# Co-Creation and User Involvement in a Living Lab: An Evaluation of Applied Methods

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**Abstract.** Living labs are only recently developing to facilitate active user involvement in an interactive setting. Research on the methodological facilitation of co-creation and user feedback in such open physical spaces is still scarce. The objectives of this paper are to identify applied methods as well as to investigate the level of user involvement in living labs to further develop theoretical insights on living labs as well as on method implementations for co-creation. A qualitative explorative approach in the form of a case study on the living lab JOSEPHS in Nuremberg is applied. This paper finds that applied methods serve either of two purposes: 1) Collecting data for innovation research, or 2) adapting co-creation to living labs. Combined accordingly, methods cover both purposes and increase user involvement. Furthermore, six factors that determine user involvement are proposed. Implications for living lab managers are provided.

**Keywords:** Co-Creation, Living Labs, User Involvement, Methods, ICT

## 1 Introduction

In an era of sophisticated information and communications technology (ICT) with empowered users and blurring organisational boundaries, innovation procedures in new product and service development (NPSD) undergo a fundamental transformation. Firms actively loosen conventional boundaries through the inclusion of external actors in their NPSD activities [1]. As part of such open innovation approaches, major importance is devoted to users. Whereas users only recently received major attention in open innovation research [2], the emergence of user innovation research dates back as far as four decades [3, 4]. Among open innovation practices, co-creation with users is one of the most important and proves to be widely adopted among firms [5].

Today, many tools of open innovation are driven by ICT [6]. Benefiting from low cost and large scale, also co-creation is often implemented online [7]. However, building trust [7] and providing context [8] proves to be challenging over the Internet. Here, real life settings play to their strengths [9, 10]. Living labs (LL), endorsed by the

13th International Conference on Wirtschaftsinformatik,
February 12-15, 2017, St. Gallen, Switzerland

Beutel, T.; Jonas, J.M.; Moeslein, K.M. (2017): Co-Creation and User Involvement in a Living Lab: An Evaluation of Applied Methods, in Leimeister, J.M.; Brenner, W. (Hrsg.): Proceedings der 13. Internationalen Tagung Wirtschaftsinformatik (WI 2017), St. Gallen, S. 1453-1464

European Union [11], are a rather new approach to foster NPSD and co-creation with users in real life settings. LLs are described as a "new way to manage the new product development process" [12] and fit into the idea of arenas for co-creation by Bhalla [10]. LL are considered as a conceptualisation of extra-organisational open innovation [2, 8].

However, it remains rather unclear *how* users can and should be involved in the context of LLs. In contrast to the firms' and the users' roles, the role of intermediaries in open innovation is less illuminated [13, 14]. Furthermore, recent innovation research has covered broadly *where* but less *how* to search for external knowledge [15]. It is particularly questioned how methods involving the user in a LL should be chosen and implemented. Such lack of knowledge may be attributed to the novel nature of LLs as an area of interest. However, the importance of user involvement specifically in LLs has been highlighted by scholars for more than a decade [16]. Mulder and Stappers [17] state that LLs are not living up to their full potential of active user involvement in real life settings. Hence, this paper aims to identify applied methods and to investigate the emergence and intensity.

## 2 Theoretical Foundation

### 2.1 Co-Creation for Innovation Purposes

As real and physical spaces, LLs can be used for open innovation by facilitating co-creation with users [2, 18, 19]. Co-creation for innovation purposes in NPSD is only one out of several applications for co-creation [20] and is framed within the concept of co-creation of value. While traditionally, the process of value creation was coined by independently value-adding firms, which led to demand from passively consuming users, value is now jointly co-created from firms and users. When users go beyond mere consumption and become active contributors in NPSD, they co-create and extract value for their own good [21]. Through the active role of users, the changed user-firm relationship implies a new locus of value creation, which lies in interaction and experience [22].

