The function of FieldLab Eerstelijnszorg in the innovation system

Master thesis in Business Administration,
Organizational Design and Development

Kaitlin Schoonderbeek

Student number: 4310799

Date: 05-12-2018

Supervisor: dr. R. Smals

Second examiner: drs. L. Gulpers

Preface

In front of you lies my thesis about the function of FieldLab Eerstelijnszorg in the innovation system. This thesis is the last step in order to complete the Master Business Administration with the specialization Organizational Design and Development at Radboud University Nijmegen.

I want to use this opportunity to thank my supervisor dr. Raphaël Smals for his support and guidance during the process. I would also like to thank my second examiner drs. Liesbeth Gulpers for her time and consideration. Furthermore I want to thank Koen Dortmans for his support and providing useful contacts to interview. Accordingly, I want to thank all respondents that participated in this study for providing me the data that I needed to answer my research question. Last but not least, I want to thank my family and friends, especially Henk Schoonderbeek, Willeke Schoonderbeek and Liza Rijk, for their support, encouraging advice and helpful insights.

I hope you enjoy reading this thesis.

Kaitlin Schoonderbeek

Nijkerk, December 5th 2018

Abstract

This thesis is a practice-oriented study about the function of FieldLab Eerstelijnszorg in the innovation system. FieldLab Eerstelijnszorg is a living lab that has the goal to improve innovation in primary care in the region of Nijmegen, by involving users in the innovation system. In this way they hope to support primary care with the challenge of a rising need for healthcare and the costs of it.

With the use of qualitative methods it is studied what the needs of the other actors in the system are, what FieldLab Eerstelijnszorg can do to fulfill these needs and during which stages of the process it can do this. Eventually it is concluded that FieldLab Eerstelijnszorg can contribute to the innovation system in multiple ways and thereby can perform multiple functions.

The results of this study can support the board of FieldLab Eerstelijnszorg to make a thorough decision about the business model and additionally the purpose of the organization. Besides, this study is a contribution to the theory of living labs and functions in the innovation system, because it shows how a specific living lab can execute these functions. Further research is needed to validate these results in other cases.

Table of contents

Preface 1

Abstract 2

1. Introduction 5

1.1. Empirical background 5

1.2. Problem statement 6

1.2.1. Objective 6

1.2.2. Research question 6

1.3. Practical contribution 7

1.4. Theoretical contribution 7

1.5. Societal contribution 8

1.6. Overview of this report 8

2. Theory 9

2.1. Innovation process 9

2.2. Stage-gate model 11

2.3. Living lab 13

2.4. Intermediary in an innovation system 15

2.5. Conceptual Model 17

3. Methodology 19

3.1. Research strategy 19

3.2. Case description 19

3.3. Data sources 20

3.4. Method of data collection and analysis 21

3.5. Operationalisation 22

3.6. Quality criteria 23

3.7. Research ethics 24

4. Analysis 26

4.1. Who are the actors in the innovation system and how do they relate to each other? 26

4.2. What are the needs of the actors in the innovation system and what can FieldLab Eerstelijnszorg do to fulfill these needs? 28

4.2.1. What are the needs of other actors? 28

4.2.2. How can FieldLab Eerstelijnszorg fulfill the needs of other actors? 32

4.3. What can FieldLab Eerstelijnszorg contribute during the different stages of the innovation process? 41

4.4. The selection of functions - additional findings 44

4.5. Adjusted conceptual model 48
5. Conclusion and discussion 49
5.1. Conclusion 49
5.2. Theoretical contribution 53
5.3. Practical contribution 55
5.4. Limitations and suggestions for further research 58
References 60
Appendices 63
1. Used websites 63
2. Topic list - first version 64
3. Topic list - adjusted version 66
4. Codebook 69

1. Introduction

The need for healthcare in the Netherlands is increasing. According to the forecast of Centraal Planbureau (CPB, 2016) the costs of healthcare will increase the coming years to 9,9% of GDP in 2021. One of the reasons for this is the aging of the Dutch population. However, this is not so much that it can explain the full increase of costs. Another reason for the increase in costs is the development of technology. Although the development of technologies makes more possible for healthcare, it also increases the cost of it (Van Ewijk, Van der Horst & Besseling, 2013). Innovations take a lot of time and often the resulting product is not in line with the needs of the user, this raises the expense of the innovation. To decrease these costs, organizations are looking for new ways to innovate. A new concept is the use of field labs to improve innovation.

A field lab is an environment in which a product developer, together with knowledge institutes and (potential) users, can develop and test products in a practical setting. In this way, the product can be altered to the preferences of the user. Also, it can be tested whether the product fits the daily work tasks. So a field lab brings together different actors that are involved in the development of new products. Together these actors form the innovation system.

1.1. Empirical background

FieldLab Eerstelijnszorg in Lent is an example of a field lab that is created to make the innovation of the healthcare more effective and efficient. Originally FieldLab Eerstelijnszorg was initiated by the province of Gelderland, because they wanted to stimulate the innovation of healthcare in their region. They created four FieldLabs that each focused on a different aspect of healthcare, which are primary care, secondary care, disabled care and rehabilitation care. FieldLab Eerstelijnszorg is the one that focuses on primary care. This is all care that you do not need a referral for, for example the general practitioner or physiotherapist.

FieldLab Eerstelijnszorg brings together product developers, care providers, patients and knowledge institutions with the objective to support product developers and let innovations succeed. Every innovation that is worked on is approached as a project and the actors that are involved differ for every project. The product developer approaches FieldLab Eerstelijnszorg about an innovation that is still under development. Then a project team is formed to test and evaluate the innovation in real-life situations with care providers and patients, which are the users of the product. The feedback of these users can be used to improve the innovation. Afterwards FieldLab Eerstelijnszorg gives an advice to the product developer about the continuation of the development of the innovation. FieldLab Eerstelijnszorg strives to make healthcare more sustainable. They focus on innovations that prevent illness, or bundle care for multiple illnesses, or digitalize healthcare. An example of an innovation of which FieldLab Eerstelijnszorg supported the development is an app for smart phones to diminish the risk of falling for elderly people.

The development of a new product, an innovation, runs through different stages. When FieldLab Eerstelijnszorg was founded the objective was to focus on products that were almost market ready. It planned to focus on the testing and validation of innovations. However, now that the organization is running, the board of FieldLab Eerstelijnszorg found out that a lot of innovations that are fully developed and almost market-ready, most of the time do not fit with the problems and needs of users. So they are wondering whether this focus on testing and validation is the right focus for the organization or maybe they should alter it.

Another important issue is that the subsidy that FieldLab Eerstelijnszorg received from the province of Gelderland, only was for the start-up period of three years. These three years are almost over now, so the board needs to decide how they will fill this gap to continue the execution of the organization. The start-up period also was meant to establish a business model that can last. So the board also sees this as a good point in time to evaluate their proceedings and decide on the continuation of the current business model. This is the reason that they are interested in a study about the function(s) that FieldLab Eerstelijnszorg could perform in the innovation system, to add some value to the system.

1.2. Problem statement

FieldLab Eerstelijnszorg presents itself as a living lab. That is also the theoretical concept that is used to describe FieldLab Eerstelijnszorg in this study. A living lab is *"an organized approach ... to innovation consisting of real-life experimentation and active user involvement by means of different methods involving multiple stakeholders, as is implied in the Public-Private-People character of Living Labs"* (Schuurman, 2015, p. 8). So a living lab brings together different actors that contribute to innovation. This means that it can be seen as an intermediary and together with the other actors it brings together, it forms an innovation system. The theory of Bergek, Jacobsson, Hekkert & Smith (2010) states that there are seven functions which the actors of an innovation system should perform together. Since FieldLab Eerstelijnszorg is an actor in an innovation system, it can contribute to the execution of these functions. The board of the FieldLab would like to get more information about what their organization can contribute to the execution of these functions.

Since the board members of FieldLab Eerstelijnszorg are also questioning which part of the innovation process they should focus on, this concept is also considered in this study. According to Ballon, Pierson & Deleare (2005) a living lab can contribute to every stage of the innovation process. This study serves as a source of information for the board members about which functions their organization can execute during the different stages of the innovation process. Also will it give information about the function that the organization could have to fulfill the needs of other actors in the innovation system.

1.2.1. Objective

The aim of this study is to determine which function FieldLab Eerstelijnszorg can take in the different stages of the innovation process and in the innovation system. It was gauged what the needs of other actors in the system are, what these actors think FieldLab Eerstelijnszorg can contribute to these gaps and what it can contribute to the different stages of the innovation process. With this information, an advice is given to FieldLab Eerstelijnszorg about the function it could have in the system.

1.2.2. Research question

To achieve the objective of this study the following research question is formulated: '*What could be the function of FieldLab Eerstelijnszorg in the innovation system based on its contribution to the different stages of the innovation process and the needs of other actors in the system?*'.

To formulate an answer to this question, the following sub questions will first be answered:

- Who are the actors in the innovation system and how do they relate to each other?

- What are the needs of the actors in the innovation system and what can FieldLab Eerstelijnszorg do to fulfill these needs?
- What can FieldLab Eerstelijnszorg contribute during the different stages of the innovation process?

Qualitative methods were used to study these questions. Interviews were held with representatives of actors in the innovation system and documents were analyzed to get an overview of the different opinions.

1.3. Practical contribution

The board of FieldLab Eerstelijnszorg has to decide how the organization can continue in a way that it can add value to the current innovation system. This research puts in order which innovation system FieldLab Eerstelijnszorg is part of and what the construction of this system is. Also it provides information about the expectations that actors in this system have about FieldLab Eerstelijnszorg and what the contribution of the organization can be to the innovation process and system. The result of this study is an overview of the manners in which FieldLab Eerstelijnszorg can contribute to the execution of the functions in the innovation system. This will provide the board of FieldLab Eerstelijnszorg with the information they need to make a founded decision about the business model of the organization. This decision is also supported by some managerial recommendations that are given at the end of the study.

1.4. Theoretical contribution

This thesis is a contribution to the existing literature about living labs. The term living lab is relatively new and the literature does not give an unequivocal definition of what a living lab is and does. This research contributes to a more academic basis for living labs, by specifying its function in the innovation system.

Another contribution of this thesis is the link it makes between theory about the innovation process and innovation systems. The literature of innovation systems is about the multiple actors that are involved in the innovation process, while the theory about stages in the innovation (Cooper, 1990, 2014) is about the activities during the different stages. In the concept of a living lab these two theories come together, because a living lab is an actor in a system and can contribute to all stages of the innovation process (Ballon et al., 2005). However, it is not explained what this contribution is. This thesis explores what the specific functions of a living lab can be during the different stages of innovation and what it contributes to the system in this way.

