototyping, validating, and refining complex solutions in multiple and evolving real-life contexts. Living labs are user communities that have been mostly used in recent years by high-tech companies for validating new technology applications in real end-user environments. In a living lab, it is crucial to allow for experience research, in-situ research with an emphasis on measuring real-life use, continuous iterations between development and evaluation, and an open innovation consortium involving partners with different backgrounds. In addition, living labs require an open attitude and a human-centred mindset.

A living lab is not just a network of infrastructures and services, but a network of real people with rich experiences and a new way to deal with user-driven innovation. Those experiences are the very things that make a living lab *living*, and therefore, appropriate methods should capture these social and dynamic aspects (Mulder et al., 2008; tinyurl.com/8su2mal). However, Mulder and Stappers (2009; tinyurl.com/9f75ndh) reviewed methods used in living labs and found an emphasis on the use of traditional methods for laboratory testing over the use of co-creation techniques and participatory methods. Traditional methods have their value in ethnographic research, but they might not exploit living labs as an infrastructure that comes close to the user nor make use of the potential of living labs as a way to

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extract richer insights about what drives people. Most living labs currently do not benefit from such a living methodology that enables the studying of social and dynamic interaction in the real world. Moreover, living methodologies are very heterogeneous and specific to the individual sites (and even vary within each site). In other words, "living methodologies" that relate to the assessment of social dynamics in real-life contexts on a large scale are still in their infancy. This is one of the main challenges for living labs: to mature living methodologies so that they can be used across living labs. Therefore, this article contributes to understanding of social experiences that make the living lab *living* and elaborates how *living methodologies* that capture social and dynamic aspects can be embedded in living lab practices.

We report on three living labs cases that were intended to enable the citizens of Rotterdam, Netherlands, to co-develop their city; our aim is to illustrate how living methodologies help us gain insights and activate users to design for tomorrow's society. The first case introduces visual ethnography as a research methodology that was used to improve the life of elderly citizens. The second case depicts prototyping as a method that helped to increase engagement in art co-creation among festival participants. The third case illustrates how living labs were used in co-creating new public services for the citizens and townspeople.

Case 1: Visual Ethnography for Assisted Living

There is a growing understanding that seniors should continue to function independently for as long as possible. Key to living independently is to promote solitude without added feelings of loneliness. Various ambient assisted living (AAL) development projects have taken place to empower seniors and to stimulate social connectedness. Still, these projects too often emphasize the introduction of innovative technologies that could be helpful in supporting elderly people in their daily lives, and they focus less on how existing and available technologies could fit their daily routines. One of our AAL projects aimed to advance videophone technology as a means to help independent elderly avoid social isolation (Goumans et al., 2012; tinyurl.com/9vj6969). We emphasised the elderly people's motivations for being social and investigated how they interact with the videophone in their own surroundings. We, therefore, used *visual ethnography* to study the elderly people's everyday lives in the chosen elderly residences.

Photos taken of daily living contexts proved to be helpful. For example, ageing comes with several barriers, such as changes in mobility, cognitive decline, and overall health problems, which all negatively influence social connectedness. The visual results of the observed elderly residence show that the design of the main entrance and the elevator are architectural issues that did not support successful ageing. The main entrance, for example, is an open space that does not provide any shelter from the rain or bad weather conditions, making the route unnecessarily slippery when wet. Our visual ethnography study thus revealed valuable insights that were not directly related to the use of videophone, but were necessary to comprehend the social context of elderly residents. These insights were crucial for understanding how new (and already available) technology could be embedded in residents' daily lives and in which ways it contributes to their independent living.

Case 2: Prototyping for Increased Public Engagement

The public space is the city's medium for communication with its citizens. Recent invasions of interactive media in the cityscape, however, are to a large extent commercial broadcasting systems that do not stimulate communication among citizens. The second example case originated from the idea that these emerging media can be interactive and used to enrich people's lives in a meaningful way. Aiming to stimulate more participation in the city and advance interaction among its inhabitants, we developed interactive art installations, which were used to prototype for public engagement by enhancing the physical world with the benefits of emerging media.

