Online Living Lab Community Development towards Social Web: A Case Study of PATIO

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Master’s Thesis
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18.04.2016
Abstract

The concept of Living Lab has gained attention as a user-centered approach in ICT development, especially when talking about the innovation creation. Nowadays, social network has become part of the daily life for many people to share news, pictures, and stories. The earlier researches mostly see Living Lab as an approach for innovation with the supporting of social media in terms of user involvement.

Considering the challenges of user commitment into the online Living Lab communities, and the insufficiency of social network approach, this paper is aiming to provide a guide for the development and improvement of online Living Lab community, with answering the research questions of the online Living Lab community characteristics towards social web, and the primary requirements of establishing such online community.

The main research methodology applied in this paper is based on grounded theory. Through the case study of PATIO, the data was collected via various sources including user motivation survey, user modelling interview, participant-observation as system administrator, and utilizing of existing organizational documents. As the outcomes of the research, based on the personas and the scenarios generated through user interviews, the requirements of developing online Living Lab community were defined, which also served as the fundamental of the framework establishing.

This research contributes to the Living Lab with the further analysis of the online community from different stakeholders’ points of view. The online Living Lab community framework associating with the characteristics social web, provides an overall picture of the whole Living Lab environment. This online community serves as a platform, which is targeting to the user-centered products and services testing in real-life contexts. The study in this paper has put more emphasis on the roles of end users and system administrator. Therefore, the direction for future research could be focusing on the needs and benefits to customers (e.g. SMEs) and researchers. In addition, the technologies for the system implementation (e.g. platform choosing, web 3.0) also have the needs to be further studied.

Keywords
Living Lab, social network, online community, user requirements, user-centered innovation
Foreword

The starting point of this paper is a master student project work of PATIO user motivation study what I did with other three project team members for OULLabs. The topic of this research paper was extended from the PATIO development project work. Thanks to the great support of former CIE (already closed since end of year 2016) and people from PATIO project, especially Ms. Lotta Haukipuro and Ms. Satu Väinämö.

The initial inspiration of further developing online Living Lab community as a platform associating with that of social network came in my mind after I read the book written by Professor Oinas-Kukkonen, named “Humanizing the Web: Change and Social Innovation”, where describes the developing of web towards social media in term of user-involved innovation. The chapter of “Social Web as an Innovation Ecosystem” is the fundamental of the framework generated in this paper. Especially the analysis of social web development from three dimensions of software platform, business ecosystem, and user experience matches with the topic of developing online community for Living Labs in this paper properly.

Hopefully this paper will serve as a generally guild for either developing own online community or adopting suitable social media to be used in Living Labs. However, the research on online Living Lab community will not stop here. The implementation of the platform with suitable technology as well as the business value of the whole Living Lab environment will be the future study directions.

Weiping Huang
Oulu, March 27, 2016
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1. Introduction

The original thinking of user centered approach can be traced back to the term of “lead users” defined by Eric Von Hippel (1986) with the solutions for the problems in market research (Von Hippel, 1986). Recently, the Living Lab concept, based on this user centered approach, starts to take an important role in the ICT development, especially when talking about the innovation creation. Community of Living Labs is also increasing dramatically. According to the latest information fetched in year 2016, historically almost 400 Living Labs worldwide have been listed in the European Network of Living Labs (ENoLL) (http://openlivinglabs.eu), where 19 effective members are helping with the strategic development of the ENoLL association. Living Lab has been described as an environment of user-centric innovation based on daily practice and research, with the approach of using user influence in the open innovation process within real-life contexts, in terms of sustainable value creation (Bergvall-Kåreborn; Eriksson; Ståhlbröst; & Svensson, 2009). This definition reflects the Living Labs phenomena as both an environment and an approach (Bergvall-Kåreborn & Ståhlbröst, 2009).

With the rapid development of web, social network becomes a significant part for people’s daily life, where they share news, stories, and ideas. Online Living Lab community is acting as a platform which provides the opportunity and possibility to combines the Living Lab concept with the characteristics of social network, in order to further increase the innovation with the power of social web (Oinas-Kukkonen & Oinas-Kukkonen, 2013). Studies have been done towards the analysis of the online applications, especially social software for Living Lab innovation process, where classified the online application types in related with the different innovation process phases (Følstad & Karahasanovic, 2013), as well as provide a basic framework to better understand the social software in using of the Living Labs (Følstad; Ebbesson; Hammer-Jakobsen; & Bergvall-Kåreborn, 2011).

Most of the earlier researches have been focusing on the Living Labs as a methodology or an approach for innovation, where online application, such as social software, can be used for supporting different process phases for various purposes. However, in this paper, more emphasis will be put on the analysis of Living Labs as an environment of innovation, namely the ecosystem of innovation, with an aim to increase the user’s engagement and involvement into the development process, from a social network perspective. The online Living Lab community will not be seen as just a tool, but more like a user-centered environment aiming to serve the innovation creation. Instead of integrating social media in use with the concept of Living Labs (Karaseva; Seffah; & Porras, 2015), this paper attempts to provide a guide of constructing an online Living Lab community associated with the characteristics of social network.

1.1 Motivation

End users as one of the main factors take essential role in the Living Lab environment in terms of user-centered innovation. However, several earlier studies had shown the challenge of user commitment into the online Living Lab communities. For example, a
A survey conducted by PATIO (www.patiolla.fi) among the PATIO users (registered online testers) implied the lack of user engagement due to the insufficient support of the online community service. The research from other Living Labs also listed several main aspects which need to be considered when using social media as a channel to commit users (Hess & Ogonowski, 2010), including the selection of the social network approach, the user engagement activity timing, and so on (Bertoni & Ståhlbröst, 2013). In addition, except the end users, there are also other roles involved in the Living Lab environment, such as the administrator, developers, researchers, as well as the business customers. The framework and characteristics of Living Labs have been studied from different aspects, but there are not so much research particularly focus on those for the online Living Lab community from the perspective of the different roles.

### 1.2 Research question

Considering the challenges and the insufficiency mentioned above, with the aim of increasing user commitment in online Living Lab community, as well as improving the system to better serve Living Labs, the research objective of this paper is: firstly through the literature review of Living Lab, comprising of the concept, framework, key components and the process, associating with the attributes of social network to outline the main structure of online Living Lab community; then by the case study of PATIO to analyze the characteristics of online Living Lab community, primary requirements for developing such online community, as well as how should the implementation be constructed. Therefore, the research questions are listed as below:

- What are the characteristics of online Living Lab community towards social web?
- What are the primary development requirements of online Living Lab community?

In the following chapter, through literature review the concept and framework of Living Lab are present, along with the attributes of social network as well as the different aspects need to be considered in terms of construct a social web. Combining the findings from chapter 2, in the following chapter, a framework of online Living Lab community with its characteristics is constructed. Chapter 4 describes the research method of this paper in detail with the research paradigm, research plan and process, as well as data collection and analysis methods. PATIO case study is presented in Chapter 5. Along with the data analysis and findings representing, the requirements of online Living Lab community are established as the result of this chapter. Next, the research questions are answered in Chapter 6, meanwhile the framework of the online Living Lab community generated from chapter 3 is refined and improved. The implication of the research outcomes are also expounded in this chapter. Finally in the last chapter, the contribution and limitation of this study are presented as well as the possible directions of the future studies.
2. Literature Review

2.1 Living Lab

For the purpose of outlining the structure of online Living Lab community, literature review is conducted from several relevant aspects. In this chapter, the study is mainly focusing on the concept of Living Lab, its framework, key elements and components, as well as the process.

2.1.1 Concept of Living Lab

As mentioned in the introduction section, Hippe (1986) first brought the user-centered approach into market research problems resolving, which is seen as a fundamental of the Living Lab concept nowadays. Living Lab plays an important role in the ICT development in terms of innovation creation. In the following section, the various definitions of Living Lab with different emphasis points are reviewed.

Markopoulos and Rauterberg (2000) in their white paper of Living Lab described the Living Lab as “... a platform for collaborative research projects that should serve as a development and testing ground for novel technologies” (Markopoulos & Rauterberg, 2000). The substance of this “Living Lab” is slightly different with the common understanding nowadays, however the description of the platform for developing and testing novel technologies is seen to be the basic thought of Living Lab in earlier state.

The European Network of Living Labs (ENoLL) founded in 2006, gives the definition of a Living Lab “is a real-life test and experimentation environment where users and producers co-create innovations” (About us, 2013). Lama & Origin (2006) introduces living labs as “a user-centric research methodology for sensing, prototyping, validating and refining complex solutions in multiple and evolving real life contexts” (Lama & Origin, 2006). Comparing those two definitions, one describes Living Labs as environment while another as a methodology; one emphasizes the co-creation of users and producers, while another focuses on the solutions processing in real-life contexts. One of the latest definitions describes Living Lab as user innovation creation in online or offline community, where the business stakeholders are also involved (Pieter & Schuurman, 2015).

Fast developing technologies bring innovations to realization, however, most of those innovations failed to be sustainably successful after went into market. The importance of the involvement of customers and other stakeholders were recognized, in order to reduce the risks in the design and development process. With this purpose the concept of Living Labs were defined as the “collaborations of public-private-civic partnerships”, where the relevant stakeholders are involved in the co-creation of new products, services, business and technologies under either living environments or networks (Feurs; He; Hri; Thoben; Schumashe, 2008). In this definition Living Lab is more seen as an integration approach of the Living Lab value chain, which highlights the importance of the stakeholders’ involvement. Følstad (2008) sees Living Lab more like an extension to testbed where ICT services could be tested in a
real-life environment (Følstad, 2008), while there are also other researchers arguing it more as an innovation platform to engage users, developers, researchers and all related stakeholders into the innovation process leading to the potential breakthrough innovations.

Similar with the definition given by ENoLL, Bergvall-Kåreborn, Eriksson, Ståhlbröst and Svensson (2009) describe Living Lab as an environment of user-centric innovation based on daily practice and research, with the approach of using user influence in the open innovation process within real-life contexts, in terms of sustainable value creation (Bergvall-Kåreborn; Eriksson; Ståhlbröst; & Svensson, 2009). This definition reflects the Living Labs phenomena as both an environment and an approach (Bergvall-Kåreborn & Ståhlbröst, 2009).

Higgins and Klein (2011) point out in their article a shifting of the Living Lab concept toward the “active role of users as co-innovators”. Living Labs server as platforms for the user-centered innovations, in which more stakeholders are involved, including both users and organizations. (Higgins & Klein, 2011)

Based on proposition of stakeholders involving to the innovation process, Ståhlbröst and Holst (2012) extend the attention of Living Lab to SMEs, considering of the difficulty for SMEs to accomplish the innovation process due to limited resource and competencies. Besides, Living Labs is also defined as both an environment and an innovation approach. (Ståhlbröst & Holst, 2012)

2.1.2 Framework of Living Lab

The Framework

Zaaiman and Vuuren (2009) in their paper present a Living Lab Framework consisting of four factories, including product factory, network factory, knowledge factory, and service factory. (Figure 1) A product factory represents the process and activities of creating tools and methodologies for the Living Lab. A network factory refers to a social network where community members are profiled. A knowledge factory uses a Question and Answer Extrapolation Tool (QAET) to create dynamic knowledge objects. Last but not least, a service factory provides both physical and non-physical services, such as web services, based on community needs with the aim of Living Lab functionality. This framework has been used in a research of knowledge management in the Living Lab where the study is centered by the knowledge factory (De Jager; Buitendag; & Van der Walt, 2012). In this paper, with the research objective of online community, more focus will be put on the social network factory accordingly, with a purpose of building up a platform to engage the various players, e.g. test users, researchers, moderators, SMEs, with in the Living Lab. Five processed are included in the workflow of the network factory: 1) key roles identification in the knowledge domains; 2) analysis of the role profiles with the related actions and experience; 3) classification of the roles, knowledge, experiences, and skills; 4) virtual team creation according to the requirement of projects; 5) measurement of the team members performance. (Zaaiman & Vuuren, 2009) In short, the crucial of the network factory is to identify the profiles of various players and then establish the virtual teams.
Key Components

There are several key components of a Living Lab from both methodological and environmental perspective, which include ICT & infrastructure, management, partners & users, research, and approach. (Figure 2) All the components are around the central of innovation, where ICT & Infrastructure represents the role of the technology to be used in the way of innovations among stakeholders; Management refers to the organization of companies and researchers to be managed; the knowledge and expertise of the Partners & Users could help with the knowledge transferring; Research mainly means the activities of learning happened in the Living Lab; Finally, the Approach is the methods and techniques used in the Living Lab. (Bergvall-Kåreborn; Eriksson; Ståhlbröst; & Svensson, 2009)
**Key Elements**

