An exploratory model of the willingness of end-users to participate in field tests: A Living Lab case-study analysis

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Biography

Annabel Georges. In 2013 Annabel Georges graduated as Master in Communication sciences (specialization 'New Media and Society') at Ghent University. In her master's thesis 'Social media from A to Z: the role of mediacoaches in the diffusion of social media literacy, within the library as organization' she used social network analysis to study the diffusion of social media literacy with library staff. During three months Annabel was an intern at LINC, in cooperation with MICT. In august 2013 Annabel started at MICT (Research department of Media and ICT at Ghent University) as a Junior Researcher. She works as a Living Lab researcher on projects initiated by SME's.

Dimitri Schuurman. Dimitri Schuurman holds a Master's degree in Communication Sciences (2003) from Ghent University and is currently finishing his Ph.D. which deals with Living Lab-methodologies and the involvement of user and customer characteristics in order to optimize these innovation processes. He joined the iMinds research group MICT in 2005 with an initial focus on the role of content within the diffusion of new media and ICT-innovations. In 2009 he joined iMinds-iLab.o as a researcher for the Digimeter-studies (www.digimeter.be), a yearly survey of a representative sample of Flemish people enabling on overview regarding (new) media trends, habits and practices. From 2010 on, he became principal researcher of the Mediatuin (www.mediatuin.be) and LeYLab (www.leylab.be) ICT-Living Labs. He is currently responsible for developing iLab.o's methodological toolbox for panel-based Living Lab-approaches, taking into account specific user characteristics related to the innovation in development (e.g. Lead User-characteristics, innovators,…).

Bastiaan Baccarne. Bas Baccarne graduated in june 2012 as a Master in New Media & Society (Ghent University). His master thesis 'The crowd as a gatekeeper: 'A comparative research between in-house and crowdsourced selection procedures in idea competitions' takes a closer look at crowdsourcing as a tool for the evaluation of innovative ideas within a smart city. Fascinated by user-centric design, Bas started as a researcher at iMinds-MICT-UGent in October 2012. Also being part of iMinds-iLab.o, he worked as a Living Lab user researcher for several SME and start-up cases, with an academic focus on the possibilities and limitations of user-centric innovation development ecosystems. In October 2013, Bas became a teaching assistant for prof. dr. Lieven De Marez for the courses 'Media & ICT: innovation research', 'Media, Market & ICT' and 'Introduction to new communication technologies'. Besides these activities, Bas is also working on a PhD about the convergence between Smart Cities and Living Labs.

Abstract

End-user involvement is seen as a central element within Living Lab research. However, it is crucial to recruit enough users that are willing to participate in the Living Lab. Within this paper, based on the technology acceptance model, a new model is being developed in which factors that play a role in the participation of end-users in field tests are described. The field test participation model is developed by analyzing a Living Lab case-study in which three field tests took place. Perceived usefulness, perceived ease of use (including factors endogenous and exogenous to the innovation) as well as other motivations from end-users determine their willingness to participate in field tests. The perceived risks and trust in the innovation and the attitude towards testing will determine the actual behavior of participation in Living Lab field tests. Another central element within this model is the functional maturity of prototypes. The functional maturity of a prototype is the extent in which a prototype resembles the go-to-market innovation. However, within this case-study the high functional maturity of the prototype increased the risks for end-users and thus decreased the willingness of end-users to participate in the field test. Therefore, based on the field test participation model, some practical guidelines, such as the involvement of different user types, are formulated at the end of the paper.