The last contribution is to the literature about innovation systems. Bergek et al. (2010) do explain which functions should be executed by an innovation system in total, but they do not link these functions to specific actors. This study makes a contribution to this by clarifying which functions an intermediary and specifically a living lab can perform. This also results in an overview of logical configurations of these functions. The results of this single case study can be used as a basis for expansion of the theory when they are complemented by studies of other cases.

1.5. Societal contribution

This study also has a societal contribution. The need for healthcare is rising together with the costs of it. This has led to a debate about how healthcare should be organized to make it affordable. With the help of innovations new ways of providing healthcare can be developed and the current healthcare system can be reorganized to deal with the increasing need for care and decrease the costs of it.
As was explained before, FieldLab Eerstelijnszorg focuses on innovations that prevent illness, or bundle care for multiple illnesses, or digitalize healthcare. In this way, they strive to reduce the need for healthcare and diminish the costs of it in their region. This research studies how FieldLab Eerstelijnszorg can operate effectively to deliver this contribution. So this research supports the creation of conditions under which a societal contribution can be made.

1.6. Overview of this report

In the rest of this thesis the research is discussed. In the following chapter the most important concepts are explicated and related in the theoretical framework. Also the conceptual model is given. The third chapter follows with an explanation of the used methods. Then the results of this study are discussed in the fourth chapter. The data is analyzed and a link is made with the literature. The report is concluded by a conclusion, discussion and recommendations in chapter five.

2. Theory

In this chapter the theoretical concepts that are used for this research are explicated. FieldLab Eerstelijnszorg takes part in the process of product innovation for the primary care. To describe what this entails it should first be clear what innovation is and how the process of innovation elapses. It is explained that FieldLab Eerstelijnszorg takes part in open innovation, which means that it does not only take place inside the boundaries of an organization. It is also explained that a lot of different models are used to describe the innovation process. For this study, the stage-gate model is used, so this model is introduced. This model is altered through time as a response to developments in the innovation environment, these alterations are also explained. Eventually the newest version of the model is shown, because this model fits the best with the activities of FieldLab Eerstelijnszorg.
The next theoretical concept that is discussed, is the term living lab. The first chapter already explained that FieldLab Eerstelijnszorg characterizes itself as a living lab, so this is the theoretical concept that is used to describe FieldLab Eerstelijnszorg. It is explained what the characteristics of a living lab are and how it can be positioned in the innovation process.
At last, it is explained that FieldLab Eerstelijnszorg is part of an innovation system. The structure of such an innovation system is explicated together with the functions that the actors in the system should perform together and the possible contribution FieldLab Eerstelijnszorg can make to these. Eventually these concepts lead to the conceptual model of this study. This model is explained in the last paragraph.

2.1. Innovation process

Since FieldLab Eerstelijnszorg participates in the process of innovation, it should first be clear what innovation is. Innovation can be seen as *'an intentional and proactive process that involves the generation and practical adoption and spread of new and creative ideas, which aim to produce a qualitative change in a specific context'* (Sørensen & Torfing, 2012, p. 849). The process of innovation can in general be divided in two different parts. In the first part, often called the fuzzy front end, ideas are generated, collected, adopted, clustered, screened, selected and improved and a decision is made about which ideas will be further worked out (Boeddrich, 2004). In the second part, which Boeddrich (2004) calls multiple project management, the chosen projects are elaborated and results are delivered.

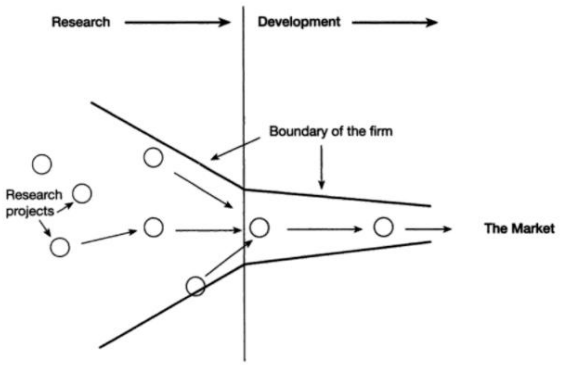

Figure 2.1 Closed innovation paradigm (Chesbrough, 2003)

In Figure 2.1 (Chesbrough, 2003) the separation between the two parts is shown by the vertical line between research and development. This figure is a visual representation of the traditional concept

of innovation, which can be seen as closed innovation because the organization handles everything by itself. In Figure 2.1 this is displayed by the continuous line that demarcates the boundary of the firm. All research projects, which are displayed by dots, take place inside these boundaries of the firm. The organization focuses on the development of technologies and products internal in the organization to commercialize it also internally (Docherty, 2006). The organization has to keep control over the process by developing ideas into products and market them. Only in this way quality, availability and capability can be assured (Chesbrough, 2003).

As a result of multiple developments in organizations and their environment, a new paradigm of innovation was developed and introduced by Chesbrough (2003). This concept is called open innovation. *'Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology'* (Chesbrough, 2003, p. XXIV). As is also visible in Figure 2.2 (Chesbrough, 2003), the open innovation process is much more dynamic than the closed process (Docherty, 2006). The boundary of the firm is displayed with a dotted line and research projects also move outside this boundary. This is in line with an important assumption of the open innovation paradigm, that parties outside the organization can add value to ideas that are internally created.

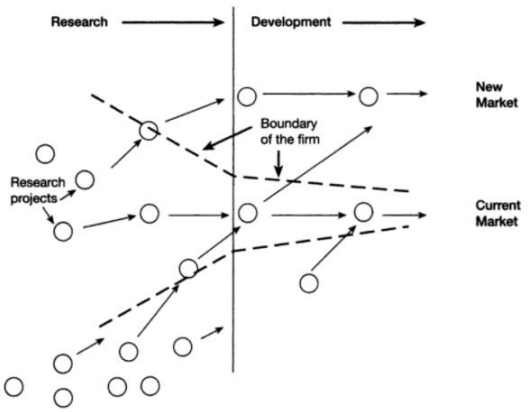

Figure 2.2 Open innovation paradigm (Chesbrough, 2003)

FieldLab Eerstelijnszorg does not develop new products by itself. The organization supports the development of products. So this is by definition an open innovation process. However, that does not say anything about how the innovation process is organized. This can be further clarified by innovation process models.

Different authors did research about the process of innovation and they came up with a variety of models (e.g. Buggie, 2001 and Hughes & Chafin, 1996). Some of them see innovation as a straight process with fixed stages (e.g. Zaltman, Duncan & Holbek, 1973, in King, 1992), while others see the process as a more fluid one (e.g. Schroeder, Van de Ven, Scudder & Polley, 1989, in King, 1992). Saren (1984) made a classification of five different types of models. He states that there are departmental-stage models, activity-stage models, decision-stage models, conversion process models and response models. Saren (1984) already acknowledged that a more general model was needed. Bernstein & Singh (2006) attempted to create an integrated model. The starting point for their model is Rothwell's (1994, in Bernstein & Singh, 2006) view that the innovation process is a sequence of interacting and interdependent stages. It also highlights that this process does not only take place inside the organization, but also in interaction with the environment. According to

Bernstein and Singh (2006), the innovation process can be divided in four different stages, which are idea generation, innovation support, innovation development and innovation implementation. However, these stages are still very broad defined and it is not well clarified what kind of activities each stage entails. That is why this model is not used for this study.

The model that is used for this study, is the stage-gate model of Cooper (1990). According to Leithold, Haase & Lautenschläger (2015) this is the most widespread and known model, it is used by three-quarters of top-performing organizations (Cooper & Edgett, 2012). One advantage of the stage-gate model is that the stages are more specifically defined and activities are linked to them. Also, the stage-gate model is altered to important changes in the innovation process through time, such as the development of open innovation. A disadvantage of the stage-gate model (Cooper, 1990) is that is shows innovation as a linear process. However, this study is also about the innovation system so that adds the dynamic part of innovation

2.2. Stage-gate model

The stage-gate model consists of multiple stages in which activities are carried out to develop the product from idea creation to market launch (Leithold et al, 2015; Grönlund, Sjödin & Frishammer, 2010). The stages are separated by gates to evaluate the achievements during the process. The product has to pass certain criteria to move on to the next stage. So during a stage information is gathered, then an integrated analysis of this information is done and the results of this analysis are the input for the gate (Cooper, 2008). At the gate the decision is made whether the project is moving on or stopped.

Cooper (1990) created a typical stage-gate model that organizations can use to increase the effectiveness and efficiency of their new product process. Usually a stage-gate model identifies four to seven stages and gates, the model of Cooper (1990) contains five. Figure 2.3 (Cooper,1990) gives an overview of the stages and gates that Cooper (1990) identifies.

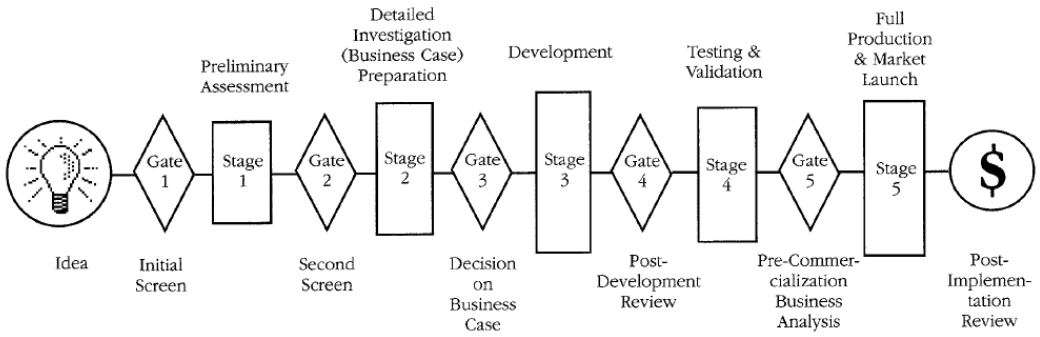

Figure 2.3 Typical stage-gate model (Cooper, 1990)

As the figure indicates, the first step in the process is to screen an idea. If the idea passes this gate then a project is started and the first stage is entered. In the first stage the objective is to gather technical and market information (Cooper, 1990). The new information is evaluated at the second gate. At this gate more criteria are considered than at the first gate. During the second stage the business case is prepared. This contains market research, technical details and a financial analysis (Cooper, 1990). At the third gate, again the new information is evaluated with stricter criteria. Also the activities undertaken during the second stage are reviewed (Cooper, 1990). The last part is the

review of the plan for the rest of the development. During the third stage the real product is developed and tested, marketing and operations plans are made. At the fourth gate the progress and attractiveness of the project and product are evaluated (Cooper, 1990). The next stage contains the validation of the product and the project. The fifth gate reviews the quality of the activities during the validation stage and their results (Cooper, 1990). During the fifth and final stage the marketing and operations plans are carried out. After the launch of the product a post implementation review is done.