In this paper, co-creation is defined as "an active, creative and social collaboration process between producers[1] (retailers) and customers[2] (users)" [24]. It is argued that users place importance primarily on the value that (eventually) emerges while the process is of little account to them [29]. Consequently, Snyder et al. [29] propose to view outcome and process separately. However, it is not to be neglected that users create value during co-creation processes [30], e.g. benefit from enjoyment and learning [26]. It is therefore useful to shed more light on processes and methods of co-creation.

For a firm, the most important benefit of co-creation with users lies in an improved access to need information, as need information tends to be sticky. Thus, better access to user preferences leads to more effective NPSD [24].

[1] The literature contains varying terminology, such as "company" [as in 21, 23] and "producer" [as in 3, 24]. This paper confines the word choice to the term "firm" [as in 1, 2].

[2] Likewise with footnote 1, this paper employs the term "user" [as in 3, 25] in place of "consumer" [as in 26, 22], "customer" [as in 21, 24], "citizen" [as in 27, 28] and "visitor" [as in 23].

## 2.2 User Involvement

The involvement[3] of users is a fundamental dimension to co-creation [22] as well as to open innovation [2]. User involvement can be defined as a user's influence on the idea, development and launch processes in NPSD [25]. Similarly, Piller, Ihl, and Vossen [24] see co-creating users actively involved during NPSD processes, but add that they are performing "an act of company-to-customer interaction which is facilitated by the company" [24]. Depending on their role, users engage in different intensity, varying in time and effort. User activity in NPSD processes can range widely among users as a passive source of information, a co-creating contributor, and a designing innovator [33].

## 2.3 Living Labs

LLs provide a novel way to connect firms with users and help with "closing the gap between open and user innovation" [34]. Compared to other innovation approaches, LLs differ in two dimensions [8]. Firstly, LLs are capable of providing novel structures for user involvement [35]. They involve users in an interactive and empowering way, enabling them to become co-creators, and thus go beyond user-centred approaches that only involve users passively [36]. Secondly, a particular strength of LLs lies in their real life offline setting. In this regard, they overcome hurdles in knowledge transmission relating to sticky information and tacit knowledge [37]. Therefore, LLs can be considered as "a user-centric research methodology for sensing, prototyping, validating and refining complex solutions in multiple and evolving real life contexts" [38].

**Methods applied in Living Labs.** Bergvall-Kåreborn and Ståhlbröst [27] argue that LLs are methodologically designed in two levels. While a general framework provides stability and continuity, a second level beneath allows spontaneity within projects [27]. Similarly, Dell'Era and Landoni [12] argue that a framework both allows and determines the implementation of methods within a LL. The LL methodology draws from co-creation techniques as well as from traditional innovation research methods such as questionnaires, in-depth interviews, or focus groups. Depending on the domain and its method, a different type of knowledge and originality can be expected [39].

Distinguishing itself from other approaches, the LL methodology stands out in active user involvement and realism [17, 37]. Real life environments set LLs apart from controlled environments. A real life setting is usually designed through the use of contextual methods and/or with the aid of physical artefacts [12]. It is argued that methods applied in LLs should adapt to the distinct advantages in interactivity and real life environments and thus should go beyond traditional methods of innovation research [35, 40]. However, only few studies evaluate methods applied in LLs in relation to the distinct features of LLs, whereas traditional methods have been researched extensively [27]. All in all, distinct attributes of LLs and advantages over other innovation approaches have been emphasised sufficiently [8, 9, 35, 37]. However, studies linking

[3] This paper uses the term "involvement" [as in 25, 30, 31], whereas the literature interchangeably employs the terms "participation" [as in 3, 26] and "integration" [as in 24]. However, it is not referred to committing oneself emotionally as in "commitment" or "dedication" [32].

methods applied to LLs to these attributes are sparse and tend to focus on NPSD phases [18, 41] or single methods [42, 43]. Consequently, this paper conducts a comprehensive analysis of methods and their characteristics. Accordingly, it is questioned:

(1) *Which methods are implemented in a living lab and how are they characterised according to the level of user involvement?*