With the emphasis of stakeholders’ involvement, Feurstein et al. (2008) claims the required elements of Living Lab comprising of participation and context, services and methodology. The participation here refers to not only the customers, but also other stakeholders, such as SMEs and large organizations, in the value chain, since their participation and cooperation are rather crucial in terms of Living Lab. Besides, the multi-contextual innovation environment is a core advantage comparing with traditional user-driven methods. From business point of view, Living Labs could provide services of co-creation, integration and data preparation to industries, research organizations, companies, especially SMEs. With the basic idea of Living Lab as a “users as innovators” approach, different methods for user-centered development process need to be used depending on the projects. (Feurstein; Hesmer; Hribernik; Thoben; & Schumacher, 2008)

**Principals and Activities**

The primary principles of Living Lab methodology refer to the Continuity of the innovation, the Openness of the innovation, the Spontaneity of users’ reactions and thoughts, the engagement and Empowerment of users, as well as the Realism to the markets with the focusing on the real-world settings, which is known as a main distinguished characteristic of Living Labs comparing to other approaches concerning about user-centric development. Among all the principles mentioned above, open innovation, user empowerment and real-world settings are seen as the core of the Living Labs. (Bergvall-Kåreborn & Ståhlbröst, 2009) Ståhlbröst & Holst (2012) in a later study also give five key principles for Living Lab, where besides the similar ones of openness, influence (user involvement), realism and sustainability (continuity), also point out the value creation of Living Labs, including economical value, business value and user value. (Ståhlbröst & Holst, 2012)
ENoLL defines the four main activities of a Living Lab as the Co-Creation of the users and producers; Exploration of the new usages, behaviors, and opportunities; Experimentation within user communities; and Evaluation of the ideas, product and services based on certain criteria. (About us, 2013)

**Characteristics**

Følstad (2008) through literature review summaries the four common characteristics of Living Labs composing of: new ICT solutions evaluation with users; exploration of the emerged ICT use and new opportunities; ICT solution experience with user familiar environment; and long term involvement of users. Another research based on Følstad (2008) generates the Living Lab framework with three mainstays of “innovation outcome”, “Living Lab environment”, and “Living Lab approach”, containing eleven key characteristics. From general point of view, the characteristics of the Living Lab environment include technical environment, long-term ecosystem development, the openness of Living Lab (e.g. IPR, partnership), the community with user involvement, the Living lab duration (e.g. short-term, or long-term), user involvement scale (e.g. small-scale, or large-scale), and the real-life context with nature environment for users instead of a laboratory testing. From project level, the characteristics of Living Lab approach are user evaluation level, usage context (e.g. survey, diary, observations), user co-creation level in innovation process, and the role of users (e.g. tester, contributor, co-creator). (Veeckman;Schuurman;Leminen;& Westerlund, 2013) These characteristics are also taking into consideration for the development of living Lab online community as part of the whole Living Lab framework.

**2.1.3 Online Living Lab Community**

With the development of ICT services, online community becomes an increasing trend of Living Lab approach. Relying on high user involvement, the motivation and engagement of users in online Living Lab community became a crucial issue. Both intrinsic motivations and extrinsic motivations play the essential roles of user engagement, where intrinsic motivations refer to interest, satisfaction, curiosity, involvement, and extrinsic motivation factors include incentive, rewards and so on (Füller, 2006). Using Living Lab as a media for cooperating end-users with companies, Seppo Leminen (2011) and his colleges create two different approaches of customer involvement: 1) traditional way of thinking user as the information source who follows the company’s guideline. 2) From company point of view, looking for cooperation with uses for new business opportunity, where users take the guide for the companies (Leminen;Fred;Kortelainen;& Westerlund, 2011). This paper also attempts to analyze the motivations for users to participate in an online Living Lab community comparing with the motivations of participating in social networks, taking consider of the different user cooperation approaches.

There are some existing researches trying to connect Living Lab with social network. For example, an earlier research of using Living Lab as a developing approach has focused on three dimensions of user, technology and business for the user-centric innovation (Eriksson;Niitamo;& Kulikki, 2005). Similarly, another introducing of Living Lab also represents three factors surrounded, including enterprises, technology, and society (Living Labs, 2013). As figure 3 shows below, several key relevant aspects are identified based on those three dimensions. From technology dimension, the key elements which could affect the outcomes are the abilities of network, platform as well.
as the user interfaces. The enterprises include both large organizations and SMEs considering of the innovation process and business models. The third important aspect is the involvement of users into this innovation process, where the method of society to work with Living Lab is through social media. Besides, catering to the knowledge factory in Living Lab framework (Figure 1) and the key components (Figure 2), the aspect of research involvement refers to the capability of transforming knowledge generated from Living Labs into the human-centered technology researches.

![Living Lab model](Living Labs, 2013)

### 2.2 Social Network

A network is defined as a set of relationships, containing a set of objects and the description of the relations between those objects (Kadushin, 2012). Innovation is seen to be more as a social process than a technical process, where networks play an important role (Jha, 2011). The characteristics of social network, from knowledge management perspective, are described as showing in the table below (Table 1).
Table 1. Social Network Characteristics, adapted from (Pettenati & Cigognini, 2007)

<table>
<thead>
<tr>
<th>Goal</th>
<th>Relation based on individual interests, argument, face to specific topics; diversity and differentiation of participating interests and motivations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belonging</td>
<td>Spontaneous and autonomous motivation</td>
</tr>
<tr>
<td>Duration</td>
<td>Not defined</td>
</tr>
<tr>
<td>Cohesion and enabling factors</td>
<td>Trust and reputations, responsibility, technological skills, socially spread self-examination and evaluation</td>
</tr>
<tr>
<td></td>
<td>Type of relation: share/evaluate</td>
</tr>
</tbody>
</table>

Social web has been discussed as an innovation accelerator in professor Oinas-Kukkonen’s (2013) book named “Humanizing the Web: Change and Social Innovation”, where social web is analyzed as an innovation ecosystem, including social web as a software platform, social web as a business ecosystem, social web as a user experience.

Firstly, instead of developing a single application, the development of the environment where allows the application development happening would bring more business opportunity. The development of a platform requires the essence of user experiences, software feature based on it, and availability to application development. The software solution need to be carefully designed, and the platform might face the risk of being abandoned by the social web users if it fails in delivering as promised. Some guidelines are available for the social web platform developments, which mainly highlight the starting without overthinking, simple and efficient result delivering, and keep revising.

Secondly, the ecosystem in terms of social web platform represents the numerous stakeholders with various motivations, goals and working styles as whole. In a social web business ecosystem users and other stakeholders participate in the information systems, where they communicate and influence each other. Business ecosystem is seen as a sub-ecosystem of innovation ecosystem, where generates numerous of business opportunities. Social web is action as a crucial role in the creation, maintenance, and support of this business ecosystem which encourages the innovations. Instead of spent money on marketing, many of the social networks more depend on the users and their influence. Companies improve their own innovations through helping and supporting the user communities of innovation. Besides, companies need to be careful when with the social networks, in terms of user losing due to too much changing or too strong forcing.

Finally, to keep the users and other stakeholder stay and interact in the network, there is a need of engaged user experience to motivate and encourage their contributions. For user communities, the good and positive user experience is rather important. Accordingly, for the development of social web platforms, one central goal is to provide motivating and encouraging experience for the users. (Oinas-Kukkonen & Oinas-Kukkonen, 2013)
This structure (Figure 4) can also be applied to analysis the characteristics of online Living Lab community, since the phenomenon also matches with the framework of Living Labs where Living Labs acts as a platform to connect users and business and other stakeholders. In this paper, social network is not just used as a tool or an approach, but also treated as a guide based on the social web framework, associating with the characteristics of Living lab, to analyze and contribute into the online Living Lab community development. In next chapter, a framework of online Living Lab community is present with the combining of the results from the literature review above.

### 2.3 Web 2.0 to Web 3.0

If Web 1.0 is seen as read only web, then Web 2.0 could be called as social web, where users can both read and write, furthermore to share their own ideas and thoughts via social networks. Nowadays, Web 2.0 has infiltrated into everyday life and business. However, it also has the limitation of less-structured information. Web 3.0 is brought to the stage as an “intelligent web” to solve the problem what Web 2.0 is facing, with more suitable and appropriate contents to the users. (Almeida & Lourenço, 2011)

Table 2 shows the main differences between Web 2.0 and Web 3.0, where can tell that Web 3.0 is more focusing on the connection of data to both people and devices, as well as the reuse of the contents, which bring more positive user experience. Comparing with the dynamic content generated from community with Web 2.0, Web 3.0 uses semantic web technologies which allow the data to be studied and categorized by machine with the ability of data gathering, analyzing, structuring distributing and reusing. (Hendler, 2009) From business perspective, Web 2.0 is featured with the availability of cloud services, online software and system. While based on Web 3.0 technologies, more business opportunities and possibilities are provided in regions of web services, knowledge management, e-learning, marketing (Rudman & Bruwer, 2016) with the
intelligent technologies, open data along with the SaaS Business model taking in considered (Ahmed, 2015).

Table 2. Comparison of Web 2.0 and Web 3.0

<table>
<thead>
<tr>
<th>General</th>
<th>Web 2.0</th>
<th>Web 3.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>Read-write web with content sharing in communities</td>
<td>Semantic web integrated into web applications</td>
</tr>
<tr>
<td>Contents</td>
<td>Dynamic contents created, edited, viewed and shared by community.</td>
<td>Web experience with data learned and categorized by machine.</td>
</tr>
<tr>
<td>Features</td>
<td>Interaction of software and applications with multi-platform support</td>
<td>Ability of data gathering and recording, analyzing and structuring, distributing and reusing.</td>
</tr>
<tr>
<td>Technology</td>
<td>Ajax (asynchronous JavaScript and XML)</td>
<td>RDF (Resource Description Framework) and OWL (Web Ontology Language)</td>
</tr>
<tr>
<td>Business</td>
<td>Cloud, online software, system and services</td>
<td>Business intelligence, knowledge management, e-learning, marketing SaaS business model</td>
</tr>
</tbody>
</table>

In context of online Living Lab Community development, the current focus is still on Web 2.0. However, the trend and benefit of Web 3.0 should also not be ignored, especially the connect of data and the reuse of contents, which are also seen as key factors for the Living Lab in terms of user study and knowledge learning. This paper will not discuss Web 3.0 in detail, but keep the concept in mind when analyzing the requirements of development the online Living Lab community.
3. **Online Living Lab Community Framework**

The primary goal of online Living Lab community is for Living Labs to provide internet services with an online environment where collects users ideas and feedback on the designing and evaluation of new products and services. Accordingly, this online environment has to be able to allow 1) developers to post new products and services; 2) users give comment and suggestions to the new products and services; 3) users post ideas and suggestions; 4) discussions between different stakeholders, e.g. users and developers; 5) users give feedback on the system, which here refers to this online environment. (Følstad, 2008)

As showing in the framework of Living Lab, the stakeholders, e.g. researchers, developers, companies, especially the end-users, are the key elements, and all the activities happened in Living Labs are around those stakeholders. Online Living Lab community is this environment where to gather those peoples, provide information system services, as well as collecting data in order to learn from the users. To keep the users participate and be active in the community is one critical issue for many current Living Labs. Social network have its difference with online Living Lab community, since the latter is particularly focus on the design and evaluating of new products and services. Nevertheless, both are belonging in the concept of user-centered innovation.

![Online Living Lab Community Framework](image)

*Figure 5. Online Living Lab Community Framework*
Based on social web framework, along with the concept of Living Lab, Figure 5 presents a framework of online Living Lab Community. The main stakeholders of the whole system include system developers and moderator, researchers, companies and partners, as well as the most important one, the users. Since each stakeholder has different activities, their requirements of the system are also shown as different with others.

For the online Living Lab community developers and moderator, what need to be considered are the development of the system, for example what platform technology should choose; easy way to manage the system, especially the feedback management and rewarding system management; how often the system need to be maintained and updated; as well as the method of managing the testing activities happened in the Living Lab. As researchers, the support tools and methods to collect information and data are more demanded. From this point of view, using of Web 3.0 would provide better service in this context.

The companies and partners sometimes also can be seen as the customers of the Living Lab. The companies, especially SMEs many times don’t have the resource and cost to build up own environment and tools for the innovation, and Living Lab is able to offer the services they need, such as product and services testing in real-life environment with the potential users collected from online Living Lab community, concepts and ideas prove and co-design with users, as well as market studies. Valuable comments, feedback, and suggestions could be collected through Living Lab user community, which could be used for the products and services development and improvement.