The traditional stage-gate model of Cooper (1990) was developed over time. Multiple alterations were done as a reaction to critiques of other authors that the model is too linear, too rigid and too planned (Cooper, 2014). This resulted in different generations of the stage-gate model.

One alternative version of the stage-gate model is the version that is altered to the concept of open innovation, this model can be found in Figure 2.4 (Docherty, 2006 in: Cooper, 2008). This model shows that companies look inside out and outside in across all three aspects of the innovation process (Docherty, 2006). At the front-end companies look at external parties to find problems that they can solve and look for technologies that they can build on their ideas. During the development phase organizations look for productized innovations that they can further develop, but they can also pass on their product ideas to other parties (Docherty, 2006). For the commercialization phase this works the same, but then the products are already commercialized.

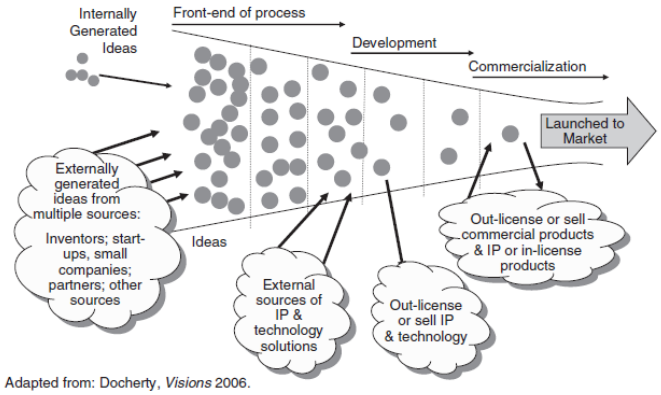

Figure 2.4 Stage-gate model for open innovation (Docherty, 2006 in: Cooper, 2008)

This model explains that organizations can turn to other parties during the innovation process, so this seems to fit with the open innovation environment in which FieldLab Eerstelijnszorg participates. However it does not explain how the user can be involved in the process, which is a primary objective of FieldLab Eerstelijnszorg. That is why this model is not used for this study.

In 2014 Cooper created the newest generation idea-to-launch system which has the stage-gate model as the basis, but it is more lean, faster, adaptive and risk-based (Cooper, 2014). This model can be found in Figure 2.5 (Cooper & Sommer, 2016). In this model, the stage-gate model is complemented with the triple A system, which stands for adaptive and flexible, agile, and accelerated. The most important improvement of this model is that it represents the innovation model not as a strict linear process, which the original stage-gate model does. This is displayed by the addition of iteration loops, called sprints, in which customers and users are involved in the process.

Every stage consists of several sprints. This is a period of two to four weeks in which a product is created which can be demonstrated to stakeholders (Cooper & Sommer, 2016). A working product can be a simple or limited model, especially in the earlier stages, but it can also be a set of completed drawings or a prototype. Especially in the early stages it can include anything tangible that can be reviewed by an expert (Cooper & Sommer, 2016). This model should be tested by customers and they give feedback about it. Then the model should be revised according to the feedback in the next sprint. In this way the product can be adapted to the needs of the customer early in the process.

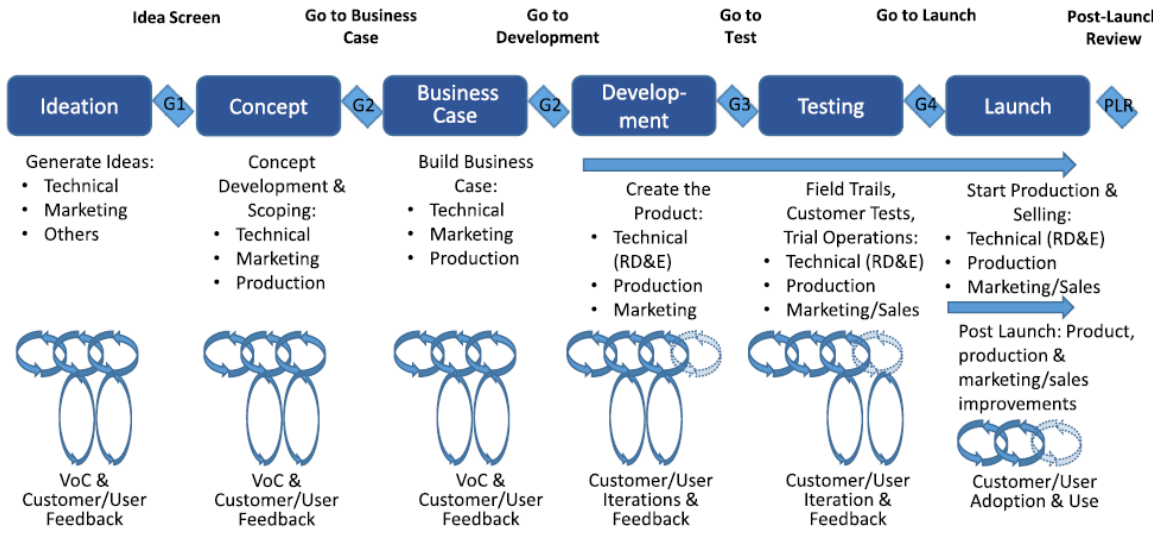

Figure 2.5 The integrated Agile-Stage-Gate hybrid model (Cooper & Sommer, 2016)

This newest model is eminently suitable for this research, since FieldLab Eerstelijnszorg was established to involve the user in the process of product development for primary care. So to determine the stage of the innovation, the Agile-Stage-Gate model is used. With this it is examined what FieldLab Eerstelijnszorg can add during these different stages, especially in the field of involving users in the process.

2.3. Living lab

As FieldLab Eerstelijnszorg presents itself as a living lab, it should be clear what the theoretical meaning of a living lab is and what implications this has. A living lab is a relatively new concept in the innovation process. It is a specific type of platforms for testing and experimentation, which are facilities and environments in which joint innovation is enabled (Ballon, Pierson & Deleare, 2005). These test and experimentation platforms can be used to test technology, to make prototypes or to try it within usage situations. The main objective is to use feedback of users throughout the process of technological design and development.

There are six types of test and experimentation platforms. Ballon et al. (2005) created a conceptual framework to give an overview of the characteristics of these six types, see Figure 2.6. However, this framework is primarily based on empirical findings, so it does not have a strong theoretical basis. The first characteristic Ballon et al. (2005) used is the maturity of the technology. High maturity means that a product is (almost) market ready. This characteristic is placed on the horizontal axis and reaches from low to high. The second characteristic is the focus of the platform. A distinction is made between a focus on testing and a focus on design and this is placed on the vertical axis. With testing Ballon et al. (2005) mean to check if the technology works properly and with design they mean what

the technology should be capable of and what it should look like. The last characteristic is the openness of the platform. This is also placed on the horizontal axis, but at the top.

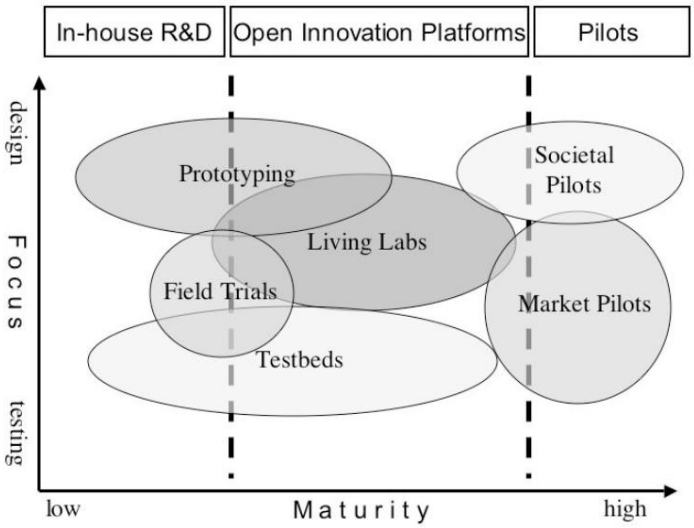

Figure 2.6 Conceptual framework of test and experimentation platforms (Ballon et al., 2005)

As you can see in Figure 2.6 Conceptual framework of test and experimentation platformsFigure 2.6 Ballon et al. (2005) place living labs almost at the middle of the framework, because the living lab has a broad conceptual scope. Most of the time a living lab is an open innovation platform, but it can sometimes be part of in-house R&D. The focus is a bit more on design than on testing and also slightly more on technologies with low maturity than high maturity. This can be connected to the middle stages of the stage-gate model (Cooper, 1990) which are the development of the business case and the development of the product. In these stages the idea of the product is completely elaborated, but the product itself is still under construction.

Ballon et al. (2005) define a living lab as *"an experimentation environment in which technology is given shape in real life contexts and in which (end) users are considered 'co-producers'"* (p.3). The fact that the experimentation is done in a real-life setting is what distinguishes the living lab from other kinds of platforms (Schuurman, 2015). Another distinctive characteristic of a living lab is that it treats users as co-producers (Almirall, Lee & Wareham, 2012) and involves them in all the stages of innovation development (Ballon et al., 2005). This is in line with the theory about the Agile-Stage-Gate model (Cooper & Sommer, 2014), that users can be involved in every stage of the innovation. So, living labs functions as facilitator of user involvement in the innovation process. Typically a living lab brings together product developers, end users, the public sector and academic parties (Almirall, Lee & Wareham, 2012). By bringing together these parties the living lab creates an environment in which the technology can be shaped by social contexts and needs (Ballon et al., 2005).

According to the previous explanation of living labs it can be concluded that a living lab brings together different parties in the innovation process. This makes that a living lab can be typified as an innovation intermediary. Innovation intermediaries are *'organizations that facilitate innovation by providing the bridging, brokering, and knowledge transfer necessary to bring together the range of different organizations and knowledge needed to create successful innovation'* (Lin & Wei, 2018, p. 22).

2.4. Intermediary in an innovation system

An innovation intermediary, along with the different actors it brings together, forms an innovation system. An innovation system can be defined as *'that set of distinct institutions which jointly and individually contributes to the development and diffusion of new technologies and which provides the framework within which governments form and implement policies to influence the innovation process. As such it is a system of interconnected institutions to create, store and transfer the knowledge, skills and artefacts which define new technologies'* (Metcalfe, as cited in Van Lente, Hekkert, Smits & Van Waveren, 2003). Figure 2.7 (Van Lente et al., 2003) gives a framework of the possible different actors in an innovation system. The firms in this system are the product developers, so these are the organizations that carry out the innovation. Demand contains all actors that will use the product that is developed. Research institutes and universities are all knowledge institutes that can contribute to an innovation. Infrastructure covers all actors that create the conditions under which innovation takes place, such as financing and legislation. And intermediaries bring together all these different parties. However, the actual composition of an innovation system depends on its context. In this research it is studied what the exact composition is of the system of which FieldLab Eerstelijnszorg is part.

