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## Editorial: A Living Lab Research Agenda

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## 1 Introduction

Living Labs have rapidly emerged in project practice to increase innovation performance. This special issue builds on experience from these projects and explores underlying assumptions, concepts and implications of this emerging practice. This overview defines living labs as “*innovation intermediaries that coordinate network partners for the execution of innovation processes with engagement of end-users for which they provide the technical and organisational infrastructure*”. The overview further reviews the emerging scholarly body of knowledge and extracts five perspectives, entrepreneurship, the innovation process, specific empirical cases, process dynamics, and the user-engagement process that are needed to understand Living Labs more fully as a conclusion from the papers of this special issue and the emerging body of scholarly literature on Living Labs.

## 2 Perspectives on Living Labs

Discussions on alternative approaches to innovation are high on the scientific and the industrial agenda. Within an overall trend towards innovation in networked, inter-organisational settings, Living Labs have emerged following a practical need to coordinate product development as an inter-dependent multi-stakeholder processes including users.

Research on Living Labs is in its early stage. A first workshop on Living Labs was organised during the ICE-Conference 2006 in Milan and among others included a state-of-the art review paper (Niitamo et al., 2006) and a Living Lab methodology paper (Eriksson et al., 2006) that still today are among the most cited ones. This was followed by a special issue on the topic of Living Labs, edited by Katzy and Klein (2008) and the papers published in a book by Schuhmacher and Niitamo (2008) in the same year that serve as a reference point or baseline on Living Labs. Much of the writing at that time was more a realisation of shortcomings of existing theories and practices than the documentation of reliable knowledge or mature methodological approaches in their own rights. This changes in the September 2012 special issue on Living Labs in the management review *TimReview.ca* where papers present practical solutions. The here presented special issue provides an updated scholarly overview of some of the most

active authors in the field and is based on an ongoing discussion process at a dedicated track on the European Conference on Technology, Innovation and Engineering ICE-conference.org between 2009 through 2012. The conference submissions are published in the online conference proceedings on IEEEExplore and form the second largest citation base as measured by Google scholar.

The *definition of Living Labs* has broadened from an early methodology focus for user involvement only. We define Living Labs as “*innovation intermediaries that coordinate network partners for the execution of innovation processes with engagement of end-users for which they provide the technical and organisational infrastructure*”. This definition extends the scope of action from undertaking an isolated activity of user involvement towards covering innovation processes from idea conception to result adoption. Papers in this issue show that the definition becomes more concrete in a managerial sense as it describes processes in a legal perspective and in institutional terms where Living Labs are seen as autonomous but networked organisational entities that combine valuable resources such as heavyweight product development infrastructure like the Concurrent Design Facilities, RFID Installations, or learning infrastructures. They exist temporarily or over longer periods of time to accumulate knowledge and external relationships.

A *scholarly body of knowledge* is shaping with more publication in peer-reviewed journals and consequently a clearer theoretical underpinning. Until 2008 most experience was project based, especially from projects funded by the European Commission and the Scandinavian countries with only one science policy journal published by Schwittay (2008). This experience was further consolidated and expanded by two papers in 2009, one in an information system journal (Wareham et al., 2009) and one in a behavioural science journal (Mulder et al., 2009). Four journal papers appear in 2010, again one in the field of science policy (De Moor et al., 2010a) and the others in information systems journals (De Moor et al., 2010b; Lepik et al., 2010; Wolfert et al., 2010). In 2011, six papers appear, with an initial four in engineering and innovation management journals (Almirall and Wareham, 2011; Budweg et al., 2011; Dekkers, 2011; Stahlbröst and Bergvall-Kärebom, 2011) next to two papers in information systems journals (Lawo et al., 2011; Schuurman et al., 2011). The five papers published in the first semester (Björgvinsson et al., 2012; Katzy et al., forthcoming; Liedtke et al., 2012; Liu et al., 2012; Scott et al., 2012) confirm four disciplinary backgrounds of Living Labs:

- information systems with 7 papers,
- engineering and innovation management with 7 papers,
- behavioural sciences with 2 papers, and
- science policy with 2 papers.

More recently, stronger rise in publications with much sharper focus on management related issues and analysis is in line with the evolution of the Living Lab definition and more aligned with innovation process management (Galbraith and McAdam, 2011).

### 3 Five research directions

We structure the remainder of this editorial by five perspectives that emerge from the papers published in this special issue. These perspectives are intended to distill linkages between the papers in this issue and to provide direction for a future research agenda on living labs and innovation intermediaries in general.