Last and most important stakeholder in the community is the Users, who are the foundation of the entire community. The online Living Lab community need to support users to participate in the Living Lab activities, and provide positive user experience, including tools and method to give comments, suggestions, feedback, share ideas. Even though rewarding system is one effective way to motivate the users to participate in the activities in Living Lab, the intrinsic motivations of user interests and self-satisfaction are also key factors to keep the users inside the community. In addition, besides the requirements from each stakeholder towards the system, there is also a need of smooth communication flow between each stakeholder. This means, not like traditional thinking of system moderator as agent to connect companies and users, but to bring the connection between companies and users in certain level. By this way, not only companies are able to get more timely and accurate information from users, but also release the workload of the moderator in the meanwhile.
4. Research Methods (definition of the methods and how it applies to this thesis)

4.1 Research Paradigm

The main research methodology applied in this paper is based on grounded theory, as one of the qualitative research methods, which has been increasingly used in information system research with its significance advantages of using in “developing context-based, process-oriented descriptions and explanations of information systems phenomena” (Cathy; Hans; & Myers, 2010). Grounded theory was first introduced in 1960s by Barney Glaser and Anselm Strauss (Evans, 2013), defined as

“...an inductive, theory discovery methodology that allows the researcher to develop a theoretical account of the general features of a topic while simultaneously grounding the account in empirical observations or data...” (Martin & Turner, 1986)

Grounded theory method becomes widely known with its flexibility in information system researches due to the strengths of its “relevance” of close to data; and the “rigor” of data analysis along with the theories building up (Urquhart & Walter, 2006). With the aim of developing the framework of online Living Lab community, grounded theory is used as the theory fundamental of data gathering and analyzing.

![Cycle of data collection and analysis in the grounded theory method for Online LL community Framework establishing](Cathy; Hans; & Myers, 2010)
Figure 6 demonstrates how the grounded theory generating process applies to the online Living Lab community framework establishing. The research begins with the keywords of Living Lab, innovation, and social network, from which the research topic is defined. The “enquiry” phase has been done with the earlier researches through literature review. In this paper the focus is mainly on the theory structure conceptualizing from the “categories and their properties”. Therefore the primary goal is to setup the “relations” with the “additional slide of data” in order to fulfill the “existing categories”. Various methods are used to collect and process data from different sources, which are presented in the following chapters. The grounded theory finally is formed from the concepts of the relationships between the “core categories”. (Cathy; Hans; & Myers, 2010)

4.2 Research Design

4.2.1 Research Planning

According to the research paradigm introduced in previous chapter, the research is targeted to find out the “relations” of the characteristics of Living Lab online community and social web. Based on the online Living Lab community framework generated from the literature review earlier, there are four key aspects need to be studies furthermore, as Users, Researchers, Developers, and Customers (companies and partners). In this paper, the research is mainly focus on Users and Developers (administrator and/or moderator), since they are the most relevant aspects, which could influence the development of the online community system.

4.2.2 Case Study

Case study is one type of the qualitative research, which describes one single entity, such as company, organization, system, or activity, in detail with comprehensive characteristic. Case studies could be held either through direct observation of the objective environment, or via understanding the subjective feelings and emotions, or even both. (Laws & McLeod, 2004)

PATIO, as the chosen case for the study of this paper, is an open online test user forum under OULLabs (Oulu Urban Living Labs), which enables the involvement of the end users into the development phases of the products and services. More details about the PATIO case study are discussed in chapter 7.

4.2.3 Data collecting & analyzing

Yin lists six “sources of evidence” that are frequently used for the data collection of case studies (Yin, 2002). Accordingly, with grounded theory method as fundamental, the different data gathering techniques are used in this study, for example, survey of user motivation by questionnaire, semi-structured interviews of end users, system working process observation as administrator and developer, as well as the existing materials utilizing (Bowen, 2009), so that relevant data is collected. Figure 7 shows the multiple sources of evidence for the data collection of this research.
The primary analytic strategy adopted in this case study is “relying on theoretical propositions” (Yin, 2002), with the categories and properties of Living Lab online community framework (Figure 5) as the theoretical guideline of the case study. The outcomes of the data analysis are described and compared with the Living Lab online community framework, in order to verify and fulfill the categories of the framework. The next section specifies in detail the methods used in data collection and analysis. Furthermore, all the sources of evidence (Figure 7) are associated and analyzed together in order to produce the comprehensive outcomes of the case study.

**Figure 7.** Convergence of Evidence in Practice (Yin, 2002)

### 4.3 Data Collection and Analysis Methods

**4.3.1 Survey: Quantitative research**

Survey research is widely known as one of the quantitative research methods for community needs assessing and established communities evaluating (Preece, 2000). Questionnaire as a technique of data collection has been used within this case study. The stages of the questionnaire design are showed in the table below:
Table 3. The stages of the questionnaire design (DeVaus, 2002)

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determine aims of the questionnaire</td>
<td>System requirements based on user motivations</td>
</tr>
<tr>
<td>Select appropriate question styles</td>
<td>Closed format: Yes/No questions, multiple choices, Likert Scales. Open format: open-ended question; Language: both Finish and English</td>
</tr>
<tr>
<td>Design questions</td>
<td>Framework based on relevant literature reviews (Figure 8)</td>
</tr>
<tr>
<td>Pilot test</td>
<td>Questionnaire send to 3 users for pilot test</td>
</tr>
<tr>
<td>Revise questions</td>
<td>Questions adjusted according to the feedback from pilot test</td>
</tr>
<tr>
<td>Administer questionnaire</td>
<td>Questionnaire lunched by using online survey tool: <a href="http://www.webropol.com/">www.webropol.com/</a></td>
</tr>
<tr>
<td>Analyze data</td>
<td>Graphs, descriptive statistics</td>
</tr>
<tr>
<td>Report the results</td>
<td>Report of findings and suggestions</td>
</tr>
</tbody>
</table>

The online participating framework (Figure 8) was built up based on the earlier literature reviews of the user motivations. The framework describes the factors of economic (rewards), sharing, status (self-esteem), socialization, learning and feedback, as well as UX/UI, which influence the motivations of the participation and engagement in online forum. Those factors are used as the fundamental for the design of the questionnaire. Target samples, namely end users, are chosen from the user pool of online living lab forum. Questionnaire is launched and monitored via online survey tool.
4.3.2 Face to Face Interview: Qualitative research

The primary method of data collection for the case study of this research is qualitative research methodology, and the face-to-face interview is used as the main technique for information collecting from people (Ranjit, 1999). The interview is aiming to furthermore understand the users, including the background information, motivations of participating in the online forum, stories and experience with online Living Lab forum, as well as the experience of social network. The goal is to answer the research questions with the findings out from the data analyzing of the interview.

Brinkmann & Kvale (2015) provide seven stages of the interview to thematize, design, process, transcribe, analyze, verify and report. Table 4 represents the interview stages and their descriptions in detail, which are applied in this research study, thus the whole interview process is carried out accordingly.

Ranjit (1999) classifies two types of interview according to the flexibility as: “unstructured” and “structured”. Unstructured interview is more flexible in the way of gaining rich “in-depth” information, comparing with structured interview. However, using unstructured interview has the risk of incomparable data. Besides, it also requires more skill and experience for data collection to avoid bias. (Ranjit, 1999)
Table 4. The stages of the interview investigation (Brinkmann & Kvale, 2015)

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thematizing</td>
<td>The purpose and the theme conception of the interview</td>
</tr>
<tr>
<td>Designing</td>
<td>Interview planning and guiding, interview type determination (semi-structured interview), interview topics, target interviewees (samples), interview agenda, and so on</td>
</tr>
<tr>
<td>Interviewing</td>
<td>Interviews processing based on the interview guide</td>
</tr>
<tr>
<td>Transcribing</td>
<td>Transcription of the interviews to written text</td>
</tr>
<tr>
<td>Analyzing</td>
<td>Analysis mode choosing based on the interview purpose and topics</td>
</tr>
<tr>
<td>Verifying</td>
<td>Interview findings verification of reliability and validity, as well as the generalizing of the findings.</td>
</tr>
<tr>
<td>Reporting</td>
<td>Findings standardization with the scientific aspects. Readable report generation.</td>
</tr>
</tbody>
</table>

Interview is also seen as one of the important methods for information gathering in case study. Yin (2002) introduces three types of interview based on how the interview questions are asked to the respondents. First type is similar as unstructured interview, where interview is seen as an “open-ended nature” with more open-ended questions. On the other hand, “survey” is aligned with structured interview, in which more specific questions are enquired to the respondents, and quantitative data is collected for the study. Third type of “focused interview” allows the open-ended in certain range, meanwhile the interview is under controlled with a set of question topics towards the research goals. (Yin, 2002) This type is also known as semi-structured interview (Galletta, 2012), where a basic interview guideline is used. With this guideline, even though the questions are asked in different order for different respondent accordingly, the interview is proceeded more intensively and closely related to the research purpose with all the same essential topics covered. (Preece, 2000)

Thus, with the purpose and goal of this face-to-face interview expressed in the beginning of this section, semi-structured interview is chose as the suitable type for the interview processing. The interview guideline is designed based on the research questions, which lists the main topics, meanwhile serves as a reminder for major tasks and issues. The interview topics and questions are covered according to the interview guideline, with the flexibility of order changing and further probing during the interview proceeding. Interview with open-ended questions might be time-consuming and effort
requiring (Preece, 2000), but it also make it possible to explore deeper understanding and new areas of knowledge from the answers.

Sampling is the process to select samples from the population to represent in order to estimate the outcomes and findings of the research. The interview target samples of this case study are selected from the end users of the system, involving those who had participated in the earlier survey, with the consideration of the factors including gender, age, occupation, and etc., so that it could cover the range as large as possible. The interviews are recorded and transcribed with the permission of interviewees. Content analysis is processed with the interview transcriptions, and the findings are present accordingly. More detail about the interview stages of scheduling, arrangement, recording and transcribing process are represented in the next chapter.

4.3.3 Participant-Observation

Observation as another source of evidence that allows to provide extra usable information for the case study. Participant-observation is one type of observation where the actual role is taken to be involved as part of the case study. For example, for technology or software system study, researcher participates in the study as the user or developer. By this way, the system study is carried out with an inside view, and same as the data collecting. In addition, associating the participant-observation with the methods of interviews and existing document using provides a better possibility and opportunity for combined data collection and analysis from different sources. However, the risk of biases of the participant also need to be aware of, in case of the potential tending to the research object. (Yin, 2002) With all issues concerned above, the participant-observation method is adopted for more information gathering of PATIO case study, and the analysis process is combined along with data from other sources.

4.3.4 Existing Document

For late years, the using of organizational document analysis, including printed and digital format, as a qualitative research method has been increased (Bowen, 2009). Within this case study, the document analysis is combined in use with other methods to provide triangulating data with multiple sources (Yin, 2002). Document analysis has its advantages of time and cost saving, easy to fetch, repeatable reviewing, as well as long-term content covering. However, on the other hand, it is also noticed that the broad content coverage might bring more details, which are not relevant to the research. Besides, the choosing of the documents need to be based on the organization point of view with the exclusion of personal bias. (Bowen, 2009)

With the consideration of the document analysis principles discussed above, organizational documents with relevant data are selected and analyzed cautiously for the case study. Content analysis includes the material reading and interpretation towards the research questions (Bowen, 2009). The findings produced out from the document analysis are not independent but integrated with the findings from data sources mentioned above together.
5. PATIO Case Study

5.1 PATIO and the Living Lab Online Community Development

As the adherent member of The European Network of Living Labs (ENoLL), OULLabs (Oulu Urban Living Labs) provides different services of targeted test users, versatile test environments, as well as the specialist supports for companies and organizations to process their user involved design and development. Through OULLabs, customers are able to test their products or services with authentic users in a real life environment with the possibility of professional supporting by the specialist team. Aiming to be innovative of cooperation with user, OULLabs provides services for different development phases in terms of user driven design. (OULLabs, 2016)

PATIO (2016), the testing environment service under OULLabs, is an open test user online community (What is Patio, 2016) which provides opportunities for the end users to participate in the development phases of the products and services by combining the citizen forum and Living Labs activities together. Serving as a bridge, hundreds of users had been connected with developers through PATIO online discussion forum. Since year 2013, OULLabs has started to improve PATIO service with the purpose of providing better testing experience for customers. The improvement involves all the aspects which have influence to PATIO service, including the end users, system administrator, developers, customers, researchers, as well as the PATIO system itself.

The case study of PATIO happened during the time period when PATIO system and service improvement was undertaking. PATIO case study contains four different sections. The first section is an online survey towards all PATIO users with the aim of finding out the motivations of end users to participate in the online community, as well as the features which have the impacts to such motivations.

The second section is the further user interview based on the results come out from online survey, where more details about the PATIO users are studies, including the user’s background information, experience with nowadays technology, especially the experience and interaction with PATIO system and with other social networks. In this section, the persona-based scenarios (Cooper & Reimann, 2003) from end user point of view are constructed. Other expected outcomes of this section are the characteristics of PATIO towards social network, as well as the functionality of the PATIO system and the priority of the relevant functions from end user point of view.