**User Involvement in a Living Lab.** While involving users is only one factor among many that promote co-creation in a LL [19, 44], it is considered quintessential to the LL concept [12, 35]. In LLs, firms are often one stakeholder among many [45]. Hence distinguishing between stakeholders is required. Due to LL's roles as intermediaries in innovation, Piller, Ihl, and Vossen's [24] understanding of a *firm-user interaction* is altered to *intermediary-user interaction*. This adjustment seems appropriate because the co-creation process takes place *in* and *with* the LL, acting as an agent for the firm. Nevertheless, the firm is still considered to facilitate the co-creation process [24].

Regarding voluntary user involvement, many questions remain for future research [46]. A dearth of methods and tools adapted to the distinct attributes of LLs has been emphasised [27]. As a first step, methods applied in a LL are examined for the level of user involvement [28]. As a result, it is proposed to shift from user-centred to user-driven methods. However, Gray et al. [28] do not present further implications concerning the application of co-creation methods in LLs. To date, only few studies evaluate methods applied in LLs specifically in relation to user involvement as a distinct feature of LLs, while observed LLs cases vary widely [28, cf. 40, 41, 47]. Hence, the second research question of this paper is as follows:

*(2) How does user involvement differ and how is it determined?*

## 3 Research Design

A qualitative explorative approach in the form of a holistic single-case study is applied. To gain in-depth insights on co-creation methods and user involvement in LLs, qualitative case study research is a suitable methodology [48]. Further reason lies in the opportunity to illuminate contextual conditions and processes [48, 49]. The LL serving as unit of analysis of the present case providing a unique setting and the LL landscape being rather diverse [12, 50] further justifies a single-case design [48]. Hence, this paper focusses on an in-depth analysis rather than aspiring general claims [48].

### 3.1 The Case

The case study is implemented at JOSEPHS® – Die Service Manufaktur, a LL centrally situated in Nuremberg in southern Germany. Within its premises, which also include a coffee shop and a workshop area, the LL devotes an openly accessible area to five distinct co-creation spaces, used by five companies simultaneously. Six days a week during regular shopping hours, any passer-by is invited to come in; LL visitors await the opportunity to engage themselves interactively in firms' NPSD processes. Just as

LL visitors are expected to share their feedback, companies are advised to be equally open and cooperative. Firms can utilise JOSEPH's real life environment to test (physical and digital) ideas and prototypes under simulated conditions with a diverse, self-selected crowd of users. Since the LL's launch in 2014, users had been able to co-create about 60 diverse products and services at the LL. The firms utilising the LL come from a broad variety of backgrounds, ranging from start-ups in consumer products, to technology providers and larger enterprises even in business-to-business industries.

### 3.2 Data Collection and Analysis

This case study took place during summer 2016 and is based on primary data in the form of physical artefacts and seven semi-structured expert interviews as well as on secondary data from documentation material such as reports and photo documentation.

To utilise the expert's knowledge effectively and ensure comparability, an interview guide allowed open responses within a predefined field of interest [48, 51, 52]. All interviews were audio recorded, transcribed following the rules proposed by Misoch [52], and analysed using the qualitative data analysis software MAXQDA [49, 53]. The challenges of quality in interview data lie in potential biases, poor recall, or inaccurate articulation [48]. These are addressed through a diverse sampling of interview partners who occupy various perspectives and positions in three different organisations as well as through complementary data from documentation and artefacts [51].

While the interviews constitute the main and most important source of information, including documentation and artefacts both forms a reliable starting point for the case and allows to verify and contextualise interview data in a complementary way [48, 49]. Press releases, photo documentation and various publicity materials as well as internal documents by the LL are analysed. Due to the importance of context, physical artefacts such as the LL itself and objects within the LL are included in this case [54].

As part of the data analysis process, raw data from all three data sources was approached through open coding and iteratively complemented with existing literature [49, 51, 55]. Upon completion of the coding process, all codes, code segments and comments were exported from MAXQDA to Microsoft Excel for further analysis.

