Taking Real-life Seriously in Living Lab Research: An Approach for Decomposing Context Beyond "Environment"

Lynn Coorevits (iMinds MICT-UGent) and An Jacobs (iMinds SMIT, VUB)

Abstract

The maturity of Living Labs has grown and several researchers have tried to create a uniform definition of what Living Labs are by emphasizing the multi-method and real-life, contextual approach. Although researchers thus recognize the importance of context in Living Labs, they do not provide insights into how context can be taken into account. The real-life context predominantly focuses on the in-situ use of a product during field trials where users are observed in their everyday life. The contribution of this paper will be twofold. By means of a case study we will show how context can be evaluated in the front end of design, so Living Lab researchers are no longer dependent on the readiness level of a product, and we will show how field trials can be evaluated in a more structured way to cover all components of context. By using a framework to evaluate the impact of context on product use, Living Lab researchers can improve the overall effectiveness of data gathering and analysis methods in a Living Lab project.

Keywords: Context, Living Lab, Real-life, Prototype

Introduction

The Living Lab methodology emphasizes that users should be aware of their participation (Dell'Era & Landiano, 2014) and involved throughout the entire innovation process. Demarez (2006) provides a literature overview of the latter and suggests a common framework consisting of five innovation development steps, namely opportunity identification, concept design, product design, launch and post-launch phase.

Figure 1: The innovation Process based on Demarez (2006)

However, the literature used by Demarez (2006) was mostly written before open innovation was common practice and does not take into consideration that introducing users to the mix can require more adjustments to the design than initially anticipated. Especially, because it is hard to predict in advance what the user will need in a future use context (Von Hippel, 1986).

To tackle this challenge Living Labs invite users to react to the innovation via surveys, evaluate a concept or prototype, participate in usability tests, … . Mulders and Stappers (2009) suggest that these methods are valuable, but they do not gain rich insights into the complex interactions of the user with the environment, or the use context. To cope with this, testing in a real-life setting is also mentioned as a solution by Living Lab researchers (Ballon et al., 2005; Følstad, 2008; Kjeldskov & Skov, 2014; Schuurman et al., 2013). When referring to a real-life setting, the majority of Living Lab researchers are talking about the 'wild' and the uncontrollable aspects of real life environments. But real life testing can only happen when an innovation has reached a certain level of maturity. As a result, Living Labs often miss then out on the innovation process as a whole, which is dynamic because relationships of people and activities cross boundaries in a multi-contextual environment (Johansson, Snis & Svensson, 2011). In other words, taking context into consideration in one phase of the innovation process is not enough.

For this reason, the earlier phases of the innovation process, the fuzzy front end, often take place in a lab trying to replicate the 'real life' environment with a semi-real environment, for example making the usability lab look like a living room (Mulder & Stappers, 2009). The fuzzy front end exists out of the opportunity identification and concept design phases, in which important design decisions are being made (Sanders & Stappers, 2008). In certain circumstances researchers will choose this semi-real environment to remain in control, because the readiness level of the product is too low to let users interact with it as they would in their daily life. These semi-real environments raise some interesting questions, for example regarding the degree of realism needed to make an evaluation meaningful. How can complex contextual requirements of the product be researched in the fuzzy front-end of design? (Stewart & Williams, 2005; Dell'Era & Landoni, 2014 ; Mulder & Stappers, 2009). In answer to that question several solutions for contextual inquiry in the front end of design have been suggested such as Lead-Users (Von Hippel, 1986), Generative Design techniques (Sanders & Stappers, 2012), Context Mapping (Sleeswijk & Visscher, 2005) and experience prototyping (Sein, Henfridsson, Rossi, & Lindgren, 2011).

So methods that enable us to measure or elicit context are already available for the different phases of the innovation process in Living Lab research, but they all remain vague on what

context is and how it should be evaluated. Mulders and Stappers (2009) and Dell'Era and Landoni (2014) emphasize the importance of contextualisation in Living Labs for example, but they do not provide any insights on what context is and how it can be taken into consideration throughout all the phase of the Living Lab methodology.

In this paper we will therefore first clarify the concept of context based on a literature review. Subsequently we describe the methodology of the project that we use as a case study exploring and explaining the context components withheld from the literature. Next, we illustrate the context components with the case study project material and conclude with a reflection of its use for Living Lab research projects.