The third section of PATIO case study is carried out through the participant-observation, namely observing how PATIO system is working by participating in the real testing activities with the role of the system administrator. By this way, distinct with end user, the system is further explored from another more professional point of view as administrator and developer. Since this role is serve as a bridge between PATIO users and customers, both the needs of system administrator and customers with the using of PATIO system are analyzed.

Next, the studying of existing documents using in PATIO system development is done as the fourth section, which is not independent but running through all the phase of other sections.
Finally, as the result of the sections above, the requirements of PATIO system are expected to be defined, which are served as the fundamental of establishing the online Living Lab community framework later on.

**Figure 9. PATIO Case Study Process**

In brief, the expected outcomes of the PATIO case study contain a set of personas and persona-based scenarios. Furthermore, associating with the characteristics of social media, the eventual goal of PATIO case study is to establish a set of requirements which can be used in the further development and improvement of PATIO system, as well as to be as a guide to set up online community for other Living Labs accordingly. The sources of data with the relationship to the expected outcomes are represented in figure 9.

### 5.2 Online Survey and User Motivations

With the aim of establishing the user requirements of PATIO system, online survey, named PATIO development project survey, was conducted to analyze the behavior and needs of PATIO end users, especially towards the motivations of participating in the testing activities, in order to find out the features which can encourage the participation. Considering that PATIO has end users of both Finnish citizens and other nationalities, the questionnaire was designed in English language and later on translated into Finnish as well. The questionnaire included both close-ended questions (yes/no questions, multiple choices and Likert scales) and open-ended questions for collecting more comments from users.

The questions were designed based on the framework of online participating (Figure 8) in terms of user motivations. The features mentioned in the survey were mainly from three sources: 1) PATIO existing features; 2) Features from other Living Labs online forum, and 3) features from social networks (e.g. Facebook, Twitter). The information which is expected to be collected through the questionnaire, consists of basic user information, for example age, gender, education and occupation; user’s behavior towards PATIO, such as how often user join the testing activities or visit PATIO homepage; user’s experience of using PATIO; evaluation of PATIO sharing function; user motivations of joining the PATIO test activities; comments towards the socializing kind function and rewarding system of PATIO; new features suggestion; as well as few
open-ended questions, which allow users to provide comments and suggestions for the improvement more freely.

After being sent to three users for the pilot testing, the questionnaire was adjusted according to the feedback from pilot testers and the test data analyzing result. Finally, the “PATIO Development Project” was launched in PATIO website to all PATIO users with the main task for answering an online questionnaire in English or Finnish language. (Appendix A) With 535 invitations being sent out, 53 participants enrolled in the activity. Totally 41 questionnaire responses were received, including 7 in English and 34 in Finnish. Among the 41 responses, there were two respondents who answered the questionnaire twice. In this case, only the answer of the later response was included in the results, which means the total valid data amount was 39.

![Figure 10. PATIO development project survey result: User Demographics](image)

Figure 10 is the summary of the basic information of the questionnaire respondents, which shows that the PATIO users are covered with different age ranges and various backgrounds. Within all the responses, about three fourth has been participated at least once in some PATIO testing activities, more than 60% have earned rewards by participating in PATIO activities, and about 67% had recommended PATIO to others (Figure 11).
One of the most important questions in this questionnaire was targeted to find out the motivations of user to join the PATIO testing activities. The question was formulated as “I join test project because”, and the answer options included the factors from different aspects with the scales from strongly agree = 5 to strongly disagree = 1. Figure 12 lists all the motivation factors which were mentioned in the question. Different color of 1 - 5 refers to the answer scales. The numbers shows on left side are the amount of respondents corresponding with each answer scale. From the result can be seen that the “interests” and “involvement in development” are of the most reasons, following by “learning new technology”, “giving feedback” as well as earning “rewards”. On the other hand, “participation of friends” and “meeting people with same interests” are seen as the most irrelevant factors.

**Figure 11.** PATIO development project survey result: User Experience
Figure 12. PATIO development project survey result: User Motivations

Another scaled question, “I would like to post my idea to the project discussion forum, if”, was aiming to understand the factors which could have impact on user’s willingness to post ideas to the online discussion forum. The results from Table 5 show that respondents would be more willing to post ideas in the forum if they “could see my idea used in the new product or service” (mean = 3.90), “could receive feedback during and after the project” (mean = 3.67), and “could gain reward points for it” (mean = 3.49). However, there were also over 25% of the respondents who don’t agree that rewards can motivate them to post more ideas in discussion forum. Besides, the awareness of friends in the discussion forum appears to be not an important factor to increase the willingness of posting in forums.

Table 5. PATIO development project survey result: Idea sharing

(5-Strongly agree; 4-Agree; 3-Neutral; 2-Disagree; 1-Strongly disagree)

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Answer Options</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>Total</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gain points</strong></td>
<td>I could gain reward points for it.</td>
<td>10</td>
<td>11</td>
<td>8</td>
<td>8</td>
<td>2</td>
<td>39</td>
<td>3.49</td>
</tr>
<tr>
<td></td>
<td>Response Percent</td>
<td>25.64</td>
<td>28.21</td>
<td>20.51</td>
<td>20.51</td>
<td>5.13</td>
<td>100.00 %</td>
<td></td>
</tr>
<tr>
<td><strong>Receive feedback</strong></td>
<td>I could receive feedback during and after the project.</td>
<td>7</td>
<td>16</td>
<td>12</td>
<td>4</td>
<td>0</td>
<td>39</td>
<td>3.67</td>
</tr>
<tr>
<td></td>
<td>Response Percent</td>
<td>17.95</td>
<td>41.03</td>
<td>30.77</td>
<td>10.26</td>
<td>0.00</td>
<td>100.00 %</td>
<td></td>
</tr>
<tr>
<td><strong>Use of the suggestions</strong></td>
<td>I could see my idea used in the new product or service.</td>
<td>10</td>
<td>19</td>
<td>6</td>
<td>4</td>
<td>0</td>
<td>39</td>
<td>3.90</td>
</tr>
<tr>
<td></td>
<td>Response Percent</td>
<td>25.64</td>
<td>48.72</td>
<td>15.38</td>
<td>10.26</td>
<td>0.00</td>
<td>100.00 %</td>
<td></td>
</tr>
<tr>
<td><strong>Awareness of friends</strong></td>
<td>I could see my friends also check the discussion forum</td>
<td>1</td>
<td>3</td>
<td>15</td>
<td>9</td>
<td>11</td>
<td>39</td>
<td>2.33</td>
</tr>
<tr>
<td></td>
<td>Response Percent</td>
<td>2.56</td>
<td>7.69</td>
<td>38.46</td>
<td>23.08</td>
<td>28.21</td>
<td>100.00 %</td>
<td></td>
</tr>
</tbody>
</table>
According to these results, in order to motivate PATIO users to be active in the online discussion forum, and post their ideas more often there, besides better rewarding system, PATIO could also make improvement in the aspects of testing activities result sharing and feedback providing.

In this PATIO questionnaire one close-ended question about the new features suggestion was also asked for the end users opinions. Based on the functionality study of other Living Labs online forum, as well as comparing with the functionality of social media like Facebook, three new feature suggestions in terms of improving user involvement were listed: forum email notification, mobile application, and public forum.

Table 6. PATIO development project survey result: New features suggestion

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Answer Options</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>Total</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forum Email notification</td>
<td>I would like to receive an email from the discussion forum, when there is a new post in a thread I have been active.</td>
<td>5</td>
<td>14</td>
<td>11</td>
<td>8</td>
<td>1</td>
<td>39</td>
<td>3,36</td>
</tr>
<tr>
<td>Mobile application</td>
<td>I would like to use PATIO through mobile application.</td>
<td>9</td>
<td>10</td>
<td>6</td>
<td>9</td>
<td>5</td>
<td>39</td>
<td>3,23</td>
</tr>
<tr>
<td>Public forum</td>
<td>If PATIO has a public forum to share the new ideas, I would be interested to participate.</td>
<td>5</td>
<td>9</td>
<td>14</td>
<td>9</td>
<td>2</td>
<td>39</td>
<td>3,15</td>
</tr>
</tbody>
</table>

Same as other questions, the option of new features suggestion question was answered with scales from strongly agree = 5 to strongly disagree = 1. Generally, a positive attitude is showed to all three new features. However, there is also around 23% to 35% disagreement with the possibility of using those new suggested futures in the future. Therefore, the feasibility of the new feature implementations needs to be evaluated both from the PATIO system point of view, as well as taking the PATIO users’ opinions into account. In addition, further study is needed to find out what are the reasons or concerns of the responders to reject those new feature suggestions.

Besides all the closed-end questions, few open-ended questions were also asked in order to provide opportunity of more freely opinions. The open-ended questions were designed from four different aspects of the motivations to participate in PATIO testing activates, improvement of rewarding system, general improvement suggestions, and new feature suggestions in PATIO. The answers of the open-ended questions were then categorized based on the contents and the keyword. Questions and categories are listed below.
Question 18: Which are the aspects that you think would motivate more people to participate in PATIO projects?

- More and wider marketing to create awareness of PATIO
- More testing activities
- Better rewarding system
- Feedback providing
  - Provide feedback during testing
  - Test result summary/usage (benefit for the development) as feedback
- Better user interface
- Mobile use

Question 19: What kind of reward options would you like to see on PATIO? (E.g. free ticket, free gift, etc.)

- Vouchers (Eden ticket, movie ticket, ski-resort ticket, lunch coupon, bus ticket)
- Free gift (related to the project or product)
- Gift card for larger range (sport shop, S/K- group, verkkokauppa.com, etc.)
- Free use of the product or Services been tested
- Most active PATIO-user award

Question 20: Any improvement suggestions for PATIO?

- Marketing
- UX UI improvements
- More activities
- New message notification

Question 21: What features would you like to see in PATIO?

- Search engine
- User friendly applications
- Clear reward list
- Reject proposed project and tell the reason
- Feedback page
- UI improvements

To sum up, through the PATIO development project survey, few key factors which affect the motivations of end users to participate in PATIO testing activities were identified. These factors include both intrinsic motivation of personal interest, product development involvement, learning new things and feedback providing, as well as the extrinsic motivation of rewards. The current PATIO rewarding system is seen with the needs of improvement from both how the function is expressed and the policy regarding to the rewarding. In order to maintain the user engagement, long-term feedback on the further progress of the testing activities is willing to be provided to the end users, which means a better feedback providing system is required. Besides, email notification and public discussion forum with idea sharing are also seen as positive factors of the user engagement.
Another finding from this survey is related to the connecting of PATIO to social networks and the social media kind features implementing in PATIO. The result of the questionnaire indicates that it could encourage users to recommend PATIO to others if there is possibility to connect and share PATIO information to other social networks, and users are able to gain certain rewards by doing so. Moreover, the functions of “follow” others and “like” other’s comments also arouse the interests of the responses during the survey, which is seen as one of the most popular features for most social sites, along with the other frequently-used functionality of multi-media supporting.

5.3 Interview and Persona-based Scenario

Considering of the end users as the major group for using and interacting with PATIO online forum, PATIO end user interview was conducted, in order to further understand user behavior and user needs, as well as to answer the research questions of:

- What are the characteristics of online Living Lab community towards social web?
- What are the primary development requirements of online Living Lab community?

The PATIO end user interview, as part of this research, was carried out with the purpose of re-designing and developing PATIO system in order to provide better services to users. Through the interview it is hoped to hear more opinions and stories from different type of users about the current using of PATIO system. In addition, the attitude of users towards social media, e.g. the using of social media, real-life stories, are also expected to be studied during the interview. The information collected are used to build the user profiles and personas-based scenarios, and furthermore to be used in the feature analysis and system design of Online Living Lab community.

Table 7. PATIO User Interview Guide Topics

<table>
<thead>
<tr>
<th>Topics</th>
<th>Key words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background Information</td>
<td>Occupation, language skill, family, interests, hobbies</td>
</tr>
<tr>
<td></td>
<td>ICT devices usage, skill, experience</td>
</tr>
<tr>
<td>PATIO experience</td>
<td>Activity participating, problems and issues, motivation, rewards, new features</td>
</tr>
<tr>
<td>Social Media experience</td>
<td>Opinion, account usage (social networks, games, etc.), blogging, concerns, comparing with PATIO</td>
</tr>
</tbody>
</table>

As introduced in the research methods section, the PATIO user interview was defined to be semi-constructed with using of the interview guideline. Therefore, a brief script for guidance was written to ensure all essential topics would be covered in each individual
interview. With the aim of building a set of personas, during the data collection through
interview, the information need to be taken into consideration consists of personal
background information, technical information (e.g. knowledge and usage), relationship
information and the information of the opinion towards the interview subject. (Aquino
& Filgueiras, 2005) Accordingly, three main topics were defined for the PATIO
interview. Firstly, the interview started with user to introduce him/herself both generally
about name, age, occupation, education, family, interests, hobbies, etc., and especially
about the knowledge and usage of technology, for example the use and experience with
the ICT products. Secondly, as the primary part of the interview, interviewee was asked
to describe one case of using PATIO system lately, whereby the user behavior are
studied along with the user’s experience and expectation of interacting with PATIO
system. The last part of the interview was mainly focus on user’s opinion about the
social media, by which interviewee could describe real-life stories related to social
media, what kind of influence it brings to nowadays lifestyle, what’s the advantages and
disadvantages, as well as how online Living Labs community could be associated with
social media from user point of view. Table 7 expounds the guide topics and the key
factors of the interview questions. More details about the interview guide are explained
in the interview plan (Appendix B).