Prototyping was used as an informative design tool, as suggested by Suchman, Blomberg, and Trigg (2002; tinyurl.com/94ak7bs). Design tools are increasingly used to activate people enabling them to shape their own products, services, and living environments. With this example case, we illustrate how prototyping can be used to activate people, because one of the main challenges to keep living labs "living" is to involve active users in the product-service development. The interactive art installation was piloted in a real-life context during Rotterdam Museum Night (tinyurl.com/8cwas4r), a well-known cultural event that has been running for 10 years. In addition to over 50 museums remaining open all night long, the event includes numerous performances and exhibits by local artists lining the streets of

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Rotterdam as visitors travel between museum sites. About 15,000 people visited the event in 2011.

Audience involvement was crucial in the interactive art installation; people visiting the event could shape the artwork together using a "magical cube" containing a motion-sensing video-game controller, through which sensory data was captured and then projected as video. Interestingly, the audience was impressed, amazed, and even immersed by the video projection on the sculptures (Figure 1), though less interactivity among the engaged audience was observed. This may be due to that people were overwhelmed by the visual experiences and might not have been aware of the fact that they could interact with the sculpture and shape the artwork.

Figure 1. Impressions of the interactive art installation during the Rotterdam Museum Night 2011

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Case 3: Co-Creating Public Services Based on Open Data

The core advantage of living labs methodologies over traditional user-centric methodologies is the contextual space in which the co-creation of ICT product and service development, and its evaluation, take place. With the third example, we illustrate co-creation in a real-life context. Public sector information (PSI) becomes open data when released into the public domain. Consequently, it is deemed suitable for re-use by citizens and available for the creative industry to build on and create new services. While the opportunities of opening up PSI are often referred to and supported by strategic mandates, the release of PSI by local governments is sometimes difficult. Since open data is not limited to the government as authority and the citizen as user, all public as well as private-sector living lab stakeholders participate together with local government, citizens, creative industry, and academia. We examined how such participation could be applied to PSI release leading to the co-creation of innovative public services that align with identified citizen needs. For details, see Conradie, Mulder, and Choenni (2012; tinyurl.com/9hyhpso).

Co-creation methods and storytelling were used to identify citizens' needs. These storylines then informed the public-service concept designs, to be created by student teams. These stories were also used as boundary objects enabling communication between citizens and the participating civil servants from the city council. Represented by seven participating city council services, each public service department started the project with a client briefing, in which goals or needs from the departments are presented. Ranging from curbing the social economic health differences in the region to making the core service of a particular council service more accessible to a younger or different target group, the goals acted as starting point for a co-creation design process led by students.

The co-creative efforts resulted in 36 public service ideas, varying in focus and maturity, though all focused on (re-)using PSI, which were presented during a national open data conference. After the conference, participants could vote for the winning concepts, and the alderman responsible for Employment, Education, Innovation, and Participation presented the top-five concepts. Some service concepts were taken into development, though the main outcome of the current pilot was to let these applications act as objects illustrating the value of co-creation and the potential of the reuse of open data.

The project not only provided many insights, but it also had a larger impact on open innovation in Rotterdam. The active participation and co-creation of multiple partners in the early phases of idea generation managed to put open data on the local policy agenda of the Rotterdam municipality. The board of management of the City Council decided to allow the release of the City Development Service's PSI as open data, having currently significant amounts of PSI available in an open data store for experimentation and co-creation of public services in Rotterdam. In addition, the project also introduced the participating creative-industry partners to the potential of using and re-using PSI and the important role of the creative industry in that endeavor. Citizens played a role by providing the input for the creation of the prototype applications, which in turn act as concrete examples to illustrate the benefit of the cooperation (Louwes, 2011; tinyurl.com/9kxj5aq)

By animating public servants to free up more PSI for reuse, potential fuel for other service design applications was created. The final event where applications were presented also acted as a platform where partners with different strategic backgrounds met and discussed the developed applications. The partnership between academia, the creative industry, and the public sector was awarded with additional research funding for two projects to further ensure the release of PSI.

By ensuring participation of the crucial partners, a sustainable infrastructure has been created to co-create public services and foster further innovation with PSI. The case example demonstrates that co-creation can also lead to the development of better public services, with citizens and the private sector contributing data by means of crowdsourcing, and it paves the way for more co-creation through open service development.

Conclusion

This article derived from the observation that existing living labs do not benefit from their full potential. Most living lab activities emphasize traditional user-centric lab methodologies, although it is the *living* part that makes a living lab an outstanding methodology for user-driven and co-creative innovation. Another observation was that the living methods and tools in common use are heterogeneous and vary between different living lab sites; they can even vary across the services within one site. This might not be a problem once living methods become harmonized, and tools could make it easier to compare findings across living labs and allow for a wider uptake of living methodologies.

