The design of a Windesheim living lab for customer co-creation

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The design of a Windesheim Living Lab for Customer Co-Creation

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Abstract
Organizations in the area of Zwolle are searching for ways to engage in customer co-creation as a method to work together with customers for their innovation processes. As stated by Hogeschool Windesheim and supported by academic literature SME B2B organizations are hindered by financial means and are faced by the boundaries of their companies rather sooner than later (van de Vrande, de Jong, Vanhaverbeke, & de Rochemont, 2009). Due to these impediments businesses are insufficiently able to perform customer co-creation, and are searching for alternative possibilities. A design approach has been adopted to target the problem at hand resulting in the designing of a practical solution for the target audience. The Hogeschool Windesheim has raised the question whether the design of a Living Lab could satisfy the perceived demand. The target audience has completed a questionnaire in order to define design requirements to find out whether the claimed problem from Windesheim corresponded to the problems actually faced by practice and whether these businesses are benefitted by such an application. The research of Ståhlbröst, A., & Holst (2013) offered several guidelines in designing a Living Lab. In order for the businesses to learn from their experience in a Living Lab a Serious Gaming perspective is adopted that ensures that the learning of skills and capabilities takes place. These topics from literature are used as a starting point for the development of a model. Experts on these topics were interviewed in order to answer questions raised from gaps found in literature, these interviews were conducted through proposing hypothetical scenarios that yielded design rules which together with the design propositions from literature were used as input for the design of the Windesheim Experience Living Lab (WELL). The design of WELL is a Living Lab approach that provides guidelines for businesses to learn how to perform idea generation sessions through customer co-creation. Validating of the design was performed by α-testing, and thereby iterating on the design. Consequently, a discussion was held that reflects on literature. The ending point of this thesis is the design, which serves as a starting point for Windesheim as it should be further developed by implementing and evaluating it in practice.
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The master thesis project started out with several explorative discussions I had with my mentor, Mathieu Weggeman, he has helped me clarify my interests into a direction that provided the creative challenge I was searching for, soon after Marcel Weber came in the picture as the embodiment of my unformulated interests. Marcel obtained his PhD degree under the wings of Mathieu in the field of Customer Co-Creation. Having decided that I wanted to do my master thesis in the field of customer co-creation I found myself being immersed in the ever-growing world of co-creation. I started reading, browsing, studying and even twittering to be able to find myself becoming more confident about the creation of a common understanding of the outlines on co-creation. I read and I read, and then I read some more, but I could not have imagined that I would face such difficulties with the creation of an understanding of the research field and the formulation of an appropriate problem description. I encountered some bumps along the road and in order to get going I found the help I needed in the continuous support of Mathieu and Marcel. As the process continued Elke den Ouden was brought on board as the third counsellor. With the help of everybody involved I managed to successfully bring this master thesis project to an end and thereby finishing my master study and career at the Eindhoven University of Technology. I would like to make use of this opportunity to thank Mathieu, Marcel en Elke for their helpful feedback and valuable evaluation sessions. The scheduling of appointments has been a delight due to the wonderful services of the ITEM secretary and the boundless flexibility of my supervisors.

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Summary

Theory
The lectureship of co-creation and customer experience wants to strengthen the relation with regional businesses by means of helping them to improve performance and providing pragmatic applications. The problem was therefore defined as a lack of innovation processes for B2B SMEs in the region of Zwolle. In this study the Living Lab approach has been studied by applying a serious game perspective in order for B2B SMEs to learn how to perform customer co-creation. A literature review is performed in order to integrate and generalize findings across theories and to bridge the different languages used across fields. The identified gaps in literature helped to define the design objective. The first objective was to determine the requirements of involving regional businesses in customer co-creation. And the second objective was the creation of a Living Lab approach regarding the engagement of customers in customer co-creation.

Method
The research design that has been employed is the problem solving cycle as described by van Aken et al. (2012) which was utilized to produce knowledge to solve field problems. Design requirements are created in order to describe the desired situation, such requirements function as the input for the design. Design propositions follow the CIMO-logic. This logic is constructed as follows: in this class of problematic Contexts, use this Intervention type to invoke these generative Mechanism(s), to deliver these Outcome(s) (Denyer, Tranfield, & Aken, 2008). The findings from the analysis and diagnosis regarding the literature formulate requirements for the intended design thereby determining what settings are prevalent for the design parameters in the current context. The choice of setting for the design parameter at large determines the context of the design. The outline of the design is an unorganized set of information that will be further synthesized into a final Living Lab approach design with increasing detail (van Aken, Berends, & Van der Bij, 2012). The design exists out of three types of designs, these are: (1) an object design representing a Living Lab approach, (2) a realization design representing a protocol and (3) the process design representing the process. Due to the scope of this thesis actual implementation during the intervention phase is omitted, also meaning that the learning and evaluation phase is not performed either. Instead, in order to realize an feedback iteration loop, a α-test is performed (Dolan and Matthews, 1993; as cited by J. E. van Aken, 2005). The difference with α-testing is that testing and further development are done by the originator of the rule instead of β-testing through third parties (J.E. van Aken, 2004).

Design
The functional requirements are formulated by means of the results from a questionnaire and have led to concrete guidelines concerning the design parameters settings and thereby determine the context of the design. The design consists of three different phases. Starting by simulating idea generation through an example scenario, secondly the formulating of an idea generation challenge and lastly the actual idea generation. The simulation offers the space to actively experiment with some example scenarios that should lead to the insight that the participating client can develop his knowledge and understanding regarding how to write and evaluate innovation challenge questions. This concrete experience gives rise to reflective observation, allowing for abstract conceptualization of the predicted problem regarding the formulating of innovative challenges. The second stage is the actual formulation of challenges from a client business' context. The endpoint of these challenges is the starting point of the actual ideation and evaluation. Ideation is supervised by the client business
and appeals on students from Windesheim for idea generation. The means of communication is a challenge-briefing document that includes a well-formulated challenge. An overview is displayed in Fig. 0-1.

![Fig. 0-1 Client process (J.J. Schep)](image)

**Discussion**

The protocol helps professional workers in SMEs to get acquainted with the customer co-creation processes by means of participating in serious game processes. The guidelines and standards presented by such a protocol in the form of design propositions allow for individual adjustments and should not be taken strictly, deviations from the protocol are allowed and a protocol represents the knowledge base of a group of professionals that strengthens the autonomy rather than threatening it. The CIMO provides an example how organization should use the solution design. Organization is unfamiliar with the topic of customer co-creation (C), will need to acquire knowledge (I#3) through the scenario simulating idea generation through an example (M#3) and experience regarding customer co-creation (I#2) through formulating of an idea generation challenge (M#2) and will need to learn how to perform idea generation (I#1) through actual idea generation (M#1), thereafter the organization can engage in an idea generation session without further guidance (O).

![Fig. 0-2 Guidelines regarding the required amount of support (J.J. Schep)](image)
1. Introduction

The Hogeschool Windsheim consists out of various research groups; the lectureship of co-creation and customer experience is the principal for this master thesis. One of the aims of the lectureship is to continue to build upon the work of dr. Marcel Weber who has created a dissertation on customer co-creation in innovations. The interest of Windsheim is to strengthen the relation with regional businesses by means of helping them to improve performance and providing pragmatic applications. The dissertation by Weber (2011) however does not specifically address applications for SMEs or B2B businesses, which represent a large part of the regional businesses. Nowadays SMEs are increasingly vulnerable and subject to structural handicaps such as size, time, culture, managerial capacity, skills, access to information and finance. These handicaps bring about deficiencies that cause organizations to lack resources, which restricts these organizations to master new determinants of production, innovation and competitiveness (Wynarczyk, 2013). On the basis of this gap identified in theory the question has arisen how these regional SME B2B business could be best supported regarding the application of customer co-creation. The creating of innovative products and services that can actually impact the market is not a straightforward process. Specifically for SMEs the innovation process can be hard to accomplish due to the deficiencies described above. An application that is successfully used in practice is the so called Living Lab, a Living Lab is a multi-actor co-creation method that aims to help the innovation process for all stakeholders involved in such an endeavour, from manufactures to customers, and with a particular focus on SMEs and a focus on potential users (Ståhlbröst, A., & Holst, 2013). Living Labs are defined in a various number of ways; the activities that take place inside a Living Lab environment are ambiguous, and no off-the-shelf solution to the problem described by Windsheim exists in literature. This thesis also aims to target this gap in literature and the goal is to provide a practical method for businesses to engage in co-creation in such a Living Lab. A Serious Gaming perspective is explored in order to explain the activities that take place inside a Living Lab. Serious Gaming is a playful method that allows participants to acquire knowledge through learning from an experience (Connolly, Boyle, MacArthur, Hainey, & Boyle, 2012). An overview of the relations between the different topics can be found in Fig. 1-1.

![Fig. 1-1 Overview showing how the independent components are related to each other (J.J. Schep)](image_url)
1.1 Relevance of this study

The relevance for this project is twofold. At the academic level, the project aims to contribute to the scientific literature on Customer Co-Creation, Living Labs and Serious Gaming. At the practical level, the goal of this project is to offer a set of tools that can assist the regional business community to be able to co-create more productively. Several general solutions exist that help businesses to involve customers as valuable assets regarding innovation projects. The regional businesses around Hogeschool Windesheim are however in need of prescriptive research that can be applied in all kind of industries and contexts. This demand has led to opting to create a practical application that can help them to learn how to engage in customer co-creation. Such a practical application should address the following research question:

*How can a Co-creation Lab be designed that allows B2B SMEs from the region of Zwolle to involve customers in co-creating within their innovation processes?*

This research question can be divided in several sub questions:

- *How is customer co-creation different in a B2B context with SMEs?*
- *What are the determinants of Living Labs?*
- *Can a Serious Game perspective be employed to design a Living Lab?*

Research hasn’t reached a sufficient level of completeness, comprehensiveness and applicability for firms to use when engaging and involving customers (Camarinha-Matos, 2009; as cited by Weber, 2011). Therefor besides the practical goal this master thesis will also contribute to the scientific literature by means of creating design propositions.


1.2 Structure
This thesis is structured as follows. First, in chapter 2 general theory regarding Customer Co-creation, Living Labs and Serious Gaming are described in Literature Review 1, in an attempt to answer the research questions through literature, the aim is to determine the existing gaps in literature. Chapter 3 presents the methodology and the design process, which provide the overarching framework for this project. Chapter 4 and 5 respectively cover, literature and interviews that will serve as building blocks for the creation of the design of a Living Lab process. Chapter 6 describes the principles in terms of design requirements that are used to determine the design of the Living Lab following the design of the actual Windesheim Experience Living Lab. Chapter 7 validates and tests the design. And lastly Chapter 8 reflects on the whole research project through discussion, managerial implications, limitations and scholarly implications. The complete overview is shown in Fig. 1-2.

2 Literature review 1
2.1 Introduction
This chapter is an overview of the appropriate body of literature with a focus on pragmatic approaches and applications, and thereby tries to help establish a practical need that is currently not being met. This literature review is performed in order to integrate and generalize findings across theories and to bridge the different languages used across fields. It serves to justify the research performed in the master thesis project, presenting the reader with the bigger picture of the research landscape (Randolph, 2009). This chapter aims to identify gaps in literature by concluding what questions remain unanswered and will lead to the design objective underlying the purpose of this master thesis.

2.2 Customer Co-Creation
Throughout this thesis the definition of customer co-creation from Weber (2011) is followed: "The term co-creation refers to creativity where more than one person is involved, resulting in a product that something none of the creators could or would have achieved working alone. Co-creation does not necessarily imply the involvement of customers – the creation of a new product by two different
firms is also co-creation. We will therefore avoid the use of the term co-creation, and will designate it more specifically by customer co-creation. Customer co-creation is the collaboration between firms and customers to create value together, rather than by the firm alone" (Weber 2011, p. 397). In order to make customer co-creation explicit design propositions are provided around the following topics; (1) the context of customer co-creation of innovations, (2) the customer requirements and (3) the process of customer co-creation of innovations. These design propositions set the playground on how customer co-creation is ought to be carried out. Weber’s Customer Co-Creation in Innovations (3Ci) protocol aims to provide a solution for firms willing to use customer co-creation as a means to involve customers in participating in innovation. Throughout the 3Ci protocol Weber uses terms and definitions of which the meaning in academic literature is rather ambiguous. Therefor a few of the definitions that are frequently used are described by means of the work of Weber. A customer is defined as: “term to designate individuals or organizations that (will potentially) transact with the firm to obtain a product or service for their own use or further use by others. This means that the whole collection of existing and potential customers, existing and potential users are incorporated in this meaning” (Weber 2011, p. 397). The user is defined as: "the person or organization that uses the product or service for their own benefit." (Weber 2011, p. 399). This chapter will continue by explaining the aspects and elements through which customer co-creation can take place. Thereafter four distinct approaches are displayed.

2.2.1 Context of customer co-creation of innovations
Regarding the context of customer co-creation of innovations a distinction can be made in the (1) nature of the firm wanting to involve customers. A customer is not defined the same for every firm type. The distinction can be made based on the offer type, a firm can distinguish its offer between products or services. It can be based on the market type and maturity, B2B and B2C market types focus on different customers. Also a product or service focuses on the dimension, type of market, of which its existence stretches along emerging on one end and towards mature on the other end. Lastly a distinction can be made based on the industry a firm is operating in, firms operate in different sectors such as industrial, consumption, FMCG, high-tech products, services, or the public sector. Two parties can initiate an innovation project and thereby represent the (2) source of innovation; either the customer or the company can take initiative in conceiving product or service ideas. With customer initiated ideas it is the responsibility of a firm to enable customer-initiated ideas by providing a platform for users and customers to come up with innovative output. And it concerns company-initiated ideas when a firm enables customers to actively participate by means of transparent goals and providing participants with all the relevant information in an innovation project. A firm trying to conduct business can do so by means of different (3) types of innovation, existing out of three dimensions. The first is the object of innovation, different industries produce different output; a distinction can be made between a product, service or process innovation. The second is novelty; firms conduct different types of innovations regarding products and services. In developing new products or services a categorization can be made between two sorts of innovations. Incremental innovations concerning incremental improvements to existing products and services, and radical innovation concerning a blank point of departure with novel and new to the world products and services. The third dimension is openness, involving customers in the innovation process can be done along the dimension of openness with the spectrum reaching from closed towards open. Openness signifies the amount and the diversity of customers involved. Determining the amount of openness a firm wants to utilize is dependent on secrecy regarding IP protection,
customized products, the state of a product in the innovation process and knowledge about the target market and customer.

![Diagram](image)

**Fig. 2-1 Openness (J.J. Schep)**

### 2.2.2 Customer requirements - Factors regarding the customer which is involved

In this paragraph a closer look is taken at the (1) type of customers to co-create with in innovations, the definitions above regarding customers and users have provided us with a terminology on what type of customer can potentially be targeted for customer co-creation in innovations. Lead users are a valuable source when it comes to radical innovation especially if the target market and its lead users are easily identifiable. On the other hand regular less experienced users are able to provide more valuable ideas than professional users. In order for firms to have a successful customer co-creation session they rely on the (2) customer’s capacity providing the required input. Expertise is a capacity that is required from the participants. Involving customers in your innovations requires that these participants have some common ground regarding the product or service. They can have common ground regarding two factors. The first is use experience, being a user of the product or service class and the second is product-related knowledge, which increases the chance of success. Weber concludes that requirements regarding knowledge, expertise, technical skills, and such do not matter in the sense that the ideal customer to involve will not be available when trying to involve it in innovation, therefor anybody will do that is potentially an end-user or is able to put themselves in the role of a customer as long as they are familiar with the company, its products and the use of its products and services. It is important that the participants have some sort of use experience and as such are a qualitative representation of a company and have established a common ground. For companies to benefit the most from customer co-creation they need the (3) engagement of the customer, engaging willingly in the process. Motivation and commitment of participant involved are dependent on the perceived benefits of participating. In order to receive the best possible contributions a firm should try to involve intrinsically motivated and voluntary participants.

### 2.2.3 Process - Aspects regarding the process of co-creation

Regarding the (1) timing of the involvement producers and service providers can involve customers into their innovation process at different points of time. Even though all firms are different, the innovation process can be generalized. A regular product or service innovation passes through three phases. The conception phase, which brings about innovations through generating and selecting ideas. Traditionally conception took place in a closed innovation environment within a firm. The Implementation phase starts after an idea has come to surface, then a firm will have to develop the idea into a product or practice. Finally it reaches the marketing phase, which starts when the idea has been materialized and is ready for use, and then the firm will need to think how to bring the product or service to the market. After these phases the product or service will reach the market.
When a product arrives at the market and customers start using it, the so-called re-innovation stage is reached. Here everything after introduction of a product or service to the market is covered. The different activities within each phase are displayed in Fig. 2-2. Firms that want to involve customers in their innovation process through co-creation are able to do so in all stages or phases of the innovation.