Introduction

Since the 1970s, the innovative potential of users has been recognized by von Hippel in his research on the Customer Active Paradigm (CAP) and Lead Users (von Hippel, 1976, 1986). Since then, end-users are more and more involved during innovation research and development. Such user involvement exists in many forms. One approach in which end-users are actively involved is the Living Lab approach. Although some theoretical discussion exists on the actual definition of a Living Lab, most authors agree that it is a way to involve end-users in the development of an innovation over a longer period of time using a combination of different research methods, following an iterative process (Schuurman, Lievens, De Marez & Ballon, 2012). This end-user involvement is one of the central elements of Living Lab research (Schuurman, De Marez & Ballon, 2013). Therefore Baccarne and his colleagues (2013) argue that "*the question is not any longer about why we should involve users, but rather how they should be involved in Living Lab research activities*". Within Living Lab research multiple methods are used to iteratively develop a new product or service. Depending on the research design, end-users can be involved during one or several research phases of the Living Lab. When an innovation is getting more concrete and a prototype is developed, end-users can participate in field trials in which they can test the innovation. However, different elements can play a role in the willingness of users to test a new innovation. Based on a Living Lab case study analysis, we developed a model in which different aspects that can influence the degree of participation are described. Before introducing this model, we will first discuss the technology acceptance model that is used as a basis for our model.

Technology acceptance model

The technology acceptance model (TAM) was developed by Davis (1985) in order to understand user acceptance processes of information systems and to evaluate new systems before they are being implemented. The model states that people will start using a new information system if they already have an intention and attitude of using the system. This attitude consists of the perceived usefulness and the perceived ease of use of the information system. The perceived usefulness is defined as "*the degree to which a person believes that using a particular system would enhance his or her job performance*" and usefulness is defined as "*capable of being used advantageously*" (Davis, 1989). The perceived ease of use refers to "*the degree to which a person believes that using a particular system would be free of effort"* and ease is defined as "*freedom from difficulty or great effort"* (Davis, 1989). The perceived usefulness and the perceived ease of use are influenced by external stimuli. Several authors have already adapted and upgraded the TAM (Venkatesh & David, 2000; Venkatesh, Morris, Davis & Davis, 2003; Venkatesh & Bala, 2008). Because this exploratory research will focus on the willingness and intention of end-users to participate in field tests and thus to test prototypes, the focus lies on the first technology acceptance model. Although this model focusses on the factors that influence an adoption intention and behavior of people towards new innovations, we believe the basic infrastructure of the model can also be applied on the intention and behavior of participation during field trials.

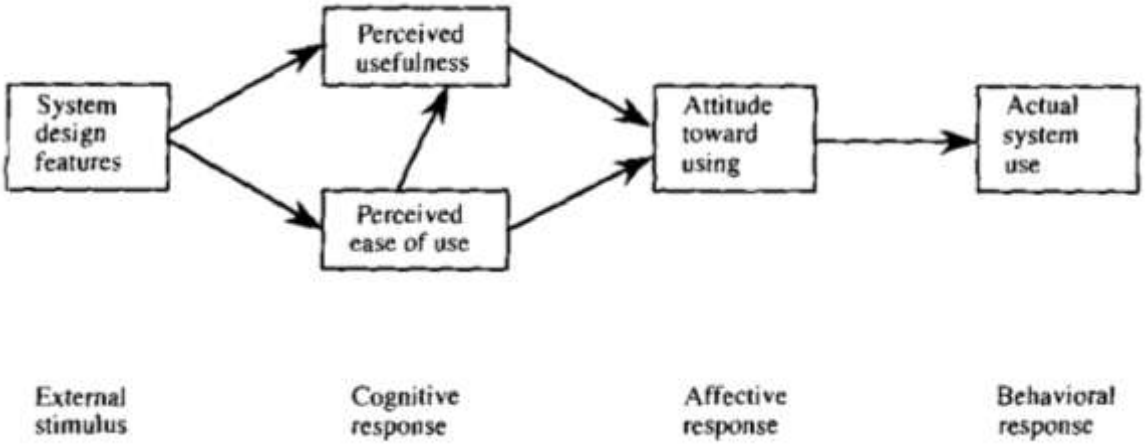

Figure 1: Technology Acceptance Model (Davis, 1993)