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The current article contributes to the use of living methodologies in understanding the social experiences that make the living lab living. It elaborates how these living methodologies, which capture social and dynamic aspects, can be embedded in the management of living labs. Three examples illustrated how the use of living methodologies contributes to gaining rich insights that are invaluable to inspire and inform the design of innovative services aiming to enrich our daily life and daily environment

Living methodologies as co-creation and visual ethnography as living methodologies enabled us to understand the social fabrics. Next, we ensured a sustainable social infrastructure for the development of open data and the related innovations that can be created as a result of an open data policy, going beyond merely the development of applications. Rich insights and prototypes are used as a form of inspiration and to inform social innovation and policymaking. On one hand, living labbing allows facilitation, and on the other hand, it facilitates participation. Living labbing enables co-creative practices in Rotterdam and has citizens shaping their own surroundings, thus making and co-designing the city of Rotterdam. The user-driven approach, do-it-yourself mindset, and the participatory character perfectly fit the down-to-earth Rotterdam attitude.

Recommended Reading

- The Living Labs Harmonization Cube: Communicating Living Lab's Essentials (Mulder et al., 2008; tinyurl.com/8su2mal)

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A Small-Firm Perspective on the Benefits of Living Labs

Veli-Pekka Niitamo, Mika Westerlund, and Seppo Leminen

> *"We go about our daily lives understanding almost nothing of the world."*
>
> Carl Sagan (1934–1996)
> Professor, astronomer, and science popularizer

Decreasing energy consumption is a global priority and the energy market is in constant change. The search for energy-saving innovations provides an opportunity to initiate a user-centered approach using the living labs model. This article describes how Process Vision, a small-yet-leading Northern European provider of energy IT systems, applied the livings labs approach to develop novel energy-efficiency management solutions. We discuss the company's participation in the APOLLON consortium, a cross-border living labs initiative on energy efficiency. More specifically, we describe the Finland-based company's experiences of a pilot project launched in the living lab and report on the perceived managerial challenges of applying the living labs approach from the perspective of a small firm.

Introduction

A key success factor for today's companies is their ability to integrate customers into the innovation process, both to learn from them and with them (Edvarsson et al., 2010; tinyurl.com/3exkqua). A growing number of firms pay attention to users and their views as sources of useful feedback, relevant use experiences, important ideas, and new information. Moreover, companies involve customers and users in the co-creation of products and services (Zwick et al., 2008; tinyurl.com/8dv5ah5). Co-creation helps companies to better address their customer needs. It reduces market risk when launching new offerings and it improves the return on investment and time to market, which are of particular importance for rapid internationalization. User involvement for co-creation purposes is supplemented by the increasingly fashionable concept of "open innovation" (Westerlund and Leminen, 2011; timreview.ca/article/489). One of the most interesting methods of open and user innovation is the living labs approach, where technology is developed and tested in a physical or virtual real-life context, and users are important informants and co-creators (Kusiak, 2007; tinyurl.com/5vggb7h).

The popularity of open and user innovation has brought new opportunities and challenges for small companies in many industries. According to Chesbrough (2010; tinyurl.com/97mqe65), the advantages of open innovation for small firms include the fact that large companies are now looking to partner with small firms in open-innovation communities, because small companies are active users of many new technologies and they may develop important enhancements for these technologies. Conversely, small firms often lack the ability to profit from open innovation because of their limited resources; therefore, they carefully consider whether or not to participate in new development activities (Leminen and Westerlund, 2012; timreview.ca/article/553). To date, there are few studies on the experiences of small firms in the use of open innovation for product and service development. Moreover, the literature is silent of the perceived benefits and managerial challenges when a small firm applies a user-centered methodology such as the living labs approach. Understanding these issues is crucial for small business management in order to be able to assess and decide to participate in open and user innovation activities.