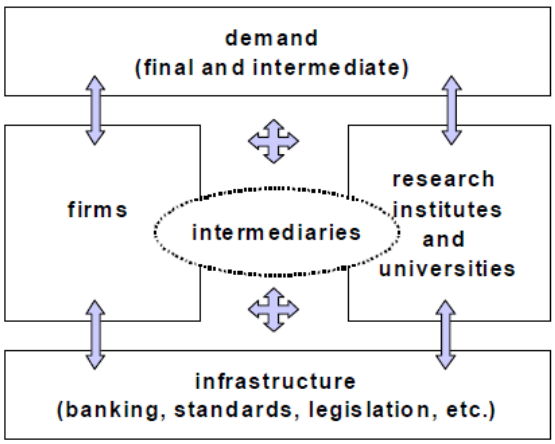

Figure 2.7 Building blocks of innovation systems (Van Lente et al., 2003)

Van Lente et al. (2003) do not explain what the flows between the actors are. They use different kinds of arrows or let figures overlap to illustrate the flows, but they do not explain what these differences mean. So on that area the theory is a bit vague. In this study, the meanings of these flows are identified for the system of which FieldLab Eerstelijnszorg is part.

The other actors in the system can be the drivers of a living lab. According to Leminen, Westerlund and Nyström (2012) there are four types of living labs that are driven by different actors. The type of a living lab affects its activities. The first type is utilizer-driven. In this case the living lab focuses on collecting user information by developing and testing products and services of the utilizer (Leminen et al., 2012). The utilizer can use this information for the development of new products and the organization itself. So the living lab serves the supplier of products, which are the firms in the system according to the theory of Van Lente et al. (2003). The second type is enabler-driven. Enabler-driven living labs typically work on regional or societal needs that are initiated by public-sector actors, non-governmental organizations and financiers (Leminen et al., 2012). These public-sector actors, non-

governmental organizations and financiers are the enablers, which the living lab serves. In the system these are part of the infrastructure. Often the enabler-driven living lab supports a regional-development body or program (Leminen et al., 2012). The third type, provider-driven living labs, focuses on research and the creation of knowledge which can be used to improve everyday life of all participants (Leminen et al., 2012). Providers are for example academic and educational institutions or consultants, which is comparable to research institutes and universities in Figure 2.7 Building blocks of innovation systems (Van Lente et al., 2003). The last type is user-driven living labs. These labs focus on solving everyday life problems of users and user communities, who form the demand side (Van Lente et al., 2003), in such a way that it is in consensus with their values and requirements (Leminen et al., 2012). The determination of which type of living lab FieldLab Eerstelijnszorg is or could be, and thus which are the primary actors it serves, can contribute to the decision about the function(s) FieldLab Eerstelijnszorg could have in the system.

The possible functions FieldLab Eerstelijnszorg could have, are based on the functions that appear in an innovation system. According to Bergek, Jacobsson, Hekkert & Smith (2010) innovation systems should perform different functions, divided over the different actors. So all the components of an innovation system have a function, this is what they actually do and achieve (Bergek et al., 2010). Following are the functions that an innovation system should perform according to Bergek et al. (2010).

- Knowledge development and diffusion
  To get all the knowledge an organization needs for innovation, it often has to make use of external knowledge bases (Bergek et al., 2010). The innovation system offers an opportunity for organizations to collaborate and cooperate to get this knowledge. Attention should be given to how the organizations that form the knowledge infrastructure of the system (e.g. universities, government labs, research institutes, etc.) preserve scientific and industry specific knowledge bases and how knowledge is spread and combined.

- Influence on the direction of search and the identification of opportunities
  Organizations in the innovation system should look for new opportunities to exploit (Bergek et al., 2010). They can also influence the direction of the search for new opportunities.

- Entrepreneurial experimentation and management of risk and uncertainty
  One of the key elements of an innovation system is the experimentation of product developers (Bergek et al., 2010). However, experimentation also brings forward risk and uncertainty. Innovation systems should identify and manage this risk and uncertainty.

- Market formation
  Innovation systems should start in small markets in which actors are enabled to learn about the innovation and form expectations and beliefs about it (Bergek et al., 2010). In this way the market and the innovation system can evolve and grow.

- Resource mobilization
  Innovation can only take place if the needed resources are available (Bergek et al., 2010). This is also a task that the system should take care of.

- Legitimation
  The innovation system should make sure that they and their innovations collect legitimacy. This means that they should be socially accepted and in line with relevant institutions (Bergek et al., 2010).

- Development of positive externalities
  When the system is evolving it can strengthen the other functions by the entrance of new organizations (Bergek et al., 2010). This creates positive externalities.

These functions of an innovation system cannot be linked to a specific actor in the system, it depends on the system which actor(s) performs which function(s). Van Lente et al. (2003) already stated that the major functions of an intermediary in a system are *"the articulation of needs and options, the alignment of relevant actors and the support of processes of learning and experimenting"* (p.29). This implies that FieldLab Eerstelijnszorg could make a contribution to the influence of direction of search and the identification of opportunities, to knowledge development and diffusion and to entrepreneurial experimentation and management of risk and uncertainty. However, Van Lente et al. (2003) call it the major functions and this does not exclude that there can be any other functions. So in this research it is studied to which of the functions in the system FieldLab Eerstelijnszorg can make a contribution and in what way.

The function of one specific actor, in this case the intermediary, depends among other things on which functions are already fulfilled by other actors and which are still needed. If a function is not fulfilled in the system, then there is a lack of it. In this research it is expected that this leads to a need in the system. So if the function of knowledge development and diffusion (Bergek et al., 2010) is not fulfilled, then it is expected that there is a need for knowledge and customer information. A lack of directions of search and identification of opportunities (Bergek et al., 2010) might lead to a need for coordination. If resource mobilization is not fulfilled, then a need of resources is expected. If legitimation (Bergek et al., 2010) lacks, then there might be a need for legitimacy. And lastly there is expected to be a need for a network if positive externalities (Bergek et al., 2010) are not developed. So for this study, needs are defined as the requirements and desires of other actors in the innovation system.

2.5. Conceptual Model

Based on the theoretical framework a conceptual model is made for this research. During every stage of the innovation process, different activities need to be carried out. This suggests that the functions an innovation system needs to perform, are not equally important during the different stages. So it is expected that the stage that the innovation is in, influences the function that a living lab can have. Since the living lab is an intermediary, it is dependent on the other actors in the system so it is also expected that the function in the innovation system depends on the needs of other actors in the system.

Thus, the function of the living lab in the innovation system is influenced by the actors in the innovation system and by the stage of the innovation. This results in the following visual representation of Figure 2.8.

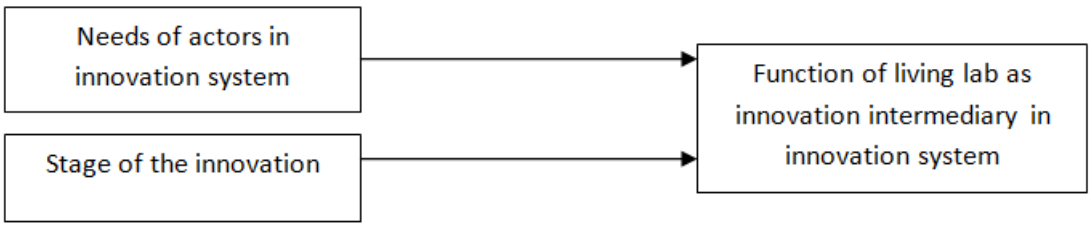

Figure 2.8 Conceptual model

The concepts of this model are not used together in research before, this makes that the relationships between them are expectations based on logical thoughts and not on scientific knowledge. There might also be other relations between the concepts. Because of the feasibility of this research, these relations are not taken into account.

3. Methodology

This chapter gives an explanation of the method that is used for this research. First is described which research strategy is used. Subsequently a description is given of the context in which the research took place. Then the used data sources are given and an explanation of the method for data collection and analysis. Thereafter the used concepts are operationalised. The chapter concludes with a discussion of the quality criteria of the research followed by the research ethics.

3.1. Research strategy

This research is a practice-oriented study that is focused on a single organization, that is FieldLab Eerstelijnszorg. The study took place in the natural environment, no factors were manipulated. This research is a case study, which can be defined as *'an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident'* (Buchanan, 2012, p. 353).
In this study the single case is FieldLab Eerstelijnszorg, this is the unit of analysis. Three other FieldLabs that are part of the system, were also taken into account during this study, which may indicate a multiple case study. However, these other FieldLabs are only considered as parties in the system to which FieldLab Eerstelijnszorg can be compared and no statements will be made about them. This makes that this research is a type 1 case study according to the typology of Yin (2014), which is a single holistic case study.

Data sources that were used are people and documents. The data was collected through respectively interviews and document analysis. These qualitative research methods were used to get insight in important factors and patterns in the social structure.

3.2. Case description

FieldLab Eerstelijnszorg is an organization that mediates in the process of innovation and product development in the healthcare sector. It was established by the province of Gelderland and initially funded with subsidy. Together with FieldLab Eerstelijnszorg, three other FieldLabs were set up as part of this project, these are FieldLab Tweedelijnszorg, FieldLab Gehandicaptenzorg and FieldLab Revalidatiezorg. The purpose of these FieldLabs was to promote the economy of the region around Nijmegen by speeding up the process of innovations. The healthcare providers of Thermion, which is a care practice in Nijmegen Lent, were approached by the Province of Gelderland to take part in FieldLab Eerstelijnszorg because they were already active in the field of innovation. In the meantime FieldLab Eerstelijnszorg became part of the bigger care group STIELO, which Thermion belongs to. Together with Hogeschool van Arnhem en Nijmegen (HAN), STIELO takes care of the government of the organization. The program manager, which is a researcher from HAN, has the leading role in this and he is supported by a workgroup of five people in which STIELO and the care practices are represented together with a member of REshape. Health Valley, another intermediary in the system operates as the front desk of the four FieldLabs and is responsible for the marketing.

Product developers can approach FieldLab Eerstelijnszorg for a review about the product that they are developing. This can be about the need for the product by care providers, for example if the product can solve a problem care providers or patients are struggling with. FieldLab Eerstelijnszorg

can also play a role in testing a prototype of a product or testing the final product in the daily practice.

FieldLab Eerstelijnszorg is part of an innovation system. Other parties in this system are product developers, care providers, patients, knowledge institutes, infrastructural organizations and other intermediaries.