Methodology

Within this paper we aim to develop an exploratory model regarding the participation of end-users during Living Lab field trials. This model is constructed by using an already well-known model (TAM) completed with data based on a Living Lab case-study analysis. This case-study is situated in the domain of the ticketing service market and was performed by iMinds-iLab.o[1]. The innovation offers a solution for filling up the empty seats of no-shows during sold-out events. At the start of the Living Lab there was already a prototype of the innovation. The main goal of the Living Lab was to iteratively evaluate the ticketing service by end-users. The instigators were also interested in the unexpected uses and opportunities of their innovation. The Living Lab consisted of a kick-off meeting, three field trials during a soccer game, a State of the Art analysis (consisting of an environmental scan and a competitor analysis), an online questionnaire and a co-creation workshop. Between the different research phases the researchers and instigators met to discuss the results in order to iteratively develop the ticketing system. This case-study analysis focusses on the three field tests during the Living Lab. The data was gathered by studying project documents (e.g. project deliverables and project offer) and by conducting short telephone interviews with test-users. Before constructing the model, the three field tests will be discussed.

Field test 1. The first field took place the 7th of December. An invitation for the field trial was send to 3000 panel members. However, because of several reasons (e.g. the topic, the distance, the price for a ticket) only 86 panel members filled in the questionnaire related to the field trial and only 19 panel members showed all the criteria needed for participation. Therefore friendly users and acquaintances of the instigator were invited. In total twelve test users attended the first field trial. Six of them were friendly users, four users were invited by the instigators and four were panel members.

Field test 2. The second field trial took place the 26th of December. Previous to the second field trial, the online survey was launched. In this survey the participants could subscribe themselves to participate in the second field trial. The same conditions as the first field trial were used. In total twenty participants were eligible to participate in the field trial. For this field trial no friendly users or

[1] http://www.iminds.be/en/develop-test/ilab-o

acquaintances of the instigators were invited. All the communication was executed by the instigators. During this field trial nobody appeared. Only one test-user went to Anderlecht, but he could not find the location. The day after the field trial, thirteen test-users were contacted in order to get an insight in the reasons why they did not show up. Following reasons were mentioned:

- Test-users had something else to do.
- The price in the questionnaire was different than the price in the e-mail of the ticketing system.
- One test-user did not receive an e-mail.
- Some test-users mentioned that the communication was not in their mother tongue. Therefore they did not read the entire email and were more anxious towards the new ticketing system.
- One test-user did not participate because of the uncertainty of getting a ticket and the distance of the venue.
- One test-user registered on the site, but he refused to come to the venue because he could only queue for one person and he did not want to fill in his credit card number to the ticketing service.
- Another test-user forgot to register.
- When signing up in the queue a test-user received several emails in a different order then they were sent. Therefore he was unsure about the field trial, however he went to Anderlecht but only received a text message after the soccer game concerning the practical information.

Field test 3. Finally the last field trial took place 26th of January. Test-users were recruited via the questionnaire that was also used in the second field trial. There were 78 subscribed panel members. The instigators of the ticketing system also recruited some friendly users to test the innovation. During this last field trial 23 test-users were present, including six panel members. The communication towards the panel members in this field trial was conducted by the panel managers from iLab.o.