Context: a multi-layered concept, more than just the "environment"

As already mentioned in the previous section, the concept of context is not enough problematized in Living Lab research. Yet, it should gain more attention, because the concept in itself is very complex. In previous work, published by Geerts et al (2010) we pointed out three issues: 1) it is too often treated as a container concept, with a vague definition encapsulating different aspects that influence use; 2) it is often conceptualised as something static, underestimating its dynamism and change during the use process; 3) it is recurrently used post-hoc as an explanation for results while operationalization upfront is neglected. Let us therefore focus on the dimensions and complexities of the context concept. This will allow Living Lab researchers to make more conscious decisions on the research design and more specifically the aspects that could be taken into consideration when studying context.

The Webster Online dictionary defines context as "t*he interrelated conditions in which something exists or occurs*" which gives a general idea, but does not help researchers to study the concept. We start our search for dimensions of context in the field of Human Computer Interaction since our Living Lab research focus on the digitalisation of society. Dourish (2004) distinguishes two different types of views on context: *representational* and *interactional.*
In the *representational view of context* (post-positivist scientific wordview), context is a set of environmental features surrounding generic activities. Dourish states that context in this view is a form of information, which is delineable, stable and where it is possible to separate the context from the activity. In the *interactional view of context* the scientific viewpoint is a

phenomenological one, trying to asses how, in the course of interactions, do people achieve and maintain a mutual understanding of the context for their actions. Context is thus not something external, surrounding the users. The actual context to take into account is the one arising from (inter)action, thus from the relation between the user's internal characteristics (motivation, intention, internalised societal values, goals, ...) and the external characteristics (location, social aspects, technical components, …). Consequently context cannot be treated as static information, but is a relational property arising out of activity. A perspective that is closely in line with the Living Lab approach.

In previous work we tried to integrate this interactional view in our quality of experience model (Geerts et al 2010) by making use of the framework of Mantovani (1996). For the purpose of this paper we focus on the short description of the three context processes during situated action of a person and its influence on the user experience. These processes, *interactional, situational and socio-cultural* [1]are nested (during an interaction, one goes through all three) and they are dynamic (over time there is change e.g. from a new to a routine activity).

The *socio-cultural level of context* is described as the result of the interaction between the structures or the cultural models (e.g. social norms) and the actions of people within and with this structures. Over time this reinterpretation of the cultural models create change and thus history.

Secondly, there is the *situational level of context.* The interpretation of a situation emerges from interaction where a person, with plural interests and goals, interprets the opportunities in the everyday life environment. On this level, a person takes into account the cultural models of the previous level when making a choice between the opportunities to reach certain goals.

Third, there is the *interaction level of context*, where the user interacts with tools or artefacts to perform a task (action) taking into account the previous situation and the socio-cultural context levels.

Based on the goal prioritised in the situation, a project is made. To realise this project, a plan is created. The realisation of the plan can be cut down into several tasks or actions. Which aspects receive attention in the interactional level of context depends largely on the activity and the tools at hand. The tools incorporate certain goals and plans of their designers. The users add meaning to their purpose. In this interaction innovation on all levels is introduced because exact replication of interaction is impossible (see also Molotch, 2003) .

[1] Mantovani added the socio-cultural level because at the time of writing the article this level was often forgotten in the HCI field.

The challenge with this interaction approach is: how to operationalise this within the human centred design research approach of our Living Lab projects? We think a viable approach can be found in the work of Jumisko-Pyykkö and Vainio (2012) on the context of use for mobile HCI. They refer to the ISO standard 13407 where the context of use is associated with "user characteristics, tasks, technical, physical and the social environment". So the standard separates the user and system from the other components, but approaches context as something stable. Although it is better to treat context as a dynamic given, Dourish (2004) also pointed out that approaching context from an interaction perspective makes it more difficult to operationalize and describe in relevant dimensions. Therefore in this paper we will use the representational perspective as an analytical approach, separating the context components and observing it as external to the user and system. This is in line with for example the ISO standard, but we remain aware of the dynamic interactional nature of context when decomposing context into components.

The different dimensions of context of use following the work of Jumisko-Pyykkö and Vainio (2012) are: *physical, temporal, task, social, technical and transitions.* In Table 1 a more detailed explanation is given on all 5 components, their definition, and the properties with examples.