![3 Phases of a Simplified Innovation Process](image)

**Fig. 2-2 Innovation process model as used by (Weber, 2011)**

The (2) **role and contribution of the participating customer** involved in the innovation process can take on all kinds of roles, either passively or actively. For customer co-creation in innovations a perspective is taken on actively involving customers in all stages and activities of the innovation process. The activities in which customers can get involved are displayed in the lower row of Fig. 2-2. Regarding the (3) **mode of co-creation** a platform that enables interaction between firm and customer needs to be in place for participation to be possible. Such a platform can either be a physical or offline channel, which is the preferred option when tangible products need to be tested. Using a physical channel however hampers the amount of participants that can be involved. Alternatively a platform can be virtual or online providing a faster and less substantial process. Contrary to a physical channel a virtual channel allows for theoretically limitless participants. A combination of both channels is also possible. The (3) **techniques and tools to support customer involvement** include going virtual which opens up a lot of possibilities to involve customers. With the appearance of web 2.0 the individual has taken over control on the Internet. This shift allows businesses to rely upon the Internet through an open call – outsourcing its tasks towards a crowd of non-professionals – and by means of virtual communities. A virtual community should be considered when a company intends to frequently involve customer in its innovation projects. Interaction with customers can happen in different manners. Finally a closer look will be taken towards (4) **the intensity and type of interaction**. During a co-creation project a firm should treat the customers as part of the new product or service development team. Doing so puts the intensity between the firm and customer on the same level engagement, providing equal treatment, symmetrical relations and will lead to more and better exchange of ideas and contributions. The type of interaction between firms and participants needs to be a type of language using metaphors, analogies and symbols. Using such language helps to overcome the barrier between different cultures thereby benefitting the quality of the solutions and the creative input from participants.

### 2.2.4 Four main routes in one generic approach

Weber proposes four approaches for firms to engage in customer co-creation, these four distinct pathways all share certain similarities with its basis in co-creation. A business using the protocol
however can decide its choice of action on the basis of the extremes of three dimensions: the (A) completeness of contribution, the (B) stages for involvement and the (C) openness of involvement. The previously discussed paragraphs show on the basis of which design propositions the protocol by Weber was created. These design propositions have led to four main routes that help the practitioner in co-creating with customers. The dimensions show in what aspect the routes differ from each other. An overview can be seen in Fig. 2-3.

![Diagram](image)

Fig. 2-3 Distinction between the four routes on three dimensions (Weber, 2011)

The *Dreamcatcher Route* calls upon a virtual or physical user community where customers use, review and discuss products, services and platforms. The role of the firm is to start a dialogue where discussions regarding innovations can take place. Besides actively participating, the firm should also, moderate and observe the interactions. If correctly performed companies can discover opportunities that they can transform into innovations projects. In the *Contest Route* the firm present a specific question, request or challenge for the customers that they can solve through composing specific solutions. The focus is on the front end of innovation since the company is yet to determine needs and wants of the market for the product or service under investigation. In the *Touchstone Route* customer co-creation can take place in any stage or activity of the innovation process. The involvement is however discrete and short-lived due to a well-defined involvement assignment. Hence this route is used for validation, verification, and additions to existing requirements. The *Employment Route* allows a company to integrate one or more customers in its innovation venture by means of employing a customer temporarily as part of the project team. This strategy is particularly interesting in the conception and implementation stage.

### 2.3 The Living Lab concept

#### 2.3.1 Introduction

Living labs are used as a method to facilitate interaction between organizations and users; it is an open innovation environment that can be used for several applications. This study focuses on co-creation from the perspective of firms that involve customers and users into their innovation development. Specifically, this study investigates the possibility of customer co-creation in the living lab context. Living Labs may be defined as a methodology: “a human-centric research and
development approach whereby ICT innovations are co-created, tested, and evaluated in open, collaborative, multi-contextual real-world settings” (Bergvall-kåreborn, Holst, & Ståhlbröst, 2009). Another view on Living Labs describes the concept as “people-centred, open-innovation ecosystems, often operating in a territorial context, integrating research and innovation process within a public-private-people partnership” (European Design Leadership Board, 2012; as cited by Brankaert & Ouden, 2014). Likewise, Bergvall-kåreborn, Eriksson, Ståhlbröst, & Svensson, 2009 define Living Labs as a milieu: “user-centric innovation milieu built on every-day practice and research, with an approach that facilitates user influence in open and distributed innovation processes engaging all relevant partners in real-life contexts, aiming to create sustainable values”. This definition has emerged through the growing interest for Living Labs in Europe, using a perspective where Living Labs are a research method for the development of innovations. In Europe the ENoLL (European Network of Living Labs) was established in order to support the contributions originating from Europe.

2.3.2 Defining Living Labs

Throughout this thesis the definition of Living Labs by Ståhlbröst (2012) is followed, she defines a living lab as both an environment (milieu, ecosystem) and an approach (or methodology). The environment entails the characteristic that Living Labs are geographically or institutionally bounded space. Taking the perspective of the Living Lab as an environment brings about five different types. Research Living Labs focus on performing research on different aspects of the innovation process. Corporate Living Labs focus on having a physical place where they invite stakeholders (e.g. citizens) in order to co-create innovations. In Organizational Living Labs members of an organization co-creatively develop innovations. Intermediary Living Labs are those in which different partners are invited to collaboratively innovate in a neutral arena. And the time limited Living Lab as a support for the innovation process in a project, the Living Lab closes when the project ends. (Ståhlbröst, A., & Holst, 2013) A Living Lab generally involves four different types of main stakeholders that participate in the innovation process. The first are companies that can acquire new innovative ideas. Second are users that influence the innovations according to their needs. Thirdly public organizations benefit through increased return on investment on innovation research and the fourth stakeholder are researchers that can develop studies through case research. These different stakeholders are also commonly referred to as Quattro Helix (Ståhlbröst, A., & Holst, 2013) or Quadruple Helix (Arnkil, Järvensivu, Koski, & Piirainen, 2010), which means that the innovation process is harmonized among the four main stakeholders. Ståhlbröst continues to define Living Labs along several components that can be found in Fig. 2-4. These components facilitate the occurrence of innovation (found in the middle) in a living lab; they define the environment in which the living lab exists. ICT & Infrastructure facilities and supports the Living Lab activities among the different stakeholders. Both the process of user involvement and the co-creation of new innovations are such activities. Management represents the ownership, organization, and policy aspects, a Living Lab can be managed by e.g. consultants, companies or researchers. Partners & Users are a source of knowledge and expertise, having access to such stakeholders is needed for achieving optimal knowledge transfer. Research is part of the output of a Living Lab in the form of learning and reflection of activities. Technological parties can also use research as input, which allows for technological innovation. Approach defines the actual innovative activity that takes place in the Living Lab. It is a methodology that ensures successful operations within the Living Lab.
The described components are the characteristics that define a Living Lab environment. The approach component builds on five key principles that should be present in all operations; initially these principles are the building blocks for the design of Living Lab operations. Besides being a design proposition the principles also function as a parameter to assess Living Lab operations (Bergvall-kåreborn, Holst, et al., 2009; Ståhlbröst, 2012; Ståhlbröst, A., & Holst, 2013).

- **Value** – The goal in a Living Lab is to create value for both, partners in terms of business value, and for users in terms of an innovation’s user value.
- **Influence** – Users should be viewed as valuable stakeholders in terms of contributing to innovation and development processes.
- **Sustainability** – A Living Lab should be sustainable in terms of longevity, focusing on transforming generated knowledge from Living Lab operations into models, methods and theories to learn from and use it to further build upon.
- **Openness** – This principle highlights the importance of creating an open innovation process where external stakeholders are involved in order to generate multiple perspectives that allow for speeding up the innovation process and strengthening innovation capacity,
- **Realism** – The context of the Innovation activities should be a realistic, natural, real-life setting in order to work with participants in the intended context. By either generating an environment that suggests reality, or performing innovation in the users’ actual real-world environment.

### 2.4 Conclusion to this chapter

The exploration of the work of Weber has shown on the basis of what elements and characteristics custom co-creation can be performed. It is important to note that the definition of a ‘customer’ used in this thesis represents individuals or organizations that will (potentially) transact with a principal organization to obtain a product or service for their own use or further use by others. This also represents the whole collection of existing and potential customers, existing and potential users are incorporated in this meaning. Customer co-creation research is grounded in the field of Open
Innovation which, generally focuses on standard organizations, generally MNE organizations that deal with the consumer markets. In several aspects SMEs differ from MNEs regarding open innovation. SMEs are restricted by their size in terms of innovation resources, central to the open innovation paradigm is collaboration as it involves external influences in order to commercialize innovations. SMEs are known to form alliances or networks to extend their technological competences. Also SMEs mainly focus on the commercialization phase, and are unable to exploit open innovation for the R&D phase. Living labs are frequently used as an environment in order to stimulate innovation for SMEs. Acknowledging that the Living Lab concept is, an approach, a methodology, an environment, an ecosystem or a milieu it can be established that a Living Lab is a broad concept that potentially covers a lot of different applications. A huge amount of methods exists that can be applied in Living-Lab projects, which can be due to the academic origin. A living lab is based on the principles value, influence, sustainability, openness and realism. The parties generally involved are four main stakeholders existing out of companies, users, public organizations and researchers. The approach or methodology of a living lab consists out involving users in several manners and at different phases in the innovation process. It is important to consider what co-creation activities are intended to occur in the Windesheim Living Lab, with what type of users and determine whether this falls within the concept of a Living Lab. The goal is to perform customer co-creation with SMEs; however no off-the-shelf innovation processes exists. The literature has provided several leads to further develop an innovation process that allows SMEs to involve customers into their innovation projects. By using components from general concepts of customer co-creation and living labs an approach will be designed regarding the specific context faced by Windesheim.

3 Methodology
This master thesis follows a prescriptive nature that aims to design a Living Lab approach for Windesheim to be able to provide knowledge and understanding regarding customer co-creation for regional businesses that are willing to productively conduct customer co-creation. The focus of this research lies within the field of design science, which is the methodology applied for management research. Its goal is to solve field problems, rather than carrying out explanatory research (van Aken et al., 2012). The first issue in developing a research design is the design objective (van Aken et al., 2012), the design objectives are #1: determining the requirements of involving regional businesses in customer co-creation. And #2: the creation of a Living Lab approach regarding the engagement of customers in customer co-creation.

The research design that has been employed is the problem solving cycle as described by van Aken et al. (2012), this was utilized to produce knowledge to solve field problems. The problem solving cycle can be found in Fig. 3-1, its starting point is the problem mess which resembles the business problem faced by Windesheim, and this problem mess is the driver of the problem solving cycle and was translated into a problem definition. The problem definition has been described in chapters 1 and 2. Following from the problem definition a suitable method of business research was selected to perform the analysis and diagnosis step which is performed in chapter 4 and 5 that has resulted in general concepts that serve as building blocks for the creation of the solution design. The solution design in chapter 6 is the output and is also the ending point of this thesis.
Due to the scope of this thesis actual implementation during the intervention phase is omitted, also meaning that the learning and evaluation phase is not performed either. Instead, in order to realize an feedback iteration loop, a α-test is performed (Dolan and Matthews, 1993; as cited by J. E. van Aken, 2005). The difference with α-testing is that testing and further development are done by the originator of the rule instead of β-testing through third parties (J.E. van Aken, 2004). This enables the possibility of evaluating the solution design and creating iteration through performing an α-test in chapter 7. The current chapter describes the methodology employed in achieving the different steps of the design process. Paragraph 3.1 describes the method for the creation of design requirements, entailing the demands that the design has to meet in order to be considered a success. This is followed in paragraphs 3.2 and 3.3 by methods that describe the collection of relevant input. Paragraph 3.4 then explains how the analysis is performed. Paragraph 3.5 continues to describe the development of the actual design. This chapter is concluded in paragraph 3.6 with the validation method of the design.

### 3.1 Design requirements

Design requirements are created in order to describe the desired situation, such requirements function as the input for the design. These requirements can be derived from the businesses that are eager to engage in customer co-creation and from the principal from Windesheim aiming to serve their needs. Hogeschool Windesheim is related to around 14.000 companies whose contact information is stored in a database, these businesses were contacted by e-mail and were requested to participate in a survey. The survey included questions regarding firm characteristics, co-creation experience, understanding of co-creation and an exploration of interests and/or motives (see Appendix A). This survey aimed to contribute to the creation of the design requirements for the intended solution design. Here the types of requirements are presented that were needed in order to develop a protocol for businesses that want to experiment and learn how to involve customers into their innovation projects through customer co-creation. The design requirements can origin from four requirement categories: functional or user requirements, boundary conditions and design restrictions (van Aken et al., 2012).


Functional and user requirements

In order to create a solution design the causes to the contemplated problem should be tackled. The requirements are set based on solving the causes to the problem. The creation of functional requirements is carried out through discussions with the principal from Windesheim and from the results of the survey. Requirements regarding the performance demands of the design object and what is thus expected of the design. These requirements are the starting point. The user requirements concern the user perspective regarding the use of the design.

Boundary conditions, design restrictions and attention points

The boundaries and restrictions help to narrow down the solution design and provide limitations for the followed direction. The boundary conditions are strict conditions that cannot be exceeded; these boundaries are externally imposed on the design. Examples are legislation, ethical habits or code of conduct. The design restrictions are the solution space preferred by the principal of Windesheim which have been formed through discussions with the principal. Attention points are requirements that are relevant to the design but they’re not requirements or design restrictions.

3.2 Exploration of different streams in literature

Underlying this thesis project is a literature review that has been performed as an exploration to the field of literature. The literature review is a single document (Schep, 2014) where the topics of Customer co-creation, Living Labs and Serious Gaming are addressed. In this report the relevant theory from the literature review is summarised where applicable: the general theory is discussed in chapter Error! Reference source not found., in chapter 4 the subjects are discussed in relation to the context of this research project. Theory discussed in chapter 4 provides theoretical frameworks that are used to solve the business problem and serve as leads to realizing the intended design.

3.3 Interviews

Interviews have been conducted with experts in order to obtain relevant knowledge, which has contributed to creating the design solution. The experts that were involved consisted of scholars and practitioners from the field of Serious Gaming & Living Labs. Interviews are efficient and relatively simple ways to gather knowledge of field experts. The knowledge of these experts is often implicitly captured as tacit knowledge in their minds. Design propositions help convert tacit knowledge into explicit and actionable knowledge. Plsek, Bibby, & Whitby (2007) describe several methods how to extract these explicit design propositions from practice. In this research this is done through “posing hypothetical scenarios to those experienced in . . . asking them to ‘think aloud’ about how they would approach the situation, and then extracting design rules off-line” (Plsek et al., 2007, p. 155). The hypothetical scenarios imply a certain context in which a certain outcome could happen through a certain interaction, this interaction needs to be provided through ‘thinking aloud’ by the expert in a discussion with the interviewer. These discussions have been recorded and were carefully transcribed afterwards. From these ‘off-line’ transcribes design propositions were extracted. The selection of the experts was performed through approaching authors of the literature consulted in the literature review. The interview protocol that was used for these interviews can be found in 7.Appendix C, the interview protocol was created according to eight principles to the preparation stage of interviewing which includes the following ingredients: (1) choose a setting with little distraction; (2) explain the purpose of the interview; (3) address terms of confidentiality; (4) explain the format of the interview; (5) indicate how long the interview usually takes; (6) tell them how to get in touch with you later if they want to; (7) ask them if they have any questions before you both
get started with the interview; and (8) don’t count on your memory to recall their answers (McNamara (2009); as cited by Turner, 2010).

3.4 Analysis
An 'off-line' extraction of design rules is employed, which entails in extracting design rules from the transcribed interviews through translating the regular interviews into standard design rule language. The output of the literature review and interviews is prescriptive knowledge in the form of design propositions that is regarded the basis of the design of the Living Lab in the following step. The design proposition is a proposal to professionals to use a generic solution concept to design a variant of it to target their specific field problems of this type. The proposition can provide the type of field problem in question, the intervention or solution to target the problem and the expected outcome. However the power lies in knowing why this intervention in a certain context produces the desired outcome, what generative mechanism is exploited by the intervention to produce this outcome? These design propositions follow the CIMO-logic. This logic is constructed as follows: in this class of problematic Contexts, use this Intervention type to invoke these generative Mechanism(s), to deliver these Outcome(s) (Denyer et al., 2008). These design propositions are created through the synthesis of the qualitative data. Synthesizing this qualitative data in an academic manner is by means of realist synthesis (Denyer et al., 2008). This method prescribes creating an understanding how interventions or systems work in different types of context. Within this thesis this involves transferring the theory on customer co-creation from a large firm context towards a B2B SME perspective and finding a mechanism on how to enable the target group to acquire this knowledge in an effective manner. The main goal of synthesis lies in creating and understanding the underlying generative mechanisms in order for practice to know what to do in which situations to create certain outcomes. These underlying generative mechanisms generate a range of different outcomes regarding the context of implementation (Denyer et al., 2008). The interviews and literature review focus on identifying the underlying generative mechanisms of applying serious gaming as a means to learn customer co-creation in a B2B SME context. The purpose is to identify why certain interventions are expected to produce intended outcomes in different contexts.