Figure 13. PATIO User Interview Process

Figure 13 above illustrates the process of PATIO user interview from preparation to the
interviewing. According to the interview plan, about ten PATIO end users were going to
be selected as the target interviewees. The interview information was announced in
PATIO homepage, where PATIO users can apply to participate in as a testing activity.
Amount all the applicants fourteen users were chose as interview candidates with
different genders, age ranges, education background to enlarge the coverage of users as
much as possible. The interview time and location were agreed with all the interview candidates separately. Eventually, twelve out of fourteen candidates participated in the interview where half of the twelve were from Finland and half from other countries. (Figure 14) The interviews were conducted according to the interview guideline, and the interview contents were recorded and transcribed with the permission of interviewees for the use of PATIO system development and online Living Labs community studies.

![Figure 14. PATIO User Interview General View](image)

**PATIO Personas and Persona-Based Scenarios**

Personas are fictitious identities with the given name, background, skills and goals based on real user characteristics (Aquino & Filgueiras, 2005). In order to make the user data more tangible, a set of personas are generated with the information collected through PATIO user interviews. PATIO personas are narrated with the characteristics of name, age, occupation, education, language skill, interests, family and friends, technical skills, as well as the factors of culture and environment, motivations and attitude, needs and goals, experience and issues. Focusing on these personas, scenarios are described with the context of the relevant activities and behaviors, also the frequency and regulation of usage within a meaningful time slot. (Cooper & Reimann, 2003) PATIO personas and the personas-based scenarios are illuminated as below.
Juho

“I have been living in Oulu since graduated from college.”

“I don’t feel social network is the place for me. I would like to meet my friends face to face sometimes, rather than just chatting and following from internet.”

Juho is 41 years old Finnish man, who has studied both marketing in University of Oulu and computer engineering in Oulu university of applied sciences. Finnish and Swedish are the mother language, besides he also speaks fluent English and a little bit German. Nowadays, he is working in a small Finnish software company in Oulu. Meanwhile, he is managing a start-up company by himself.

Like most Finnish people, he is interested in many sport activities, such as skiing, swimming, hiking, as well as fishing. He has his own car which he uses daily drive to office and other places. At weekend and holiday, he always call his friends to get together.

He has Facebook account, but barely use it. He doesn’t want to waste too much time on suffering internet, especially on social networks. When he wants to contact his friends, he normally just call them with mobile phone, or contact via a mobile application, named What’s Up. Even though many his friends do use social media almost every day, but it wouldn’t bother him. His friends understand why he does so, and he also doesn’t feel be left out.

Although not using Facebook and other social network sites, he does follow some blogs and forums for the news and happenings around the world. He has big interests in the development of the top-end technologies. In those forums, he time to time posts his own opinions and ideas. Moreover he also has continually investment in the stock market.

He sometimes play computer games, including online games. He has noticed that nowadays many games and websites offer opportunity to link or login with social media account, e.g. Facebook account. But he would prefer to create a new account for each different purpose, instead of using same one everywhere. Although he may need to remember many different accounts and passwords for different logins, it’s not a problem for him. Especially with nowadays technology, account information can be remember by machine automatically, and found back quite easily in case of forgetting password.
Maria

“I don’t have so much my own time sitting in front of computer at home, since I have small children who want to play with me all the time.”

“I don’t know so much about the high-tech or gaming stuffs, but it’s always good to have free movie tickets.”

Maria is 32 years old Finnish mother with two small children. She loves music, movies and dancing. She also likes shopping, even though nowadays when needing to take care of children at weekend, she doesn’t have so much of her own free time. She used to work in Bank before. Lately she just got her Master’s degree and currently is working as a research assistant in university.

Finnish is her mother language which she uses mostly every day, but sometimes English is also needed especially in her work. Maria and her family live in their own house near city center. Her husband takes children to daycare and go to work by car. Normally she goes to office by bus.

She has an Android mobile phone and a laptop just for daily use. She uses her laptop most of time for study and work. Besides, mobile phone is also very important and convenient for her to either check email or browser internet anytime anywhere. In addition, as she enjoys sharing the daily happenings with her friends through internet, she also quite often takes pictures with her mobile phone, and then posts them to social media, e.g. Facebook and Instagram.

When having free time, she often participates in different kind of online customer survey, for example M3Panel, where she gives opinion or feedback to certain products or services, and same time gain some rewards like supermarket coupons, movie tickets, lotto tickets, etc. She doesn’t resist trying new technologies, even she doesn’t have so deep understand of those. On the other hand, she more cares about the development of the city, especially things related to children benefits, educational system and public facilities.

She has noticed lately that her children start to be keen on using digital devices like mobile tablet or computer to watch cartoon and play games. This makes her feel struggling, since she cannot be sure that if it’s a good thing for child to start using digital devices from this young age.
Yasir

“This is my second year of study in Oulu University. Life here is so different comparing to my home country, but luckily I always have friends can get together.”

“I like all things about technologies. It’s my study, my work and my hobby.”

Yasir is a 25 years old master student of electrical engineering in Oulu University. He is from Pakistan and has been living in Oulu for about two years. He lives in the student apartment next to the university campus, which is about a ten-minute walk distance to campus. He is keen to technical stuff, especially everything about hardware devices, and could spend lots of time on it. For him repairing a broken machine is more like a fun hobby than a time-consuming task.

In weekday he spends most of the time in campus either attending courses or just studying in library. At weekend, he likes to hang out with his friends, many of whom are also students from Pakistan. They get together to share the experience and information about the life and study abroad, as well as news happened in hometown.

Besides his mother language, he mostly uses English for his study and everyday life in Oulu. He had attended the Finnish survival level course in the first year of his Master study, but still barely can say just “hello” and “thanks” in Finnish. This language issue sometimes bothers him, for instance when he needs find some food in supermarket or when he has to use some social public services where most information are only offered in Finnish. He has noticed that even though many Finnish web sites have a page in English, but the information in English page is always quite brief and lack of more details comparing with the Finnish pages.

Like most young generation nowadays, he spends quite long time every day on social networks, where he could follow and comment the latest news happened in his home country. Thanks to social media, it’s much easier for him to keep closely contact with his friends at hometown even he is currently living in a country far from there.

Scenario 1:

Juho arrives office in the early morning. He makes himself a cup of coffee and starts to check email. He notices that there is a new email from PATIO with subject of 3D Game Testing, which sounds quite interesting. He opens the email and finds out that it is an invitation for him to join the coming new testing activity in PATIO. Since Juho is always interested in the new technology, especially in gaming area, he thinks maybe it would be nice to participate in this test event. Therefore, he clicks on the link in the email to check more details.

The link opens the 3D Game Testing activity page in PATIO site, but it needs a user login to show more information. Juho cannot remember his login password. Luckily it could be reset through email. After giving his email address, instantly he gets an email
from PATIO system with the reset password. Juho logs in to the PATIO and changes the password of his own. Then he finds the same invitation which has been sent to him by email. After read more information of this 3D game testing activity, he knows that this activity will happen after two weeks and it needs an onsite test, which means he has to go somewhere physically for the testing. But it wouldn’t be a problem for him, so he accepts the invitation to join it.

Morning email reading time gets over with the coffee. Juho starts to focus on the work. It is a busy day again as usual. Later afternoon, he gets another email from PATIO to agree with him the testing schedule. Juho checks his calendar of the week when the activity will be hold, and finds out Thursday morning of that week would be good time for him. He provides the time proposal to the PATIO moderator, and later be informed that the time is accepted, which could also be changed or canceled day before in case of any emerging issue. Setting down the testing even time and location, he instantly puts the reminder in his phone, so it would not be forgot after two weeks.

Scenario 2:

Maria always likes to surf the internet with her mobile phone during the lunch break. She reads the news from Kaleva website first, then goes to M3Panel, but she doesn’t find any new customer survey open for now. It comes to her mind that she has received email from PATIO about some new activity few days ago, but she cannot find that email any more. So she goes to PATIO homepage to see if she can find what that activity is. Thanks to connect her Facebook to PATIO account not long ago, Maria now can login to the system with her Facebook account. After login to the system, she first checks how much reward points she has now, and finds out that after the activity last time, she already has enough points for a movie ticket. Thus she redeems the movie ticket with the required points. From the ongoing activity list, she finds one activity of local city development which includes an online survey and some online discussion in the activity forum. “Ahaa, seems our city is planning some new development currently. I could participate in this one with my free time,” Maria says. She sends the membership requirement to join the online forum and survey. Meanwhile, she thinks that it would be nice to let more people know about this activity, especially for those who also want to provide opinions and suggestions for the development of our city. Therefore, she shared this activity to Facebook. Lunch break time is ending soon. Maria now need get back to her work.

On the way home, when Maria checks her email again via her mobile phone, she noticed that her request to membership of the online activity in PATIO has been approved. She opens the link to read more detail, but then notices that her phone is too small for answering the survey. She decides that she will continue to finish the survey tomorrow in her lunch break.

Scenario 3:

It’s 16:00 now. Yasir steps out from the university lecture room, where his last course of today is just ended, and now he can have a little relaxing before thinking about the homework. He has agreed with one fellow to have dinner together in the university canteen at 17:00. There is still hour time, so he comes to the computer room in campus, and login to his Facebook to check any news or interest things happened today. There his classmates are inviting him to the party this weekend. Yasir likes to go out with friends, which is always a good way to spend the dart time of Finnish winter. He accepted the invitation from Facebook Event. Back to the activity page, Yasir sees a
wedding picture of his friend from home town. He instantly comments the pictures with his greetings and blessings.

Browsing the Facebook, one post about 3D Game Testing gets Yasir’s interest. That is a shared link from one university friend, and the link opens a web page named PATIO, where shows detail description about this 3D Game Testing activity. Quickly read through the information from the page, he gets even more interested of this game testing. Yasir looks at the watch, and there is still time before he needs to go dinner with friend. In order to participate in this 3D Game Testing activity, he firstly registers to PATIO system, then sends the membership requirement. He also finds another ongoing activity from the list about the city development, but that one is only in Finnish language, so it is not for him. Waiting for a while, Yasir doesn’t receive any email from PATIO for his membership applying. “Maybe I will check again tomorrow” he thinks. Then he leaves the computer room and heads to the canteen. When having dinner with friend, Yasir talks about the game testing and this PATIO website he finds today, which also attracts his friend. “No problem, I will share you the link from Facebook later today, so you can apply to join as well if you are interested in it.” Yasir says to his friend.

**Findings and evaluations**

With the descriptions of PATIO users and their experience in the interview, motivations of them to participate in the test activities, for instance the onsite activities of field test or workshop, are revealed. Most interviewees expressed that they choose the test activity based on interests, instead of the rewards, e.g. “I am proud if some of my suggestions are realized in the final product”. But there are also interviewees clearly point out that they participate in the activities just for the movie ticket and rewards points, e.g. “Frankly, I come here just for the movie ticket”. One big motivation for users attending field tests (onsite activities) in the Lab since they want to see new things, test the latest technologies, and provide own suggestions. For example, many mentioned the 3D Game Project and one 3D Mobile Projector project they had tested, which are all interesting and worth to try.

Almost all interviewees have attended some kinds of field testing activities in OULLabs. Out of all the interviewees, only one mentioned that he/she had missed the field testing once, since the system sent her the reminder too earlier (about week or 2 weeks ago), and in the week testing activity was arranged, she already forgot it. But later they managed to rearrange the time again.

Even though many interviewees claimed that they do not seen rewards as the main reason for them to join PATIO activities, most of them have used the PATIO system to redeem rewards. Some commented that “the current rewarding system works quite fine”, while the others suggested that it would be nice to have more reward methods, for instance some kind of online shopping.