To emphasize the dynamic dimension of context we positioned the time component first in the list. The dimension "technical /informational context" is in overlap with the physical context when you deal with the property of artefacts. But since digitisations results in artefacts that are not that straightforward physical in appearance, an additional category as added by Jumisko-Pyykkö and Vainio (2012) is still a viable solution for our digital innovation domain. Therefore, we position the dimension next to the physical component, to be aware of this potential overlap. We assume that this dimension could be redundant in non-technical innovation domains.

We suggest that by using these context components upfront in the design of each phase of your Living Lab research, one can receive more actionable insight into the context of use: e.g. how to take those aspects into account to improve the innovation trajectory. We will illustrate by a case study in the next sections how to use these context components.

Table 1: Components of context of use after Jumisko-Pyykkö and Vainio (2012)

Components of context of use	Definition of component	Properties of component	Examples
Temporal context	"The user interaction with the system in relation with time"	Duration	Length of interaction, length of event
			Anytime, weekend, peak
		Before during and after	Preparations, documenting, triggers
		Temporal tensions of actions	Hurry, wait, rapid reaction
		Syn-/asynchronous interaction	Talking/texting
Physical context	"The apparent features of a situation or physically sensed circumstances in which the user/system interaction takes place"	Spatial location	Geographical location, distance
		Functional place	School, work
		Functional space	Space for relaxation
		Sensed environmental attributes	Light, weather, sound, haptic
		Movement/mobility	Motion of user and/or environment
		Artefacts	Physical object surrounding interaction
Technical/ information context	"Relation to other services and systems relevant to the user's system "	Other systems and services	Devices applications and networks
		interoperability, informational artefacts and access	Between devices, services, platforms
		Mixed reality systems	
Social context	"Other persons present, their characteristics and roles, the interpersonal interactions and the culture	Other Persons present	Virtual, private/public; characteristics and roles with influence on user
		Interpersonal interaction,	Turn taking, co-actions, collaboration, co-experience

	surrounding the user systems interaction"	Culture	Values norms and attitudes e.g. at culture of uncertainty avoidance
Task context	"The tasks surrounding the user interaction with the system"	Multitasking	Multiple tasks priority depends on goals, primary vs secondary tasks
		Interruptions	Interaction interrupted by e.g. technical problem
		Task domain	Goal oriented (effectiveness, efficiency) vs action/process itself (entertainment)

Method: Case study description

Given the exploratory nature of this paper, the study employed a qualitative research approach, providing an example of how context can be approached in a Living Lab research project. Case studies are considered an appropriate research tool in the early phases, when key variables and their relationships are being explored (Yin 2009; Eisenhardt 1989). They are performed in close interaction with practitioners, which is also the case when dealing with multi-stakeholder Living Labs (Gibbert, Ruigbrok and Wicki, 2008). Living Labs in Flanders are one of the leading-edge members of Enoll (www.enoll.org). Therefore, Flanders appears to be a relevant location to explore the research findings from. The case in this study is a project with a company providing coaching to managers and employees of large organizations. They focus on the individual dimension of change and guide employees, teams and companies in their soft skill development. By organizing coaching events, they invite participants to reflect on themselves in their work environment and set goals for personal improvement such as empowerment, delegation, … The organizers noticed that although participants are very motivated to work on their skills during the coaching sessions, their motivation declines tremendously when being back in their regular professional environment. To bridge this critical phase, between motivation and actual behavioural change, in this project the goal was to develop an application to support and guide participants. The application ideally allows the participants to choose a behaviour they want to change, select small steps that could lead to that behavioural change and select coaches that can observe the participants during indicated training moments and provide them with feedback on the progress being made. The Living Lab project took place over the course of 1 year (from January 2014 till February 2015).

The general research flow followed by iMinds-Living Labs is a combination of the innovation process flow created by Demarez (2006) shown in figure 1 and the design squiggle explained

by Sanders and Stappers (2012). The flow is iterative in nature, because user input should be taken into consideration at any step of the innovation process and allow for optimization and change of the product at hand. We follow Sanders and Stappers (2012) in their reasoning that a project should entail at any stage of the design process (idea, concept, prototype, minimal viable product – MVP) different approaches to move the innovation forward: 1) exploration or understanding, 2) generation or making and 3) evaluation of the idea or concept (see figure 2)