3.5 Design
"Designing is the process of determining the required function of an object or process to be designed, combined with making a model of it. One can also say that designing is developing a functional specification of the object to be designed, combined with making a technical specification of it – that is, specifying the object in such a way that the makers of the object have sufficient technical information to produce it" (van Aken et al., 2012, p. 44).

The design exists out of three types of designs, these are: (1) an object design, (2) a realization design and (3) the process design. This paragraph will explain what parts of the design will be realized through the different types of design (van Aken et al., 2012). The relationships between the various designs are shown in Fig. 3-2 and represent the immaterial world, due to the scope of this thesis the content of this research will be limited to the immaterial world and the transition to the material world is omitted.
3.5.1 Object design

An object design is the primary objective of the master thesis, which will entail the development of the Living Lab approach that will be developed by means of a simulation of the reference system and represents the functional specification. It should be noted that a design cannot be logically derived based on input, this kind of designing requires a creative leap. Such a creative leap represents an abduction type of logic opposing more general methods of reasoning such as induction or deduction. Abduction involves an element of guessing which is often used to explore the unknown (van Aken et al., 2012). This object design will be realized through the 7-step methodology by Caluwé, Geurts, Buys, & Stoppelenburg (2001) which will be the topic of paragraph 4.3.2. The Living Lab approach is created based on the customer co-creation activities described by Weber (2011).

3.5.2 Realization design

The realization comprehends the design of a protocol or the technical specification. Protocols are commonly used in the field of information technology and regarding human behaviour. The protocol created in this thesis will comprise means for the principal to help businesses engage in customer co-creation. Protocols regarding human behaviour are commonly applied in the fields of medicine and sciences, particularly as a formal set of rules and procedures that represent a guideline on how to act during research experiments, the course of treatment, procedures, etc. (Weber, 2011). A protocol is comprised from design propositions (Joan Ernst van Aken & Romme, 2009). A proper protocol allows its user to interpret the steps to individual circumstances and needs, in order to be employed to different context and scenarios. Professional experience and judgement are key in applying the protocol to context-specific solutions (J. van Aken & Romme, 2012).

3.5.3 Process design

This is the design that explains the process of analysis and design, and brings about the creation of the object and realization design. The process design is represented by chapter 3.
The findings from the analysis and diagnosis regarding the literature were used to formulate requirements for the intended design thereby determining what settings for the design parameters are prevalent for the current context. The choice of setting for the design parameter at large determines the context of the design. The outline of the design is an unorganized set of information that will be further synthesized into a final Living Lab approach design with increasing detail (van Aken et al., 2012).

3.6 Validation / quality criteria for research

According to van Aken et al. (2012) the quality of research is justified based on controllability, reliability and validity. These criteria are important because they represent claims about reality based on research. This paragraph starts out by briefly discussing the first two criteria and provides the method used to validate the design.

3.6.1 Controllability

The quality criteria controllability is a prerequisite for the evaluation of the other criteria. Controllable research has to demonstrate how the study has been executed, through understanding and assessing the way research output is reached (van Aken et al., 2012). In this study the contemplated controllability is realized through the adoption of a design oriented method, an explanation of the data collection and analysis method, and by the inclusion of tacit research methods in the appendices of this document.

3.6.2 Reliability

Van Aken et al. (2012) describe reliable results as being replicable independent of specific characteristics of the study. The involvement of experts from the field of practice as discussed in paragraph 3.3 helps to increase the reliability regarding the appropriate use of the game design protocol and the intended design. Involving experts in the gathering of the design propositions helps realize triangulation through the combination of multiple sources of evidence. Triangulation complements theory found in literature by acquiring experiences from practice through interviewing experts (Yin, 2003; as cited by (van Aken et al., 2012).

3.6.3 Validation

Validation normally occurs through justifying results based on the inputs by means of deductive logic, in the case of design science this does not apply because it follows an abduction type of logic. The justification of a design has to be carried out through validating to what extent the design meets the design requirements (van Aken et al., 2012). The abstract definition of validity concerns three types of validity, these are: construct validity, internal validity and external validity.

Construct validity represents the measurements used to generate data and whether the measuring instrument measures what it was intended to measure (van Aken et al., 2012). Throughout this research data is gathered through two distinct methods, the interviews and the questionnaire. In both methods attention was paid to ensure high construct validity. The interviews were performed by using the talking board & definition list from 7.Appendix C, which pays attention to the inclusion of a discussion on the concepts used in the interview to see whether interpretations of concepts corresponded. The questionnaire employed the concept of design for, with or by users (as discussed in paragraph 4.2.2) which helped gain insights in the needs of the target group that helped built the design requirements.
The *internal validity* refers to conclusions about the relationship between phenomena (van Aken et al., 2012). As already mentioned in the case of design science it cannot be justified by means of deductive logic but instead abduction logic is employed, in order to perform such a justification iteration is applied (see Fig. 3-4). The synthesis or the creative leap that has been performed in this thesis has been validated by means of α-testing the proposed design. Based on the design requirements, using several design principles a design was created that has been reviewed by the experts that were interviewed in chapter 5. The ‘Loop A’ evaluation has offered the possibility to iterate on the design through validation. The evaluation has brought about shortcomings that resulted in adjustments to the synthesis and helped creating a more suitable design. It is impossible to say whether the actual design matches the actual design requirements, therefor testing should also take place in the material world. Due to the scope of this thesis the design is only tested ‘on paper’. The final design did manage to meet the proposed requirements and therefor a “Loop B” iteration was not necessary.

![Fig. 3-4 Synthesis-evaluation iterations (loop A) and requirement-design iterations (loop B) (van Aken et al., 2012)](image)

*External validity* represents the generalizability or transferability of the research results and conclusions in relation to other entities (van Aken et al., 2012). Since the goal of this research is to solve a field problem the external validity is limited. The method applied or the application of serious gaming as a means to create a design can however be valuable to other researcher searching to solve field problems in different contexts.

4 Literature Review 2

4.1 Introduction

Comparing B2B and B2C organizations regarding co-creation shows that differences do exist. B2B organizations co-create horizontally whereas B2C organizations co-create vertically, in this thesis an effort is made to determine whether B2B organizations can also co-create vertically with end-customers. Customer co-creation in B2B environments normally does not occur since they lack interaction with end customers, this represents a gap in literature. B2B SMEs do engage in customer co-creation, they however do not reap the same benefits a B2C oriented business reaps by involving customers into their business. This can be explained by the fact that they both have customers but its nature is different. For B2B SMEs to benefit equally from involving customers into their innovation project they need to involve another type of customers. The type of customer that should be involved does not necessarily have to be your own customer; the platform of Battle of Concepts has shown that anyone that is intrinsically motivated to help is able to help you innovate. Customers from all over the world who create and update a brand’s product or service without being employed by the firm. This may sound impossible, but reality has proven otherwise. Battle of Concepts was
launched by Joost Dekkers (2007). It is a website that provides refreshing ideas and surprising insights for ‘challenges’ that businesses are facing. By using the online Battle of Concepts platform businesses can approach 12,000 talented students and young professionals that think along and provide creative solutions to the challenge. Battle of Concepts (1) helps formulating the challenge, or ‘battle’, which is (2) extensively promoted, (3) receive dozens of concepts from whom the top 10 best concepts are selected that win a price and (4) exploring the best ideas and transform them into concrete solutions together with battle of concepts innovators, see the conceptualization in Fig. 4-1.

4.2 Windesheim Living Lab
The goal of this research is to create an incentive for companies to engage in co-creation with customers. The Windesheim Living Lab is an environment that companies can visit in order to acquire skills and experience regarding co-creation with users, the underlying assumption is that companies are not sufficiently able to perform co-creation themselves. The visiting companies are guests to the Living Lab making use of the host’s facilities i.e. users, knowledge, tools. Windesheim acts as a Host offering facilities to companies wanting to co-create with users. Windesheim is also responsible for providing these users. The Windesheim Living Lab serves as an environment where companies can learn through experience, such experience can provide companies with the required knowledge, skills and confidence to independently perform co-creation in their own businesses.

4.2.1 Host/Guest service provision model
Doppio & Pianesi (2013) elaborate on the definition of the so called Experience and Living Labs (ELL) facilities that are adopted by European Institute of Innovation & Technology ICT Labs (equivalent to ENoLL): “ELL are one-stop shop hosting co-creation and testing requirements from guest customers, on a service provisioning basis”. The operations that take place in an ELL are based on the converging efforts of two different players interacting. These players are distinguishable by the role they play. One party being the ‘Guest’ and the other party is the ‘Host’. The relation between the Guest and Host takes place on a service-provisioning basis; the ELL activities taking place are thus services from the Host to a Guest. The Host is defined as “whatever organization (public, private, project-based consortia, PPP-based consortia), who is in the position of leveraging and making available Living Lab-related assets and resources (panels of users, HRs, methodologies, ICT and related
infrastructures, territorial partnerships, etc.) in order to provide services to other organizations embarking in Living-Lab-based innovation projects” (Doppio & Pianesi, 2013, p. 41). The Guest was thus defined as the “organization [again, whatever the governance] exploiting those services, while providing a revenue stream [...] to the Host”. Fig. 4-3 shows an abstract overview on how the Guest and Host are related and who provides what services to whom.

Fig. 4-3 A graphical conceptualization of a service provisioning based working model for open Experience & Living Labs. (Doppio & Pianesi, 2013)

The Guests as defined by Doppio & Pianesi (2013) are not a partner to a Living Lab and thereby do not govern the Living Lab facilities, they are mere exploiters of a lab. These type of guest are called Client Guests, guests who on the other hand do want to get involved are called Partner Guests and thus contribute to the deployment of basic resources and assets needed by a Living Lab. Ståhlbröst, A., & Holst, (2013) describe themselves as a facilitator towards experimenters in setting up, and running user involvement activities. The guests in the Living Labs described by Ståhlbröst & Holst are the stakeholders from the Quattro Helix.

4.2.2 Defining users

In the field of Living Labs, users can be defined in many different ways such as lead users, end users, customers and consumers. The most commonly used definition for user regarding Living Labs is the concept end-user: “which includes users who actually use the system in some way and this can be both as a content user and a content provider and can be divided into actual end users and potential end users” (Ståhlbröst, 2008, p. 13). Where the actual end user represents a specific and identifiable group of users for whom a product or service is developed in a specific design situation. And the potential end users represent a known market segment but an unknown individual user or user group for generic design situations (Ives and Olson 1984; as cited by Ståhlbröst, 2008). The influence that users have over the product under consideration in a co-creation process is defined as the degree of user participation. Bergvall-Kåreborn & Ståhlbröst (2008) argue that the degree of user participation can be categorized into three different types of degrees. The first being (1) design for user, where the users do not actively influence the decision making process, users provide input and are studied in order to create data through which the decision making process is influenced. The output should match users’ needs. The second is (2) design with user, where users have more influence and have a stronger, close to an equal voice in the decision making process. Iteration between designers and users is constant through which the knowledge is shared. The designers however are in control and run the process. Users are involved because of their knowledge regarding the context and their vision for the solution. And lastly (3) design by user, this type of user participation focuses on users as designer and the original designer becomes the facilitator, two extremes along the spectrum are described here. Users either both design and develop a product or service supported by designers and their tools, where at some point the designers take over and finalize the product or service. Or users become innovators and designers, with the assistance of a
designer. In the latter two options the researcher and the designer may be the same person (Sanders & Stappers, 2008).

### 4.2.3 Application in new product development

Depending on the product development phase in the innovation process a different type of user is the best contributor. Including different type of users or customers in the phases shown in Fig. 4-4 helps to reduce market risks through finding the customer and users that suit the qualifications needed for achieving the expected output with their involvement in a specific phase (Enkel, Perez-Freije, and Gassmann, 2005; as cited by Ståhlbröst, 2008).

![Fig. 4-4 Customer involvement in innovation development processes](image)

The different types of users are categorized into seven different types of customers. *Enquiring or requesting customers* whom provide ideas based on their needs, the ideas often arise from complaints or suggestions. The *lead user* category is valuable for every phase of the development process (Von Hippel, 2005). *Non-users* are consumers that choose to limit, completely or partly, the use and amount of certain products and services (Selwyn 2003; as cited by Ståhlbröst, 2008). A *first buyer* is the type of customer that is the first to buy a product after market launch. The *launching customers* are those that participate in the development, test prototypes and provide feedback. *Reference customers* supply experience regarding the use of different applications, thereby providing feedback through comparing products and services. The last category involves *modders* whom redesign products and operate on their own (Jeppesen, 2004; Lüthje, 2004; Shah, 2007; as cited by Weber, 2011)

### 4.3 Serious Gaming

#### 4.3.1 Introduction

The previous paragraphs discussed the protocol on customer co-creation and the theory regarding Living Labs. The protocol by Weber provides tools how to act when wanting to perform customer co-creation. A Living Lab is a method and an environment through which customer co-creation can be performed by SMEs. In order to utilize the protocol described by Weber, organizations need to learn how to engage in this process. Organizations have been trying to find better ways to learn, increasing effectiveness and fostering change in operational routines in respect to complexity and variety
among the different levels of simultaneous learning. Organizational Learning is important due to the fact it allows organizations to develop knowledge and provide the need for adaption and increased efficiency in times of change, which helps to strengthen competitiveness with regards to other organizations (Dodgson, 1993; Flores, Zheng, Rau, & Thomas, 2010). The development of knowledge is the main resource in relation to the innovation capability of an organization (Jiménez-Jiménez & Sanz-Valle, 2011). Experiential learning is defined as a process by which “knowledge results from the combination of grasping and transforming experience” (Kolb, 1984, p. 41). This learning style focuses on experience in a way that active involvement in a problem or scenario requires the developing of a solution that will lead to the creation of knowledge. Armstrong & Mahmud (2008) argue that solely involving students in an experience to create knowledge is not sufficient and that the experience needs to be examined through a reflective observation process. Such a reflection will allow individuals to grasp meaning from such experience. The authors argue that reflecting on an experience is just as important as an experience itself. The Experiential Learning Cycle is Kolb’s most widely used learning theory. There are four stages (see Fig. 4-5).

Kolb’s cycle starts with concrete experience. In other words it begins with doing something in which the individual, team or organization are assigned to a task. Key to learning therefore is active involvement. In Kolb’s model one cannot learn by simply watching or reading about something, to learn effectively the individual, team or organization must actually do something. The second stage is reflective observation this means taking time-out from “doing” and stepping back from the task and reviewing what has been done and experienced. At this stage lots of questions are asked and communication channels are opened to others members of the team. The third stage is abstract conceptualization, which is the process of making sense of what has happened and involves interpreting the events and understanding the relationships between them. At this stage the learner makes comparisons between what they have done, reflect upon and what they already know. They must be able to create concepts that integrate their observations into logically sound theories. The final stage of the learning cycle is active experimentation and occurs when the learner considers how they are going to put it into practice. Planning enables taking the new understanding and translates it into predictions as to what will happen next or what actions should be taken to refine or revise the way a task is to be handled. For learning to be useful most people need to place it in a context that is relevant to them. If one cannot see how the learning is useful to one’s life then it is likely to be forgotten very quickly. Experiential learning can be applied in several ways; in the classroom an
application is problem-solving approach by means of small exercises, case studies or business games. Other classroom applications are the role-playing approach and the debate approach. One particular application of experiential learning has shown to be successful in realizing its potential is the simulation method, and more precisely, the use of Serious Games. Serious Games were first introduced in work by (Abt, 1970), he defines it as “an activity among two or more independent decision-makers seeking to achieve their objectives in some limiting context... These games have an explicit and carefully thought-out educational purpose and are not intended to be played primarily for amusement.” (Abt, 1970, p. 452). The goal of a serious game is experiencing a learning opportunity where the boundaries in the game help to put the emphasis on the relevant aspects a player can learn through. A serious game allows players to experiment in a simulation environment that represents a realistic environment through which it can perform strategies or ideas that normally would not be possible due to real world restrictions such as costs (Rodriguez, 2006). Serious Gaming is a umbrella term that covers all sorts of games with a purpose of learning and training Crookall (2011). Simulations games help narrow down the definition of serious games because they represent a simulated model of a (real) system with actors that in different roles and perspectives, try to accomplish objectives within a certain set of rules. Players become part of the model through interaction. A simulation game exists out of several building blocks or elements: (1) scenario, (2) events, (3) cycles, (4) game stages, (5) rules, (6) roles, (7) sub-models, (8) decisions and their connections, (9) calculation system, (10) indicators, (11) symbols and (12) paraphernalia (Duke 1980; as cited by Caluwé, Geurts, Buys, & Stoppelenburg, 2001). Whenever referred to a serious game the above definition by Duke is meant. It is important to note that every simulation game can be a serious game, but not every serious game is a simulation game. In order to use a serious game to learn from or teach about problems or situations, first a simplified model of reality is created, then, lessons are learned from this model; and finally the findings or the acquired knowledge will be translated back towards reality, see Fig. 4-6 (Peters, Vissers, & Heijne, 1998).