- 1 Living Labs are *innovation process professionals*. This latent consensus is uncontested from the inception of Living Labs as a methodology for user involvement. Pitkanen and Lehto make this role explicit by showing the associated legal and contractual responsibilities. Katzy, Baltes and Gard identify concurrent sub-process and the role of Living Labs in coordinating them and stress the need of intermediate measurements of progress. Leminen and Westerlund provide further support for the role of Living Lab professionals and their networked relationships with other innovation stakeholders. Stahlbröst emphasises the neutral position of Living Labs to enable the emergence of a networked innovation arena. The cases presented in this special issue show how Living Labs strategically differentiate by the innovation process that they provide. Especially, not all Living Labs aim at developing new software, hardware products, or services. Bourgault discusses how they oriented their living lab towards changing the behaviour of engineering students when being introduced to managerial attitude with project management. This paper is representative for other cases, where social innovation and change management is the focus. Such living labs adopt different methodologies like action research and refer to more psychological and organisational behaviour literature for their conceptualisation. New product development and change management appear as two ideal types of Living Labs. More research is needed to explore which other types do exist, and what it takes to create consistent organisational and strategic configurations for each type. Further empirical research is needed to understand how real Living Labs customise and combine elements of ideal types for complex practice. The RFID Lab (Bendavid and Cassivi) addresses development of new RFID products in conjunction with change management of supply chain processes, the case of Colliquio describes how this software collaboration platform evolves as a product with the changing work routines of the physicians that use it and Camargo discusses how the self-directed learners change their technology depending on their maturity with the learning process.
- 2 A noteworthy new conceptual perspective is the inclusion of *entrepreneurship* in the living lab discussion by Katzy et al., which requires the formation of a research program to explore the potential of such field.
- 3 Specific *cases of Living Lab operation* are a further contribution of this issue to provide *Anschauung* where the details of what Living Labs have done so far often remains in the obscure or in unpublished project reports that are not easily accessible. Bendavid focuses on how RFID solutions for supply chains are developed, while Pitkanen and Lehto and Stahlbröst devote their attention to software development projects and Ziegler et al. design processes of satellites, physical products. Katzy et al. and Karvonen and Conte describe enterprise software development projects and Bourgault and Camargo emphasise learning processes in Living Labs. Such collection of cases shows the diversity of innovation activities associated with Living Labs and more studies are needed to unveil phenomenological diversity.

- 4 The *dynamics of innovation process* that result from the more active role of users is a recurring theme in all papers in multiple facets. Camargo explores how self-directed learners as users, teachers, technology developers and technology evaluators induce process dynamics. Stahlbröst attributes this to varying degrees of user empowerment in the process and Pitkanen and Lehto contrast users with test persons by the fact that users create new intellectual property. For Katzy et al. such dynamics is further induced from other stakeholders like investors so that coordination of concurrent processes is at the core of Living Labs. All confer that more user involvement not only contributes to the product or service created, it equally reflects the dynamics of changing the development processes. More research is needed to develop rigorous methodologies, e.g. on systems dynamics, or agent based modelling to explain process dynamics. And, more conceptual and empirical studies are needed that take time as explicit variable into account.
- 5 The special issue contributes further insights on the complex details of the *user-involvement process*. As Camargo observes, the user as self-directed learner is highly sensitive to the Quality of Service during experiments, which creates tough requirements for the applications used, the experiment design and protocol definition needs to be improved. Similarly Ziegler et al. describe the details of the engagement of designers in the CE Facility and the technical and methodological effort it takes to observe and guide users, Bourgault similarly illustrates the technical infrastructure and extensive coaching to involve students into the project management experiments, and Bendavid and Cassivi justify their living lab with the infrastructure and knowledge that it accumulates for the engagement of distributed partners in supply chains. All agree that internet brings about ubiquitous and abundant data that requires heavy investments and methodological knowledge to process useful information. More research is needed to develop analytical methods, e.g. datamining, that allow making use of this new richness of automatic/sensor-collected data and to apply those in empirical studies to advance our theoretical understanding as well as the product design processes.

## Acknowledgements

More papers in the domain of this issue are still under review. We therefore encourage further submissions for a consecutive special issue in the near future. This issue includes one paper on legal aspects (Pitkanen and Lehto) which is written in a legal style that is most probably unfamiliar to most of the readership of *IJPD*. Still, we included the paper because the hypothetical case is well written and even to legal laymen clarifies the issues that are highly relevant to product development. The guest editors of this special issue would like to take this opportunity to thank Jerome Gard for his support of the editorial process, the authors and most of all the anonymous reviewers for their help and support throughout the preparation process of this special issue.

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