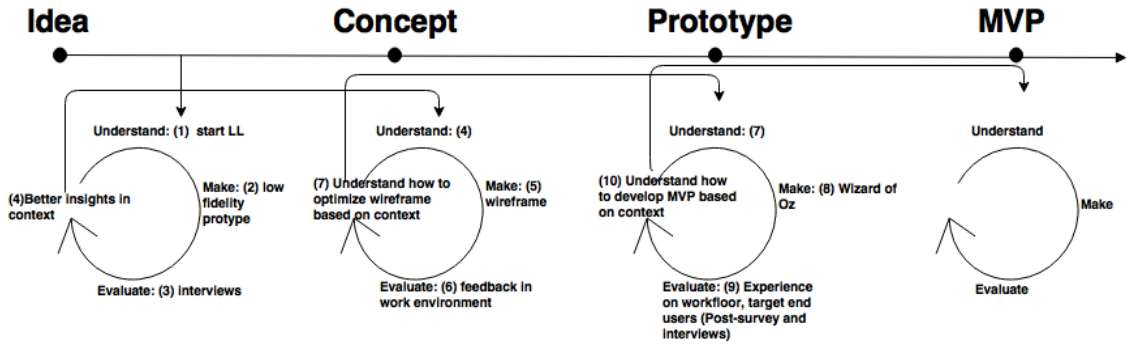

Figure 2: research flow of project used in the case study

The company came to us with an initial idea and mock-up of what the prototype should look like. Then the research flow described in figure 2 was followed. To better understand the innovation, insights were gathered from current existing technologies supporting behavioural change in organisations. Additionally, a literature review was conducted on behavioural change, technology adoption and gamification (in organizations) **(1)**. Based on this, a first idea of how the application could look like was developed **(2)**. In a second phase, a matrix was developed to invite different stakeholders to participate in interviews. Coaches, coachees and HR personnel of large organisations were invited to provide input on the use context and concept developed in phase 2. Nine interviews (with a duration of 2 hours per interview) took place with different stakeholders to gain insights in the current way of coaching and behavioural change in the organisation. This happened in a meeting room of the organisation so the physical context component was explicitly included. A first confrontation with the concept happened towards the end of the interview **(3 & 4)**. Based on these first insights, the designer started making wireframes for the application **(5)**. In a next step of the Living Lab project these wireframes were further co-designed with 6 potential end-users (3 coaches and 3 coachees) of the application.

This was done in one on one sessions of approximately 1 hour per potential end-user in a meeting room of the organisation **(6 & 7)**. Based on the input of these potential end-users the wireframes were further optimized **(7 & 5)** and used as input for the next step: the implementation phase or wizard of oz assessment **(8)**. For this phase the appropriate technology to replicate the application was selected, namely Qualtrics (a survey software) and Panelkit (an e-mail software). An invitation was sent to people that recently received a coaching session (n=20) by the company to attend a kick-off event giving them the opportunity to participate in the testing phase. During the kick-off event the goal of the test was explained as well as how the process would look like. 12 people showed up to the kick-off event and started the testing phase. In a last phase, the evaluation or feedback phase, we invited people to share their opinion on the testing phase, even if they dropped out, via a survey. During and after this testing period, different qualitative research methods were used (an online post-survey with mainly open-ended questions and interviews) to provide us with their feedback **(9)**, and to ensure the participative design process **(10)**.
During the Living Lab project the participants were observed, conversations recorded and researchers took notes. The results were a priori coded via table 1.

Results: applying the contextual components on a Living Lab case

By focusing on the different dimensions of context, the prototypes in the various research steps provided us with a strong indication of how the technology would be used in the professional lives of the users and the necessary features to enhance product-user interaction in that context. Without focusing on the different elements of context, certain critical features would not have been exposed, potentially resulting in failure of the technology (e.g. wording of the coach in the application). Because the application was not developed at the time of the test phase, the company integrated any feedback iteratively and changed the concept towards prototype accordingly.

The following table (table 2) shows the insights the researchers gathered while focussing on context during the different steps of the research flow. In each phase we illustrate different properties of the component in the different phases of the project.