3.3. Data sources

As was mentioned before, the data sources that were used are people and documents. Snowball sampling was used to select the people to interview. According to Verschuren & Doorewaard (2015) snowball sampling is a good way to uncover an interaction network. In this research the network of FieldLab Eerstelijnszorg had to be uncovered so this is why snowball sampling was chosen.

First an orienting conversation was held with the program manager of FieldLab Eerstelijnszorg to get insight in the actors in the innovation system, based on this conversation the other persons were selected. All persons that were interviewed, are members of one of the actors in the innovation system. They either take part in the government of FieldLab Eerstelijnszorg or one of the other three FieldLabs, or they work(ed) together on the review of an innovation with FieldLab Eerstelijnszorg, or they are member of one of the intermediary parties which FieldLab Eerstelijnszorg has to deal with. In total eleven people were interviewed. Due to time restrictions and availability of people, it was not possible to include all actors in the system. However, the people that were interviewed represented actors of all parts of the system. This makes that the case is illuminated from all different sides. Some of the interviewed people are member of multiple actors in the innovation system, this makes that the total representation of actors is higher than the total of interviews. Three people are board members of FieldLab Eerstelijnszorg, three are board members of one of the other FieldLabs, two are members of STIELO, two are researchers connected to HAN, one is a product developer, one is a general practitioner, one is a member of Radboud University Medical Centre (RUMC), one is a member of Health Valley, one is a member of Oost NL and one is a member of MedValue. Table 3.1 gives an overview of the interviews that were done. In this table, the respondents are mentioned with their primary organization they work for. The specific combination of organizations a respondent works for, is not given, because then it might be possible to trace who this person is.

Respondent	Main organization	Date of the interview	Duration of the interview
Respondent 1	Oost NL	26-06-2018	30 minutes
Respondent 2	HAN	12-07-2018	30 minutes
Respondent 3	Other FieldLab	22-08-2018	32 minutes
Respondent 4	General practitioner	23-08-2018	45 minutes
Respondent 5	FieldLab Eerstelijnszorg	28-08-2018	54 minutes
Respondent 6	Health Valley	30-08-2018	32 minutes
Respondent 7	MedValue	31-08-2018	38 minutes
Respondent 8	STIELO	05-09-2018	41 minutes
Respondent 9	Other FieldLab	25-09-2018	35 minutes
Respondent 10	Other FieldLab	05-10-2018	63 minutes
Respondent 11	Product developer	09-10-2018	48 minutes

Table 3.1 Overview of interviews

After the interviews were held, they were analyzed. The first results of this analysis were presented to the program manager and workgroup of FieldLab Eerstelijnszorg. The discussion that followed after this presentation is also included in the rest of the analysis.

The documents that were analyzed were also selected after the orienting conversation with the contact person and interviews with other people. Documents that were analyzed are the research report (Hoogendijk & Pluimers, 2013) that was created by members of Oost NV and led to the decision of the province of Gelderland to establish the FieldLabs, the report that was written for as a request for subsidy (Schers & Hendriks, 2015), an evaluation report of the FieldLabs (Büchner, 2017), written by an member of Oost NL and a brochure of Health Valley (n.d.) about the FieldLabs. The first two documents gave some information about the establishment of FieldLab Eerstelijnszorg and which needs it had to fulfill. In the evaluation report, a conclusion was given about which needs the FieldLabs did fulfill. The last document, the brochure, informed about the identity of FieldLab Eerstelijnszorg and what it stands for.
The websites of the actors in the system were used to get additional information about the organizations. An overview of these websites can be found in appendix 1.

3.4. Method of data collection and analysis

The interviews that were held were semi-structured. A topic list was created for the interviews, this is an interview instrument that gives some guidance to an interview, but leaves open some room to adjust the interview to the specific respondent (Boeije, 2014). This method was chosen because this list assures that all important topics are discussed during the interviews and that the same topics are discussed with different respondents. This makes the results comparable. However, the list also gives the interviewer the freedom to respond to important issues that come up during the interview. This is important for this research, because the respondents are all members of different actors in the network and they might highlight different things.

The topic list contains the most important questions that needed to be asked and topics that are linked to these questions. The topics and questions on this list are based on the operationalisation that follows. The topic list can be found in appendix 2. The topics and questions on the topic list should be discussed during the interview, but they are not ordered in a strict sequence. During the interview the researcher decided which question to ask next and when further questions needed to be asked to discuss a topic in depth. After every interview the researcher evaluated whether the topic list needed to be altered before the next interview. This resulted in the final topic list, which can be found in appendix 3.

The researcher used open questions during the interviews, which means that the respondent could choose how to formulate the answer by himself. This created the opportunity to collect data about unexpected matters and yields richer and more varied information (Bleijenbergh, 2015). This gave the researcher more insight in the situation. Furthermore, by deciding on which topics to discuss in further depth, the researcher could still make sure that the interview was on topic.

After collection the data was analyzed by using template analysis. The indicators and dimensions that were formed in the operationalisation, formed the starting point for the analysis. The indicators were used as a guideline to detect segments in the texts that were about a specific topic. These segments were marked with a topic and these topics were merged into groups, if possible. Besides, the researcher also paid attention to topics that were not formulated up front, but appeared to be

important. This led to multiple new codes. One characteristic of template analysis is that the coding process is iterative (King, 2012). This was also the case in this study. Since new codes were created during the analysis, the documents that were already coded needed to be checked again for information about the new codes. Another characteristic of template analysis is that it permits parallel coding (King, 2012). That was also used in this research, as some segments contained information about different topics.

The analysis started directly after the first interview. In this way the researcher could check if the interview delivered enough information and could learn from this for the following interviews.

3.5. Operationalisation

The theory that is explained in the theoretical frame is used to create the interview questions and topics. First an operational definition was created for every core concept that could be derived from chapter two. Then the core concepts were separated in dimensions. Indicators were linked to these (sub-)dimensions, to make the theory measurable, this is shown in Table 3.2.

The core concepts of this research with their operational definition are:

- Stage of the innovation: the stage in which the development of the innovation is, according to the Agile-stage-gate model of Cooper.
- Needs of actors in innovation system: the requirements and desires of other actors in the innovation system.
- Function of living lab: the activities and responsibilities a living lab can perform and have in the innovation process and system.

Core concept	Dimensions	Indicators	Source
Stage of the innovation	Idea generation	• Come up with ideas for new products	Cooper 2008 & 2014
	Idea scoping	• Gather technical information • Gather market information	
	Build business case	• Market research • Financial analysis • Study needs and wants of users • Test simulated prototype	
	Development	• Develop product • Create prototype • Test prototype • Marketing plan • Operations plan	
	Testing & Validation	• Field trials • Beta tests • In-home tests • Customer tests	
	Launch	• Carry out marketing plan • Carry out operations plan	
Needs of actors in	Knowledge	• Knowledge gaps need to be filled	Derived from functions in system
	Coordination	• Opportunities for new directions	

innovation system		of development need to be discovered	of Bergek et al. 2010
	Resources	• Need for financial capital • Need for human capital • Need for complementary assets	
	Legitimacy	• Need for social acceptance	
	Network	• Need for ties with potential collaboration partners	
	Customer information	• Need for information about customer demands and desires	
Function in innovation system	Knowledge development and diffusion	• Search for information to fill knowledge gaps • Store obtained knowledge • Provide other actors with knowledge	Bergek et al. 2010 Bergek et al. 2008
	Influence on the direction of search and the identification of opportunities	• Scan for changes in demographics • Mapping changes in the desires of the customer • Keep up with legislation	
	Entrepreneurial experimentation and management of risk and uncertainty	• Experiment with new technologies and applications • Identify risk and uncertainty • Take measures to reduce risk and uncertainty	
	Market formation	• Adapt innovations to customer demand • Enlarge customer group	
	Resource mobilization	• Mobilize human capital • Mobilize financial capital • Mobilize complementary assets	
	Legitimation	• Conform to social standards • Lobby for new social standards	
	Development of positive externalities	• Look for new collaboration partners	

Table 3.2 Operationalisation

3.6. Quality criteria

Several measures were taken to improve the reliability and validity of the study. First of all, the interviews were recorded and transcribed. This gives the possibility to look back at what was precisely said. Next to that, the researcher made use of a codebook to show how the data led to specific codes. Both of these measures provide that it can be traced how the researcher turned data into the results. This improves the reliability of the research.

Another measure to improve the reliability is the use of a topic list for the interviews. In this way the researcher assured that the same topics and questions were discussed with the different respondents (Bleijenbergh, 2015). However, a strict topic list can also limit the respondents freedom to discuss what he or she thinks is important for the subject of this research, which can have effects on the validity. So the researcher should be aware of the constant balance between getting more

information and securing the reliability. To secure the validity, the researcher asked each respondent at the end of the interview if they wanted to add something that seemed important for the subject to them.

Some respondents saw the researcher as a member of FieldLab Eerstelijnszorg, so this might have influenced their answers. However, these same respondents also were sometimes critical about FieldLab Eerstelijnszorg, which indicates that they did not give socially accepted answers. So this does not seem to be a big issue.

The last measure to improve the validity was through the selection of interviewees. According to Doorewaard, Kil & Van de Ven (2015) you should select people that together highlight all sides of the issue. As was explained in paragraph 3.3, this is also one of the criteria that were used for this research.

All these measures are focusing on the internal validity of the research and not on the external validity. Since this research is a practical research, external validity is not an issue. The objective of the research is not to generalize to the population. However, this research is transferable to other situations. By all means other living labs in the healthcare sector can use the outcomes of this research, because they act in a comparable system and the process of innovation is the same. But also living labs in other sectors than healthcare might benefit from these outcomes. Likewise because the innovation process is the same and an innovation system always consists of the same kind of actors. Transferability for this research is increased by explicitly describing the structure of the innovation system. Also, conditions that are specific for this system or the healthcare sector in general are discussed to give more clarity about the context of the research.

The applicability of this research is high, because it is about a problem that the board of FieldLab Eerstelijnszorg is struggling with at the moment. They can substantiate their choice for a certain business model with the information that they get from this study.

3.7. Research ethics

Measures were also taken to make sure that this research is done in an ethical way. To start with, the researcher was transparent to the respondents. This means that the researcher explained what the research is about and what its goals are. The respondents participated voluntarily. They were approached by the program manager of FieldLab Eerstelijnszorg with the question whether they wanted to participate. Only when they reacted positively, they were approached by the researcher for an interview. The chance that the respondents felt obligated to participate is small, because they are not subordinates of the program manager.