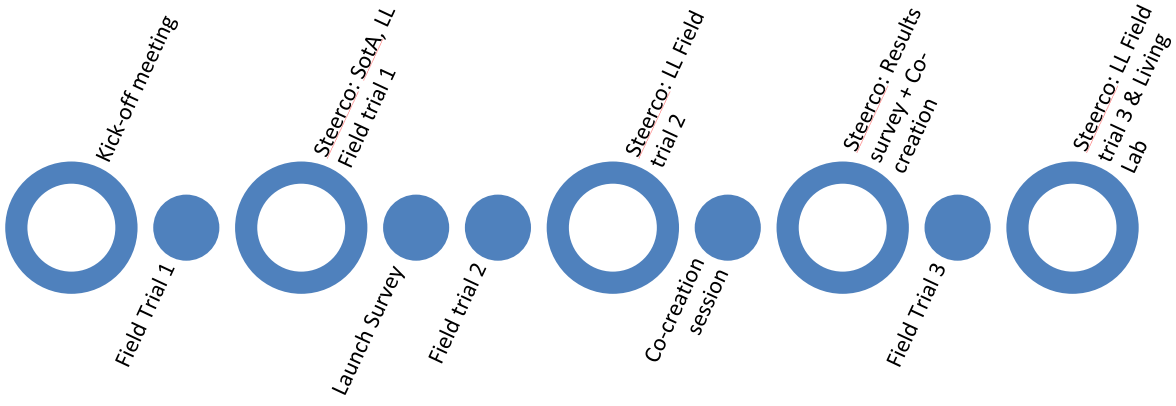

Figure 2: Living Lab research process

Results

Starting from the technology acceptance model, we will first dig deeper into the role of the perceived usefulness and the perceived ease towards the willingness to test a prototype. This will serve as the basis for the further adaptation of the technology acceptance model.

The **perceived ease of use** within this context will be defined as the degree to which a person believes that testing an innovation would be free of effort and difficulties. The perceived ease of use can be divided into factors endogenous to the innovation and factors exogenous to the innovation. Factors endogenous to the innovation are inherently related to the innovation. For example in our case-study the test-users had no guarantee that they could buy a ticket when they arrived at the venue, test-users had to register on the website of the ticketing system and they had to fill in their credit card number in order to pay the transaction costs. These are characteristics of the innovation that will also be introduced in the go-to-market version of the innovation. Therefore it is relevant to include and simulate these aspects in the field trial. To take this into account we introduce the concept *functional maturity*. Functional maturity can be seen as the extent in which a prototype resembles the functionalities and the processes of the final, go-to-market product at the moment of the field test. When the functional maturity of a prototype is high, the validity of the field trial increases because the prototype has more resemblance with the eventual go-to-market innovation. However, a high functional maturity can also decrease the willingness of end-users to test the prototype. For example during the registration on the website, some test-users refused to fill in their personal information. Therefore these test-users stopped using the website and thus did not have a chance to reserve a place in the queue. Another example related to this functional maturity was the communication towards the test-users. Test-users were only informed about their place in the queue and the practical aspects of the field trial by the ticketing service itself. However, because this innovation was still in its prototype phase, some text messages were sent in a different order, some emails included wrong information and the messages were not in the mother tongue of the test-users. Some of these characteristics endogenous to the innovation were not included during the third field test, in which more test-users participated. Therefore the role of the functional maturity of prototypes on the willingness of test-users to participate in field tests has to be taken into consideration.

Factors exogenous to the innovation can also play a role in the willingness of end-users to participate in a field trial. For example the second field trial took place during the Christmas holidays at the 26th of December, a period in which a lot of people are busy visiting family and friends. Another example of an exogenous factor is the location of the venue. Some test users had to drive more than one hour in order to get to the venue. The uncertainty of getting a ticket, even after inscribing to the queue caused hesitation to come to the venue, especially when test users are not interested in the soccer game.

Another element in the model is the **perceived usefulness**. Within this context, the perceived usefulness will be defined as the degree to which a person believes that testing an innovation holds advantages. For example in the case-study the test-users had the opportunity to buy ticket for an already sold-out soccer game. The perceived usefulness can be influenced by the perceived ease of use. For example, it was only possible to queue for one ticket. Thereby test-users who were willing to test the prototype and join the soccer game, had no certainty that they both would get a ticket and

would sit next to each other. This characteristic was disadvantageous for test-users who did not like to join the soccer game alone.