Table 2: Applying Components of context of use applied to LL project case in subsequent phases involving users

Context of use:	LL project phase: Concept/Idea	LL project phase: Codesign with Wireframes	LL project phase: Wizard of Oz evaluation of prototype
Temporal context	**Duration:** Time between evaluation less than 2 weeks	**Duration:** Evaluations should be as soon as possible/immediate after a training moment	**Duration:** One week time between evaluations too short
	Temporal tensions of actions: Easy re-entry point: what if I drop out?	**Temporal tensions of actions:** What if meeting is unexpectedly cancelled, can I reschedule my training moment	**Before, during, after:** Insights in availability of buddy during meetings is necessary to know before choosing who will be buddy
	Before, during, after: Useful having something to remind you from time to time to work on habit change		**Syn-/asynchronous interactions**: Unable to start app, when requested buddy delays to reply
	Before, during, after/duration: When having a free moment (e.g. on your way home) an extra trigger is needed: "time for reflection"		**Before, during, after:** More triggers needed, reminder is not enough to stimulate behavioural change
			Before, during, after: When drop in motivation to change behaviour over time, system needs to spark motivation
Physical context	**Functional places:** Interview in the workplace	**Functional places:** Session in the workplace, in meeting room	**Functional places:** Test, Interview and survey in the workplace
	Functional space: It's use is in a professional environment and thus game elements are not appropriate	**Functional space:** The initial wireframes are still too playful, more professional look and feel necessary for their big corporate environment	**Functional space:** The proposed prototype took the professional space too much into account

	Spatial location: Physical proximity of coach is necessary		**Movement/mobility:** If you are offside you can't access your professional mail address, which reminds you of the training moments
Technical/ information context	**Interoperability, informational artefacts and access:** The organization blocks access to certain websites, applications, … e.g. personal e-mail	**Other systems and services:** There are certain places in the buildings where you cannot access the wifi or 3/4G?	**Interoperability, informational artefacts and access:** The security infrastructure of the organization blocks any non integrated application
			Other systems and services: If I am on the move (going from one meeting to the next) I do not always have access to my emails and cannot receive/provide feedback
Context of use:	**LL project phase: Concept/Idea**	**LL project phase: Codesign with Wireframes**	**LL project phase: Wizard of Oz evaluation of prototype**
Social context	**Interpersonal interaction:** face to face interaction is preferred	**Culture:** The word "coach" refers to the company's hierarchy and associated with evaluation	**Culture:** Buddy is "too" sweet, because giving personal feedback is not part of corporate culture
	Other persons present: Chosen coach needs to be already present in your activities (e.g. meetings)	**Interpersonal interaction:** It is important to choose your own coach (buddy) as someone you trust that can provide feedback in a safe environment	**Other persons present:** The habit you want to change is not always observable by the coach.
	Culture: Being asked to become someone's coach is perceived as an honour		**Other persons present/interpersonal interaction:** The coach needs to perform two roles: witnessing the behaviour and motivating. One or more persons can take on these roles.
	Culture: Autonomy is highly valued for example choosing your own training moments, coach, ...		**Other persons present/interpersonal interaction:** People experience difficulties to define their habits correctly. They need other their buddy to guide them in the process such as choosing an observable habit, defining the right steps to get there,...
Task context	**Multitasking:** High level of multitasking, work priorities make difficult to focus on soft skills	**Interruptions/multitasking:** The timing of reminders should not interrupt an ongoing task flow (ok after meeting, but not when at work at desk)	**Interruptions/multitasking:** It is difficult to combine being active in a meeting and observing one's behaviour, when not being experienced in observation techniques.
	Multitasking: Link to own calendar is needed to integrate		**Task domain:** Not every type of meeting is appropriate, ability to

	behaviour change in between or during appropriate work tasks		choose a good meeting to make first attempt of small step improvement of one's behaviour

Because of the duration of a Living lab project, **temporal context** is always intuitively integrated in Living Lab evaluations. Yet, the example in table 2 shows that the time context component should be made more explicit to detect nuance and added value of the iterative approach. For example, in the idea/concept phase the suggested time between evaluations of two weeks was perceived too long. When adding more detail on the experience of the task flow by simulating the Wizard of Oz, the expected future experience was enriched by the other contextual dimensions and thus the perception of the ideal duration changed towards more than two weeks. In other words, the time context should be made more explicit. Especially because sometimes components will not be noticed by researchers, while in other circumstances multiple components will appear simultaneously.

The **physical context** component, was guiding in our research design to operationalize context (grey area, table 2; supra method). We purposefully held all research activities in the functional place for which the application was designed, namely an office. Over the different design phases it can be noticed that taking into account the user concerns and feedback on the appropriateness of the application for their functional space is an iterative process, looking for the right balance between professionalism and fun engagement. The artefact component of the physical context is not used in this analysis, since the project is oriented towards a mobile service, where both virtual and physical product aspects are active. They are discussed in the **technical/ information context** components. There is ample room for improvement to define the components of the technical information context.