![Diagram](image)

**Fig. 4-6 Process of designing and applying game simulations for complex problems (Peters et al., 1998)**

The left arrow represents the game design; the reality will need to be translated into a usable game, meaning that a good understanding of the characteristics of the reality is needed in order to transform these characteristics into the elements that constitute a game. Then during the **process**
the participants play the actual game, which allows them to learn and acquire new knowledge and experiences. Then the right arrow represents the output, which is often referred to as debriefing, here the actual learning happens and the experiences are translated back to reality. And thereby the circle is closed (Peters et al., 1998).

4.3.2 Input
The game represents a conceptualized version of the complex reality. The complex reality exists out of a great number of aspects and elements of different natures among which all kinds of relations exist. Because of the reality’s complexity the persons working in this reality do not have sufficient overview over the problem at hand. The goal of designing a serious game is to transfer this complex reality into a simpler model. Three principles play a role in the creation of the simpler model:

- **Reduction** – Not all elements that are distinguishable in reality will find its way into the model, but only the most central elements will be used in the model;
- **Abstraction** – The elements that are integrated in the new model do not necessarily have as much detail as the actually have in reality;
- **Symbolization** – The elements from reality are represented in a different shape in the new model (Peters et al., 1998).

Different methods exist that help to facilitate in the design of a serious game, Caluwé, Geurts, Buys, & Stoppelenburg (2001) introduced a seven-step methodology which is grounded on the ideas by Richard Duke, whom has successfully created a roadmap for the design of tailor-made simulations. The steps suggest a linear progress of the design. However in reality it is often an iterative, cyclic and concentric process.

1. Drawing up a set of requirements
The drawing up of a set of requirements should lead to the results the game has to bring about for the players and the organization. The results of the conversations between the principal and the designers are recorded in the functional program of requirements. Some of the frequent questions encountered are: What are the objectives of the simulation? What does it need to do with and for the participants? What are the main principles that are already known? This might include (a) functional, (b) organizational and (c) technical requirements.

   (a) Is related to the learning and experience moments for the participants of the simulation game. To what extent does the simulation match reality? What should the participant learn?
   (b) Concerns the execution of the simulation game. Who participates? How much participants are required for a session? How long can a session take? How many facilitators are needed?
   (c) Defines what elements must be included in the simulation game. What should at least be included? When do participants perform well (indicators)? What roles exist? Is there a competition element? Should the participants be able to fulfil different roles?

2. Analyzing processes and mechanisms
This step and the making of an integral diagram are methods for system analysis: they make sure that the game is a good representation of the reference system that is to be displayed. Gathering of information is done through an exploration of relevant information regarding the reference system. In order to distinguish main and accessory matters, selection of information can be done through:

- Using the functional program of requirements.
- To trust advancing insights
- Drawing techniques and concepts derived from system analysis
- Additional evidence that the client at this stage can and should give.
3. Making an integral scheme
The creation of an integral conceptual map is the closure of the inventory phase. The previously collected data is placed in one big scheme. The definitive version of this big picture is a display of all the elements that appear in the simulation game. In later phases this scheme will function as a blueprint or technical drawing for the game design. In this phase a definitive choice is made regarding what parts are included and which parts are left out. This blueprint needs to be agreed upon by the principal. The principal can see the simulated reference system in one overview and can provide feedback.

4. Drawing up game-technical set of requirements
This phase defines the transition from the real world (reference system) to the artificial world of the game (conceptual model). By means of the diagram the game-technical elements are determined. The previous phase resulted in a list of system components, subjects that need to be included in the game. These need to be translated in relevant parts for the game, the so-called game elements. The designer can use several building modules to do so:
1. Style/format: The structure of the simulation game.
2. Rules: Rules that cannot be changed by players.
3. Policy: “Rules” that the players can change, they represent the decisions of the acts inside the game.
4. Scenario: Description of the history and the future developments of the organizations in the simulation game.
5. Events: Update of the scenario
6. Roles: An overview of the functions and tasks that the participants in the simulation game can choose.
7. Decisions: the decisions participants have to make during a simulation game.
8. Game stages: A description of the sequence in which the participants go through the simulation game.
9. Calculation system: instrument through which the facilitators can register the participant’s results.
10. Model: Sub-models
11. Indicators: Indicators tell participants how they are performing.
12. Symbols: Illustrations that illustrate an element, activity or decision.

The game designer needs to match the system components to the 12 building blocks. Use of a matrix: system components vs. game elements. Columns represent system components that need to be in the game, rows are formed by the building blocks of the game design. The matrix provides the first overview of the translation from reality to simulation game. This rapport is the basis for the creation of the game-on-paper. This game-on-paper should meet the following requirements: correspond to the functional program of requirements, the game can be manufactured and it should function as a game.

5. Construction of the prototype
The game-on-paper or design ideas are used in order to create a prototype, and it is developed through ‘trial and error’. Alfa testing in order to further developed; also the symbols and game materials are created.

6. Testing of the prototype
The testing of the prototype occurs according to the requirements from step 1 and the design in step 4. The actual testing in contrast to alpha testing is performed with participants whom are
comparable to the target audience. Often a first test brings about lots of improvements. The intended learning effects are evaluated and concretized if needed.

7. Refine and make ready for use
Involves the creation of definitive game materials, game manuals, a facilitator’s handbook, layout of forms and indicator lists, etc. The manual describes how the game is started, what the role of the facilitator is, who does what, when? Also facilitators need to be trained.

When a closer look is taken towards the seven game design phases it can be seen that the term design is used in two distinct ways. The process as a whole is a design process, and the actual designing of the game is another design. In order to clarify what exactly happens in phase four a closer look is taken into literature around game design. The design is accompanied by a configuration, which determines the values of the parameters of the design, which is referred to as ‘load’ and the situational factors that are called ‘situation’. The load or ‘scenario’ (Gibbs, 1974; as cited by Meijer, 2009) entail the values that are given to the variables in the design of a serious game. This means that without changing the design of the serious game different games can be played. The situation concerns the variables that surround a serious game but are not part of it. These variables most of time concern operational issues such as the location, the participants, the instructions for participants, etc.

4.3.3 Process
The process is described by Garris et al. (2002) as the game cycle going through showing behavior, receiving feedback on this behavior and making judgments. Subsequently the next round starts in which the new method is tested (Kolb, 1984). In order for the cycle to result in attractive game play in terms of participant’s motivation to play it is important for the instructional content to fit the appropriate game characteristics. The better the fit the higher the motivation to play. The game cycle is an iterative process in a way so that the game play involves repeated judgment-behavior-feedback loops. The learning experience of the participants happens during this cycle and during debriefing. A game can have different function relating to the intended learning effect, several different functions are shown in Table 1.

<table>
<thead>
<tr>
<th>Function of the game</th>
<th>Role of the game</th>
<th>Dominant communication</th>
<th>Intended effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness and motivation</td>
<td>Transmission medium</td>
<td>Game to players</td>
<td>Cognitive, social psychological</td>
</tr>
<tr>
<td>Knowledge and understanding</td>
<td>Practice situation</td>
<td>Game to players</td>
<td>Cognitive</td>
</tr>
<tr>
<td>Skill training</td>
<td>Practice situation</td>
<td>Game to players and among players</td>
<td>Expanding skill repertoire</td>
</tr>
<tr>
<td>Communication and collaboration</td>
<td>Create conditions</td>
<td>Among players</td>
<td>Social psychological</td>
</tr>
<tr>
<td>Integration of learning experience</td>
<td>Practice situation and creation of conditions</td>
<td>Game to players and among players</td>
<td>Experience coherence</td>
</tr>
</tbody>
</table>

Table 1 Communication character of a simulation game (Caluwé et al., 2001)

Knowledge and understanding
A simulation game offers participants the possibility to investigate possible effects of decisions and test these. A simulation game will require detail meaning that complexity will have to be introduced
step by step. The emphasis is on showing the relationship between the game and reality. The content needs to be recognizable from the work situation.

**Skill training**
By playing a simulation game participants learn new abilities, how to act, to decide or to choose an approach for problems and real situations that are simulated in the game. Participants practice with (new) behaviour and bring this in to practice. They experience the effects and consequences of that behaviour and based on that they can adjust their behaviour and further practice their behaviour. Therefor iteration is required to make sure the skill is mastered

4.3.4 Output
As mentioned before, a crucial element of the experiential learning process is the stage after the concrete experience where reflection is performed in order to learn from experience. This stage is also acknowledged by research on serious games, Crookall (2011) states that the actual learning comes from the debriefing afterwards and not from the game itself, arguing for a reflective thinking stage, which is termed “debriefing”. Every game regardless of the intentions requires the participant, or players to learn something. Every game is subject to a set of rules that the player needs to understand in order to participate. So at the very least the player will learn the rules of the game, only when these basic rules are grasped the player will be able to acquire further skills through trying different strategies and practicing the game activities (Michael & Chen, 2005).

The mastery of a skill occurs through a cyclical process of transformation from unconscious incompetence to unconscious competence (Chapman, 2007 see Fig. 4-7). This process takes time, but can be accelerated by repeating activities and evaluating often. Serious Games greatly help raise awareness on unproductive behavior and automate productive behavior. Unconscious choices have advantages, they are made faster and people are more satisfied afterwards. Moreover unconscious choices in complex situations – with the same prior knowledge – are more than just rational thought out choices in the same situation. Unconscious choice without having the right prior knowledge can go horribly wrong. There will be a slightly faster result and a decision with more satisfaction, but there is a high probability that the decision was incorrect. This transformation process has its own 'valley of despair', in which the participant is aware of the fact there is no knowledge, becomes conscious of his incompetence and realizes that he has to work hard to learn and master skills (Wenzler & Chartier, 1999). After going through the learning process the participants becomes competent regarding the skill that is taught through the learning program. Then when a person knows how to perform a certain skill the learner apply the skill but at first is conscious of his behavior and might still need some assistance, this is the **conscious competence** phase. After a lot of experience and repetition the performer becomes experienced and learns to master the skill. This is the end station, this phase is called **unconscious competence** (Chapman, 2007).
4.3.5 Stakeholders

In serious games several other stakeholders exists besides the participants or subjects in a game. These are the designers of a game and the facilitators (Hofstede, de Caluwé, & Peters, 2010). The execution of a serious game lies with the facilitator, who acts based on the facilitation of the process. The facilitator determines the learning efficiency for the individual participants and indirectly influences the efficiency for the principal organization. For this reason it is of paramount importance that the transfer of the serious game to an educator or facilitator happens securely. The facilitator needs to be able to make the right decisions; he has to be able to exactly determine what serious game to use in a specific context with different target audiences. Such a decision should fit seamlessly into the subject matter and with the learning objectives (Hofstede et al., 2010).

Facilitators however do not have a clear task; they need to balance between several roles. Being a facilitator means instructing, leading, motivating and the facilitator needs to know everything there is to know about the content and ultimately guide, help, seduce, confront or constrain participants. During a game session the facilitator is also responsible for the debriefing afterwards which is where the actual learning takes place (Hofstede et al., 2010).

4.3.6 Validation

In order to decide whether the designed game is a valid representation of the underlying complex reality several validity criterion need to be adhered to (Peters et al., 1998). Peters et al. have looked into the concept of validity and refer to the work of Raser (1969), which looks into the use of gaming in research. Central in his work is the definition of the validity of a model: "A model can be said to be valid to the extent that investigation of that model provides the same outcomes as would investigation in the reference system." (Raser, 1969; as cited by Peters et al., 1998, p. 22). When a serious game is used to teach a participant certain traits, a game is valid when the participants achieve the learning objectives. According to Peters et al. when Gaming is used as a teaching tool three of Raser’s validity criteria need to be adhered to. The first is psychological reality, which implies that the game needs to provide an environment that needs to be perceived as realistic in order to be valid. The behavior in the game should match the desired behavior in real life. The second is structural validity, which requires that the structural elements such as the theory and assumptions of the game need to prove to be isomorphic with reality. Isomorphism indicates that the elements and relations between both systems do not need to be equivalent, but they need to be congruent to
some extent. The third criterion is the process validity, this type of validity concerns in-game processes to be isomorphic to the realistic processes. The process represents flows of information or resources, interaction between actors, and negotiations (Peters et al., 1998). The validity of the game can be checked through presenting the concept of the game to other persons that can evaluate whether the created concepts corresponds to the reality. This validating can be done by means of three different possibilities. The first is a validation type called peer debriefing (Guba & Lincoln, 1982; as cited by Peters et al., 1998) which involves two types experts, these experts can either be expert game-builders that know how the game-building process should work, and the other are content-experts that can validate whether reality is correctly conceptualized. The second possibility for validation is a member check (LeCompte & Goetz, 1982; as cited by Peters et al., 1998) by means of presenting the game concept to future players, and asking these players what their opinion is about the validity of the game, or in other words, whether they would be benefitted by playing such a game. In determining validity these two possibilities are complementary since both types focus on differs aspects of the game. The third possibility to check the validity of the game is more explicit. This is the actual testing of the game where participants play the game and go through a test-run in order to find out if the logistics in a game work. If the first two possibilities would represent an α–test, then this third possibility would represent a β–test (Dolan and Matthews, 1993; as cited by J. E. van Aken, 2005).

4.4 Conclusion

A Living Lab is both an approach and an environment. The scope of the approach can be defined along two different dimensions. The first dimension is the type of activity practiced inside a Living Lab, this ranges from idea generation to market launch. The type of activity can be viewed as a design parameter, the range of settings is found in Fig. 4-8.

![Fig. 4-8 Innovation development process (Ståhlbröst, 2008)](image)

Another dimension is the choice regarding the type of user involvement. The interaction with users varies between design with, by and for user. The setting of the interaction type also represents a design parameter, and different alternatives can be designed regarding different settings. The different options are visualized in Fig. 4-6.

![Fig. 4-9 For, with or by users (adaption from; Sanders & Stappers, 2008)](image)

This seven step methodology by de Caluwé exists out of: (1) Drawing up a set of requirements, (2) Analysing processes and mechanisms, (3) Making an integral scheme, (4) Drawing up game technical set of requirements, (5) Construction of the prototype, (6) Testing of the prototype and (7) Refine and make ready for use. These steps to a certain degree correspond to the general design science method used in this master thesis. Therefor the methodology of Caluwé is specifically employed for creating the actual design. The methodology of Caluwé is integrated with the design process from
Fig. 4-6 to provide an overview of the seven steps. The focus of this master thesis will be on the design of the Living Lab approach, which is an abstraction of customer co-creation as defined by Weber.

The design of a game employs the game-elements mentioned in paragraph 4.3.2. The configuration however differs for the different settings from the design parameters and can lead to several scenarios and situations (Meijer, 2009).

This chapter has provided general theoretical frameworks that serve as input for the solution design. Through carrying out several expert interviews the theoretical frameworks are made specific for the context of this master thesis.

5 Interviews
In order to conduct the expert interviews common ground had to be established regarding concepts and definitions in order to have a valuable discussion. Also the context of the problem faced in this master thesis was described to create an understanding of the problem at hand. After the context of the research was described several questions were raised that make an appeal on the expert knowledge of the interviewees. The questions raised aim to provide guidelines how to properly approach the designing of a solution in this context. The following paragraphs describe the results from the interviews with the experts from Serious Games and Living Labs.
5.1 Serious games experts

The creation of a list of potential appropriate candidates on the basis of literature explored in the literature study was the starting point for the interviews. From the literature study a list of 15 academics, practitioners or managers was gathered who have researched, described, organized or managed activities in the field of Serious Games. A selection was performed in close consultation with the thesis supervisors and regarding practical considerations such as availability, willingness to cooperate and the inclusion of both a theoretical and practical expert. Two experts have been interviewed in the field of Serious Games, Rens van den Bergh and dr. Geert Vissers. Appendix C contains the questions that were used and Appendix D contains the interview guide with the storyboard and definition list. The main purpose of these interviews was to create design propositions that were used as building blocks in the creation of the design.

5.1.1 Interview with Rens van den Bergh

Rens van den Bergh works at Deltares as a game developer and advisor, al his work experience has been in the field of serious game design. A successful simulation game Rens worked on is the Levee Patroller game, which is a virtual environment that simulates a range of serious situations relating to dikes. Players are able to walk around without restrictions and decide for themselves, which are the important places that need checking. The game was designed for professional and volunteer dike inspectors. Dike inspectors learn on what they should focus during dike inspections. The also learn how to report observations and about the procedures required. From the discussions with Rens the following CIMOs could be extracted:

- When simulating a real world process the required amount of time can be shortened (C) through abstracting the real world process into a conceptual model by simplifying elements of the real world process (M) such as, creating a scenario through random selection of characteristics (I), removing decisions by forcing a decision through random assignment (I), using actors instead of real people (I).
- When a target audience needs to acquire certain knowledge and skills (O) regarding complex real world activities (C) a simulation game can help to learn from experience (I) through abstracting the real world process into a conceptual model by simplifying elements of the real world process (M).