When mentioned about the participation of the onsite activities, especially individual field testing, some interviewees expressed the issues emerged during confirming the time and location of the activity. Thereby, calendar with the activity information, including time, location, reminder, and cancellation, is showed to be a promising function of the PATIO system. Besides, in order to communicate with the activity arranger (e.g. PATIO moderator), online chatting tool was also suggested by the PATIO users as one efficient way comparing with email sending.
Idea sharing was also discussed during the interview. Over half interviewees show their interests in the idea sharing function, e.g. an idea sharing wall, and are willing to share their ideas with others via PATIO. But there was also one interviewee who made it clear that he/she has no interest and will not use this kind of feature. Some suggested that even the idea sharing can be implemented as public forum, comparing with the private PATIO activities where membership is required, idea management is still necessary especially considering of the privacy issues, e.g. “share with everyone or only friends”, idea quality, e.g. “to avoid pointless ideas”, IPR policy, and how the ideas will be processed and followed afterwards.

In addition, with the increasingly use of mobile devices nowadays, the PATIO system is found out to be problematic to use on mobile devices. Thus, two suggestions are indicated during the interview. One is to develop the separate mobile application, which has the advantage of easy to login and use, and the disadvantage of multi-platform supporting. Another solution could be the mobile version website to fit for the mobile devices with small and/or touch screen.

**Associate with Social Media**

Most of the interviewees have one or few different social media accounts, e.g. Facebook, Google+, LinkedIn, etc., where more than half of them are frequently active, even it is admitted to be time-consuming. Some interviewees expressed that nowadays they quite often use social media account (e.g. Facebook, Google+) to login other places, such as some websites, games or online applications. It is seen to be easy for both login and share information with other friends. However, there are also others who would prefer not link social media account to another internet usage with the considering of protecting personal information and other security issues.

Different social media sites are used with various purposes. Facebook is more for personal life sharing, while LinkedIn is seen to be more professional. Instagram has the focus mostly around the photo posting, while What’s Up is more used for messaging and chatting. From this point of view, with the primary goal of collect opinions from user, PATIO is described with both the similarities and the differentiations comparing to other social media sites. Some interviewees mentioned that the personal profile, message and notification, comment and reply, “Like” and share are social media kind of features which are familiar and easy to use for them. On the other hand, others look PATIO in different way of more focusing on the participation and opinion providing of the testing activities, as well as on the outcomes of them, instead of building personal relationship with other users or using some “childish” features.

Table 8 below presents the characteristics of PATIO towards social network based on Table 1 from chapter 4. The goal of PATIO is also the relation based on individual interests of certain topics with either intrinsic or extrinsic motivations. The duration of the PATIO online forum discussion is mostly based on the schedule of activities, which means the topics are opened with a predefined discussion time duration. Similar as other social networks, trust, responsibility, and technological skills are the key factors of PATIO communication, along with the share and evaluation, feedback and contribution, as well as involvement in terms of real-life context activity participation.
Table 8. Characteristics of PATIO towards social network (Based on Table 1)

<table>
<thead>
<tr>
<th></th>
<th>Social network</th>
<th>PATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal</strong></td>
<td>Relation based on individual interests, argument, face to specific topics; diversity and differentiation of participating interests and motivations</td>
<td>Relation based on individual interests of specific topics; Various interests (e.g. new technology, new products and/or services) and motivations</td>
</tr>
<tr>
<td><strong>Belonging</strong></td>
<td>Spontaneous and autonomous motivation</td>
<td>intrinsic and extrinsic motivation</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>Not defined</td>
<td>Different duration based on the activity schedule</td>
</tr>
<tr>
<td><strong>Cohesion and enabling factors</strong></td>
<td>Trust and reputations, responsibility, technological skills, socially spread self-examination and evaluation</td>
<td>Trust and responsibility, technological skills, share and evaluation, feedback and contribution, involvement.</td>
</tr>
<tr>
<td></td>
<td>Type of relation: share/evaluate</td>
<td>Real life context</td>
</tr>
</tbody>
</table>

**Functionality of PATIO for End User**

The functionality of the PATIO system and the priority of the relevant functions from end users points of view are shown in Table 9, where indicates that even some functions are in higher priority for end users, but they are not supported or fully supported by PATIO yet. These could be seen as the direction of the further development and improvement for PATIO.

One of this function is related to the event calendar. According to the experience of end users, there is sometimes problem with the onsite testing (event) time arranging. It often takes time to agree the testing time with moderator due to lack of an effective supporting tool. Consequently, an easy-to-use calendar tool with the supported features of time arranging and reminding shows its necessity.

There are also functions which are currently only partly supported by PATIO. For example, the online survey is implemented with the solution of embedded online survey tools, which has the advantages of flexible and adaptable, meanwhile also has the risk of inconsistent user experience caused by different embedded tools using in one system. From end users points of view, the priority of this survey tool function for PATIO is seen as a medium level. However, the priority might be higher for customers and researchers, with the concerning of the method for data collection and analysis, as well as report generation.
Table 9. Functionality and priority of the PATIO system for end user

<table>
<thead>
<tr>
<th>Functionality</th>
<th>Priority</th>
<th>PATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Login</td>
<td>High</td>
<td>Supported</td>
</tr>
<tr>
<td>Personal profile</td>
<td>High</td>
<td>Supported</td>
</tr>
<tr>
<td>Private Forum/Group Forum</td>
<td>High</td>
<td>Supported</td>
</tr>
<tr>
<td>Comment and reply</td>
<td>High</td>
<td>Supported</td>
</tr>
<tr>
<td>Rewarding system</td>
<td>High</td>
<td>Supported</td>
</tr>
<tr>
<td>Notification (onsite, via email)</td>
<td>High</td>
<td>Supported</td>
</tr>
<tr>
<td>Localization</td>
<td>High</td>
<td>Supported</td>
</tr>
<tr>
<td>Event Calendar with online scheduling</td>
<td>High</td>
<td>Not Supported</td>
</tr>
<tr>
<td>Share</td>
<td>Medium</td>
<td>Supported</td>
</tr>
<tr>
<td>Like / Dislike</td>
<td>Medium</td>
<td>Supported</td>
</tr>
<tr>
<td>Email and Message</td>
<td>Medium</td>
<td>Partly Supported</td>
</tr>
<tr>
<td>Online Survey</td>
<td>Medium</td>
<td>Partly Supported</td>
</tr>
<tr>
<td>Public forum (Idea share)</td>
<td>Medium</td>
<td>Partly Supported</td>
</tr>
<tr>
<td>Follow Activity</td>
<td>Medium</td>
<td>Not Supported</td>
</tr>
<tr>
<td>Mobile APP</td>
<td>Low</td>
<td>Not Supported</td>
</tr>
<tr>
<td>Search</td>
<td>Low</td>
<td>Not Supported</td>
</tr>
<tr>
<td>Online Chat</td>
<td>Low</td>
<td>Not Supported</td>
</tr>
</tbody>
</table>

5.4 PATIO Participant-Observation

With the purpose of deeper system study and analysis, participant-observation was conducted for the PATIO case study through taking the role of system administrator, namely the working process was observed by monitoring the whole lifecycle of the PATIO activities, from the user recruiting to the result summarizing. The working process normally is slightly adjusted based on the different needs of the activity. For example, some activities need only online forum discussion, then the primary moderator work is focusing on the topic guiding and the interaction with test users in the forum. Besides, the online survey and diary are generated based on the requirements of the activity. In addition, some other activities need not only the online discussion but also the field testing arranged in certain location, thus the activity time and location
scheduling also need to be agreed accordingly by the activity moderator via PATIO system.

System Administrator and Moderator Needs

As mentioned in previous section, the PATIO interview was announced in PATIO system as one onsite testing activity for users to participate in. Since the current PATIO does not support event online arranging, interview time schedule was agreed with users individually via email and other online scheduling tool (e.g., Doodle). During the PATIO interview, one user cancelled the interview about week before, due to schedule conflict. While another user had booked the time, but didn’t show up either in the agreed day or the rearranged day. To make the event arranging work more efficient, as well as to better manage the event process, an “Event Calendar” could match the needs with the functionality of event (e.g. onsite activity) registering, online time scheduling, event reminding, messaging, and history tracking (to record the event history and no-reason cancelation).

Another requirement also shows its importance during the observation, which is the media management both for the online forum and diary. For example, when the online discussion is based on certain image or video, or when the users are required to post pictures in their diary, an easier and more convenient way to manage the media would fit the need for PATIO activity moderator.

Different with the autonomous of most social networks, PATIO testing activities, for instance online group discussion forum, often have the need to be monitored. Therefore, system administrators and/or moderators demand to be able to active the functionality of activity management, including providing the description, setting up the time duration, managing the membership, guiding the forum topic, as well as generating the online survey or diary if needed. In addition, with the purpose of testing and developing, it is also essential to summarize the activity data and report the result for the further learning and researching. Figure 15 illustrates the functionality of activity management for the PATIO system administrator.
As mentioned earlier, the activities conducted through PATIO are with all different kinds of purposes, such as for public services development, company product development, new technology study, as well as user behavior study. PATIO is seen not just an online community system, but more like a platform and channel to get connected with end users. Therefore, besides the end users, another important role in PATIO system is the customers and/or partners who have the needs of testing their products and services, as well as collecting data and opinions within a real-life context. These customers and partners of PATIO could be the organization of companies, cities, and universities.

Based on the activities taken place at PATIO, the needs of customers and partners are considered from the factors of purpose, type, duration, method, and result. The purpose refers to the targets of the activity, which could be marketing, developing, testing, and information collecting (e.g. ideas, suggestions, and feedback). Language used for the activity is also need to be considered on the basis of target users’ profile. PATIO system currently supports both Finnish and English language. The activity need to be able to set for in Finish or in English or with both language. For the type of activity, considering of the security and information protecting issues, some are shown as public for everyone, while others prefer to be private, which means a system login and membership request are needed. Activity duration is also based on the schedule of customer project. Besides the preparation time, the activities can last either a short term of few days or a long term of year. Depending on the needs of customers, the method of information collection with the activity is also various, which could be online, onsite, forum discussion, survey, diary, and other methods. Finally the result of the activity is able to be presented as a data analysis or an overall report according to the needs. In addition, with the
permission, these data and information could be the input study for not only the product and service development but also for the researching and learning purpose.

**System Implementation Needs**

Last but not least, the choosing of the system platform for PATIO further development needs to be considered based on the needs from different roles of user, system administrator, customer and partner. The possibility and flexibility of the requirements implementation and system developing, the feasibility of multi-devices support (e.g. PC, mobile devices), as well as the efficiency of system upgrading and maintaining should be taken into account. Deeper study is not included in this paper, but it should not be ignored.

5.5 **User of the Existing Documents**

The studying of existing documents for PATIO system development is used within all three sections above. The organizational level documents were studied for better understand the policy and working process of OULLabs and PATIO. The system definition, development plan and system requirements documents were used for PATIO functionality analysis.

Specifically PATIO system requirements document was used in both comparing with the functionality of other similar Living Labs and with that of social networks. Even though the comparison of PATIO with other Finnish Living Labs (Appendix C) is not completely comprehensive, since PATIO is a Living Lab online community as part of OULLabs, while others more tend to be open web innovation Living Labs, e.g. Owela. The purpose of this comparison is to have an overview of the functionalities, and find out the relevant features of online forum discussion, idea sharing, and contributing to online community, which help in development of PATIO in terms of user involvement and engagement. The result was served as the initial inputting source for the PATIO user motivation online survey.

Table 10 describes the comparison of PATIO functionality with the supporting functions of few well-known social network sites. The results from both PATIO interview of end user, and the participant-observation as PATIO system administrator indicate the needs of media management, event calendar, email and message, which are not fully supported by PATIO currently. These also in certain level match with the social network functions of picture management, event plan and instant message. Meanwhile, there are also some other social network features which are not included in PATIO, such as status management, network management and blog. These features have the same characteristic of personal representation and relationship build-up. The related opinions are also collected during both PATIO online survey and user interview. The motivation of user to participate in PATIO activities tend to be more interest based rather than self-presenting and networking, namely it is not expected to make friends via PATIO from user point of view, therefore those related features are seen as much lower priority.
Table 10. Supporting functions of social network sites (Anderson, 2011)

<table>
<thead>
<tr>
<th></th>
<th>Facebook</th>
<th>Myspace</th>
<th>LinkedIn</th>
<th>YouTube</th>
<th>PATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Comment Wall</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Picture Management</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Email</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>IM</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Status Management</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommend System</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Event Plan</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network Management*</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Group Management</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Blog</td>
<td>x</td>
<td>x</td>
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<td></td>
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<tr>
<td>Video</td>
<td>x</td>
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<td>Search</td>
<td>x</td>
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<td>x</td>
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<td>x</td>
</tr>
</tbody>
</table>

*Network management refers to add and delete friends by user.

5.6 Online Living Lab Community Requirements Establishing

To summarize the results from the PATIO case study, with the goal of PATIO system further development and improvement, the primary system requirements of PATIO are established with the different needs from the aspects of end user, testing activity, moderator and administrator, customer and partner, as well as the system.