With the s**ocial context** components one can see the three layers of the Mantovani model reappearing: culture for the social-cultural; the other individuals present as a proxy for the situational level, and interpersonal interaction for the micro interactional level. We experienced that *culture* is easier to elicit in interviews, while reflections based on experiences in daily life are necessary to elicit aspects of *interpersonal interactions* on a micro level while there is higher likelihood of missing out on cultural aspects. So both approaches are needed to elicit the different aspects of social context. The situational level should be maybe more explicit.

Having attention for the component of **task context** is just as the temporal context, an inherent part of user experience research. In each step of the Living Lab project there is a focus on the tasks/actions that users will fulfil to reach the goal of the application, in this case the goal was

behavioural change. In the wireframe session the researchers assumed a given flow of tasks being executed by the users, which makes it more unlikely to discover new contextual task components. The session focuses more on validating previous task context components. The danger when focussing too hard on this task component is that other components are easily neglected.

Conclusion

In this paper we decomposed the container concept of context into different dimensions and components to enable a more structured approach including the everyday life context in each stage of Living Lab projects. We illustrated the use of these components of context via a case study. We were able to show that it is feasible to detect the different components and their properties. The results clearly indicate that contextual input can be gathered at any phase of the Living Lab project. Contextual input can also vary depending on the research method being used. This emphasizes not only the importance of the multi-method approach in Living Labs projects, but also the necessity to not only focus on context during field trials, but during the front end of design as well. In the co-design phase, we focused less on the contextual use of the application, but the participants still provided us with some useful input. A first aspect was the element of gamification. Considering this is an application that will be used in a work context, all participants indicated during the interviews and co-design phase that they did not want gamification elements in the application. The more professional and plain it was, the better. Yet, when evaluating it in real-life context, all participants indicated they were missing a 'fun' element in the application to show them how well they were doing. These results indicate that a single prototype is never enough and context should be researched over time. Multiple methods such as different prototypes, contextual observation, user testing and participatory design in real life environments all bring important perspectives to complete the picture and improve the outcomes of the Living Lab.

The model helps the researcher to structure the research approach, but it does not mean all properties of the components need to be found. Components of context, for example temporal and place can be present in the same example, but that is a normal consequence of the multidimensionality of context. All components can influence each other. By experiencing difficulties decomposing, one becomes more aware of the interrelations, which is an interesting analytic insight in itself. The decomposition into different properties and examples is, as already mentioned, oriented at mobile services, and is in itself open for improvement (new components, new examples) in this digital and other innovation domains.

This case shows the approach added value in the evaluation phase, independent of the maturity of innovation. However, this approach of structuring context is also helpful in the design of the research flow where different “understand, make, evaluate” cycles will be executed. For example, spontaneous dimensions mentioned by interviewees (e.g. I don’t want a coach, but a buddy) can indicate their priority, but making a list of different components in your interview topic guide can guide the search for more components (e.g. other artefacts that can support behavioural change such a sticker on your computer).

Bibliography

Ballon, P., Pierson, J. & Delaere, S. (2005) Test and experimentation platforms for broadband innovation: examining European practice, in: *Conference Proceedings of 16th European Regional Conference by the International Telecommunications Society (ITS)*, Porto, Portugal, 4-6 September. Available at SSRN 1331557.

Ballon, P., & Schuurman, D. (2015). Living labs: concepts, tools and cases. *Info*, *17*(4), null. http://doi.org/10.1108/info-04-2015-0024

Dell'Era, C., & Landoni, P. (2014). Living Lab: A Methodology between User- Centred Design and Participatory Design. *Creativity and Innovation Management*, 23(2), 137-154.

De Marez, L. (2006). *Diffusie van ICT-innovaties: Accurater gebruikersinzicht voor betere introductie-strategieën.* Unpublished PhD dissertation, Department of Communication Studies, Ghent University.

Dourish, P. (2004). "What we talk about when we talk about context." *Personal and Ubiquitous Computing* Vol. 8(1): 19-30.

Følstad, A. (2008). Living Labs for innovation and development of information and communication technology: a literature review. *eJOV: The Electronic Journal for Virtual Organization & Networks*, 10, p 99.

Fowler, M., & Highsmith, J. (2001). The agile manifesto. *Software Development,* 9(8), 28-35.