Another important issue is anonymity of the interviewees. The interviews were transcribed afterwards, but the respondents are made anonymous. These anonymous transcripts were used to analyze the data. All the data is also stored in a confidential way by the researcher, so that no other people have access to it. The respondents were only allowed to see their own transcripts afterwards. The researcher sent the transcript of the interview, or a summary if the participant had a preference for that, to the participant to check if this reflected the interview in the right way. If the participant did not agree on that, the transcript would not have been used for the analysis. However, this was not the case so all transcripts were used. Only a few sentences were ignored during the analysis, because the participant did not support these statements any more.

If the respondent wanted to be informed about the results of the research, then the final report is sent to them. The researcher made sure that no data in the final report can be traced back to one of the respondents.

FieldLab Eerstelijnszorg would like to use the data of this research for further research. Respondents could agree with this by signing an informed consent declaration. In this declaration it is stated that FieldLab Eerstelijnszorg gets insight in the gathered data and that they might use it for further research. In case the data is re-used, then FieldLab Eerstelijnszorg will ask for permission of the respondent again. Also the previous conditions about voluntariness, anonymity and member checks are stated in this declaration. If the participant did not want to sign this declaration, he or she could still participate in this research, but then the data would not be shared with FieldLab Eerstelijnszorg. Though, all participants agreed to sign this declaration.

In this research the interests of different parties are studied, these might be contradicting. The research and researcher might have an influence on these interests. Therefore the researcher tried at all times to act in a neutral way to all respondents and did not express her own opinion, to limit this influence.

4. Analysis

In this chapter the results of the analysis are discussed. This is done on the basis of the sub questions that were formulated for this research. So first is discussed what the different actors are in the innovation system of which FieldLab Eerstelijnszorg is part and how they relate to each other. Then an explanation is given of the different needs that all these actors have and what the FieldLab can do to fulfill these needs. Next is an explanation of the possible contribution of FieldLab Eerstelijnszorg during the different stages of the innovation process. Then additional findings are explained that are important for the selection of functions that the FieldLab could perform. The chapter is concluded with an adjusted conceptual model.

4.1. Who are the actors in the innovation system and how do they relate to each other?

According to the theory of Van Lente et al. (2003), actors of an innovation system can be classified in groups. The specific innovation system which FieldLab Eerstelijnszorg is part of, is shown in Figure 4.1. The color of the arrows says something about what is exchanged between the actors. The filled arrows resulted from the data analysis, so these are proven. The arrows with dotted lines are expected exchanges.

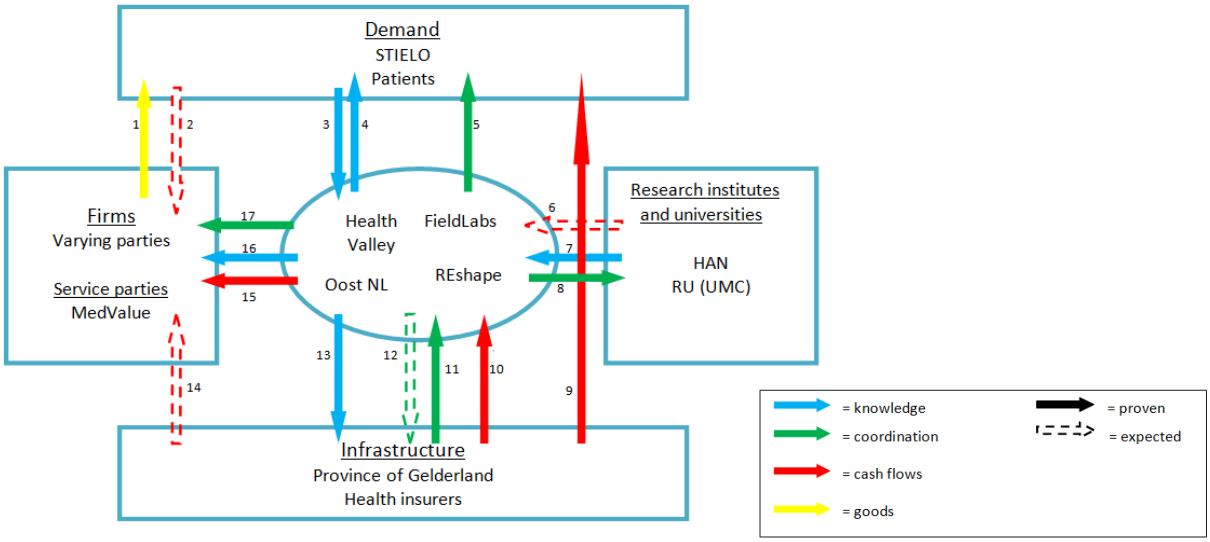

Figure 4.1 Innovation system of FieldLab Eerstelijnszorg (adapted from Van Lente et al. (2003))

First is the group of firms. These firms are the parties that develop the products, so they are a supplier in the innovation system. FieldLab Eerstelijnszorg does not have partnerships with product developers, so this group of actors has a varying composition. Mainly, these product developers are small and medium enterprises, merely an individual has international partnerships (e.g. http://www.semmelwise.nl/, https://www.orfeus.nl/over-ons/, https://www.goliveclip.eu/about-us/, https://www.videobutler.nl/over-ons-2/). All these organizations focus on e-Health. This can be software or technology. A common topic they work on is communication, among care providers or between care providers and patients.

Another actor in this group is MedValue. This is a spin-off organization of the Radboud University Medical Centre (RUMC) and it carries out health technology assessments (https://medvalue.nl/nl/over-ons). So this organization does not develop the products itself, but it

supports product developers in the process. FieldLab Eerstelijnszorg does not have a formal partnership with MedValue, but it maintains close informal contacts in case the organizations need each other in the future. Although that has not occurred yet.

The second group of actors is demand. As was already explained in chapter two, demand in the innovation system means that these actors can be the final and intermediate users of the product that is developed. In the healthcare sector, these can be the care providers or patients. So the care providers and patients buy/use products of product developers, this is shown by arrow 1 in Figure 4.1. It is also expected that these users, or the health insurers pay for these products, which is show by arrows 2 and 14 in Figure 4.1. In this specific system, demand is represented by STIELO. This is a care group in which eleven care practices in Lent and Oosterhout collaborate. In those care practices a pharmacy, general practitioners, physiotherapists, speech therapists, cesar therapists, psychotherapists, psychologists and midwives are housed (http://www.stielo.nl/). FieldLab Eerstelijnszorg brings in care providers of STIELO when it needs more information about the need for a product or the usability of it, which is represented by arrow 3 in Figure 4.1. Also, members of STIELO operate in the board of FieldLab Eerstelijnszorg.

The research institutes and universities in this system are Hogeschool van Arnhem en Nijmegen (HAN) and Radboud University. HAN is actively involved in FieldLab Eerstelijnszorg. The program manager of FieldLab Eerstelijnszorg also is a researcher at HAN and other researchers and students of HAN are concerned in the product evaluations that FieldLab Eerstelijnszorg carries out, this is indicated by arrow 7 in Figure 4.1. Radboud University and Radboud University Medical Centre (RUMC) on the other hand do not have a formal partnership with FieldLab Eerstelijnszorg, because they have their own network of general practitioners that work on innovations. However, RUMC was and is involved in some of the projects that FieldLab Eerstelijnszorg carries out (https://fieldlabeerstelijn.nl/onze-projecten/). Since one of the general practitioners of STIELO, who is also a board member of FieldLab Eerstelijnszorg, also works at RUMC, there are close informal contacts between the organizations.

The infrastructure in this system contains the province of Gelderland and health insurers. The province of Gelderland initiated the idea of FieldLab Eerstelijnszorg. They set out the goals and requirements of the organization and provided the subsidy for the start, which is shown by arrow 10 in Figure 4.1. These goals will be explicated later in this report. The province is also the party that needs to be reported to about the progress of achieving the goals. The health insurers are an important party, because they finance the healthcare, shown by arrow 9 in Figure 4.1. Certainly in the primary care, financing is a difficult point, because care providers get paid for the work they carry out. So if an innovation results in less patients to treat, then the care provider also gets paid less. Yet, FieldLab Eerstelijnszorg does not have partnerships with health insurers.

The innovation system of which FieldLab Eerstelijnszorg is part, contains several intermediaries. First there is Oost NL. This is a developmental company that is commissioned by the Dutch Ministry of Economic Affairs and Climate and the provinces of Gelderland and Overijssel and has the goal to strengthen the regional economy (https://oostnl.nl/nl/wie-zijn-we). They want to create as much impact as possible, causing organizations to grow, or to create more jobs, or to launch more products on the market. Oost NL supports organizations by optimizing their business plan. So they provide firms with knowledge, as is shown with arrow 16 in Figure 4.1. It also uses its network to get access

to financial support and validation of the products of organizations. Oost NL, which was then called Oost NV, executed the exploratory research for the FieldLabs in 2013 and was involved in the establishment of the FieldLabs afterwards.

Health Valley is a foundation that was founded by Oost NL. It is an innovation network that strengthens the innovation power of product developers and care providers (https://www.healthvalley.nl/over-ons). As it brings together different actors in the innovation system, it is also an intermediary in the system. Health Valley serves as the front office of the FieldLabs and supports it with activities such as marketing. Besides it organizes meetings with all the coordinators of the FieldLabs.

The third intermediary is REshape, another spin-off organization of RUMC which scouts, invents and shares innovations to improve healthcare (http://radboudreshapecenter.com/about-us/). A member of REshape participates in the workgroup of FieldLab Eerstelijnszorg and the organizations work together on product development. The last intermediaries are the three other FieldLabs (Tweedelijnszorg, Gehandicaptenzorg and Revalidatiezorg) that were established at the same time as FieldLab Eerstelijnszorg.

The system contains a large variety of parties, which all have their own task, but are related to each other. For example, the care providers rely on the products of product developers to provide healthcare (arrow 1 in Figure 4.1). Besides these product developers are supported by intermediaries for the development of these products (arrows 15, 16 and 17 in Figure 4.1). These intermediaries in turn are supported by the infrastructure (arrows 10 and 11 in Figure 4.1), which also supports the care providers financially (arrow 9 in Figure 4.1). It is therefore important that all parties are in close contact with each other and align with each other.

4.2. What are the needs of the actors in the innovation system and what can FieldLab Eerstelijnszorg do to fulfill these needs?

The different actors in the innovation system have different and sometimes conflicting needs. In this subsection, those needs are elaborated. It is also explained what FieldLab Eerstelijnszorg can do to fulfill these needs.

4.2.1. What are the needs of other actors?

The possible needs that were identified in the operationalisation of this study, are all derived from the functions that an innovation system should perform (Bergek et al., 2010). However, it turned out that the actors in the systems identify more and different needs. In the following paragraphs, the needs of specific actors are explicated.