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In this article, we explore co-creation with users in a living lab that is focused on energy efficiency. Energy consumption is a global concern and many companies are looking for innovative solutions to achieve energy savings. We study how Process Vision (processvision.fi), a small but remarkable energy-IT system provider in the Northern European market, applied the living lab approach to an office building to co-create an energy-efficiency management system. First, we describe the company's participation in the APOLLON consortium (apollon-pilot.eu), a cross-border living labs network. Next, we explain the development and experimentation of the company's pilot solution with selected users. Finally, we discuss the perceived management challenges that a small firm faces when applying the living labs approach to innovation. Our case study is based on an analysis of transcribed interviews with the management of the case company and observation notes from the living lab as well as secondary data including content from websites, magazines, and case reports. To maintain confidentiality, any identifiers referring to interviewees are omitted from the study.

Process Vision's Development Needs

Process Vision is a leading provider of energy IT systems in Scandinavia and Central Europe. The company, founded in 1993, is dedicated to developing and supplying business-critical IT systems to deregulated energy markets. With its approximately 160 employees, the company is categorized as a small firm. Process Vision has participated in many European Union (EU) projects, which helped it to gain insights on the future of the energy business. Process Vision also listens to its clientele carefully to gain a comprehensive understanding of changing customer needs. These insights are used in the development of the company's products and the business model.

The company's information system platform, GENERIS (tinyurl.com/8tcgpdz), can be used to manage core energy business data and processes including measurements, contracts, balance reports, market communication, and internal reports and invoicing in energy companies. Key design principles throughout GENERIS are scalability, performance, modularity, usability, and easy integration. In addition, Process Vision offers GENERIS EEM, an energy-efficiency management system, which builds on the versatility of the GENERIS platform. Its smart-meter data management and flexible reporting enable fact-based decision making to improve energy efficiency, minimize energy acquisition costs, reduce emissions, and increase the share of renewables in energy production and acquisition portfolios. Reliable and accurate reporting helps clients to communicate their commitment to sustainability to appropriate stakeholders.

There is an increasing demand for electronic service platforms that connect relevant parties in the energy sector over the Internet. It is for this reason that Process Vision entered into a living lab initiative to develop eGeneris (tinyurl.com/8gorzbh), an innovative web solution that fulfills all consumption reporting requirements mandated by legislation and energy sector regulations, and which offers a user-friendly interface for the needs of all market parties, service providers, and different end-users groups. The eGeneris platform was developed mainly via a project financially supported by TEKES (tekes.fi/en/) – the Finnish Funding Agency for Technology and Innovation – and the participation in the living lab was to further enhance and develop it along with the GENERIS EEM for better energy-efficiency processes. The project generated a new service and a service interface aimed at Process Vision's current and new customers globally. With this novel web service, the company is better able to take its part in the developing markets.

Participation in the APOLLON Consortium

The eGeneris project was part of the EU-funded APOLLON European initiatives (apollon-pilot.eu) at Helsinki Living Lab in Finland and related sister labs in Sweden, Portugal, and the Netherlands between 2009 and 2012. The APOLLON consortium consists of four cross-border living lab experiments, including one related to energy efficiency, which enable small and medium-sized firms in the industry to gain access to new markets beyond their current markets. The objective is to develop, share, and integrate innovative ICT platforms, tools, and services directed at the needs of stakeholders and end users, as well as to pilot and test those services in the targeted domain to prove viability of the concept. APOLLON consortium involves potential high-growth small firms as providers or users.

Small companies can benefit remarkably from support by an open-innovation environment such as a living lab. However, major challenges for small firms include gaining ecosystem and market access, dealing with contextual diversity, and ensuring scalability and integration of innovation (apollon-pilot.eu/SMEs). While small firms are often highly innovative and flexible, they commonly struggle to access new markets and ecosystems because of a lack of knowledge and experience. In addi-

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tion, they usually lack budget and time to overcome the costs associated with entering into new partnerships and markets. This is challenging because market circumstances, including regulatory frameworks, differ to a significant extent across markets. Small firms should not only investigate local and contextual factors that impact their service or technology, but at the same time scale-up to new markets and integrate their solution with technologies, services, and applications of cross-border complementary stakeholders. Engaging in multinational living labs can help overcome these challenges and support small firms in rapid internationalization.

The APOLLON consortium consists of 30 core partners in 10 European member states. It forms a large community of interest involving a number of supporting partners. The consortium includes living labs, various small firms, large IT companies, and research partners. Wide dissemination and involvement of this community is ensured through a close co-operation with the European Network of Living Labs (ENoLL; openliving labs.eu), which includes hundreds of living labs in Europe and worldwide. In this way, APOLLON is a living lab with a network structure, and is member of a larger network of living labs. APOLLON distinguishes between "domain networks", such as the network that is open to energy-related businesses, and "thematic networks", such as the one that is organized in partnership with energy-efficiency participants in ENoLL's "Smart Cities" initiative.