5.1.2 Interview with dr. Geert Vissers

Geert Vissers received his doctorate degree at the Erasmus university of Rotterdam, simulations games have been included in the carrying out of his research. As an author he has been involved in performing some research on the validity of games. From the discussions with Geert the following CIMOs could be extracted:

- When using students (C) as a means to engage in customer co-creation with businesses with the purpose of enabling the businesses to learn the act of customer co-creation (O) it is difficult to use a tailor made game (I) because you would have to adjust the environment to the exact circumstances of the customer (M). In this case a general protocol serving a broad audience is more suitable.

It is important to be careful when involving the context from the reference system due to two problems, the first problem is that it takes a lot of time; the other problem is that a game can become too complex for participants to acquire knowledge. Another problem pointed out by dr.
Geert Vissers is that when involving actual customers different problems arise, problems such as intellectual property, the direction of the customers proposed ideas opposes the company’s preferred course of direction due to specific specialities the company possesses. These problems occur between actual customers and actual businesses but might not show up when simulating this kind of interaction. Choosing to use students of Windesheim rules out the possibility to do something else than the generating of technical solutions.

- When an abstraction is intended (O) it is important to have enough concrete events (I) that lead participants to not know what to do (M). An abstraction should always have points of recognition the player recognizes (I). So when creating an abstraction of a co-creation session (C) it is important to have a co-creation challenge, something tangible has to be co-created (I).

In conducting a game the facilitator plays a crucial role, in the context of Windesheim engaging in customer co-creation between students and businesses the facilitator will have to explain the rules of the game, and he will need to observe in order to provide input in the evaluation afterwards.

5.2 Living Lab experts
The creation of a list of potential appropriate candidates on the basis of literature explored in the literature study was the starting point for the interviews. From the literature study a list of 10 academics, practitioners or managers was gathered who have researched, described, organized or managed activities in the field of Living Labs. A selection was performed in close consultation with the thesis supervisors and regarding practical considerations such as availability, willingness to cooperate and the inclusion of both a theoretical and practical expert. Two experts have been interviewed in the field of Living Labs, MSc Martijn Kriens and MSc Rens Brankaert. Appendix C contains the questions that were used and Appendix E contains the interview guide with the storyboard and the definition list. The main purpose of these interviews was to create design propositions that were used as building blocks in the creation of the design.

5.2.1 Interview with MSc Martijn Kriens
Martijn Kriens is a practitioner in the field of Living Labs, he was employed as the Project Director of the Health Lab in Amsterdam, the essence of the project was to enable healthcare institutions, knowledge institutes and the government together with small and large businesses to come up with realistic solutions to societal problems. In the previous 3 years Health Lab has performed various types of projects focused on healthcare in the region of Amsterdam; all together around 30 projects have been completed with a focus on trying out technology with people in their real life living conditions. Such tests need to be performed in a realistic living environment regarding the assumption that simulated users will always behave different in reality. The projects in health lab differ from testing technology to accumulating actual data regarding the real life situation of elderly people who are not self-sufficient or experience deteriorating health conditions. The data of the lifestyle of daily activities provided insights that would not come forward in regular discussions with the target audience. Such insights would be used to determine whether elderly people should remain in their own house or move to elderly care based on factual objective data instead of subjective assumptions. Allowing small businesses access to healthcare institutions by creating a context where Health lab facilitates the network connections with the different relevant institutions. The Health Lab project is completed. Currently Martijn Kriens is organizing preparations for AHTI, the Amsterdam
Health & Technology Institute, as a project director. AHTI also focuses on Living Labs but on a district level aiming to change the organization of healthcare in an improved manner. Martijn states that thinking of theories on paper does not compare to measuring reality because of the complexity faced in real life situations. Defining Living Labs as: Ensuring that you’re standing as close to practice as possible, observing how people actually live and then testing this kind of thing. And co-creation is in there but it is not the main argument we have to engage in our activities. Martijn does not believe a student is able to represent an end-user. A student is unable to imagine needs of the end-user, acting as a proxy provides unreliable data. Unless it an actual user being a student. Another option would be involving a student based on its study related expertise. A living lab represents studying actual end-users in the actual circumstances where the product service is used. Using a proxy end-user does not work. The value of a living lab is not so much the process that takes place inside a living lab but it is the facilitation that offers possibilities for exploiting parties. The facilitation contemplated for Windesheim is a method to engage in customer co-creation. Using students’ expertise mainly based on their profession knowledge gained in their study. From the discussions with Martijn the following CIMOs could be extracted:

- When using students as a facility to generate valuable ideas for business (C), and the aim is to target a broad audience (O) it is important to identify business that can be grouped and experience mutual added value through reciprocal relations (I) thereby creating a network of parties that are involved with Windesheim and with each other (M).
- When the goal is to learn how to perform customer co-creation in a living lab environment (C) in order for those businesses to pursue customer co-creation in practice (O) a specification is needed regarding the different forms of customer co-creation knowledge (I). According to the type of knowledge that needs to be transferred a different learning method should be employed (M).

5.2.2 Interview with MSc Rens Brankaert

Rens Brankaert is working as a design researcher at the Eindhoven University of Technology currently in the process of obtaining his PhD degree in the field of Living Labs. He’s working on the Innovate dementia project, which focuses on the creation of a living lab to be able to conduct long-term and real-life design evaluations. The innovate dementia project is a cooperation between Brainport representing a business network, GGZE representing users, the municipality of Eindhoven representing the government bodies and the Eindhoven University of Technology representing the knowledge institutes. This cooperation relies on the quadruple helix concept, and the different parties have a role in the design process in the living lab. The innovate dementia starts at the needs of the users, which is answered with a design from the university, the municipality verifies whether it has support through the healthcare institutions, and the role of Brainport is to explore valuable business opportunities. The role of Rens mainly exists out of translating the needs of users into a design.

In the discussion about the definition of a living lab, Rens emphasizes that the five principles of Anna Ståhlbröst are important when designing a Living Lab. These are realism, openness, sustainability, influence and value. Realism indicates that it should not be a standard research environment but that context is always taken into consideration and it at least tends to a simulated real-life environment. Openness is very important because it facilitates interaction between the different stakeholders. And it should not be the case that one stakeholder is particularly dominant but
relationships between stakeholders need to be equivalent. Sustainability is contra intuitive; it should not evolve around subsidies but need to be self-sustaining, the problem however is that sustainability comes at the cost of openness. Completely autonomous Living Labs such as Philips and i3b often do not satisfy the definition of a living lab. It requires concessions in the openness of a living lab. Or it omits the real-life environment making it less complex. Rens concludes that it is a balance between a theoretical correct living lab and a living lab that is financially attractive. Influence concerns the equality when performing the activities in a living lab and the user should have influence on the decisions. Lastly value is interpreted as all parties creating value and not just one dominant stakeholder. From the discussions with Rens the following CIMOs could be extracted:

- When facilitating a customer co-creation session with students (C), it is important to identify the capabilities of these students (I); students can either represent a specific set of end-users (M) or exploit their expertise from the field of study (M) in order to create relevant output (O).
- When trying to define a living lab (C) to co-create with customers (O) it is important to look differently to the living lab per product development phase (I), different activities require different processes (M).
- When applying a guest/host structure to a living lab (M) a proper need assessment of the involved guest is required (I) to be able to successfully perform short-term commitments (O) between guest and host (C).
6 Living Lab approach design
6.1 Design requirements
This paragraph describes the desired situation by means of requirements that function as the input for the design of the Living Lab approach.

6.1.1 Functional requirements
Windesheim set out the assumption that businesses in the region of Zwolle are willing to engage in customer co-creation and are searching for means to facilitate those actions. The results from the survey help to confirm or deny these assumptions leading to concrete guidelines concerning the design parameters settings and thereby determine the context of the design. In acquiring insights regarding the needs of the target group a questionnaire has been created. The questions included can be found in Appendix A, the survey has been sent to businesses in the region of Zwolle yielding 388 responses. Having a large sample helps to make reliable statements regarding the total target population. The questionnaire aimed to identify general data on respondents, past experience regarding customer involvement in new product/service development, an exploration of interest specifically focusing on the phase of new product/service development where businesses want to engage in the involvement of customers, the willingness to engage in customer co-creation and lastly the willingness to learn more about customer co-creation. A big part of the target group is active in the business services sector representing 33,51% of the businesses. It is also interesting to note that 29,90% is not able to ascribe their businesses to one of the options presented in the survey. 73,97% of the businesses have between 1 and 9 people employed. It is thus safe to say that most of the businesses from the target group are small enterprises. The type of customers the businesses serve vary, both consumer and business customers are served. Also 50,5% of the respondents indicated that they have involved customers in their business operations, among those 50,5% the involvement of customers varied along the different businesses processes. Fig. 6-2 however denotes that the majority of businesses have involved customers in the conception phase where 35,82% of the businesses indicate involving customers in the idea generation phase. Fig. 6-3 shows in what phases of the new product/service development process businesses want to involve customers, also showing a similar result, the main focus on the conception phase and more specifically 244 of the businesses indicate they want to involve customers in the idea generation phase. If Windesheim would offer facilities to either perform or learn customer co-creation, respectively 38,4% and 47,7% indicate they would utilize such facilities.

<table>
<thead>
<tr>
<th>Functional requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 The input for a customer co-creation session is partly provided by client organizations.</td>
</tr>
<tr>
<td>#2 The output of a customer co-creation session concerns practical applications such as product and service development.</td>
</tr>
<tr>
<td>#3 The clients involved are SME businesses.</td>
</tr>
<tr>
<td>#4 The design should focus on designing With or By Users thus involving customers in the innovation process.</td>
</tr>
<tr>
<td>#5 The Living Lab approach design needs to focus on the Idea generation phase.</td>
</tr>
</tbody>
</table>

Table 2 Functional requirements
Fig. 6-1 General data on respondents (valid 388)

**In what kind sector does your company operate?**

- Financial Services: 2,84%
- Business services: 33,51%
- Trading/retailing: 21,39%
- Education: 2,84%
- Manufacturing/Logistics: 9,54%
- Other: 29,90%

**What is the amount of employees currently working in your organization?**

- 1: 35,31%
- 2-9: 38,66%
- 10-49: 14,43%
- 50-249: 7,99%
- >250: 3,61%

**What type of customers do you serve?**

- Businesses: 38,14%
- Consumers: 18,04%
- Both: 43,81%
Fig. 6-2 Past experience customer involvement in new product/service development

In which of the following business processes have you involved customers? (More answers allowed)

<table>
<thead>
<tr>
<th>Process</th>
<th>Conception</th>
<th>Implementation</th>
<th>Marketing/Commercialization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idea generation</td>
<td>139</td>
<td>67</td>
<td>44</td>
</tr>
<tr>
<td>Technical problem solving</td>
<td>67</td>
<td>109</td>
<td>70</td>
</tr>
<tr>
<td>Concept design</td>
<td>109</td>
<td>89</td>
<td>44</td>
</tr>
<tr>
<td>Development</td>
<td>89</td>
<td>98</td>
<td>70</td>
</tr>
<tr>
<td>Testing</td>
<td>98</td>
<td>44</td>
<td>70</td>
</tr>
<tr>
<td>Launch</td>
<td>44</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>Branding</td>
<td>70</td>
<td>70</td>
<td>70</td>
</tr>
</tbody>
</table>

Fig. 6-3 Exploration of interest

Are there any phases in the new product/service development process where your organization could be benefited by involving customers? (More answers allowed)

<table>
<thead>
<tr>
<th>Process</th>
<th>Conception</th>
<th>Implementation</th>
<th>Marketing/Commercialization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idea generation</td>
<td>244</td>
<td>90</td>
<td>93</td>
</tr>
<tr>
<td>Technical problem solving</td>
<td>90</td>
<td>158</td>
<td>180</td>
</tr>
<tr>
<td>Concept design</td>
<td>158</td>
<td>155</td>
<td>73</td>
</tr>
<tr>
<td>Development</td>
<td>155</td>
<td>131</td>
<td>93</td>
</tr>
<tr>
<td>Testing</td>
<td>131</td>
<td>93</td>
<td>180</td>
</tr>
<tr>
<td>Launch</td>
<td>93</td>
<td>180</td>
<td>73</td>
</tr>
<tr>
<td>Branding</td>
<td>180</td>
<td>73</td>
<td>73</td>
</tr>
<tr>
<td>No</td>
<td>73</td>
<td>73</td>
<td>73</td>
</tr>
</tbody>
</table>

If Windesheim would offer the possibility to learn customer co-creation, would you use it?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>149</td>
<td>38,4</td>
</tr>
<tr>
<td>No</td>
<td>239</td>
<td>61,6</td>
</tr>
<tr>
<td>Total</td>
<td>388</td>
<td>100,0</td>
</tr>
</tbody>
</table>

If Windesheim would offer the possibility to engage in customer co-creation, would you use it?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>185</td>
<td>47,7</td>
</tr>
<tr>
<td>No</td>
<td>203</td>
<td>52,3</td>
</tr>
<tr>
<td>Total</td>
<td>388</td>
<td>100,0</td>
</tr>
</tbody>
</table>
6.1.2 User requirements

The functional requirements have specified characteristics surrounding the regional businesses, and narrowed down the target group to a set of intended users. The user requirements concern the user perspective regarding the use of the Living Lab approach design and zoom in on generally small businesses that want to involve customers in the idea generation process serving both consumers and businesses. The user requirements specify specific characteristics regarding the customer involvement, exploring the actual interest of the businesses. Starting with the motivation offering insights concerning what businesses want to accomplish by the involvement of users. Second defining the activity that shows in what kind of activities businesses want to involve users. Thirdly the organizational situation is clarified by providing organizational factors regarding the businesses’ strategy and structure. Lastly the intended user involvement, offering a specification regarding the type of customers the businesses wants to involve. These user requirements are determined based on the organizations that correspond with design requirement #5, they can be found in Table 3.

<table>
<thead>
<tr>
<th>User requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>#6 The Living Lab approach design should allow client organizations with different knowledge levels regarding co-creation to engage in a customer co-creation session.</td>
</tr>
<tr>
<td>#7 The Living Lab approach design should allow client organizations with different experience levels regarding co-creation to engage in a customer co-creation session.</td>
</tr>
<tr>
<td>#8 The Living Lab approach design should allow client organizations to increase their knowledge, understanding and skill training.</td>
</tr>
<tr>
<td>#9 The Living Lab approach design should relate to practice situations.</td>
</tr>
<tr>
<td>#10 The Living Lab approach design should focus on learning and doing.</td>
</tr>
<tr>
<td>#11 The Living Lab approach design has to be suitable for a business-to-business customer orientation.</td>
</tr>
<tr>
<td>#12 The Living Lab approach design should be adapted to the target group.</td>
</tr>
</tbody>
</table>

Table 3 User requirements

Boundary conditions, design restrictions and attention points

The boundaries and restrictions help to narrow down the approach design and provide limitations for the followed direction. The boundary conditions are strict conditions that cannot be exceeded; these boundaries are externally imposed on the approach design. Examples are legislation, ethical habits or code of conduct. The design restrictions are the solution space preferred by the principal. Attention points are requirements that are relevant to the design but they’re not requirements or design restrictions. The boundary conditions and design restrictions have been determined through discussions with the Hogeschool Windesheim.

<table>
<thead>
<tr>
<th>Boundary conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>#13 The Living Lab approach design has to be cost-neutral.</td>
</tr>
<tr>
<td>#14 A session should not last more than one day.</td>
</tr>
<tr>
<td>#15 The users involved in the customer co-creation process are students from the Hogeschool Windesheim.</td>
</tr>
<tr>
<td>#16 The invited client organizations have to be motivated to cooperate.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Design restrictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>#17 The Living Lab approach design can either be online/offline or virtual/physical.</td>
</tr>
<tr>
<td>#18 The client organizations do not have more than 250 employees working for their company.</td>
</tr>
<tr>
<td>#19 The Living Lab approach design should fit with the facilitative role of the Hogeschool Windesheim.</td>
</tr>
<tr>
<td>#20 The activities in the Living Lab should fall within the field of Customer Co-creation in Innovations.</td>
</tr>
<tr>
<td>#21 The Living Lab approach design has to yield valuable output.</td>
</tr>
<tr>
<td>#22 The Windesheim customer co-creation Lab involves users in the co-creation process.</td>
</tr>
</tbody>
</table>

Table 4 Boundary conditions and Design restrictions
6.2 Windesheim Experience Living Lab (WELL)

Based on the confirmation that SMEs are vulnerable and subject to structural deficiencies such as size, time, culture, managerial capacity, skills, access to information and finance, Windesheim aims to help regional businesses by offering the creativity of its students, which can provide valuable input regarding the challenges that regional businesses are facing in their innovation processes. The survey also suggests that the target businesses want to take the lead in innovation instead of waiting for their customers requesting new products or services. Taking the lead in innovation will help to improve business processes such as production, innovation and eventually leads to increased competitiveness.