## 4 Empirical Findings

A range of applied methods is identified. The variety stems from a discrepancy in purpose, as shown in Table 1. Whereas one group of methods is utilised primarily to have the user answer specific questions, the other group of methods primarily aims to stimulate the user's experience in the LL. Ultimately, all methods serve the purpose of innovation research. While the former contribute directly to data collection, the latter do indirectly – complementing the former with beneficial LL-specific characteristics.

Methods of innovation research are threefold. Questioning methods of quantitative and qualitative nature as well as observational methods including technology-assisted tracking are applied. Some of these traditional innovation research methods such as questionnaires or voting mechanisms involve the user in a rather passive and theoretical

way. In order to involve the user in a more active and practical way, a single co-creation space can be equipped with several complementary methods, as one expert phrased as follows: "*[If I] should test something, or tinker with something, then there is an active involvement which is what we want, but which can be achieved through [traditional] innovation research methods only then, if there is an app to try out, for instance*."

| *Purpose* | Innovation Research | | | Complementary |
|---|---|---|---|---|
| *Type* | Quantitative questioning | Qualitative questioning | Observing | |
| *Methods* | Price assessments, Questionnaires, Usability-tests (quantitative), Voting | Focus Groups, Interviews, Open feedback, Personas, Usability-tests (qualitative), Workshops | Observation and shadowing, Tracking | Artefacts, Storytelling, Information material, Toolkits, Prototypes, Prototyping, Service staging |

**Table 1**: Characterisation of Applied Methods

The experts consider involving users actively as crucial, one stating that "*we try to involve the user as much as possible, so you would rarely see a yes-no-query as the only method, but rather as a supplement.*" It is also described as a prerequisite to generating data for innovation research. Furthermore, it does not only make it easier for users to give feedback but also increases their willingness to do so. Methods differ regarding the facilitation of active user involvement in methods, as Figure 1 illustrates.

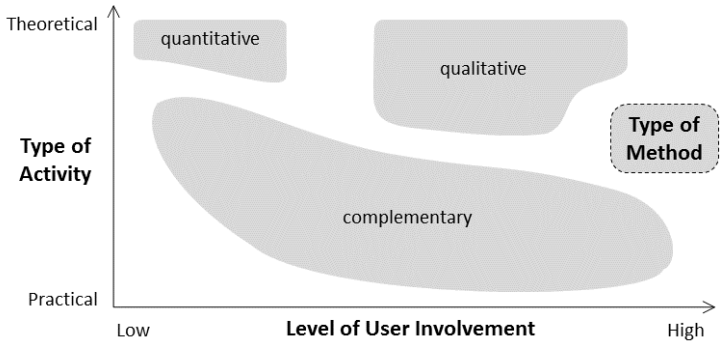


**Figure 1**: Differing User Involvement and Activity in Applied Methods

If considered individually, quantitative and qualitative methods of innovation research involve the user predominantly on a theoretical level. They require the user to answer questions, hence to think about a certain subject. Quantitative methods result in a low to medium level of user involvement in terms of activity and variety. Qualitative methods, on the other hand, rank substantially higher in user involvement. However, they are equally constrained to theoretical activities. Methods with beneficial LL characteristics may complement these innovation research methods. Examples include

the provision of context and haptic experience in the case of physical artefacts, and testable prototypes with a high level of practical activity, as two experts explain: "*Whenever possible, we hand something over to the user […] if it is a physical thing or so*", because "*through mere haptic experiences, [the user] becomes more involved*".