The overall objectives for the eGeneris project through living labs were set to involve participants in improving energy efficiency by increasing users' awareness of energy-consumption sources, guiding them to monitor their energy-consumption habits, providing them with energy-saving tips, and running an energy-efficiency competition between different buildings and units based on specific performance criteria.

Launch of a Pilot Project in the Living Lab

Process Vision's eGeneris development through living labs started by defining the target markets and businesses for the new service. After this, a general framework for the portal of a web-based service and reporting models for energy providers and end users were designed. The purpose of the project was to develop and experiment with a pilot solution in the customer interface. The pilot was to be carried out in co-operation with an energy provider, a housing corporation, and employees working in an office building as end users. Within a pilot, knowledge could be gained of the functionality of the portal, usability of the service, as well as users' emerging needs and perceived benefits of the service.

The APOLLON living labs network launched a series of energy-efficiency pilots, which tested the impact of real-time energy consumption information on users and their usage patterns. The pilot projects were conducted in the participating core living labs in four different countries. They were appointed to encompass different use typologies, such as residential, public, or commercial business buildings, which show very distinct energy consumption and usage patterns. All pilots reported energy savings and the experiments led to the correction of consumption habits and reconfiguration of equipment and heating, ventilation, and air conditioning working profiles. Furthermore, the pilot projects enhanced users' overall awareness of the importance of saving energy and the means by which it can be done (tinyurl.com/cmwtwz8).

Process Vision's GENERIS platform was one of the middleware solutions used in the APOLLON pilot buildings. It was implemented in Varma House, an office building located in Helsinki, Finland, and it was integrated with several metering technologies that monitored energy use in the premises. Varma House was built in 1989 and houses 12 companies as tenants, including Process Vision. The platform allows users to access a comprehensive analysis of their energy consumption patterns in quasi-real time, thus being an effective tool for changing user behaviour. The specific goals of the project included achieving energy savings at the company and the building levels, curbing consumption peaks, mitigating base load, testing of smart-metering solutions, and designing a new business model for the energy-efficiency management system and its add-ons.

The living lab process applied at the Varma House office building had two stages. The first stage included a competition, where two separate user groups were created that would compete against each other. Before the competition started, participants were told about the measurement systems and they were given access to an hourly updating report showing energy usage in their compartment. They were challenged to adopt more energy-efficient consumption behaviours and to observe their advancement and results using the reports generated by the GENERIS platform. They were also asked to submit ideas on how to save energy; these ideas were

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documented and archived for later use. The participating users were motivated with occasional monetary rewards.

The submitted ideas were refined at the second stage of the study, which included guided involvement. Every week, users in both groups were sent emails giving them a new energy-saving theme and instructions for related tasks; they also completed weekly online surveys about the previous week's energy-saving theme. Users addressed specific consumption issues and improvement areas based on the assigned tasks and discussed them together with the firm's management, product development unit, and researchers from the Aalto University (aalto.fi/en/). In addition, users were given access to hourly reports on their energy consumption. Weekly energy consumption was monitored between 2010 and 2012, and yearly consumption forecasts were automatically readjusted according to daily online data. As a result, participants of the living lab experiment in the Varma House pilot building achieved an average of almost 10 per cent in energy savings (tinyurl.com/bqeh4a7).

Participation in the APOLLON consortium provided Process Vision with a superior method to obtain concrete results through "living labbing" and apply them in a way that benefits both the company and its clients. The company has successfully employed these co-creation experiences with selected clients that seek new solutions in the energy-efficiency management area. Participation in the living lab has enabled the company to put more emphasis on rapid growth and internationalization. The quality and validity of the co-created solutions have freed resources from research development and innovation activities to sales and marketing.

Perceived Challenges with the Living Labs Approach

Our case study on Process Vision's energy-efficiency development initiative revealed that small firms face several managerial problems that need to be carefully considered when applying the living labs approach for innovation development. This is because small firms have limited resources and co-creation in living labs is an enormous team effort. There must be strong commitment from the board and the company has to dedicate a project manager who should stay in close contact with the market and sales. This is because the rapid growth of a company and its sales diverts resources from research development and innovation activities and because the company has to balance these activities. The company also needs to understand that a valid business context is a prerequisite for user trials when a company takes part in living labs activities.