6.2.1 Living Lab approach design context

The design propositions derived from theory on living labs and customer co-creation in chapter four and five are used as building blocks in the creation of the intended Living Lab, the design requirements help to define the playground from which the Living Lab approach design will emerge. Design requirements #4 and #5 have determined that the focus for Windesheim will be on the idea generation phase. Through the results of the questionnaire these requirements reflect the needs of the target businesses and display the known capabilities of the student population from Windesheim. Another decisive characteristic that emerged from the questionnaire is that the target businesses that are interested in performing idea generation want to apply the design by users’ perspective.

![Fig. 6-4 Living Lab approach design context (J.J. Schep)](image)

This combination makes the Contest Route from the protocol of Weber worthwhile. In the Contest Route the firm present a specific question, request or challenge as a contest for customers that they can solve through composing specific solutions. The focus is on the front end of innovation since the company is yet to determine needs and wants of the market for the product or service under investigation. The protocol by Weber provides general guidelines how to approach idea generation and does not provide specific guidelines how to actually execute idea generation. Fig. 6-5 shows two different scenario’s, the top scenario describes an abstraction of the successful website battle of concepts as described in chapter 4.1. This website has similarities to the Contest route described by Weber. The host (Battle of Concepts) plays an important role in the execution of the process on the website, as a host they translate business problems from clients into assignments that can be found
on the website. The host has extensive experience in the formulating of such assignments. The experience the host possesses is of utmost importance in enabling the user community to be able to conceive solutions for the assignment. If the assignment is misunderstood the solution concepts will be invaluable. The bottom scenario captures the aim of Windesheim, using their knowledge and facilities to enable regional businesses to co-create with the students.

6.2.2 Idea generation

Idea generation applications have long been around; back in the 1950s basic brainstorming took the management literature by storm and has long remained a hype. Such techniques have alternated with various other applications, some more effective than others. Most of these techniques require experience and understanding in order to use it properly. Arthur VanGundy (2007) wrote a book on the framing of organizational innovation challenges to gain a better understanding where to focus resources for idea generation. The work by VanGundy will be followed to create an approach for idea generation. One of the basic principles is that the defining of problems and the creation of challenge statements should be considered just as important as idea generation itself due to the fact that ideas are more valuable when dealing with well-defined problems because of a better fit. Defining of problems happens through asking questions, asking questions leads to the framing of a problem. Problem frames are used to clarify strategic challenges for idea generation and the creation of innovative solutions to organizational challenges. A business wanting to engage in idea generation can formulate a challenge but it is important that it is framed correctly in order for other entities to provide solutions. Design problems are ill-defined problems and are quite different relative to the specific technical problems that can metaphorically be viewed as a puzzle that represent acquiring all necessary information available to the problem-solver in order to eventually come up with a specific solution to the specific problem. Again for ill-defined problems no guarantee exists that the correct solutions will be found. The difference can be found in either having a solution-focused or a problem-focused strategy. In dealing with ill-defined problems it is important to define, redefine and change the problem-as-given in relation to the solution. Changing a problem to find the solution is a difficult
process in terms of design (Cross, 2006). The roadmap regarding the acquiring of knowledge and understanding of idea generation is displayed in Fig. 6-6. Starting with an example scenario simulating idea generation through an example, secondly the formulating of an idea generation challenge by means of ‘the frame game’ and lastly the actual idea generation as found in the bottom part of Fig. 6-5.

![Fig. 6-6 Client process (J.J. Schep)](image)

### 6.2.3 Example simulation

The example scenario in this simulation helps to provide insights regarding the required knowledge which is needed to enable organizations to learn how to involve customers in their business. The first stage is to create an experience where the clients acquire knowledge and understanding regarding the field of idea generation in the context of customer co-creation. Starting point of the example is the evaluation of a predefined innovation challenge. This concrete experience should give rise to reflective observation, allowing for abstract conceptualization of the predicted problem regarding the formulating of innovative challenges. The simulation offers the space to actively experiment with some examples that should lead to the insight that the participating client can develop his knowledge and understanding regarding how to write and evaluate innovation challenge questions. This simulation will provide an example of an ill-defined innovation challenge that has to be evaluated according to seven criteria for evaluating innovation challenges. These criteria test whether a challenge is well framed and if useful for productive idea generation, the criteria are:

1. **Begins with the phrase, “How might we . . . ?”** (VanGundy, 2007)
   The challenges should be open-ended questions because it helps to ensure that specific ideas for specific challenges can be generated.

2. **Singularity of objectives?** (VanGundy, 2007)
   Singularity refers to the focus on one objective per challenge.

3. **Absence of evaluative criteria?** (VanGundy, 2007)
   Evaluation criteria regarding the innovation challenge should be left out the innovation challenge itself, it hinders the generation of concepts due to the simultaneously determination of satisfying the criteria. The evaluative criteria should be used after the generation of challenges.
Challenges and solutions should not be in the same statement; a challenge can stand on its own and be part of a broader objective within which it is nested.

5. Appropriate level of abstraction? (VanGundy, 2007)
An abstract challenge include a greater number and diversity of potential other challenges. A very specific challenge limits the scope.

6. Appropriate use of positioning elements? (VanGundy, 2007)
A positioning element is a criterion for determining the scope of the primary challenge. They are used for the selecting of the ideas after ideation.

7. Clear and unambiguous? (VanGundy, 2007)
This last evaluation criterion has certain subjectivity. The challenge should represent a clean, simple and straightforward statement that is capable of generating ideas.

Fig. 6-7 and Fig. 6-8 on the following two pages present two examples of simulative exercises that can be performed with businesses that want to engage in idea generation with customers. These examples should show the complexity and provide guidelines for projecting it to their own business.

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**RELATIVELY SIMPLE CHALLENGE FRAMING**

To illustrate how to apply these criteria, here is an actual, relatively simple challenge from a consumer products company:

How can the Big Bucks Company develop brand awareness for its new XYZ brand of products with little marketing or PR funds?

A quick scan of the seven criteria discussed previously suggests that this challenge contains two criteria ("little marketing" or "little PR funds") that should be removed and used as positioning elements or reserved for later use as evaluation criteria. After presenting these options to the client, the company decided to do the latter and frame the challenge as:

How might the Big Bucks Company improve the brand awareness of its XYZ line of consumer products? Solutions ideally would not involve significant marketing or PR funds.

The primary challenge was to increase awareness, so it stands alone. In this instance, however, the positioning elements themselves might be so specific that they still could interfere with open-ended idea generation. As stated, too much focus on them could be distracting if they are viewed as criteria that must be satisfied by every idea generated. Thus, it probably would have been better to have reserved them as decision-making criteria later on.

*Fig. 6-7 Relatively simple challenge framing (VanGundy, 2007)*
**MODERATELY COMPLEX CHALLENGE FRAMING**

Consider this moderately complex challenge from an international hotel and resort chain, with the pseudonym “Beds-R-Us”:

With a diverse and creative workforce, what strategies can Beds-R-Us implement to deliver a new level of service? We want ideas that can be implemented that would also make the Beds-R-Us brand more distinctive and result in a more emotional connection with travelers.

Rather than use this presented challenge as it is, let’s see how we might deconstruct it for more effective ideation. The first task is to create a single objective using the “How might we . . . ?” format. In this case, the phrase “a new level” is ambiguous. So, the challenge might be reframed as: “How might we improve customer service?”

As stated in the presented challenge, “. . . ideas that can be implemented,” might be reserved as a criterion. Brand distinctiveness could be used either as a criterion or as another challenge objective. And “a closer and more emotional connection with travelers” might be posed as the following challenge: “How might Beds-R-Us create a more emotional connection with travelers?” (This was the challenge the client selected.) One potential concept map for Beds-R-Us is shown in Figure 4-1.

This diagram incorporates all the elements of the presented challenge. As displayed, the goal of improving customer service directly affects creating a more emotional connection with travelers. The emotional connection is critical to making the brand more distinctive, which, in turn, directly impacts the occupancy rate. Customer service also affects the occupancy rate directly, as do an emotional connection and making the brand more distinctive.

![Concept Map](image)

Fig. 6-8 Moderately complex challenge framing (VanGundy, 2007)
6.2.4 The Frame game

The Frame Game is the basis of the book by VanGundy (2007) and represents the process of framing innovation challenges. Opposite of the previous paragraph the frame game concerns the actual context of the involved business and it represents the second stage in Fig. 6-6. The Frame Game includes the involvement of Windesheim’s students in generating multiple strategic perspectives using questions and challenges. The challenges are evaluated by means of the seven essential criteria from the previous paragraph. Thereafter ideation starts and lastly the output are evaluated, for an overview see Fig. 6-9.

Before the formulation of the innovation challenges the organizations have to research their strategic terrain through systematically asking questions in organizations helping to frame the problems at hand. These questions help to generate potential innovation challenge questions in later phases.

#1 Generate a list of questions

The aim of generating a list of questions is to help extract information, knowledge, and perceptions of value held by the relevant business. The questions are organized in several categories such as, organization, customers, brand, markets, goals, competition, innovation, products and processes. Appendix F contains a list of questions that can be used to clarify the businesses strategy and structure.

#2 Business interrogation

During the business interrogation the students from Windesheim target relevant questions from phase #1 to the business thereby accumulating the required information to be able to evaluating the challenges later on.

#3 Analyse and summarize results into groups

In this step the businesses receive the answers filled in by the students and have to analyse and summarize the results into groups, these groups are the categories that belong with the questions.

The challenges are created based on the data from the previous phase. The challenges represent an open-ended “invitation” starting with the words: “How might we...?” which helps to enforcing a singular objective, which encourages a diversity of solutions.
**#4 Change questions into challenges**
The responses from the questions are used to generate a list of challenges according to the same categories.

**#5 Select the final challenge(s)**
The selection of the final challenges depends on the framing of questions and could therefore be a challenging process. The seven evaluation criteria from Error! Reference source not found. are used to evaluate the challenges.

The endpoint of these challenges is the starting point of the actual ideation and evaluation. Ideation is supervised by the client business and appeals on the students for idea generation. The means of communication is a challenge-briefing document that includes a well-formulated challenge.

**#6 Send the final list of challenges for ideation**
After selecting the final challenge(s) a definitive choice is made regarding what challenge to pose for the ideation. The challenge-briefing document is a tool that defines the challenge in easy to understand language for the ideators. This brief aims to frame the challenge in a way that it is positioned correctly in the minds of the ideators by placing the challenge in the intended perspective according to the objective and scope of the challenge. Such a brief contains, background information, desired scope of the challenge which specifies the focus of the client business, and possible other considerations that might be included but are not mandatory.

**#7 Select the priority ideas**
This last step is a final evaluation of the provided ideas regarding the challenges. The evaluation preferably occurs based on a predetermined set of explicit evaluation criteria.

In the questions and challenges phases a step is included regarding the contacting of stakeholders concerning the businesses. If the answering of questions and challenges does not occur at the same day as the actual ideation the client business is able to verify the answers to the questions with stakeholders from the business to improve the quality of the input because an extra set of eyes can help provide a more objective and more knowledgeable interpretation of the results.

**6.2.5 Living Lab**
The idea generation process described above is part of the intended Windesheim Experience Living Lab. Initially two stakeholders are identified, the first are the client businesses that engage in idea generation and thereby become connected to Windesheim. The second stakeholder is Windesheim itself; the students and brokerage facilitation are part of the Hogeschool Windesheim. The students play a dual role, on one hand as a participant in simulation to engage in the learning experience with businesses (stages 1 & 2 in Fig. 6-6) and on the other hand they can be identified as a separate stakeholder when they fulfil an autonomous role as user stakeholder (stage 3 in Fig. 6-6). The stand-alone idea generation process does not yet represent a Living Lab, however the possibility to explore different new product development processes involving different types of interaction.

**6.2.6 Clients**
The target population exists out of around 14.000 businesses. Through a general questionnaire insights have been gathered, the businesses are small- or medium sized, are looking to involve customers in different manners, and want to make use of customer co-creation in different phases of the new product development process. In order to develop a living lab a distinction is made between the levels of expertise. The different stages in Fig. 6-6 also require different levels of expertise; there
for a developing type of involvement is preferred. The more experienced clients will be involved when the later stages have been reached with the novice clients.

6.2.7 Students
The students at the Hogeschool Windesheim act as the citizen or user stakeholder, one of the stakeholders in the quadruple helix as discussed in chapter 2.3.2. Their role is that of creative entity supplying ideas and providing expertise regarding idea generation. It is important to accurately define this group of students because they represent one of the helix stakeholders and can be valuable when other new product development phases are explored in the Living Lab. Defining the group means gathering characteristics and interests thereby setting the first steps towards a community.

7 Validation
The Living Lab approach design in paragraph 0 was sent via e-mail as a word document to the interviewees with a request to α–test the Living Lab approach design. An α–test represents both peer debriefing and a member check. The feedback provided allowed to iterate on the Living Lab approach design and thereby increased its validity.

7.1 Serious game experts
The serious games experts reviewed the document according to their backgrounds, thereby validating through peer debriefing the Living Lab approach design. Rens van den Bergh did not provide many remarks, and commented that the design was clear. He did however miss illustrations regarding examples of applying a serious game opposing traditional methods of knowledge transfer. Also he indicated that he would want to see a fictitious example of the course of the process. Geert Vissers mainly provided corrections regarding the use of language and made several suggestions for improving the logic and structure of the document. He also questioned the stated fact that “ideas follow from well-defined problems” this statement has been reframed to “ideas are more valuable when dealing with well-defined problems because of a better fit”. Geert Vissers also indicated that he thinks that Appendix F is too long and therefor unusable.

7.2 Living lab experts
Rens Brankaert argued that the introduction of the design does not describe the reason why Windesheim is pursuing this venture. Rens also commented on the role of the students arguing that they fulfill a dual role, partly as subject in the simulation and partly as stakeholder in idea generation. His feedback regarding the student definition helped clarifying the role of the student. Also Rens argued that ideas on its own are not valuable and should be part of an innovation process to gain value. He made a reference to Cross (2006) explaining that an innovation challenge can change iteratively when engaging in idea generation, and the ideas and challenges should co-evolve throughout the process.

7.3 Member check
A member check verifies whether the subjects think the design would be beneficial and whether it is valuable. Regarding this member check, Rens van den Bergh indicated that he thinks it is a very promising process. Geert Vissers argued that he could not test and therefor critically reviewed the document. Rens Brankaert did not question the functioning of the Living Lab approach and provided
constructive feedback regarding his evaluation. Unfortunately Martijn Kriens was unable to provide feedback due to the limited time available.

8 Discussion
This chapter will conclude this master thesis by discussing the contributions of this study to the fields of practice and academia. First the general conclusions are provided, followed by the managerial implications and scholarly implications.

8.1 Conclusions
The Hogeschool Windesheim lectureship of co-creation and customer experience wants to strengthen the relation with regional businesses by means of helping them to improve performance and providing pragmatic applications. The problem was therefore defined as a lack of innovation processes for B2B SMEs in the region of Zwolle. In this study the Living Lab approach has been studied by applying a serious game perspective in order for B2B SMEs to learn how to perform customer co-creation. The literature review is performed in order to integrate and generalize findings across theories and to bridge the different languages used across fields. The identified gaps in literature helped to define the design objective. The first objective was to determine the requirements of involving regional businesses in customer co-creation. And the second objective was the creation of a Living Lab approach regarding the engagement of customers in customer co-creation. The needs of regional businesses were determined through a questionnaire which yielded 388 responses and have been translated into design requirements. These design requirements have set the playground for the Living Lab approach design. Based on the needs of responding businesses wanting to take the lead in innovation, an innovation process is designed that offers an Living Lab approach to engage in customer co-creation. Based on the design requirements the settings of the two design parameters were chosen. The Living Lab approach design focuses on idea generation regarding organizations wanting to involve customers in the pursuit of innovation. The Living Lab approach design allows organizations to learn how to formulate challenges and engage in idea generation with customers. The Living Lab approach was validated by performing an α-test with the expert interviewees. The test showed that the Living Lab approach design is considered feasible but that further testing is required. The study performed in this master thesis has made several contributions to the development of design-oriented research. For Hogeschool Windesheim this study has provided an approach for customer co-creation between organizations and students. It is important to note that this Living Lab approach design is the starting point and requires further development.