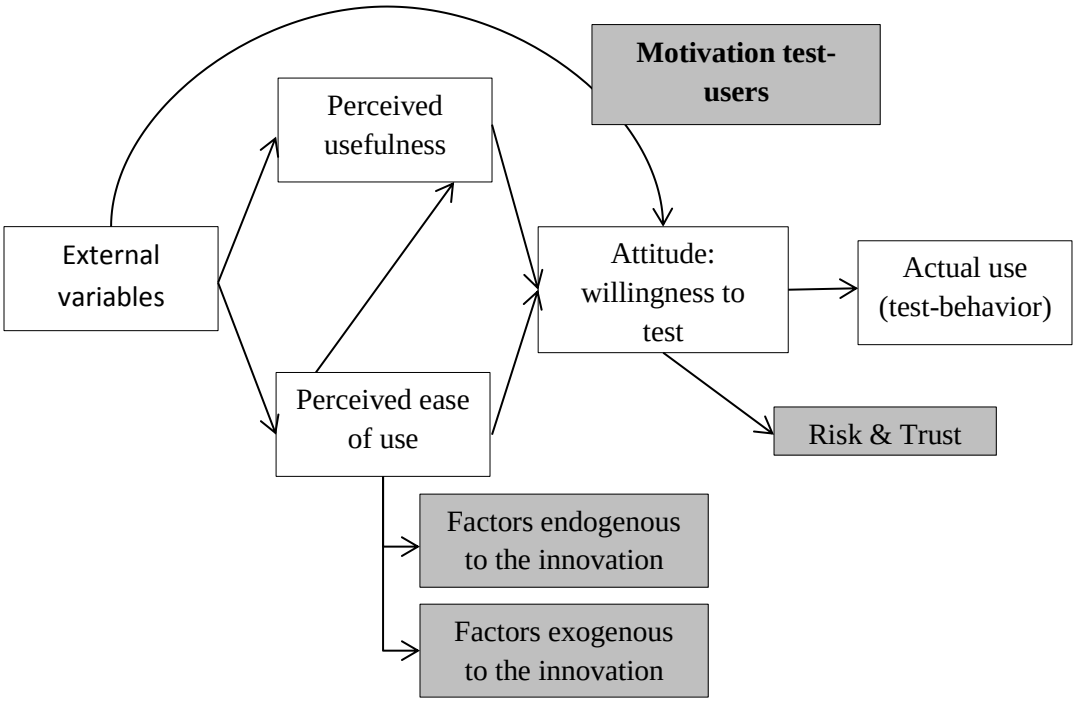

Figure 3: Field Test Participation Model

Another factor that plays a role in the willingness of end-users to participate in field tests are their own **motivations**. This case-study was facilitated by a panel-based Living Lab. Some members of this panel are motivated to participate in several field tests to test and contribute to an innovation, independent from their perceptions towards a certain innovation.
The external variables, the perceived ease of use and the perceived usefulness of the innovation determine the **attitude** of test-users towards the innovation and their willingness to test the prototype. Within this case-study two elements can be distinguished that influences the attitude of end-users towards testing an innovation: risk and trust.

Within this case-study some test-users were suspicious towards the ticketing system. On the one hand, this can be related to the innovativeness of the innovation and the unfamiliarity toward the ticketing system. Combined with the efforts of the test users to participate (e.g. registration, uncertainty of getting a ticket, giving personal information) this created higher risks. On the other hand the unclear communication may have played a role in the trust of the prototype. During the first field trial for example, only friendly users participated. This could be because friendly users are familiar with the organizers of the field trial, and thus can rely on them when they experience problems during the field test. Therefore the risks of friendly users are lower than the risks of other users.

Practical guidelines and lessons learned

The field trial generated several interesting insights related to the ticketing system. However some lessons can be learned about the willingness of test users to participate in field tests.