The requirements related to end users contain both the basic user functions, and the functions in terms of user motivation. Basic user functions refer to registration and login, user profile, and other user settings. The functions to motivate user participate in PATIO emphasize the user involvement, feedback, interaction, idea sharing and rewarding. Test activity as one of the main application in PATIO system need to have the functions of discussion forum for the online practices, and the event arrangement.
feature for the onsite activity arrangement. Comparing with the more target-oriented and structured online forum for the testing activities, the idea sharing feature represents to a more open environment, where users and/or customers are able to leave their ideas to discuss with others as well as to collect opinions and suggestions. This feature requires not only simply an open forum to post ideas, but also the thoughtful policy and procedure, in order to support the ideas to be processed more smoothly and meaningfully.

From the system moderator and administrator points of view, with the aim of getting end user involved and fulfil the needs of customers, PATIO system need to have the functionalities of user management, activity management, media management, as well as rewards management, in which activity management as the most important part has been described with more details in Figure 15.

PATIO’s customers and partners can be all kinds of organizations with the need of products and services testing in a real-life environment with end user involved. The primary requirements of PATIO system should be in line with the expectation of the customers. Depends on the willing of customer, to get end user involved, function to support the marketing purpose should be considered into PATIO system. The method of data collection through testing activity is required to be easy to use for customer, for example embedded online survey, diary creating and following. Furthermore, the outcomes generated from the activities are also expected to be reported by PATIO system automatically for the customers.

Finally, focusing on the system itself, to further develop and improve PATIO as not just a system but an online Living Lab environment, there are also requirements need to be taking into consideration. PATIO system is developed based on English language, and currently supports also Finnish due to most customers are from Finland at present. However, in order to bring PATIO to the international environment, system localization to support multilingual site is also needed. Wordpress as one powerful website creating tool have the advantage of cost-free, easy to use and mention, social media function empowered, as well as functional flexibility with numerous of free or paid themes and plugins. From this perspective, Wordpress meet the requirements what PATIO system development need currently. However, the disadvantage of open source also cannot be slighted, such as the reliability of the plugins, the degree of customizations, and so on. Another requirement related to PATIO system is the mobile application, which allows user to login to PATIO system, and use PATIO with same experience as that of the web-based system but in a mobile devices with much smaller screen.
6. Discussion and implications

6.1 Research Question

Research Question 1

With the aim to develop online Living Lab community, a case study of PATIO system was conducted in this study. The data was collected through different sources including user motivation survey, user modelling interview, system observation, and using of existing organization documents. With the analysis of the data, the characteristics of PATIO comparing with social network were described, meanwhile the requirements of PATIO system development and improvement are generated. Accordingly the research questions of this study are answered as below.

- What are the characteristics of online Living Lab community towards social web?

Professor Oinas-Kukkonen (2013) expounds the power of social web in terms of user-centered innovation. Beyond needs of the software technologies using in the service building, the participation of individuals, especially for the motivation and activeness, also cannot be neglected. The interests and needs of users are required to be fulfilled with the software environment in order to keep them stay and contribute. Social web has it’s characteristics of such to encourage the involvement of users, which is seen as a software platform with the promising user experience for the development of business. (Oinas-Kukkonen & Oinas-Kukkonen, 2013)

![Figure 16. Characteristics of Online Living Labs Community towards Social Media](image-url)
The online Living Lab community with the goal of user involved development and testing for products and services has its similarities to other social media, such as Facebook, Google+, but it also has its own characteristics concerning the target and process of Living Labs. These similarities and differences is illustrated in Figure 16. Online Living Lab community as other social media has the characteristics of user based where the motivation and activeness of participation matters concerning of the continuation and feedback provided by end users. Both Living Lab community and social media are the opened community-driven environment which tend to build upon the trust and reputation. The community is gathered based on the common interests such as new technologies, new products, gaming industry, and public service development. Individuals are expected to interact with the system in order to join and contribute to the community.

However, online Living Lab community cannot be seen as exactly same as social media, or say it cannot be replaced by social media. The user-led contents of social media are normally unstructured, while the contents of online Living Lab community is more based on the testing activities with structured process and schedule, which are conducted according to the purpose and expected outcomes from the Living Lab activities. These activity goal and target group are often defined by the customers or researchers depending on their needs. The case study of PATIO shows from different system roles’ (e.g. end user, system administrator, and customer) points of views that, the relationship between end users each other is not the emphasis of Living Lab community. Rather than the response from other users, the feedback and further information from the testing activities are seen as more important for the end users. Another significant difference of online Living Lab community and social media is that the former emphasizes the testing environment of real-life based, while the latter is more seen as a virtual world where people may or may not represent themselves with the real identity. Accordingly, for the sake of building up an online community to better serve the Living Labs, the characters of above associated with social media need to be considered thoughtfully.

Research Question 2

After clarifying the characteristics of online Living Lab community, the primary development requirements are able to be established, which answers the second research question of this study:

- What are the primary development requirements of online Living Lab community?

The requirements of establishing online Living Lab community are considered from three general parts of role, tasks and system with several aspects in each part. Firstly, from the aspect of different roles acting in the system, the requirements for the end user include both basic functions and the functionality related to the user motivations. For the system administrator role, management of the function divisions are that of user management, activity management, media management, and rewards management, where activity management is seen as the most critical element. Differ from the first two roles, customers and partners with the purpose of testing and developing their products and services are more care about the impacts and results which come out from the system, therefore the requirements of such need to be considered from the marketing, information collecting and reporting prospects.
Second part of the requirements is focusing on the actions and tasks which take place in the online Living Lab community. As OULLabs and many other Living Labs, one of the primary tasks is to conduct the testing in a real-life based environment, which leads to the requirements of testing activity for the online community so as to support the Living Labs. In addition, to support the openness of innovation, functionality of idea sharing is necessary to be pondered, where includes not only the idea management but also a thoughtful process and policy to motivate and support the positive idea development.

![Diagram of Primary Development Requirements of Online Living Lab Community](image)

**Figure 17.** The Primary Development Requirements of Online Living Lab Community

Last but not least is the requirements of the system from a generally point of view. Basically, the online Living Lab community is established upon a web-based platform. The choosing of the platform and software to develop such online community needs to take all the circumstances of different roles and actions into account. As the answer of the first research question expounds, that the online Living Lab community has its similarities with social web. Hence it is wise to analyze the feasibility of the chosen platform for developing the social media kind online community with its own needed functionalities. In addition, with the rapid development of the mobile devices nowadays, the mobile application for supporting the Living Lab community is also listed in the requirements. However, since there are different roles in the system, how this is handled with the mobile application, for both the UI and content, should be thought over.
carefully. The online Living Lab community is seen as not only a system but also an environment which connect the end users, developers, companies and researchers together in terms of the user-centered innovation. For applying to various creations and innovations, it is required to have the flexibility of both functionality and localization.

6.2 Implications

Through literature review of Living Lab, comprising of the concept, framework, key components and the process, associating with the attributes of social network, a framework of online Living Lab community was initialized in chapter 3. Furthermore, the case study of PATIO, as the online forum of OULLabs, was carried out. With answering the research questions, this paper achieves the results of analyzing the characteristics of online Living Lab community towards social network, and providing the primary requirements of developing such online community. Accordingly, the framework of online Living Lab community is revised and refined. Figure 18 illustrates the refined online Living Lab community framework.

![Refined Online Living Lab Community Framework](image)

Comparing with the initial version, the main structure remains same in the refined framework, where different roles of the system reflect each direction of the triangulation framework. However, the factors under each roles are amended based on the composition of the primary requirements. For instance, user profile and motivation are highlighted out from user participation and involvement. From platform point of view, system developers and system administrators are separated with more detail tasks.
The position of researcher role is rearranged in the refined framework from more close to platform and user to in between the platform (system moderator) and customers (companies and partners). Since through case of PATIO, it has been found out that the researcher might have the needs of both system moderator and the companies as customers, especially in terms of the data collecting, analysis and result representing. The position of researchers could incline to either side with different research purpose and expected result, for example the interaction and discussion with end users from online forum, or the data collecting and analysis from online survey and so on.

In generally, with ground theory as the methodology of this paper, through the case study of PATIO, the existing categories of Living Lab concept is fulfilled with the additional data from various sources, where the framework of online Living Lab community is established and refined. The online Living Lab community framework provides a guideline of the system development, where points out the basic requirements what should be taking into consider when developing the social community in Living Lab. However, this does not means that all Living Labs have to set up own online community platform in order to attract end user to participate in. The comparison for characteristics of online Living Lab community towards social network is conducted in this study, which allows Living Labs to choose the suitable solution comparing with the characters of their own. The framework can be used to assess whether a Living Lab should develop own platform or adopt ready social media with certain features, so as to not only involve the end users but also satisfy the customers with the expected outcomes. Either of these solutions has its own advantages and disadvantages, thus the benefit and cost of each need to be evaluated thoughtfully beforehand.

It need to be always kept in mind that besides the suitability and feasibility of the technologies using for the system developing, the people and their interactions with the system are also essential. With the online Living Lab community framework as an overview, the consideration of the platform technology, the requirements from different roles, as well as the process of Living Lab actions are illustrated.

Moreover, Living Labs have no need to implement all of the requirements listed above for the online community development, but to develop a software platform with their own demands, as well as to be flexible to provide the Living Lab as a service accordingly. Thus, SMEs as one of the target customer groups of such service (Feurstein;Hesmer;Hribernik;Thoben; & Schumacher, 2008), are easier to be involved, together with the end users, in the online Living Lab community environment with better experience of user-centered innovation.
7. Conclusions

The goal of this research was by analyzing the characteristics towards social network, to establish the primary requirements of online Living Lab community, and furthermore to generate the framework of developing such online community platform. A qualitative case study of PATIO was conducted in this paper, where also included the quantitative data analysis of PATIO user motivation survey as the input of the user modelling interview. The contributions and limitations of the study are summarized in the section below along with the direction of the future studies.

7.1 Contribution

From the literature review of Living Labs, the concept and framework of Living Lab were reviewed in this paper. The keywords of user-centered innovation, ICT development and real-life contexts were highlighted as the characteristics of Living Labs. The study of online Living Lab online community was extended based on the case of PATIO. From PATIO user motivation survey, the factors and related functionalities, which could influence users’ participation of Living Lab activities were pointed out. Furthermore, with the data gathered from PATIO user modeling interview, the persona and scenarios were generated (Faily & Flechais, 2011), which were served as the sources of establishing the primary requirements for online Living Lab community. Meanwhile the user’s attitude towards social network, as well as the characteristics of online Living Lab community comparing with social media was also analyzed from end user point of view based on the information collected from the interview.

Personas help to better understand PATIO end users and their contexts, which benefit both the improvement of PATIO and the PATIO customers in terms of user-centered development. However, the risk of personas is also need to be aware, that is to say the challenge of creating the right personas and the reuse of personas. (Grudin & Pruitt, 2002) Furtherly, with the fabricated settings, PATIO persona-based scenarios were created, from which the functionalities of PATIO online Living Lab community and the corresponding priorities were listed out.

Another contribution of this paper is that the requirements of the online Living Lab community development were analyzed from different stakeholder points of view. For instance, besides the focus on end users’ requirements, through participation-observation, this paper also indicated the need for system administrator, who is seen as the key role to manage and control the process of Living Lab activities happened via the online community. These needs include the management of users, activities, contents as well as the rewarding system. In addition, the needs from customers of Living Labs, namely companies and partners, were also considered with their purpose and expectation of using Living Lab services.

Finally, with the answering two research questions, this paper reached the goal of building up the framework of Living Lab online community, to server all kind of Living Lab, for products and services testing with user involved in a real-life environment.
7.2 Limitations

Besides the contributions mentioned above, this research also has its limitations. Firstly, the analysis of online Living Lab community and that of the data collecting were mainly focus on one case study. Even though the data was collected through various sources with different research methods, there is still risk of incomprehensive, especially concerning that the sampling of both survey and interview were only from PATIO user poll. Secondly, since PATIO is the system used by OULLabs, which is from city of Oulu in Finland, the impacts of Nordic culture to the innovation process, system development and the social network were not discussed in this paper, which actually have the possibility to influence the characteristics of online Living Lab community. Therefore, to adapt the online Living Lab community framework to a wider region of European, or even globally, besides the localization requirement mentioned in this paper, culture factors are also need to be concerned accordingly.

At last, the research emphases was mostly focused on the end users and system administrator. There was briefly mentioned about the customer’s role in the online Living Lab community platform, but the deeper study of other stakeholders, including both companies and partners as customers, as well as the researchers, is lack of, especially considering of the business value with online Living Lab community generated to the customers, also the benefit of knowledge accumulating and reusing brought to researchers (Zaaiman & Vuuren, 2009).