The research question raised in the introduction of this master thesis project was “How can a Co-creation Lab be designed that allows B2B SMEs from the region of Zwolle to involve customers in co-creating within their innovation processes?” The answer is not straightforward due to the explorative and pragmatic nature of this research. The design proposed in this master thesis project is a design that is created according to the requirements that were obtained from the B2B SMEs from the region of Zwolle regarding their co-creation needs. The details of the design could however be carried out in numerous of other ways. A solution originating from the field of design science requires a creative leap which cannot be deductively validated which is both the quality and the pitfall of this study.
\section*{Managerial implications}

The goal of the Living Lab approach design is to serve a target group with the broadest scope as possible, therefore it is important to find a balance between the different extremes. Such common ground is reached by creating a homogeneous group. The challenges faced by the regional businesses diverge between unformulated, unknown problems and specific technical problems. Due to variety of the nature of the problem, common ground between the extremes is expected to have certain complexity and to a certain degree being ill-defined. This assumption is based on the results of the questionnaire, which shows that certain organizations have interest in engaging in co-creation although having no experience. Also organizations have indicated that they do have experience, do not want to learn but are eager to make use of the intended co-creation facilities. By finding the balance for the needs of all businesses from the target group, common ground is established, but it will always contain a certain deviation from the actual needs. The facilitator that will have to adjust and steer in order to appropriately serve the business’s needs resolves this deviation.

\textbf{Design propositions}

A protocol can elaborately be designed as a detailed flow-chart or it can consist out of a number of rather vague and general recommendations, but they all guide practitioners through a sequence of steps. The protocol created in this project draws a parallel with protocols used in clinical medical research, in which a protocol assures that actions and interpretations of outcomes would be similar in all participating institutions. Also such a protocol can describe good clinical reasoning in such a way that it becomes transferable across sites, assessable, and in accordance with sound scientific principles. The parallel is supported by design science research whereas both management and medicine are described as fields carrying out explanatory research solving field problems (van Aken et al., 2012). As in medicine it is always important to learn how to use a protocol, this is why the serious game perspective is adopted. The protocol helps professional workers in SMEs to get acquainted with the customer co-creation processes by means of participating in serious game processes. The guidelines and standards presented by such a protocol in the form of design propositions allow for individual adjustments and should not be taken strictly, deviations from the protocol are allowed and a protocol represents the knowledge base of a group of professionals that strengthens the autonomy rather than threatening it (Berg, 1997). The design propositions are hierarchical and its relations are shown in Fig. 8-1. The design propositions forming the protocol are:

- Organization is able to create idea generation challenges (C), the organization can thus engage in an idea generation session without further guidance (O).
- Organization has knowledge and experience regarding the topic of customer co-creation (C), will need to learn how to perform idea generation (I#1) through actual idea generation (M#1), thereafter the organization can engage in an idea generation session without further guidance (O).
- Organization has knowledge regarding the topic of customer co-creation (C), will need to acquire experience regarding customer co-creation (I#2) through formulating of an idea generation challenge (M#2) and will need to learn how to perform idea generation (I#1) through actual idea generation (M#1), thereafter the organization can engage in an idea generation session without further guidance (O).
- Organization is unfamiliar with the topic of customer co-creation (C), will need to acquire knowledge (I#3) through simulating idea generation by means of an example scenario (M#3) and experience regarding customer co-creation (I#2) through formulating of an idea generation challenge (M#2) and will need to learn how to perform idea generation (I#1) through actual idea generation (M#1), thereafter the organization can engage in an idea generation session without further guidance (O).
generation challenge (M#2) and will need to learn how to perform idea generation (I#1) through actual idea generation (M#1), thereafter the organization can engage in an idea generation session without further guidance (O).

8.3 Limitations

One of the limitations is that with the interviewing of experts hypothetical scenarios are used and the suggested interventions following from the discussions cannot be grounded in reality, and are thus not based on actual experience. They however still represent the judgment of experienced people that are skilled in their field of expertise and are therefore useful to a novice researcher. Another sign of warning is needed for the term expert that is used in this study. The assumption is made that people with many years of successful experience in the fields of Serious Gaming & Living Labs have achieved some expertise. A more formal qualification process or at least full disclosure of the source of the extracted design propositions from the scenarios is required. The research carried out in this thesis is twofold, on the one hand the target group and the defined problem are specific, on the other hand the method employed to solve the business problem is generic and is used in countless different contexts. The method employed in paragraph 4.3.2 in order to create a protocol provides guidelines that can be replicated in different contexts. It should however be noted that due to the pragmatic nature of this research the respondents are bound to a geographical location and that this research is not easily generalizable to other target groups in another context.

8.4 Scholarly implications and avenues for further research

The nature of this master thesis project is highly explorative and focused on the creation of a Living Lab approach design for a certain business problem. The contribution of this master thesis to scholarly literature is therefore limited, this study identified several gaps in literature and the design of the Living Lab approach can be used as a starting point. Further research is required in order to confirm the findings from this master thesis project. The intended activities originating from the Living Lab approach that are facilitated by Windesheim are potentially very interesting for research regarding the interaction between businesses and users. Also the remaining settings for the design parameters can be explored in order to obtain a complete understanding of the innovation processes in a Living Lab context. The idea generation phase by itself does not offer the intended value for the target businesses and therefor the follow up phases should also be explored in order to actually create value.
References


Doppio, N., & Pianesi, F. (2013). Co-creating an open working model for Experience & Living Labs willing to provide services to external players. *4th ENoLL Living Lab Summer School in Manchester, 36*(1), 35–46.


Appendices

Appendix A: E-mail invitation to questionnaire

«AddressBlock»
Tel. «Tel_Netnr»-«Tel_Abnnr»
E-mail «Email_als_waarde»
«Domeinnaam»

Eindhoven, «TIME @ "d MMMM yyyy"»

Geachte heer of mevrouw,


Bij het creëren van deze praktijkgerichte toepassing heb ik uw hulp hard nodig! Ik wil namelijk uitzoeken hoe u het meest gebaat zou zijn bij een dergelijke cocreatie-toepassing.

Wilt u instappen in dit onderzoek? Dan nodig ik u van harte uit de enquête in te vullen via:

https://docs.google.com/forms/d/1ylGaNOWWUHmpXgg3PVa6480Ngv-3RxmjFioHQ66xPs/viewform?usp=send_form

Met hartelijke groet,

Joren Schep

---

ing. J.J. Schep

T. 06 11 04 66 77
E. j.j.schep@student.tue.nl
LinkedIn: nl.linkedin.com/in/jjschep

In samenwerking met Kenniskring Klantbeleving & Cocreatie || Windesheim
Postbus 10090 || 8000 GB Zwolle
www.windesheim.nl
Appendix B: Questionnaire used for defining design requirements

Co-Creatie
Allereerst wil ik u graag bedanken voor u deelname aan deze vragenlijst!
Uit eerder onderzoek van Windesheim is naar voren gekomen dat er interesse is vanuit bedrijven uit de regio Noord-Oost Nederland om klanten te betrekken in hun innovatieprocessen bij product en/of dienstverlening en daarmee de bedrijfsovergang te verrijken. Het doel van deze vragenlijst is een verkenning van hoe u als ondernemer het meest gebaat bent bij een dergelijke samenwerking.

Het invullen van deze vragenlijst duurt ongeveer 5-10 minuten. Uw antwoorden zullen geheel anoniem verwerkt worden.

* Required

Algemene bedrijfsinformatie
1. In wat voor sector is uw bedrijf actief? *
   Mark only one oval.
   - Financiële dienstverlening
   - Zakelijke dienstverlening
   - Handel / detailhandel
   - Onderwijs
   - Productie, logistiek
   - Anders
2. Wat is het aantal werknemers dat momenteel actief is in uw organisatie? *
   Mark only one oval.
   - 1
   - 2-9
   - 10-49
   - 50-249
   - >250
3. Wat voor soort klanten heeft u? *
   Mark only one oval.
   - Bedrijven
   - Consumenten
   - Beide
4. Bent u bekend met het concept cocreatie? *
   Mark only one oval.
   - Ja
   - Nee
5. Heeft u ooit eerder klanten in uw bedrijfsvoering betrokken? *
   - Mark only one oval.
   - Ja to question 6.
   - Nee Skip to question 7.

Eerdere ervaringen
6. In welke van de volgende product/dienst ontwikkelingsprocessen heeft u wel eens klanten betrokken? (Meerdere antwoorden mogelijk) *
   - Check all that apply.
   - Ideeën generatie
   - Technische probleemoplossing
   - Concept ontwerp
   - Ontwikkeling
   - Testen
   - Lancering
   - Imago ontwikkeling

Verkenning van belangstelling
7. Zijn er fasen in het product/dienst ontwikkelingsproces waar uw organisatie van zou kunnen profiteren door het betrekken van klanten? (Meerdere antwoorden mogelijk) *
   - Check all that apply.
   - Ideeën generatie
   - Technische probleemoplossing
   - Concept ontwerp
   - Ontwikkeling
   - Testen
   - Lancering
   - Imago ontwikkeling
   - Nee Skip to question 26.

Motivatie
Wanneer het doel is om gebruikers te betrekken bij innovatieprocessen is het belangrijk om te beseffen waarvoor u deze gebruikers wilt inzetten, waar richt u op met het betrekken van gebruikers in uw innovatieproces?
8. Wat wilt u behalen met het betrekken van gebruikers in het innovatieproces?
   1. * Mark only one oval.
      - Om de invloed van de gebruikers te versterken
      - Om de horizon van het bedrijf en innovatieprocessen te verbreiden
      - Om input op reeds bestaande producten en diensten te verkrijgen
   2. * Mark only one oval.
      - Om meer inzicht in toekomstige behoeften te verkrijgen
      - Om gebruikers en ontwikkelaars te ontwikkelen en op te voeden
      - Het verkrijgen van input op vooraf gedefinieerde ideeën
   3. * Mark only one oval.
      - Het co-creëren van producten en diensten
      - Om gebruikers nieuwe producten en/of diensten te laten ontwerpen/ontwikkelen
      - Om ideeën voor producten en diensten te verkrijgen
   4. * Mark only one oval.
      - Het verminderen van risico's welke gemoeid zijn met de ontwikkeling van producten/diensten
Om de drempel te verlagen voor gebruikers om te beginnen met een dienst
Om beter te begrijpen wat gebruikers willen en waarom
  5. * Mark only one oval.
Om al betrokken gebruikers te ondersteunen
Om nieuwe relaties op te bouwen
Om meer over de gebruiker te leren

Activiteit
Gebruikers kunnen bijdragen aan verschillende activiteiten en hun betrokkenheid verleent verschillende resultaten. Het is daarom belangrijk om de activiteiten te bepalen waaraan de gebruikers het meest kunnen bijdragen. Vandaar dat de tweede stap de activiteiten bepaalt in welke uw organisatie gebruikers kan en wil betrekken.

9. In welke activiteit of activiteiten wilt u gebruikers betrekken?
  1. * Mark only one oval.
  2. Om hun klachten kenbaar te maken rondom bestaande producten en/of diensten
  3. Delen co-ontwikkelen van producten en/of diensten samen met ontwikkelaars
  4. Aanpassen van bestaande producten en/of diensten
  5. * Mark only one oval.
  6. Het bespreken van mogelijke oplossingen en ideeën met andere gebruikers
  7. Marketing van producten en diensten aan andere toekomstige gebruikers
  8. Om ontwerpeisen te verifiëren
  9. * Mark only one oval.
  10. Het genereren van ideeën voor nieuwe producten en diensten
  11. Genereren van ideeën samen met andere gebruikers en ontwikkelaars
  12. Het laten produceren van content
  13. * Mark only one oval.
  15. Evaluatie van nieuwe producten of diensten
  16. Ontwikkelen van producten en/of diensten die de gebruikers nodig hebben
  17. * Mark only one oval.
  18. Het verkrijgen van feedback over business modellen
  19. Om met behulp van toolkits nieuwe producten en/of diensten te ontwerpen
  20. Wees een gesprekspartner op voorgestelde concepten

Organisatorische situatie
Het gebruiker-gedreven innovatieproces en aanpak moet passen in de strategie en structuur van uw organisatie om ervoor te zorgen dat de inbreng van gebruikers leidt tot een echte bijdrage.

10. Welke organisatorische factoren zijn waar voor uw organisatie?
  1. * Mark only one oval.
  2. Ondersteuning van de activiteiten en input van de gebruiker
  3. Het bezit van sterke intellectuele eigendommen of patenten
  4. Omgaan met een krimpende markt
  5. * Mark only one oval.
  6. Streven naar het behouden van een hoog niveau van controle
  7. Klanten die in toenemende mate producten aanpassen
  8. Klanten die in toenemende mate vragen om op maat gemaakte producten
3. * Mark only one oval.
   - Organisatiekosten zijn een kritische succesfactor
   - Productdifferentiatie is een kritische succesfactor
   - Kwaliteit is een kritische succesfactor

4. * Mark only one oval.
   - Het ontbreken van een goed gedefinieerd innovatieproces
   - Modificeerbare producten en diensten
   - Behoefte aan iteratie met klanten om een passende oplossing te vinden

5. * Mark only one oval.
   - De wens om activiteiten en input van de gebruiker te coördineren
   - Het gebruik van hoogwaardige computer-gebaseerde simulaties of rapid prototyping (3D printen) gereedschap
   - De overtuiging dat een organisatie de innoverende moet zijn

**Betrokkenheid van de gebruiker**

Bepaal de meest geschikte gebruikers om te betrekken, en hoe ze kunnen worden betrokken.

11. **Welke gebruikersdoelgroepen zijn belangrijk voor uw organisatie?** *
    1. U kunt maximaal 2 antwoordmogelijkheden opgeven - Check all that apply.
       - Eerste koper (de eerste klanten die het product na marktintroductie koopt)
       - Niet-gebruikers (hebben actief gekozen het product of de dienst niet te gebruiken)
       - Modders (herontwerpen producten en bouwen hun eigen oplossingen)
       - Informerende klanten (geven suggesties en kritiek)
       - Referentieklanten (vergelijken met andere producten / diensten en het geven van feedback op basis van de vergelijking)
       - Launching customers (participeren in de ontwikkeling, testen van prototypes geven feedback)
    2. *Mark only one oval.
       - Lead users (zich bewust zijn van, en het kunnen uiten van hun behoeften)
       - Lead users + (zich bewust zijn van en het kunnen uiten van hun behoeften, en het ontwikkelen van oplossingen)
       - Lead users ++ (zich bewust zijn van en het kunnen uiten van hun behoeften, en het ontwikkelen van oplossingen die ze zelf willen gebruiken)

12. **Wanneer de hogeschool Windesheim u de mogelijkheid zou bieden om customer cocreatie te leren, zou u daar dan gebruik van maken?** *
    Mark only one oval.
    - Ja
    - Nee

13. **Wanneer de hogeschool Windesheim u de mogelijkheid zou bieden om customer cocreatie uit te proberen, zou u daar dan gebruik van maken?** *
    Mark only one oval.
    - Ja
    - Nee

Komend najaar (begin november) organiseert het lectoraat een symposium waarin de ins en outs op het gebied van klantbeleving en co-creatie aan de orde komen, waaronder ook de resultaten en conclusies van dit onderzoek. Indien u een uitnodiging wilt ontvangen voor dit symposium kunt u hier uw contactgegevens invullen:
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>14.</td>
<td>Naam bedrijf</td>
</tr>
<tr>
<td>15.</td>
<td>Uw naam:</td>
</tr>
<tr>
<td>16.</td>
<td>Uw functie:</td>
</tr>
<tr>
<td>17.</td>
<td>Adresgegevens:</td>
</tr>
<tr>
<td>18.</td>
<td>E-mailadres:</td>
</tr>
</tbody>
</table>
Appendix C: Interview guide
(Questions are in red)

Required materials:
- Printed Interview guide
- Notepad
- Definition list
- Talking board
- Voice recorder

Personal introduction and word of thanks (1 minutes)

Purpose of the interview (2 minutes)
- Expert interviews
- Obtaining building blocks for my design / Het verkrijgen van bouwstenen voor mijn ontwerp

Terms of confidentiality (1 minute)
- Can I record this conversation? / Mag ik dit gesprek opnemen?
- Do you, and the company, want to remain anonymous? / Wilt u, en uw werkgever, anoniem blijven?

Explanation of the format of the interview (1 minute)
- Personal introduction of interviewee
- Explanation of the context by means of talking board
- Description of scenarios

Do you have any questions before we get started with the interview? (1 minute)

Personal introduction of interviewee (5 minutes)
- Can you briefly describe your relation to [serious gaming/living labs]? / Kunt u in het kort omschrijven hoe u in relatie staat tot [serious gaming/living labs]?

Serious Gaming
Explanation of context by means of talking board (5 minutes)
- Does this look like how you would approach game design, both abstraction and deduction? / Komt dit oversee met hoe je game design, zowel abstractie en deductie zou benaderen?

Answer based on experience not from the perspective of your business. / Antwoord gebaseerd op ervaring niet vanuit het perspectief van uw bedrijf.

Description of scenarios (30 minutes)
- In this context, if I want to create a simplification: What level of abstraction would you apply? 0% Reality – 100% Perfect metaphor. / In deze context, als ik een vereenvoudiging wil maken: Wat is het niveau van abstractie dat u zou toepassen? 0% Realiteit - 100% Perfecte metafoor.
- In this context, if I want to abstract: How would you normally try to approach this? / In deze context, als ik een abstractie zou willen: Hoe zou je dit normaal gesproken dan benaderen?
- In this context, if I want to players to learn. What would be important? / In deze context, als ik wil dat spelers leren wat zou dan belangrijk zijn?