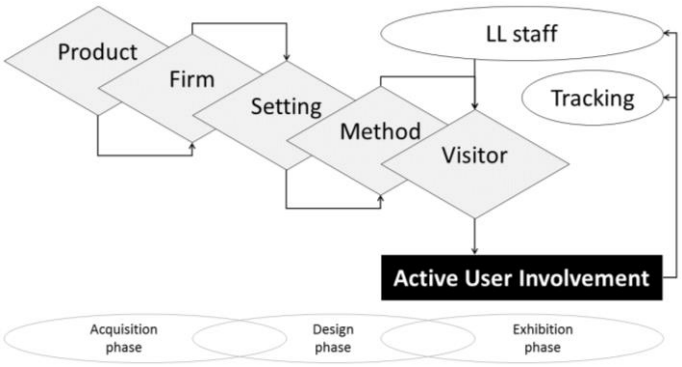


**Figure 2**: Factors and Conditions Determining Active User Involvement

Figure 2 outlines several factors, which are proposed to influence the emergence of active user involvement beforehand. In this model, each of the six factors product, firm, setting, method, LL staff, and users are dependent on all previous factors, with several conditions respectively as shown in Table 2.

| *Factor* | Product | Firm | Setting | Method | User | LL staff |
|---|---|---|---|---|---|---|
| *Conditions* | Fit for co-creation,<br>Functio-nality | Strategic fit,<br>Willing-ness | Context/ artefacts,<br>Appeal,<br>No barriers | Facilitating activity | Type,<br>Effort,<br>Time,<br>Motivation | Enabling/ motivating |

**Table 2**: Factors Determining Active User Involvement

## 5 Discussion

Contributing to the discussion about method application and development for new methods in LLs [27, 40], this paper proposes a combinatorial approach. Several complementary methods lead to the desired outcome of data for innovation research in a more effective and more appropriate way than traditional innovation research methods on their own. Complementing methods can adapt to the distinct features of LLs and thus benefit traditional methods of innovation research through more richness and quality in data. These findings are in line with Tang and Hämäläinen [41] who argue that combining methods can lead to a better understanding of users.

A predominant use of traditional innovation research methods like interviews and surveys in LLs is observed, congruent with Tang and Hämäläinen [56]. However, it is

frequently argued that ICT is underused in LLs [7, 9, 18, 41, 57, 58]. Use of ICT, however, could contribute to an improved realisation through shortening the feedback loop between users and corporate designers in iterative processes [58], enabling a true firm-user interaction beyond the intermediating LL. Equally, ICT could connect users with LLs when they are not on site. Either way, higher user involvement can be expected, as the level of activity would increase both time and effort spent.

While no systematic approach to using ICT was identified, general technology use as part of the co-creation process occurs at times. In line with previous authors, this study finds technologically sophisticated methods and tools being used infrequently besides mobile handsets for usability-tests. Counterexamples include a 'thumbs up'-voting mechanism using a Microsoft Kinect camera for gesture recognition and virtual reality (VR) applications using a Google Cardboard. Besides, tracking technology is implemented, which the user, however, is not concerned with as this is an unobtrusive way of collecting data [41]. Notably, it is found that technology use may also impede user involvement. If a lack in technology acceptance, unfamiliarity, or technical failure is present, this can keep users from becoming actively involved in the envisaged way.

This study proposes users as the chronologically last, thus deciding factor in involving themselves actively. Holding the position of a co-creating partner, LL visitors are entitled to both include and exclude themselves from the co-creation process whenever they want and without having to give reasons [59]. In an open LL, the idea of incentivising outsiders to become a LL visitor suggests itself at first sight. Dutilleul, Birrer, and Mensink [45] even ask if incentives are needed in order to attract and sustain a desired amount of LL visitors continuously. However, based on the principle of self-selection, this study argues that such mechanisms may distort results and question their validity. Previous studies find that material and financial rewards are not important to users [46] while importance is attached to the value that users experience in the course of co-creation [60]. Instead of giving financial incentives, it is proposed to improve on the co-creation space, particularly the appeal of its setting in order to provide an experience to LL visitors that is as much beneficial and pleasant as possible.