Geerts, D., De Moor, K., Ketyko, I., Jacobs, A., Van den Bergh, J., Joseph, W., … De Marez, L. (2010). Linking an integrated framework with appropriate methods for measuring QoE. In *Quality of Multimedia Experience (QoMEX), 2010 Second International Workshop on* (pp. 158–163). IEEE.

Gibbert, M., Ruigrok, W. and Wicki, B. (2008), What passes as a rigorous case study?. *Strat. Mgmt. J.*, 29: 1465–1474. doi: 10.1002/smj.722

Jumisko-Pyykkö, S., & Vainio, T. (2010). Framing the context of use for mobile HCI. *International Journal of Mobile Human Computer Interaction*,2(4),1-28.

Kjeldskov, J., & Skov, M. B. (2014, September). Was it worth the hassle?: ten years of mobile HCI research discussions on lab and field evaluations. In*: Proceedings of the 16th international conference on Human-computer interaction with mobile devices & services* (pp. 43-52). ACM.

Larman, C., & Basili, V. R. (2003). Iterative and incremental development: A brief history. *Computer*, (6), 47-56.

Mantovani G., G. (1996). Social Context In Hci: A New Framework For Mental Models, Cooperation And Communication. *Cognitive Science*. Vol. 20, Pp. 237-269.

Molotch, H (2003) *Where Stuff Comes From: How Toasters, Toilets, Cars, Computers and Many Other Things Come to Be as They Are*. New York and London: Routledge

Mulder, I., & Stappers, P. J. (2009). Co-creating in practice: results and challenges. In: *Collaborative Innovation: Emerging Technologies, Environments and Communities* (Proceedings of the 15th International Conference on Concurrent Enterprising: ICE 2009, Leiden, The Netherlands, 22–24 June 2009). Centre for Concurrent Enterprise: Nottingham, UK.

Newman, D. (2011). That squiggle of the design process. http://cargocollective.com/central/The-Design-Squiggle (retrieved 22/04/16).

Ries, E., 2011. The Lean Startup: *How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses* 1st. ed., New York: Crown Business.

Sanders, E. B. N., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. *Co-design*, 4(1), 5-18.

Schuurman, D., Baccarne, B., Kawsar, F., Seys, C., Veeckman, C., De Marez, L., & Ballon, P. (2013). Living Labs as Quasi-experiments: Results from the Flemish LeYLab. In: *ISPIM Conference Proceedings* (p.1). The International Society for Professional Innovation Management (ISPIM).

Schuurman, D. (2015). *Bridging the gap between Open and User Innovation?: exploring the value of Living Labs as a means to structure user contribution and manage distributed innovation*. Doctoral dissertation, Ghent University.

Sein, M. K., Henfridsson, O., Rossi, M., & Lindgren, R. (2011). Action Design Research. *MIS Quarterly*, 35, 37–56.

Stewart, James K and Williams, Robin, The Wrong Trousers? Beyond the Design Fallacy: Social Learning and the User (2005). *User Involvement in Innovation Processes. Strategies and Limitations from a Socio-Technical Perspective*, Edited by Harald Rohracher, Profil-Verlag, Munich, 2005. Available at SSRN: http://ssrn.com/abstract=2176794

Trimi, S. & Berbegal-Mirabent, J., 2012. Business model innovation in entrepreneurship. *International Entrepreneurship and Management Journal*, 8(4), pp.449–465. Available at: http://link.springer.com/10.1007/s11365-012-0234-3 [Accessed November 11, 2013].

Von Hippel, E., 1986. Lead Users: A source of Novel Product Concepts. *Management Science,* 32(7), pp.791–805.

Yin, R., 2009. *Case Study Research: Design and Methods,* London: Sage.

Biography

Lynn Coorevits has 8 years of experience in innovation research and consultancy. She works as a user researcher for iMinds Living Labs, focusing on tools and techniques for open and user innovation such as wearables and design thinking. Her current research focuses on the adoption and attrition of wearables as well as optimization of context integration in Living Lab projects. She works on several SME Living Lab projects ranging from the financial to social industry. She holds a master in Psychology and a master in Marketing Analysis from Ghent University.

An Jacobs is part-time Assistant professor at iMinds SMIT (Vrije Universiteit Brussel), Belgium. At iMinds she participated in and coordinated various EU and Flemish projects with a focus on

digital innovations, human-centred design and Living lab methodology. As methodologist she supports the Care Living Labs Flanders. One of her current research interests is on human robot collaboration, with current and finished projects in hospital, care and manufacturing settings.