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."*
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> 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-

A Small-Firm Perspective on the Benefits of Living Labs

Veli-Pekka Niitamo, Mika Westerlund, and Seppo Leminen

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

A Small-Firm Perspective on the Benefits of Living Labs

Veli-Pekka Niitamo, Mika Westerlund, and Seppo Leminen

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

A Small-Firm Perspective on the Benefits of Living Labs

Veli-Pekka Niitamo, Mika Westerlund, and Seppo Leminen

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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A Small-Firm Perspective on the Benefits of Living Labs

Veli-Pekka Niitamo, Mika Westerlund, and Seppo Leminen

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