The province of Gelderland

The initial idea for FieldLab Eerstelijnszorg came from the province of Gelderland. The provincial priority program Top sectors and Innovation had the goal to accelerate innovation in healthcare in a sustainable way. By introducing innovations to the market through field labs, the province strives to achieve this goal (Schers, & Hendriks, 2015). The introduction of field labs should also contribute to the activity and employment opportunities in the region. The FieldLabs should focus on the acceleration of the development of prototypes and the testing of prototypes to market ready products by facilitating the interaction between product developers and knowledge institutes that can develop these prototypes and products on the one side and experiences of care providers and

patients on the other (Schers, & Hendriks, 2015). So the main need of the province of Gelderland is to connect different actors in the innovation system so that the launch of new products can be accelerated.

Oost NL

Oost NL did exploratory research (Hoogendijk & Pluimers, 2013) for the province of Gelderland about the possibilities for field labs in the region. In response to this research, Oost NL got the instruction to establish the FieldLabs. Since Oost NL is commissioned by the province of Gelderland, they have the same need as the province, which is the acceleration of the innovation process. Besides that, Oost NL also identifies more specific needs for their clients. The business developers of Oost NL support product developers with the development of their business case. One important issue that they often have to deal with is that the developed product does not fit with the demand. *"And what you often see is that the products that organizations deliver ... are not in line with the desires of the primary care, because there is just no need for it."* (Respondent 1, Oost NL).[1] So according to Oost NL there is need for more alignment between demand and supply. Another issue that Oost NL has to deal with is the acceptance for products that are developed by their clients. *"There is a big problem with acceptance. The healthcare sector is quite traditional, so organizations want to have much evidence that something works. ... It is not only the proof that it works technological, but just do I want it. ... if it is not developed here, why would I use it in a hospital?"* (Respondent 1, Oost NL).[2] So the added value of the product needs to be proven before care providers and patients are willing to use it in the daily practice. This means that there is a need for legitimacy of new products.

Health Valley

For Health Valley also applies that they specify needs for their clients. They would like to see more alignment between supply and demand, according to Respondent 6 (Health Valley). They also recognize that product developers often lack access to the healthcare sector, which leads to products that are not in line with the demand. *"What I do see as the biggest barrier is the entrance to healthcare."*[3] (Respondent 6, Health Valley). They would like to see more market pull instead of technology push. Another issue they identify is that product developers often need launching customers for their product to build a reputation and gain more acceptance before expanding the market.

Product developers

Product developers do not earn money until their product is launched. So for them it is important that the development of the product goes as fast as possible. However, in the current system that is not always the case. Multiple respondents mentioned that product developers seem to have a lack of knowledge about the healthcare sector, as is illustrated in Table 4.1. Besides that, product developers also have difficulties to get in contact with care providers or patients. *"Healthcare is difficult to access for those kind of firms. They can call a doctor, but the chance that they get any*

[1] *"En wat je ziet is dat vaak producten die bedrijven leveren ..., sluit niet aan bij de wensen van de eerstelijnszorg, omdat daar gewoon geen behoefte aan is."*
[2] *"Dr zit een heel groot acceptatie probleem. De zorg is best wel traditioneel, dus bedrijven hebben wel heel veel behoefte aan meer bewijs dat iets werkt. ... Het is niet alleen het bewijs dat het technologisch werkt, maar wil ik het ook gewoon. ... als het hier niet ontwikkeld is waarom zou ik het dan een ziekenhuis gebruiken? "*
[3] *"Wat ik wel signaleer als grootste barrière is die toegang tot die zorg."*

response is very low."[4] (Respondent 7, MedValue). This makes that products under development often do not fit in the current operations of healthcare. *"You have to start with the problem, so you have to know what the problem of healthcare is and then see if you can solve it. And that step is often taken too late."*[5] (Respondent 7, MedValue). When a product does not fit in the market, it needs to be altered, which takes extra time. So the respondents agree that it is important for product developers to get in contact with care providers and patients to get more information about their needs and desires and the healthcare sector in general. Then products can be developed that fit in the market.

"What often lacks is knowledge about a specific sub-area of healthcare."[6] *(Respondent 8,* STIELO*)*
"I think that people often are too far with the development, while they have no idea of the reality of primary care for example."[7] (Respondent 4, General practitioner)
"But they have little understanding of the context in which it will be used. So they badly know healthcare."[8] (Respondent 7, MedValue)
"The young start-ups sometimes have very naive images of how healthcare works. ... And they sometimes make the wrong choices, they bet on the wrong horse"[9] (Respondent 10, Other FieldLab)

Table 4.1 Lack of knowledge about healthcare sector

A subsequent need of product developers is evidence that their product works in the daily practice and that it has added value. Potential users of new products do not know what the benefits of the product can be and this makes them resistant to buy the product. *"Because we actually offer a new opportunity, at the moment there is still little knowledge about it on the work floor, so why would we use it?"*[10] (Respondent 11, product developer). Evidence of the product can help overcome this resistance. By proving the added value of a product, product developers also hope to gain acceptance for that product and create a market for it.

Besides that, product developers often have a lack of knowledge about how the product can be tested in a proper way. *"They have no idea about how to design such a pilot, they have no idea about where they have to be, who they need for it. And what you also often see is that they do a test that afterwards has no value."*[11] (Respondent 7, MedValue). So product developers also have a need for support with testing their product.

It would also be appreciated if the product developers get some support with practical issues around this test. *"It is very nice if there is substantive project management. People who for example organize meetings, who make notes, who plan follow-up meetings."*[12] (Respondent 11, Product developer). So

[4] *"De zorg is ook moeilijk toegankelijk voor dat soort bedrijven. Ze kunnen wel een arts bellen, maar de kans dat ze daar respons op krijgen is gewoon heel laag."*
[5] *"Je moet bij het probleem beginnen dus je moet, je moet weten wat het probleem is in de zorg en dan kijken of je dat op kan lossen. En die stap wordt te laat gemaakt vaak."*
[6] *"Wat vaak ook ontbreekt is kennis van het specifieke deelterrein van de zorg."*
[7] *"Ik vind dat mensen vaak veel te ver zijn in de ontwikkeling, terwijl ze geen idee hebben van de werkelijkheid van de eerstelijn bijvoorbeeld."*
[8] *"Maar ze hebben heel erg weinig verstand van de context waarin het gebruikt gaat worden. Dus ze kennen de zorg slecht."*
[9] *"De jonge start ups die hebben soms hele naïeve beelden bij hoe gezondheidszorg werkt. ... En die maken soms de verkeerde keuzes, die gokken op het verkeerde paard."*
[10] *"Omdat wij eigenlijk nieuwe mogelijkheden bieden is er op dit moment nog heel weinig kennis op de werkvloer over, waarom zouden we hem dan gaan gebruiken."*
[11] *"Ze hebben geen idee over hoe je zo'n pilot opzet, ze hebben geen idee waar ze zouden moeten zijn, wie ze daar voor nodig hebben. En wat je dan ook vaak ziet dat ze een test gaan doen die achteraf geen waarde heeft."*
[12] *"Heel erg fijn is, is als daar inhoudelijke projectbegeleiding is. Mensen die bijvoorbeeld de vergaderingen organiseren, die de notities maken, die de vervolgafspraken maken."*

product developers have a big need for knowledge, specifically in the field of the market, in the field of the innovation process and in the field of a specific product. This is not surprising, as Nonaka (1994) already stated that innovation is a process of knowledge creation to solve problems defined by the product developer. Nonaka (1994) also states that knowledge can be created at an interorganizational level. So it is not peculiar that product developers need some support of other organizations to fill a knowledge gap.

The last need of product developers is financial resources. As was already mentioned, they do make a profit before they launch their product. Meanwhile they need money to develop the product. They have to get new funds for every step they take in the developmental process, which takes them extra time to actually take the step. *"That trajectory of taking a step and redo financing every time again. Then you also see that you deviate from the red threat. So you make little weird jumps to eventually get where we are now."*[13] (Respondent 11, Product developer). Therefore product developers could use some financial support during the whole process.

MedValue

MedValue is a service party for product developers, they provide product developers with insight in the added value of the developed product. So the need MedValue is comparable to those of the product developers. According to Respondent 7 (MedValue), they need information about the healthcare sector and the needs and desires of the care providers and patients to determine the added value of a product.

REshape

One respondent mentioned that REshape approached FieldLab Eerstelijnszorg to cooperate for the development of a specific product. That is why it is expected that REshape has the same needs as product developers. However, the organization was not included in the data collection, so this is not further specified.

STIELO

When FieldLab Eerstelijnszorg was founded, the care providers of Thermion and STIELO did not have a specific need that needed to be fulfilled, according to Respondents 4 (General practitioner) and 8 (STIELO). However, the concerned care providers and board members had the ambition to be a precursor in primary care and to look for innovative and effective opportunities to improve healthcare, because they see the need for it. *"Innovation is of interest for healthcare. Later on we surely have to do more work with less people."*[14] (Respondent 4, general practitioner). The respondents have a broad understanding of improvement in healthcare. It can mean lower costs, smarter ways of organizing, reducing the workload or improving the quality of care. *"Because the professional has a demanding job and it will only get more demanding. And if there are things that can help citizens to bear more self-responsibility and to easily facilitate this, or that the care provider gets unburdened, of course those are interesting things in this situation."*[15] (Respondent 8, STIELO). Though, this need for innovation is not necessarily felt by all care providers, because they are already

[13] *"Dat traject van elke keer weer een stapje zetten en opnieuw financiering doen. Dan zie je ook dat je afwijkt van de rode draad. Dus je maakt een beetje rare sprongen om uiteindelijk te komen waar we dan nu zijn."*
[14] *"Innoveren is wel van belang voor de zorg. We moeten straks toch met minder mensen weer meer werk doen."*
[15] *"Want de professional die is altijd druk, krijgt het alleen nog maar drukker. En als er dan zaken zijn die of burger kunnen helpen om meer zelf verantwoordelijkheid te kunnen dragen en om makkelijk gefaciliteerd te worden, of de zorgaanbieder wordt ontlast, ja dat zijn natuurlijk wel hele interessante dingen in deze tijd."*

busy with their daily job. *"Of course, that is quite complicated for them, you do not have capacity for it, it all ... has to go in between … the primary process."*[16] (Respondent 9, other FieldLab). So care providers are also too busy to think about innovation. Next to that, they often do not know what the benefits of innovations could be for them, as was also recognized by product developers. So the needs that can be identified for care providers are improvement of care and knowledge about opportunities of innovation.