- In this context, if I target multiple principal clients. How would that be different? / In deze context, als ik meerdere klanten benader. Hoe zou dat anders zijn?

- In this context, what would the role be of the facilitator? / In deze context, wat zou de rol zijn van de facilitator?

- In this context, if I want to lecture the basis to the participants first, how would you do that? / In deze context, als ik wil de deelnemers eerst de basis wil leren, hoe zou je dat doen?

Living Lab

Explanation of context by means of talking board (5 minutes)

- Does this look like how you would consider a Living Lab? / Komt dit overeen met uw opvatting van een Living Lab?

Answer based on experience not from the perspective of your business. / Antwoord gebaseerd op ervaring niet vanuit het perspectief van uw bedrijf.

Description of scenarios (30 minutes)

- In this context, if I want to operate with a broad target group, how would you do that? / In deze context, als ik een brede doelgroep wil bedienen hoe zou u dat dan doen?

- In this context, if I want capture the process in a living lab, how would you do that? / In deze context, als ik de processen in een living lab vast wil leggen, hoe zou u dat dan doen?

- In this context, if I want to involve students as users in the living lab, what should I take into account? / In deze context, als ik studenten wil betrekken als gebruikers in het lab, waar zou ik dan rekening mee moeten houden?

- In this context, if I target at a certain innovation phase, would it differ per innovation phase? / In deze context, zou het dan per innovatie fase verschil maken waar ik mij op richt? Wat zou er anders zijn?

- In this context, if I want to teach clients a business process how would you go about? / In deze context, als ik cliënten een bedrijfsproces wil leren, hoe zou u dat dan doen?

- In this context, what would be the role of the host and/or facilitator? / In deze context, wat zou de rol zijn van de host en/of facilitator?

Closure of interview (5 minutes)

- Do you have any remaining questions? / Heeft u nog resterende vragen?

- Possibility to stay in touch through my preceding e-mails. / U kunt met mij in contact blijven via het voorgaande e-mail contact.

- Thank you for your time / Bedankt voor uw tijd
Explanation of my research

Research Design

What is a Living Lab

Battle of Concepts

Host

Supplies input

Client

Host as exploiter

Host as facilitator

Host

Supplies learning method

Client

Creates input

Living Lab

Translates input

Host

Assignments

Users

B2B SMEs

Customers

Serious Gaming

Co-Creation

Customer Co-Creation in Innovations

Living Labs
Appendix D: Interview protocol Serious Games

Talking board

Participatory modelling

Deduction

Simulation game
Visual representation
Textual display

Building blocks

Conceptual model

Interviews

Models from scientific theory

Mental models

Reference system

Design
Roles
Rules
Objectives
Constraints

INPUT
Configuration
Load
Situation

Game session

STAGE 3
Try in practice
Try at WELL

Projection of problem to practice

Co-creation session with example-load

STAGE 2

Explanation of design through example-load

STAGE 1
1. **Drawing up a set of requirements**
   The drawing up of a set of requirements should lead to the results the game has to bring about for the players and the organization. The results of the conversations between the principal and the designers are recorded in the functional program of requirements. Some of the frequent questions encountered are: What are the objectives of the simulation? What does it need to do with and for the participants? What are the main principles that are already known?

2. **Analyzing processes and mechanisms**
   This step and the making of an integral diagram are methods for system analysis: they make sure that the game is a good representation of the reference system that is to be displayed.

3. **Making an integral scheme**
   The big picture - The creation of an integral conceptual map is the closure of the inventory phase. The previously collected data is placed in one big scheme. The definitive version of this big picture is a display of all the elements that appear in the simulation game. In later phases this scheme will function as a blueprint or technical drawing for the game design. In this phase a definitive choice is made regarding what parts are included and which parts are left out.

4. **Drawing up game-technical set of requirements**
   From system components to game elements - Defines the transition from the real world (reference system) to the artificial world of the game (conceptual model). By means of the diagram the game-technical elements are determined. The previous phase resulted in a list of subjects that need to be included in the game (system components). These need to be translated in relevant parts for the game. The designer can use several building modules to do so (game elements):
   1. Style/format: The structure of the simulation game.
   2. Rules: Rules that cannot be changed by players.
   3. Policy: “Rules” that the players can change, they represent the decisions of the acts inside the game.
   4. Scenario: Description of the history and the future developments of the organizations in the simulation game.
   5. Events: Update of the scenario
   6. Roles: An overview of the functions and tasks that the participants in the simulation game can choose.
   7. Decisions: the decisions participants have to make during a simulation game.
   8. Game stages: A description of the sequence in which the participants go through the simulation game.
   9. Calculation system: instrument through which the facilitators can register the participant’s results.
   10. Model: Sub-models
   11. Indicators: Indicators tell participants how they are performing.
   12. Symbols: Illustrations that illustrate an element, activity or decision.

The game designer needs to match the system components to the 12 building blocks. Use of a matrix: system components versus game elements. Columns represent system components that need to be in the game, rows are formed by the building blocks of the game design. The matrix provides the first overview of the translation from reality to simulation game. This rapport is the basis for the creation of the game-on-paper.

5. **Construction of the prototype**
   The game-on-paper or design ideas are used in order to create a prototype, and it is developed through ‘trial and error’. Alfa testing in order to further develop; also the symbols and game materials are created.

6. **Testing of the prototype**
   The testing of the prototype according to step 1 and 4. Testing is performed with participants, which are comparable to the target audience. The first test generally brings about a lot of improvements. The intended learning effects are evaluated and concretized if needed.

7. **Refine and make ready for use**
   This goes about the creation of definitive game materials, game manuals, a facilitator handbook, layout of forms and indicator lists, etc.
Definition list Serious Gaming

**Customer co-creation:** The collaboration between firms and customers to create value together, rather than by the firm alone” (Weber 2011).

**Serious game:** A game can be distinguished according to the primary function of the game, a serious game’s primary goal is education rather than entertainment (Michael & Chen, 2005).

**Simulation game (Caluwé/Duke):** a simulated model of a (real) system with actors, which in different roles, try to accomplish objectives within a certain set of rules. A game simulation exists out of several building blocks or elements.

I. The essence: a simulation game puts people into models
II. Function: in simulation games people train in communication with each other, supported by an artifact
III. Form: simulation games are procedures of orchestrated and condensed complexity

<table>
<thead>
<tr>
<th>Function of the game</th>
<th>Role of the game</th>
<th>Dominant communication</th>
<th>Intended effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness and motivation</td>
<td>Transmission medium</td>
<td>Game to players</td>
<td>Cognitive, social psychological</td>
</tr>
<tr>
<td>Knowledge and understanding</td>
<td>Practice situation</td>
<td>Game to players</td>
<td>Cognitive</td>
</tr>
<tr>
<td>Skill training</td>
<td>Practice situation</td>
<td>Game to players and among players</td>
<td>Expanding skill repertoire</td>
</tr>
<tr>
<td>Communication and collaboration</td>
<td>Create conditions</td>
<td>Among players</td>
<td>Social psychological</td>
</tr>
<tr>
<td>Integration of learning experience</td>
<td>Practice situation and creation of conditions</td>
<td>Game to players and among players</td>
<td>Experience coherence</td>
</tr>
</tbody>
</table>

**Form of the game:**

**Mental models:** individual and subjective representations that people often unwarily make of the reality (Caluwé et al., 2001).

**Conceptual model:** Explication of mental models (Caluwé et al., 2001).

**Design:** The design represents the institutional environment within the game. This institutional environment exists out of roles, rules, objectives and constraints (Gibbs, 1974; as cited by Meijer, 2009).

**Configuration:** The design is accompanied by the configuration, which determines the values of the parameters of the design which is referred to as ‘load’ and the situational factors that are called ‘situation’ (Gibbs, 1974; as cited by Meijer, 2009).
Appendix E: Interview protocol Living Labs

Talking board

TRENDS AND NEEDS

- Idea generation
- Concept development
- Core concept and design
- Concept evaluation
- Pre-announcement
- Market Launch

PRODUCTION

- Host
- Service and asset supply

Living Lab

Host as facilitator

Service Demand

Guest

Users

Innovation
The environment is built from five components that facilitate the occurrence of innovation;

- **ICT & Infrastructure** facilitates and supports the Living Lab activities among the different stakeholders. Both the process of user involvement and the co-creation of new innovations are such activities.
- **Management** represents the ownership, organization, and policy aspects, a Living Lab can be managed by e.g. consultants, companies or researchers.
- **Partners & Users** are a source of knowledge and expertise, having access to such stakeholders is needed for achieving optimal knowledge transfer.
- **Research** is part of the output of a Living Lab in the form of learning and reflection of activities. Research can also be used as input by technological parties that allow for technological innovation.
- **Approach** defines the actual innovative activity that takes place in the Living Lab. It is a methodology that ensures successful operations within the Living Lab.

The approach component builds on five key principles that should be present in all operations;

- **Value** – The goal in a Living Lab is to create value for both, partners in terms of business value, and users in terms of an innovation’s user value.
- **Influence** – Users should be viewed as valuable stakeholders in terms of contributing to innovation and development processes.
- **Sustainability** – A Living Lab should be sustainable in terms of longevity, focusing on transforming generated knowledge from Living Lab operations into models, methods and theories to learn from and use it to further build upon.
- **Openness** – This principle highlights the importance of creating an open innovation process where external stakeholders are involved in order to generate multiple perspectives that allow for speeding up the innovation process and strengthening innovation capacity.
- **Realism** – The context of the Innovation activities should be a realistic, natural, real-life setting in order to work with participants in the intended context. By either generating an environment that suggests reality, or performing innovation in the users’ actual real-world environment.
Definition list Living Labs

Customer co-creation: The collaboration between firms and customers to create value together, rather than by the firm alone” (Weber 2011).

Living Lab definition Ståhlbröst: in close cooperation among involved stakeholders, develop product and services from the basis of what users really want and need, where the main role of the Living Lab is to engage and empower users to participate in the creation of valuable and viable assets. The interaction with users should be carried out in real-world contexts with active users aiming for innovation in close correlation with ongoing research and development processes. Living Labs are both an environment (milieu, arena) and an approach (methodology, innovation approach).

- **Research Living Labs** focus on performing research on different aspects of the innovation process.
- **Corporate Living Labs** that focus on having a physical place where they invite stakeholders (e.g. citizens) to co-create innovations.
- **Organizational Living Lab** where the members of an organization co-creatively develop innovations.
- **Intermediary Living Labs** in which different partners are invited to collaboratively innovate in a neutral arena.
- **A time limited Living Lab** as a support for the innovation process in a project. The Living Lab closes when the project ends (Ståhlbröst, A., & Holst, 2013).

Four main stakeholders ( Arnkil et al., 2010)

1. **Companies** can acquire new innovative ideas.
2. **Users** influence the innovations according to their needs.
3. **Public organizations** benefit through increased return on investment on innovation research.
4. **Researchers** can develop studies through case research.

Serious game: A game can be distinguished according to the primary function of the game; a serious game’s primary goal is education rather than entertainment (Michael & Chen, 2005).

Simulation game: a simulated model of a (real) system with actors, which in different roles, try to accomplish objectives within a certain set of rules. A game simulation exists out of several building blocks or element (Duke 1980; as cited by Caluwé, Geurts, Buys, & Stoppelenburg, 2001).
Appendix F: Sample questions

A Sample List of Questions
A list of sample questions follows. If there appears to be some duplication among the questions, that is intentional. Sometimes, phrasing a question a little differently can elicit richer, more robust responses capable of getting at core issues.

Our Organization
1. What does our company do?
2. What are our core competencies?
3. What is our primary vision?
4. What is our primary mission?
5. What are our core values?
6. Who are our strategic partners? Why?

Our Customers
7. Who are our customers?
8. Whom would we like to have as customers?
9. Whom do we not want to have as customers?
10. What customer needs do we meet?
11. What customer needs should we meet that we aren’t now?
12. Where are we positioned in the minds of our customers?
13. Where would we like to be positioned?
14. When should we reposition ourselves?
15. What value do our products, processes, and services provide our customers?
16. Why do our customers like us?
17. When don’t our customers like us?

Our Brand
18. What is our brand?
19. What are our sub brands?
20. What values are associated with our brands?

21. How consistently do we transmit these values?
22. What is our brand equity?
23. How do we know that?
24. What are the components of our brand equity?
25. What extensions would be best for us to explore?
26. What is our aided brand awareness?
27. What is our unaided brand awareness?
28. Should we broaden or narrow our brand? Why?

Our Markets
29. What markets are we in?
30. What markets would we like to penetrate? Why?
31. What markets would we like to segment?
32. What do we know about current markets we are pursuing? 33.
What do we need to know for success in these markets?
34. What markets are we overlooking?
35. What markets should we leave or reduce our presence in?
36. Are we exploiting market trends?

Our Goals
37. Where do we want to be in one, three, or five years?
38. If anything were possible, what should we do?
39. What do we want to do in the future that we aren’t doing now?
40. What do we want to do differently?
41. How do we know when we achieve our goals?
42. Which goals, if any, should we change? Why?
43. How often do we revise our goals?

Our Competition
44. Who is our competition?
45. What are they doing right?
46. What are they doing that is not working?
47. What do we like about our competition?
48. What do our competitors’ customers like about them?
49. What do our competitors’ customers like and dislike about us?
50. Who has achieved the positive results we want?
51. How are they doing that?
52. How can we do that?
53. Who is doing something well in our industry or another?
54. What can we borrow from them (e.g., learning, tools, approaches)?

**Our Innovation**
55. How do we define innovation?
56. How do we measure it?
57. Do we have a strategic innovation process? 58. What is our innovation process?
59. How effective is it?
60. How do we know it is effective?
61. What are our top three to five barriers to innovation?
62. How might we overcome these barriers?
63. How do we reinforce/motivate innovation?
64. How do we reduce the motivation to innovate?
65. Do we have a way to generate and track new ideas?
66. How often do we generate new ideas?
67. What sources do we use for new ideas? Internal only? Customers? Vendors?
68. How well do we manage the ideas we generate? Why?
69. How might we manage them better?
70. At any one time, how many ideas do we have in our innovation pipeline?
71. Do we re-evaluate promising ideas we once left on the shelf?
72. When do we innovate best? Why?
73. When do we innovate least well? Why?
74. How do we reward innovation?

75. How might we become more innovative?
76. What new products, processes, or services should we explore?

**Our Products**
91. What products do we have that are successful?
92. Do we know why they have been successful?
93. What products do we have that are unsuccessful?
94. Do we know why they have been unsuccessful?
95. What extensions would be best for us to explore?

**Our Processes**
96. What are our core processes?
97. How do we measure process effectiveness and efficiency?
98. How well do we meet our goals for these processes?
99. When do our processes function best?
100. When do our processes function least well?
101. What are the greatest obstacles to internal process functioning?
102. What value do our processes add to us?
103. What value do our processes add to our shareholders?
104. What are our process inputs?
105. What are our process outputs?
106. What are our process outcomes?
107. What are our process throughputs?
108. How well do we track and manage new ideas?
109. How well do we convert new ideas into commercial innovations?
Appendix G: Sample challenges

Sample list of Challenges
Based on the sample responses to selected questions from the questions some possible challenge statements are presented next. (Remember, not all of them may be derived directly from the original categories.)

Customers
1. How might we increase the number of wealthy customers?
2. How might we help potential customers qualify for our products and services?
3. How might we increase the number of qualified customers?
4. How might we increase the number of gift card users?
5. How might we help current customers to increase their credit ratings?
6. How might we encourage customers to increase their debt?
7. How might we increase customer access to our financial services?
8. How might we better meet customer expectations?
9. How might we improve our customer service?
10. How might we better understand our customers?

Branding
14. How might we increase our brand recognition?
15. How might we increase our brand equity?
16. How might we increase our aided brand awareness?
17. How might we increase our unaided brand awareness?
18. How might we better position ourselves in our customers’ minds?
19. How might we be perceived as the number one financial services provider in the world?
20. How might we brand ourselves as being the company for the financial market?

Markets
21. How might we learn more about our current markets?
22. How might we learn more about new markets we want to enter?
23. How might we be more successful in our current markets?
24. How might we be successful in future markets we want to enter?
25. How might we communicate better with our markets?
26. How might we increase our competitive advantage?
27. How might we shift from single-product marketing to one-to-one marketing?

Goals
28. How might we best enter the South American market?
29. How might we solidify our presence in Western Europe?
30. How might we become more future-oriented? Processes
31. How might we improve our infrastructure for servicing customers?
32. How might we become a more nimble organization?
33. How might we improve our public relations?
34. How might we increase our profitability for the next decade?
35. How might we become the number one financial services company in the world? 36. How might we achieve financial goals related to our target markets?

Products and Services
37. How might we better price our products and services?
38. How might we ensure high revolving balances?
39. How might we increase the perception that our products are priced fairly?
40. How might we develop new products faster?
41. How might we test new products faster?
42. How might we launch new products faster?