Consider usability testing before testing an innovation in the real-world context

Within Living Labs users are involved in the development of a new product or service in order to iterate and further develop an innovation. The field trial can be seen as an important step in this iteration process because it is the first time that end-users can test the innovation in the use-context. This allows for generating information about the use-context in which the innovation is adopted. However, within these field trials (and especially the first one), it was challenging to study the use-context of the innovation because a lot of technical issues occurred which hindered the natural use of the innovation. Therefore we suggest to first focus on the usability testing to solve as much as technical issues as possible before conducting a field trial.

Involve different types of users

For the second field trial only panel members were invited. Therefore the whole field trial depended on the presence of the panel members. Although a lot of interesting conclusions were made after the second field trial, it demanded a lot of resources for a small start-up company and the Living Lab infrastructure to organize the field trial. Therefore we suggest to compile a group of test-users with a different background (e.g. panel members, friendly users, lead users). By involving friendly users, panel users and acquaintances of the instigator, the risk of having no test-users at all will be reduced. Friendly users and acquaintances of the instigator are also less sensitive to the risks that are implicitly related to testing prototypes. Panel members can also be more willing to test a prototype because they are more likely to trust the research institute that facilitated the Living Lab than end-users who are not familiar with the institute. Moreover a comparison can be made between the groups and how they perceive the innovation. However, more important than proactively anticipate on the possibility that no-one will show up, is to communicate clearly with test-users about the field trial.

Communicate clearly with one SPOC

Although it may seem obvious, communication is one of the main critical elements when recruiting participants for field trials. Especially when test-users are confronted with an unfamiliar innovation. Provoking trust in the innovation and the field trial context can make test-users more willing to participate. For example, some test-users were more anxious towards the innovation because the emails in the second field trial were not in their mother tongue. Therefore they did not read the entire email and did not register on the website. Another test-user argued that he did not want to register because he had to fill in his credit card number and he only did this when he was sure the company can be trusted.

An important aspect of this ticketing service is the communication towards users about their chances of getting a ticket. Therefore text messages and emails were sent to users several days before the start of the event. However, these text messages were unclear to the test-users and some issues occurred towards the timing of these messages. Because the main goal of a field trial is to test the innovation in a real-life context, these were interesting findings. However, this unclear communication made the test-users doubtful about their participation in the field trial. In order to reduce these problems, some iterations were made for the third field trial. All the communication towards the panel members was conducted by the panel management, a familiar and trusted source

for the test-users. Clear instructions were given to the test-users about the flow of the field trial and when they would be contacted by the ticketing system.

Focus on one aspect of the innovation before fully testing the innovation

At the start of the evaluative Living Lab, a prototype was already developed. Therefore the main goals of the Living Lab was to iteratively further develop the prototype based on user insights and user testing. Besides the other research steps within the Living Lab, the main focus was on the field trials. However various elements of the innovations still needed iteration and enhancement, such as the communication process, the functionalities, the concept *an sich* and the usability. Within the field trials, all those elements were taking into consideration. However, in order to get more in-depth results, it would be interesting to only focus on some aspects of the innovation, certainly when testing an complex innovation.

Conclusion & discussion

Within this paper an exploratory model was developed to determine the participation of end-users in field tests during Living Lab research. This model, based on the technology acceptance model, revealed several aspects that can play a role in the willingness of end-users to test a new innovation prototype. Perceived usefulness as well as the perceived ease of use were determining factors. Within the perceived ease of use we distinguished factors endogenous and exogenous to the innovation. Hereby it is important to take into account the functional maturity of the prototype. The extent in which the prototype resembles the go-to-market innovation can play a role in the willingness of end-users to test an innovation. Eventually the perceived risks of testing the innovation and the trust towards the research institute and the innovation can be related to the attitude of end-users to test an innovation.

The factors in the field test participation model were qualitatively derived from one Living Lab case study analysis. Therefore it would be interesting to conduct more in-depth research to validate this model quantitatively with more Living Lab case studies. In addition more research is needed to explore other factors that determine the willingness of end-users to test innovation prototypes. Finally it would be interesting to further investigate the role of functional maturity of a prototype on the willingness to participate in field tests.

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