Small firms must not only consider living labs activities per se but also how these activities create concrete performance and efficiency improvements and measurable impact within their clientele. Living labs environments require both user-centric and user-driven processes, where new ideas are developed and tested. The company's end customers – typically users of a product or a service – should be involved in these activities for best results. However, it is important to understand that user involvement does not necessarily result in successful innovation. Furthermore, partnering with other market players and research organizations is necessary, because small firms are short of human resources. As a consequence of relying on external resources, the creation of genuine trust among all partners is a corner stone in living labs. Also, it should be noted that researchers and practitioners may have different perspectives and expectations for living lab activities, especially regarding intellectual property rights issues versus publishing intentions.

The actions of firms in living labs are based on the philosophy of openness, but this aspect creates challenges for small firms. For example, proper management of intellectual property rights may be needed, especially in cross-border initiatives such as multi-country living labs in the EU area. Also, small firms play a central role in challenging established systems of large market actors in, for example, the energy sector, but open collaboration with large clients and multinational energy providers is likely to be necessary. When collaborating with large counterparts, small firms should be aware of potential risks. For example, innovative small firms and their top managers may be preyed upon by large companies that are looking for potential businesses to buy or people to hire.

A major challenge for small firms is their ability to provide useful information to support innovation in real-life contexts. In the case of the eGeneris project, Process Vision provided users with data on their energy consumption, which improved the quality and validity of users' input. In addition, because users are vital for living lab activities, the company and its research partners must decide on and validate user participation in collaborative work. Users can be current or potential customers, randomly selected consumers, committed lead users, members of research organizations, or company employees. Each of these groups poses different

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challenges related to their motivations, retention, and representativeness in the project. Companies should recognize each user group's motives and support their participation accordingly. Process Vision used both individual and team bonuses to motivate and reward users for achieving energy savings or reaching certain objectives.

Nevertheless, a bigger challenge is to identify the end users' readiness and willingness to control their own energy consumption after the living lab initiative. During the living lab experiment, participants were occasionally rewarded for participation in the project. Their continued use of the co-created system depends heavily on the perceived benefits that the innovation can provide in the long run. In sum, the key small-firm management challenges in regard to living labbing include sufficient staffing in the project, active partnering with other participants, and extensive support for users in action.

Conclusion

This article investigated the perceived benefits and managerial challenges of using the living labs approach from a small-firm perspective. Specifically, the article explored the experiences of a small firm in co-creating with users in a living lab that was focused on energy efficiency. We described the case of Process Vision, who entered into a cross-border living labs network to develop a novel, web-based energy-efficiency management system. The company's eGeneris project started because there was a pressing need for a portal service that would offer relevant information on users' energy consumption. The project focused on examining user needs, new ways to save energy, and a new business model. For these purposes, the Finland-based company participated in a living lab pilot project that took place in an office building populated with commercial tenants.

We found that the living lab research methodology worked well in the examined energy efficiency case. Close collaboration and interaction with users and partners in the living lab, including companies and research organizations, proved to be an efficient way to develop the new system. However, participation in open innovation is not without challenges. Especially for small firms, the contradiction between academic and practitioner thinking is a challenge. Whereas companies emphasize intellectual property rights, academic researchers face pressure to publish the results.

For small firms that wish to participate in living labs initiatives to develop new products or services, we recommend that their management develops a strong commitment to support and promote an open mindset across the entire company. Since living labs are platforms characterized by the open-innovation philosophy, this mindset will help them in dealing with all relevant stakeholders in real-life settings. Furthermore, an open mindset will help them to reinforce the role of the customer in the innovation process from the early stages and encourage high-quality and high-impact service and product developments. For small firms, participation in living labs can stimulate multiparty partnerships to develop, validate, and integrate new ideas and rapidly scale-up their services and products to a global market.

About the Authors

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Continued...

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TIM Lecture Series

Born Global: A Pharmaceutical Startup Perspective

Louis R. Lamontagne

"Born globals: from the onset, their playground is the world."