7.3 Further study

The triangulation framework of the online Living Lab community shows three related dimensions of platform, business value and user experience with four main roles involved in the whole environment. In this research, the analysis of the platform requirements was carried out in detail from the end user and system administrator points of view. However, the study should not end up to here. Some possible future research directions are suggested as below from the needs of the roles, business creations and technical development fields.

First is the further analysis of the customer needs, especially considering of the impacts and benefits of the online Living Lab community development to the SMEs innovation in terms of the resource and cost (Ståhlbröst & Holst, 2012), user involvement, knowledge management, and the business creation (Oinas-Kukkonen & Oinas-Kukkonen, 2013). Another direction is from researcher point of view, to find out the method to reuse the user pool and knowledge pool generated with the online community to better serve the Living Labs (Zaaiman & Vuuren, 2009).

The literature review of technologies, knowledge and innovation in an international business environment represents the concepts and the importance of these three (Andersson;Dasí;Mudambi;& Pedersen, 2016). Along with this direction, future researches of online Living Lab community could be focused on the development and challenges of technologies, the management of knowledge pool and knowledge process, as well as the integration of those two into the online community as an innovation environment of the Living Labs for business development both locally and globally.
In addition, focusing on the technology area, the concept of web 3.0 (Rudman & Bruwer, 2016) was mentioned in this paper but not expended in discussion. Therefore, feasibility and benefits of adopting web 3.0 to online Living Lab community development, as well as the challenges of its implementation also have the needs to be further studied in detail.
References


Appendix A. PATIO User Motivation Survey

Project name: PATIO Development Project (PATIO Kehitysprojekti)
Short Description: Improvement of PATIO (www.patiolla.fi) is underway. You have an opportunity to participate in the development of the new PATIO to best meet your needs.

Detail Description: Improvement of PATIO (www.patiolla.fi) is underway. You have an opportunity to participate in the development of the new PATIO to best meet your needs. This survey is for PATIO users and it aims to help in the improvement for the new PATIO. The survey will take you approximately 15-20 mins to complete. You will get 200 reward points by participating this survey. Your opinion is important.

1. Please fill the information below for reward in PATIO:
   PATIO username: __________________
   Email address: __________________

2. I have heard about PATIO via:
   □ Event
   □ Friend
   □ Advertisement
   □ Other website
   □ Search engine (e.g. Google)
   □ Newspaper or Magazine
   □ Other, where? __________________

3. I have participated at least once in some project in PATIO.
   □ Yes □ No

4. I visit PATIO home page regularly.
   □ Yes □ No

5. I have recommended PATIO to others.
   □ Yes □ No

6. I have earned reward from participating in PATIO project. (E.g. gift card, movie ticket, etc.)
   □ Yes □ No

7. Please answer the questions below about your experience with PATIO:
   (The question is answered with the scales as: 5 = strongly agree, 4 = somewhat agree, 3 = no opinion, 2 = somewhat disagree, 1 = strongly disagree)
   - PATIO makes it possible to be creative in presenting my own ideas
   - I am satisfied with PATIO reward point system.
   - PATIO front page provides clear information about the active projects.
   - PATIO front page is attractive.
   - I would like to share my experiences of PATIO project with my friends.
   - PATIO provides me enough feedback on my participation in projects.
8. I get information about new PATIO projects from:
   □ PATIO home page (www.patiolla.fi)
   □ Email notification from PATIO
   □ Social media
   □ Friends
   □ Other, where? ___________________

9. I have shared PATIO project link to others in social media.
   □ Yes       □ No

10. I have shared PATIO project link in:
    □ Facebook
    □ Twitter
    □ Myspace
    □ Other site, where? ___________________

(Question 11-17 are answered with the scales as: 5 = strongly agree, 4 = somewhat agree, 3 = no opinion, 2 = somewhat disagree, 1 = strongly disagree)

11. I join test project because:
    - It seems to be interesting.
    - I want to gain reward points (e.g. gift cards, movie ticket, etc.)
    - It is related to my expertise area.
    - It provides me an opportunity to participate in service/product development in some way.
    - It provides me an opportunity to meet people with same interests.
    - It provides me an opportunity to learn about the new technology.
    - It provides me an opportunity to give feedback on certain services, products or events.
    - My friends are also participating in the testing.

12. I usually give up participating in PATIO project because:
    - It takes too long time.
    - It takes too much effort.
    - I don’t receive feedback from my participation (e.g. response to my suggestion)

13. I would participate more in projects if PATIO would provide:
    - More reward options.
    - More information on further progress of the projects I have participated.

14. I would like to recommend PATIO to others if:
    - I could gain reward points for it.
    - The project seems to be interesting.

15. I would like to post my idea to the project discussion forum, if:
    - I could gain reward points for it.
    - I could receive feedback during and after the project.
    - I could see my idea used in the new product or service.
    - I could see my friends also check the discussion forum.

16. I would like to be the “main tester” to keep project discussion forum alive by visiting and posting frequently, if:
    - I could gain extra points for it.
    - I could get more involved in the development ofnew product or service development.
- I could be promoted to as higher ranking user among others.

17. Please answer the questions related to the improvement suggestions:
   - I would like to receive an email from the discussion forum, when there is a new post in a thread I have been active.
   - I would like to use PATIO through mobile application.
   - If PATIO has a public forum to share the new ideas, I would be interested to participate.

(Question 18-21 are open-ended questions)

18. Which are the aspects that you think would motivate more people to participate in PATIO projects?

19. What kind of reward options would you like to see on PATIO? (E.g. free ticket, free gift, etc.)

20. Any improvement suggestions for PATIO?

21. What features would you like to see in PATIO?

22. Age
   □ 18 or under □ 19-34 □ 35-50 □ 51 or older

23. Gender:
   □ Female □ Male □ Don’t want to tell

24. Highest Education level:
   □ Comprehensive school
   □ High School or Vocational school
   □ Bachelor’s degree
   □ Master’s degree
   □ Doctoral degree
   □ Other: ________________________

25. Your current profession: ________________________

26. Your Employment Status:
   □ Student
   □ Employed
   □ Self-Employed
   □ Job-Seeking
   □ Retired
   □ Other: ________________________
Appendix B. User modelling Interview plan

Purpose

User modeling (persona) and persona-based scenarios building through interview. (Plinio & Lucia, 2005) (Cooper & Reimann, 2003)

With the case study of PATIO, to answer the research questions of:

- What are the characteristics of online Living Lab community towards social web?
- What are the primary development requirements of online Living Lab community?

Description

This interview, as part of my master thesis research, is conducted with the purpose of re-designing/developing PATIO system in order to provide better services to users. Through the interview we hope to listen more opinions and stories from different type of users about the current using of PATIO system. In addition, we would also like to study the attitude of users towards social media, e.g. the using of social media, real life stories. The information collected will be used to build up the user profiles (personas), further more to be used in the feature analysis and system design of Online Living Lab community.

Interview Plan

Interview time: 60 minutes

Interviewer: Vivian Weiping Huang

Interviewee: PATIO users (8-10), PATIO system moderator, PATIO partners or customers (1-2 if possible)

Interview recording: recording pen, video recording if needed

User interview guide questions and expected outcome information*:

1. Basic information
   - Name, age, occupation, language skill, Family (optional), interests, hobbies…
   - Using of ICT product: frequency (daily, sometimes, once a week…), location (home, office…), skill and experience (basic user, professional…)

2. About PATIO: Describe one case of using PATIO lately
   - How (from where) get the information about PATIO news and testing projects. (Getting information initiatively, e.g. from homepage, or passively, e.g. email…)

   *Note: The information expected to be collected should be used to build the user profile (persona) and expected outcome of the interview.
- What kind of projects are interesting.
- Problems in using PATIO and/or processing the test projects.
- What satisfied user most of PATIO.
- Opinions of the new added features (e.g. slide bar, forum, “like”, Idea wall, new layout… -> survey)
- Motivation of attend the testing in Living Lab physically (like this interview). Why or why not?
  (Current problem: some user didn’t show up in the agreed testing time, which bring bad image for the customer company.)
- About the rewarding system: What user needs, and what user likes?

3. About Social Media
- What’s the opinion of social media?
- Have social media account? Have been using social media account to login other web page or applications? If so describe one case.
- What’s the advantage and disadvantage of social media?
- Willing to share/receive PATIO information to/from social media? Why or Why not.
- What if seeing PATIO as a social media, e.g. public blog? -> idea wall
- Have you “like” the PATIO page in Social media, e.g. Facebook?

Expected results

- Build user models : persona
- Characteristics of PATIO system to be suitable for the user.
- The connection between PATIO and Social media.
- Requirements of system. (reflect with the Online Living Lab community framework)

*: The interview guide of PATIO system moderator and partners will be slight different as that for the users.

References


Appendix C. Comparison of PATIO with other Finnish Living Labs

<table>
<thead>
<tr>
<th>Features</th>
<th>PATIO</th>
<th>Owela</th>
<th>Suuntaajat</th>
<th>Lutakko</th>
<th>Culturell*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public projects visibility</td>
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<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
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<tr>
<td><strong>Forum:</strong></td>
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<tr>
<td>Open questions, text field for comments</td>
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<td>X</td>
<td></td>
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<tr>
<td>User can add different questions by choosing type</td>
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<td></td>
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<tr>
<td>User can add images, links, videos, pdf, files, etc.</td>
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<td>X</td>
<td></td>
<td></td>
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<tr>
<td>Customizing and defining order of questions</td>
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<tr>
<td>Editing comments</td>
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<tr>
<td>Qualities – e.g., add like/smiley/thumb</td>
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<tr>
<td><strong>Users:</strong></td>
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<td>Can be shared with Facebook, Twitter, etc.</td>
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<tr>
<td>Virtual persona; personalizing avatar</td>
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<tr>
<td>User can mark which information is public</td>
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<tr>
<td>User can select option for reminders on new projects</td>
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<tr>
<td>Active wall (users own comments)</td>
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<tr>
<td>Projects that user is taking part in</td>
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<tr>
<td>Different kinds of reminders / notifications / persuasive features</td>
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<td>Friends’ followed</td>
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<td>User can see how own idea / opinion is getting popularity / evolving conversations</td>
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<td>Feedback notification</td>
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</table>
User activeness and appreciation level on separate indicators

<table>
<thead>
<tr>
<th><strong>Prize points system (Rewards)</strong></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Redemption of prizes: automated</td>
<td>X</td>
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<tr>
<td>Separate level prizes</td>
<td>X</td>
<td>N</td>
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<tr>
<td>More prize alternatives</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>Feedback on the projects</td>
<td>X</td>
<td></td>
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<tr>
<td>Direct channel of communication</td>
<td>X</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>to service / product developer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sending a private message to a</td>
<td>X</td>
<td>N</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>moderator</td>
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</tbody>
</table>

**Email related:**

<table>
<thead>
<tr>
<th>Advertising description of the project (text, image, video)</th>
<th>X</th>
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</thead>
<tbody>
<tr>
<td>Direct link to the project description</td>
<td>X</td>
</tr>
<tr>
<td>Link to other open projects or idea pool</td>
<td>X</td>
</tr>
<tr>
<td>Notification on new projects</td>
<td>X</td>
</tr>
<tr>
<td>Notification on ongoing projects</td>
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</tr>
<tr>
<td>Encouraging users (Additional points of full profile)</td>
<td>X</td>
</tr>
<tr>
<td>Idea pool (Open to the possibility of conception)</td>
<td>X</td>
</tr>
<tr>
<td>Opening new projects based on initiatives</td>
<td>X</td>
</tr>
<tr>
<td>Possibility to inform a friend about the PATIO or single project</td>
<td>X</td>
</tr>
<tr>
<td>Additional points when bringing users with initiatives</td>
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<tr>
<td>Chat -&gt; real time conversation</td>
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</tr>
<tr>
<td>Quests in 3D environment – anonymous avatar</td>
<td>X</td>
</tr>
<tr>
<td>Ability to see the public information (about projects)</td>
<td>X</td>
</tr>
<tr>
<td>Sending a message to other users</td>
<td>X</td>
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</tbody>
</table>

**RSS feed**

<table>
<thead>
<tr>
<th>RSS feed</th>
<th>N</th>
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</thead>
<tbody>
<tr>
<td>Comment Feed</td>
<td>N</td>
<td>X</td>
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</tr>
<tr>
<td>Newest comment</td>
<td>N</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Older comments</td>
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<td>X</td>
<td></td>
</tr>
<tr>
<td>Number of Customer firms</td>
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<td></td>
</tr>
<tr>
<td>Number of registered participants</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Previous projects &amp; products</td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

* culturell ([http://www.culturell.fi/](http://www.culturell.fi/)) is not existing anymore