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# Q&A

## Seppo Leminen

### Q. *What are living labs?*

**A.** The term "living lab" is at risk of becoming a buzzword in the innovation domain because it lacks a consistent or commonly accepted definition. Indeed, a wide variety of activities are carried out under the umbrella of living labs, and they feature many different methodologies and research perspectives. However, even if a common definition is beyond our reach, insights can be gained by understanding the common characteristics and types of living labs. Here we examine typical usages of the term "living lab" and how such labs may be categorized and studied; we also outline the practical benefits of this form of innovation.

In the literature, Westerlund and Leminen (2014) have found that a living lab has been variously perceived as:

- *A regional system* (cf. Oliveira et al., 2006)
- *An innovation system* (cf. Ballon et al., 2005; Eriksson et al., 2005)
- *An ecosystem* (cf. Lievens et al., 2011; Schaffers & Turkama, 2012; Tang et al., 2012)
- *A network* (cf. Leminen, 2013, 2015; Leminen & Westerlund, 2012; Leminen et al., 2014a, forthcoming; Nyström et al., 2014)
- *A combined approach* (cf. Dutilleul et al., 2010)
- *An environment with embedded technologies and users* (cf. Bajgier et al., 1991; Intille et al., 2005; Intille et al., 2006)
- *A context or a methodology* (cf. Almirall et al., 2012; Bergvall-Kåreborn et al., 2009; Dell'Era & Landoni 2014; Mulder & Stapper, 2009;)
- *An enhancement or implementation of public and user involvement*, such as for rural innovations (cf. Schaffers & Kulkki, 2007), regional innovations (cf. Juujärvi & Pessa, 2013), smart cities (Ballon et al., 2011), enabler-driven or user driven innovations (cf. Leminen, 2013; Leminen et al., 2012a; Leminen et al.,

2014a; Leminen & Westerlund, 2012), public-private partnerships (PPPs) (cf. Lepik et al., 2010; Niitamo et al., 2006), and a public-private-people partnership (4Ps or quadruple helix) (cf. Arnkil et al., 2010; Ferrari et al., 2011; Molinari, 2011)

- *A development project* for products, services, and systems (cf. Bajgier et al., 1991; Bengtson, 1994; Lasher et al., 1991)
- *A business activity and operational mode* (cf. Schuurman et al., 2012, Schuurman et al., 2013; Veeckman et al., 2013)
- *An innovation management tool* (cf. Edvardsson et al., 2012; Leminen et al., 2012b)

Westerlund and Leminen 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" (Leminen, 2013; Westerlund & Leminen, 2011). As such, living labs are used *by communities and for innovation*.

### Characterizing Living Labs

The definition above highlights seven key characteristics of living labs:

1. The innovation activities take place in *real-life environments* (cf. Ballon et al., 2005; Intille et al., 2005, 2006).
2. *Public-private-people partnerships* (4Ps) are formed by the participants, which include companies, researchers, authorities, and users (cf. Westerlund & Leminen, 2011).
3. *The importance of users*, including citizens and customers, is emphasized (cf. Ballon et al., 2005; Følstad 2008; Leminen, 2011).

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4. They are *different* from testbeds, field trials, and other forms of innovation (cf. Almirall et al., 2012; Ballon et al., 2005; Bergvall-Kåreborn et al., 2009). They feature innovations that are more mature than in-house R&D, where prototyping and field trials are more appropriate, but the innovations are less mature than would be found in pilot projects (Ballon et al., 2005).
5. *Multiple stakeholders* are employed in living labs (cf. Ballon et al., 2005; Leminen et al., 2014b; Leminen & Westerlund, 2012; Westerlund & Leminen, 2011).
6. *Multiple roles* are pursued by stakeholders in living labs (Leminen et al., 2014a; Nyström et al., 2014).
7. *Collaboration* between stakeholders is an essential feature of living labs, which are grounded in the principles of open innovation (cf. Leminen & Westerlund, 2012; Niitamo et al., 2006).

### Categorizing Living Labs

The term "living lab" has been applied to many different types of innovation activities; however, even within the definition proposed above, there can be different types of living labs. In particular, the type of participant that is driving the innovation activities can be used to categorize living labs into utilizer-driven, enabler-driven, provider-driven, and user-driven (or user-community-driven) living labs (Leminen et al., 2012). The characteristics of each type are shown in Table 1.

### Benefits of Living Labs

The living labs approach offers benefits to companies, users, developers, and public financiers. Companies benefit through cost-efficient access to end-user data and user experiences. They also save money by being able to make changes to a product much earlier in the devel-

**Table 1.** Characteristics of different types of living labs (Reproduced from Leminen et al., 2012)

Characteristic	Type of Living Labs			
	<i>Utilizer-driven</i>	<i>Enabler-driven</i>	<i>Provider-driven</i>	<i>User-driven</i>
<b>Purpose</b>	Strategic R&D activity with preset objectives	Strategy development through action	Operations development through increased knowledge	Problem solving by collaborative accomplishments
<b>Organization</b>	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
<b>Action</b>	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
<b>Outcomes</b>	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
<b>Lifespan</b>	Short	Short/medium/long	Short/medium/long	Long

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opment process based on user feedback. Over the long-term, living lab activities also tie customers to a company and its activities.