Louis R. Lamontagne
President and CEO
LTL Global Innovations and Management

Overview

The sixth TIM lecture of 2012 was presented by Louis Lamontagne, President and CEO of LTL Global Innovations and Management. Lamontagne shared his experiences as a seasoned entrepreneur in the pharmaceutical industry while reflecting on the "born global" concept, which refers to businesses that aim to address a global market from day one (Tanev, 2012; timreview.ca/article/532). The event was held at Carleton University in Ottawa, Canada, on August 9th, 2012.

The TIM Lecture Series is hosted by the Technology Innovation Management program (TIM; carleton.ca/tim) at Carleton University. The lectures provide a forum to promote the transfer of knowledge from university research to technology company executives and entrepreneurs as well as research and development personnel. Readers are encouraged to share related insights or provide feedback on the presentation or the TIM Lecture Series, including recommendations of future speakers.

This report summarizes the presentation and its key messages, including the lessons learned by audience members.

Summary

Louis Lamontagne began the lecture by describing the various definitions that exist for the born-global approach to internationalization. The born-global approach is attracting increasing attention because of the potential advantages this approach offers over conventional staged-internationalization approaches.

Lamontagne explained that, in the more traditional, "step" model of internationalization, companies first establish themselves in a domestic market, where they gain an understanding of the market and (hopefully) demonstrate solid growth. Expansion to adjacent countries is slow as the companies gain familiarity and understanding of foreign markets before venturing overseas. In contrast, born-global companies internationalize at or near their founding.

The born-global approach is potentially "game changing" and disruptive because it challenges traditional views of business internationalization. That said, Lamontagne cautions that the existence of competing definitions make it difficult to assess the born-global approach and compare studies.

Lamontagne distilled the most commonly recognized characteristics of born-global companies and the strategies they employ to gain competitive advantage. Finally, he shared a pharmaceutical perspective on the born-global concept based on his own experiences as an international entrepreneur.

Although the born-global concept provided the backdrop for the lecture, Lamontagne pointed out that he was not purporting himself to be an expert in the area. Rather, he wished to share his reflections on his own career and experience to shed light on the born-global approach and stimulate discussion and a healthy debate.

Born Global by Design?

Among the multiple definitions of born-global companies, a key distinction is whether or not the approach is

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intentional or is simply a by-product of a company's circumstance. Some definitions (e.g., Tanev, 2012: timreview.ca/article/532; Bailetti, 2012: tinyurl.com/8aqppfc), require the company to take *deliberate action* to compete globally from inception. Nonetheless, Lamontagne argued that whether a company is global by design or emergence, the "new global marketplace" has made conditions more favourable for early internationalization. These favourable conditions include modern information and communication technologies, cost-effective global transportation systems, just-in-time manufacturing, global networks and alliances, and e-commerce.

Distinctive Characteristics of Born Globals

Born-global companies seem to share the following distinctive characteristics:

1. Highly active in international markets from or near inception

2. Scarce financial resources and other assets

3. Internationalized entrepreneurial management

4. Compete on differentiation strategies

5. Leverage advanced information technology

6. Strategic alliances in foreign markets

Lamontagne pointed out that many of these distinctive characteristics could apply to any firm that wishes to reach global markets. However, for born-global firms, these characteristics take on a greater importance and these companies are likely to possess most or all of these corporate traits.

Born-Global Strategies for Business Internationalization

Born-global companies typically make use of an arsenal of capabilities to help overcome the challenges of being a small player in a competitive marketplace. Well-defined strategic orientation is critical and management must adapt strategies to the specific needs of the firm. Even if we arrive at a single definition of "born global", it is likely that no single approach is appropriate for all companies, at all times, in all markets. Yet, most born globals share two common success factors: i) resourcefulness and ii) dynamic capabilities of management and the firm.

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In Lamontagne's experience, he argues that practically all pharmaceutical startups are born global by default and this approach has always been a feature of this industry. This does not necessarily mean that internationalization within pharmaceutical companies is always by design, but the industry has always been an exception to the traditional staged model of internationalization. No company develops a medicine solely for a domestic market. By default, nearly all pharmaceutical products are aimed at a global market, and related financing, R&D, manufacturing, strategic alliances, etc. tend to be global. Thus, entrepreneurial founders "think global from inception" in all key aspects of the business, including markets, commercialization, product development, manufacturing, intellectual capital (i.e., management, expert resources and IP) and strategic alliances. Investments in projects to derive significant global competitive advantages are the norm.