*Managerial Implications*

Implementing digital technology for an automated acquisition of implicit, behavioural data as well as explicit, articulated data would arguably not only support LL staff and let them focus on interpersonal communication but also accelerate the data analysis process, thus increasing efficiency. For example, a customised mobile handset that runs a digital content management system could record interviews, capture questionnaires, and aggregate contextual data (e.g. place, date, time, duration). Most importantly, LL staff needs to be provided with enough expertise in order to carry out semi-structured interviewing and other methods of qualitative innovation research.

In the design process of co-creative activities, a firm's requirements serve as the starting point and may imply certain methods. However, some firms have false expectations or request mostly quantitative methods. During communication with customer firms, it is advisable to follow a threefold strategy of selecting appropriate firms fitting the LL methodology, undertaking expectation management on the innovation research outcome, and consulting firms in order to utilise a LL's strengths.

Particularly in iterative or continuous NPSD processes in LL, the use of ICT may be of help. ICT could bridge the gap to a firm without the necessity of sending an employee physically to a LL. With an employee being available on call, all LL visitors had the chance to deepen their input. On the other hand, ICT are able to reach LL visitors before and after their physical co-creation engagement. For instance, a web interface could be a way for LL visitors to contribute even in hindsight. It does not seem too farfetched to assume that users might come up with new ideas after they left and had the opportunity to rethink their contribution, but also find their additional input not worth a second (physical) visit. In terms of a real life setting, storytelling proves beneficial for creating overall context. Combining ICT and the method of storytelling with augmented reality (AR), Snapchat, a story-based social media application, could fit LLs with changing themes quite well. Its contribution to user involvement in activity and variety is yet to be evaluated. However, it might be a way to involve younger users in particular.

## 6 Conclusion and Outlook

The first contribution of this paper is a review on methods that are applied in LLs. Characterising these, two primary purposes emerge. The first group of methods directly contributes to data collection for innovation research, while the second group contributes indirectly and primarily complements former methods with beneficial LL-specific characteristics in providing a real life setting and enabling user involvement.

The second contribution of this paper is a proposed model of six consecutive factors and several conditions that influence user involvement. It is proposed that these factors influence user involvement firstly in its emergence, and secondly in its intensity. If a factor allows user involvement at all, it further limits its maximum intensity that subsequent factors are able to draw on.

Concerning this study, several limitations apply. Firstly, the form of a holistic single-case study induces an in-depth analysis, which does not permit generalisation but requires comparison across multiple cases of LLs. Secondly, while this paper focuses on contributing to the intermediary perspective of LLs and is conceptualised accordingly, both the user and the firm perspective are not particularly addressed.

Exploring the field as a first step, this study indicates promising niches worth further quantitative research. Above all, the proposed model on factors influencing user involvement demands quantitative validation with proof of causal effects. Furthermore, future studies should ask whether combinations of methods with a higher level of user involvement result in superior validity or efficiency [35]. Here, studies should contribute with other perspectives than the intermediary's. As part of the firm, the rates of adoption for further development and profitability might contribute to the question which level of user involvement is considered ideal. Assuming a high level of active user involvement, it is of interest to know which kinds of firms benefit the most. Simulating and enhancing a real life setting, new technologies, such as AR and VR, seem promising. It should be evaluated if they are beneficial to the level of user involvement as well as to the co-creation process as a whole. Do these technologies lead to more motivation and willingness among LL visitors through improved

experience and a higher perceived value? Although LLs differentiate themselves with their offline real life settings from Internet-based technologies, ICT usage within LLs is worth further research. While LLs utilise the Internet only rarely [35], the combination of online-offline methods could lead the way for the future of LLs. Finally, in providing *Co-Creation as a Service*, the intermediary perspective needs further research [14]. In line with Schweitzer, Gassmann, and Rau [31], it is argued that reciprocal effects of goal setting, chosen methods, and user involvement require further qualitative and quantitative modelling.

## 7 Acknowledgments

We thank all interview partners, the JOSEPHS team, and the anonymous reviewers for their valuable contributions to this research paper. The paper is part of current research projects funded by the Fraunhofer IIS-SCS within its "Service Innovation" initiative.

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