Users gain opportunities to influence the development of products. They also benefit from the solutions that are developed, which in many cases are solving problems that affect their everyday lives and which may have been otherwise unsolvable. Users also may perceive the new, user-driven products to be more functional because of the co-creative development process.

Living labs also contribute to the core activities of developers; the living labs brings opportunities and resources, and the developers bring their capabilities to develop real-world solutions to the users' problems. And, finally, public financiers benefit from activities and outcomes that support their objectives.

In addition to the benefits to participants, living labs also provide advantages over other types of innovation activities. Table 2 lists the advantages of a living labs approach.

**Table 2.** Advantages of living labs (Modified from Leminen, 2015)

Area	Advantage
<b>Innovation</b>	<ul style="list-style-type: none"> <li>• Enhance learning (Abowd, 1999; Bajgier et al., 1991)</li> <li>• Tackle complex real-life problems (Bajgier et al., 1991; Mulder et al., 2008)</li> <li>• Foster vertical integration (Eriksson et al., 2005)</li> <li>• Enhance dialogue between different stakeholders (Schaffers &amp; Kulkki, 2007)</li> <li>• Share experiences (Schaffers &amp; Kulkki, 2007)</li> <li>• Enhance SME incubation (Van Rensburg et al., 2007)</li> <li>• Filter problems (Schuurman &amp; Marez, 2009)</li> <li>• Enable open collaboration between actors (Bergvall-Kåreborn et al., 2009)</li> <li>• Enhance multi-organizational collaboration (Kviselius et al., 2009)</li> <li>• Act as a focal point for multi-organizational collaboration (Kviselius et al., 2009)</li> <li>• Engage all key actors for innovation (Mulder &amp; Stappers, 2009)</li> <li>• Understand innovation (Mulder &amp; Stappers, 2009)</li> <li>• Enable unique knowledge (Dutilleul et al., 2010)</li> <li>• Access real interaction data and real application contexts (Azzopardi &amp; Balog, 2011)</li> <li>• Motivate users (Ståhlbröst &amp; Bergvall-Kåreborn, 2011)</li> <li>• Enhance sustainable solution development (Liedtke et al., 2012)</li> </ul>
<b>Context</b>	<ul style="list-style-type: none"> <li>• Can be used in different contexts (Eriksson et al., 2005)</li> <li>• Provide an environment to study richness of complex user behaviour and use of technology in home (Intille et al., 2005, 2006)</li> <li>• Integrate multi-contextual sphere, i.e. regional and cultural diversity (Feurstein et al., 2008)</li> <li>• Catalyze rural and regional systems of innovation (Schaffers &amp; Kulkki, 2007)</li> <li>• Integrate fundamental and applied research (Mulder &amp; Stappers, 2009)</li> <li>• Empower rural communities in developing countries (Mutanga et al., 2011)</li> <li>• Advance smart city operations (Ballon et al., 2011)</li> <li>• Upscale urban development (Ballon et al., 2011)</li> <li>• Provide assets for the innovation environment (Schaffers et al., 2011)</li> </ul>
<b>Business Opportunities</b>	<ul style="list-style-type: none"> <li>• Create new business opportunities (Kviselius et al., 2009; Niitamo et al., 2012)</li> <li>• Localize products (Feurstein et al., 2008)</li> <li>• Lead to unexpected market opportunities (Mavridis et al., 2009)</li> </ul>

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### Living Labs vs Traditional Projects

Although there are many advantages of living labs, as listed in Table 2, they do bring certain management challenges in relation to traditional projects. To achieve the benefits of the living labs approach, participants should be aware of these differences and adjust their actions and roles accordingly (Table 3).

### Roles in Living Labs

The literature provides a broad variety of rich descriptions on multiple and different stakeholders intertwined in innovation activities in real-life environments. Acknowledging the richness of such studies, the discussion offers many conceptualizations of living labs. Such conceptualizations include roles and role patterns (Leminen et al., 2014a, 2014b; Nyström et al., 2014), but also how creative consumer roles explain the emergence of innovation outcomes (Leminen et al., 2015a) and how network structures and driv-

ing parties increase the likelihood of targeted innovation outcomes (Leminen et al., *forthcoming*) in living labs.

### Conclusion

A living lab is one form of emerging open innovation network that provide many benefits for companies and other organizations, and it offer many research opportunities to scholars. As our understanding of the phenomenon expands and our usage of the terminology converges, we will further maximize the benefits of the living labs approach to innovation.

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**Table 3.** Differences between the traditional project model and the living lab model (Westerlund & Leminen, 2011)

	Traditional Project	Living Lab
<b>Objective</b>	Targeted to a preliminary defined project goal	Targeted to an undefined objectives; final objectives change based on the needs of users
<b>Role of Project Manager</b>	Management and control of resources	Management and control of own resources; facilitation and encouragement of users
<b>Control Point</b>	Adjustment points are based on a predefined project plan	Adjustment can be flexible; in extreme cases, adjustments can even be made daily
<b>Role of Users and User Communities</b>	Users are an object of study; they may test and verify products and services	Equal and active participants in the project; co-creators of products or services
<b>Resources and Capabilities</b>	Project resources are used efficiently, including resources from the network	Readjustment and redefinition are the next steps; flexibility in integrating different types of knowledge in the living lab network/community; facilitation of end users and user communities
<b>Tools</b>	Project management tools and methods	Facilitative methods and group work tools

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