Lamontagne next described recent changes to business models in the pharmaceutical industry. The development of medicines used to be mostly the domain of large multinationals. However, the advent of genetic engineering in the 1970s allowed entry of small firms, which can now compete head-to-head with multinationals. Multinationals have responded by increasingly focusing on the revenue side of the pharmaceutical business, thus becoming large marketing engines for pharmaceutical products, many of which were developed through more cost-effective out-sourcing/alliances and acquisitions with smaller firms.

Although Lamontagne argues that pharmaceutical startups are born global by default, the evolution in business models underscore several increasingly relevant elements of the born-global concept:

1. Understanding market nuances and demands prior to product development is critical.

2. Success depends on worldwide strategic alliances, particularly for marketing.

3. Companies must comply with regulations in multiple jurisdictions, which greatly impacts strategies for clinical trials.

4. An entrepreneurial management team that has international experience and "know-how" is essential.

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5. Manufacturing typically involves multiple geographies.

6. R&D depends on worldwide strategic alliances (both private and public).

7. From inception, there must be a global strategy for intellectual property.

8. Pharmaceutical companies must seek global sources of investment capital; Canada lacks sufficient investment capital to support the biopharmaceutical industry through its requirement for multiple successive financing rounds as potential products move through preclinical and clinical development phases.

Conclusion

In closing, Lamontagne emphasized the attractiveness of the born-global approach in light of the ever-increasing globalization of markets. He called for support for born-global companies by business and financial leaders, stakeholder communities, academic scholars, and government policies and programs. Lamontagne concluded by saying: “From an intuitive perspective, 'born global' is a simple business concept; however, the strategies and execution behind it are very complex and challenging. And, of course, we only hear about the success stories - there are several questions that remain unanswered. The jury on 'born global' is still out.”

Lessons Learned

In the discussions that followed the first and second parts of the presentation, audience members shared the lessons they learned from the presentation and injected their own knowledge and experience into the conversation.

The audience also identified the following key takeaways from the presentation:

1. Globalization seems to be an artefact of global change, especially the development of the Internet.

2. You can be small and global.

3. The chances of global success are increased by founder experience, international management experience, and networks. These factors are particularly valuable when trying to globalize with scarce resources. Infrastructure can also enable success.

4. There is no specific recipe for success, nor is there a common definition of "born global".

5. Dynamic capabilities are essential; born-global companies must be flexible.

6. Opportunities lie in niche markets that are worldwide.

7. Thinking about going global from Day 1 is different from implementing from Day 1.

8. If you wish to be a born-global company, it is essential to understand your target market, even more so than for other companies. This includes knowing the costs and benefits of conducting business in each region.

9. Large companies are increasingly becoming marketing machines that outsource R&D. Therefore, small companies can compete, or at least co-exist, with large global players through niche R&D. However, for an individual company, the risk is that all the eggs are in one basket.

10. To be born global, you need to approach the problem of globalization differently. It is not about deploying a large, international sales force. Born globals need to rely on new strategies that leverage the help of others, both locally and globally.

Born Global: A Pharmaceutical Startup Perspective

Louis R. Lamontagne

About the Speaker

Louis Lamontagne is the President and CEO of LTL Global Innovations and Management, Inc., which he founded in 2009. LTL Global Innovations and its wholly-owned subsidiary LTL Global BioEnergy Corp. are primarily focused on the development and commercialization of renewable and sustainable co-generation of combined heat and power (CHP) modular technologies using biomass as fuel. He was recently appointed as Global Practice Lead for the Life Sciences in Canada by the Department of Foreign Affairs and International Trade (DFAIT) and is interim CEO of Alztech, a USA based biopharma company focused on the development of novel therapies for Alzheimer's Disease. Dr. Lamontagne formerly served on the Board of Canada's Natural Sciences and Engineering Research Council (NSERC) (and is a member of the Council's Committee on Research Partnerships), the Board of Governors of Algonquin College, the Board of Directors of the Ottawa Hospital Research Institute (OHRI) representing the Ottawa Hospital, the Riverside Hospital, the Civic Hospital, the Children's Hospital for Eastern Ontario, and the Heart Institute. He is also on a Board of Advisors for the Canada Science and Technology Museums Corporation, comprising of the Canada Food and Agriculture Museum, the Canada Aviation and Space Museum, and the Canada Science and Technology Museum.

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Start by asking yourself:

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