Health insurers

Health insurers also did not take part in this research, but respondents of other actors in the system mentioned that health insurers only want to invest in a product if it has proven to add value. However, the case for FieldLab Eerstelijnszorg is to prove this value. *"And then you get a difficult situation. Because health insurers say 'actually I want to know if it will gain me something', while the entrepreneur says ' but the trial was just meant to determine this'."*[17] (Respondent 5, FieldLab Eerstelijnszorg). Derived from this, it is expected that health insurers have the need for improvement of healthcare. Especially a need for reduction of costs, since they pay for healthcare. Some of the biggest health insurers in the Netherlands identify that innovation can help reduce the costs of healthcare and that is why they support initiatives for innovation (https://www.achmea.nl/zorgparticipaties/paginas/default.aspx, https://versterkingeerstelijn.nl/algemeen-zn/over-ons and https://www.menzis.nl/over-menzis/zorginnovatie). So this contradicts the expectation of the respondents that health insurers are not willing to pay for innovation.

HAN

According to Respondents 2 (HAN) and 5 (FieldLab Eerstelijnszorg), HAN has the need to gather information about best practices to test products, about the adaptation of products and about the innovation process in general. They want to use this information for educational purposes and in the research that they execute. Also, they would like to give their students an opportunity to bring their knowledge in practice.

The needs of the actors in the system are sometimes overlapping. Taken all together, it can be concluded that the needs in the system are the need for knowledge about the healthcare sector, the need for access to the healthcare sector, the need for knowledge about the innovation process, the need for knowledge about a specific product, the need for acceptance of a product, the need for customers, the need for financial resources, the need for a coordinating party, the need for alignment of demand and supply and the need for improvement of healthcare. Most of these needs come from the supply side of new products. So it seems logical that FieldLab Eerstelijnszorg was established to support this supply side. In the following section it is explained what FieldLab Eerstelijnszorg can specifically do to provide in these needs.

4.2.2. How can FieldLab Eerstelijnszorg fulfill the needs of other actors?

Knowledge about healthcare

A common problem of product developers is a lack of knowledge about the healthcare sector. The parties agree that FieldLab Eerstelijnszorg can provide these product developers with information

[16] *"Dat is natuurlijk best ingewikkeld, je hebt daar geen capaciteit voor, het moet allemaal ... tussendoor hè, tussen het primaire proces door."*
[17] *"En dan krijg je een beetje een moeilijke situatie. Want daarin zegt de zorgverzekeraar van 'ja eigenlijk wil ik al weten of het mij wat gaat opleveren' terwijl de ondernemer zegt 'ja maar de proef was nou net bedoeld om dat vast te stellen'."*

about the structure and processes of the healthcare, but also about how often certain diseases occur and how often certain treatments are executed. This is already done sometimes. FieldLab Eerstelijnszorg can provide this information itself, but it can also bring product developers in contact with care providers so that these can exchange their knowledge. After all, FieldLab Eerstelijnszorg is an intermediary and one of the characteristics of an intermediary is to facilitate knowledge transfer (Lin & Wei, 2018), so it seems logical that it brings different parties in contact to do this. In both cases FieldLab Eerstelijnszorg occupies in the exchange of knowledge. In the first situation it transfers the knowledge itself, in the second situation it creates the possibility for knowledge transfer. Combination of knowledge is also a way to create new knowledge (Nonaka, 1994). In either case, FieldLab Eerstelijnszorg contributes to knowledge development and diffusion (Bergek et al., 2010). By providing requisite knowledge, FieldLab Eerstelijnszorg helps to solve problems, of which innovation is a concatenation (Nonaka, 1994).

Access to healthcare sector

Subsequently another need that FieldLab Eerstelijnszorg fulfills is for product developers to get in contact with care providers, since product developers have difficulties with this. *"A care provider is educated to help patients and not for helping product developers. So those product developers seek entrance to healthcare, but you often end up with a few enthusiastic care professionals who all have to do that next to their job. That makes it difficult."*[18] (Respondent 6, Health Valley). For product developers, FieldLab Eerstelijnszorg can be an easy way to acquire access to the healthcare sector. Since the board of FieldLab Eerstelijnszorg consists of care providers and it has a partnership with a care group, they already have this access. So when FieldLab Eerstelijnszorg is approached by a product developer, they can directly involve the most suitable care providers. This makes it a lot easier for product developers to get their product in the picture of potential users. There is not one specific function in the system (Bergek et al., 2010) to which this activity contributes. However, it can be argued that FieldLab Eerstelijnszorg brings together different actors to facilitate the execution of other functions, such as knowledge development and diffusion. So in this way it strengthens the other functions and then it is a way of developing positive externalities (Bergek et al., 2010).

Knowledge about a specific product

Thus, FieldLab Eerstelijnszorg can bring together parties of supply and demand. This entails that a product developer (or a service party such as MedValue, on behalf of the product developer) approaches FieldLab Eerstelijnszorg with a product under development to let this product be reviewed and tested by potential users, which can be care providers or patients. *"To gain knowledge about the new product and to come to a consensus that the new treatment is more effective. And indeed has advantages compared to the old treatment."*[19] (Respondent 11, Product developer). In the earlier phases of the development, FieldLab Eerstelijnszorg can gauge the opinion of patients or care providers about the idea of the product or a simulated prototype of it (Cooper, 2014). *"Yes you could explore if 'it could be something' and then we as a professional can say 'well, it seems nice to us, but then you have to develop it a bit further before we can really do something with it', it can also be the*

[18] *"Een zorgverlener is opgeleid om patiënten te helpen en niet om ondernemers te helpen. Dus die ondernemers die zoeken toegang tot die zorg, maar je komt vaak terecht bij een paar enthousiaste zorgmedewerkers die dat allemaal nog een beetje erbij moeten doen. En dat maakt het lastig."*

[19] *"Kennis opdoen met het nieuwe product en eigenlijk tot een consensus komen dat de nieuwe behandeling efficiënter is. En inderdaad voordelen heeft ten opzicht van oude behandeling."*

case that we say 'well, that wheel is invented ten times already, do not do it'."[20] (Respondent 8, STIELO). This has also occurred already.

In a later phase, when the product is constructed, FieldLab Eerstelijnszorg mobilizes users to cooperate in the design of the product and test a prototype. Most of the time, the product developers can do the building of the product themselves. *"Participating on or building a prototype, a company can arrange that itself."*[21] (Respondent 7, MedValue). This is in accordance with the typology of Ballon et al. (2005) that a living lab focuses a bit more on the design of the product than on the technical side of it. So it is logical that FieldLab Eerstelijnszorg focuses more on how the product looks and if it works in a convenient way, because this is the part that has to do with the needs and desires of the users.

When the product is constructed, FieldLab Eerstelijnszorg assesses whether the product can be embedded in the daily practice of healthcare. *"What the FieldLab can mean, ... is really test products, to test if they can be implemented in those care processes. And that means that, a part of the implementation is that those products fit with the operations of the care providers or to the patients."*[22] (Respondent 2, HAN). The way in which FieldLab Eerstelijnszorg does that is by setting up a trial period in which the care providers or patients use the product in daily practice and then give feedback. This is also in line with the characteristic of a living lab, that products are tested in a real-life setting (Ballon et al., 2005). The feedback of these potential users in turn can be used to alter the product. This shows that the innovation process is iterative instead of linear.

So FieldLab Eerstelijnszorg can and does provide information about a specific product in multiple ways, in Figure 4.1 this knowledge exchange is show by arrow 16. In this way FieldLab Eerstelijnszorg fulfills the need of product developers, by fulfilling the function of knowledge development and diffusion (Bergek et al., 2010). Besides, it is also a contribution to the diminishing of risk and uncertainty (Bergek et al., 2010) for the product developer, because in this way it can be determined whether the product fits the needs and desires of users and whether there is a possibility to market it or that it should be altered before. This diminishes the risk of launching the product. At this point the functions in the innovation system cannot clearly be distinguished from each other, there is some overlap.

The support of processes of learning and experimenting is also a typical function of an intermediary according of Van Lente et al. (2003). So it seems logical that FieldLab Eerstelijnszorg provides an opportunity to experiment with products.

Legitimacy of the product

The involvement of users in the developmental process also contributes acceptance of users for a specific product, which is another need of product developers. Some of the respondents see this acceptance as an important factor that determines whether the product will be sold. *"One of the most important determinations whether a technology can be used in the healthcare organizations or*

[20] *"Ja je zou kunnen verkennen van 'zou het iets kunnen zijn' en dan kunnen wij als professional zeggen van 'nou, het lijkt ons wel aardig, maar dan zul je iets verder moeten zijn voordat we er echt iets concreet mee kunnen', het kan ook zijn dat we zeggen 'joh, dat wiel is al tien keer uitgevonden, doe maar niet'."*

[21] *"Het meewerken aan een prototype of het bouwen, dat krijgt een bedrijf meestal wel zelf voor elkaar."*

[22] *"Ja wat het Fieldlab kan betekenen, ... om te testen of die kunnen worden geïmplementeerd in de zorgprocessen. En dat betekent dus ook, een onderdeel van die implementatie is dat die producten voldoende aansluiten bij de werkmethode van zorgprofessionals of van patiënten."*

not, is in the perception what the future or potential user has, whether they can gain something with it or not."[23] (Respondent 5, FieldLab Eerstelijnszorg). Because the potential users are involved in the development, they get more insight in how the product works and what the added value can be. *"I think that by testing that technology in healthcare organizations and with your clients, thereby the technology can prove its added value. Or the technology can be adapted if necessary, because tests prove that. And in that way you contribute to the social acceptance."*[24] (Respondent 2, HAN). This acceptance leads to less resistance for a product when it is launched. *"If the implementation can prove that the technology has an added value, only then they are willing to buy it."*[25] (Respondent 2, HAN). So by gaining acceptance for a product, FieldLab Eerstelijnszorg performs the function legitimation (Bergek et al., 2010). Besides, if a product is seen as legitimate by potential users, this also reduces the risk of launching the product. So this is also a form of managing risk and uncertainty (Bergek et al., 2010). This also shows that the functions in the system, in practice cannot always be as clearly distinguished as the theory suggests.

The reputation of FieldLab Eerstelijnszorg itself can also contribute to acceptance of the product by potential users that were not involved in the review of the product. When FieldLab Eerstelijnszorg has a reputation that it is trustworthy, then people also might accept new products sooner if FieldLab Eerstelijnszorg has proven the added value. However, multiple respondents mentioned that they question whether FieldLab Eerstelijnszorg is well known. The workgroup of FieldLab Eerstelijnszorg indicated that they are aware of this problem and that they are working on it, but it might need some more effort.

Creating a market

The acceptance of a product by potential users also contributes to the creation of a market. If a product proves its added value, then the potential users might want to purchase it. *"But yes, those who are willing to participate, [you] may hope that they do that because they want to use that product themselves."*[26] (Respondent 11, Product developer). In this case, they can serve as launching customers. Then the product developer can use them to build a reputation for the product and eventually expand the market. So in this way the functions legitimation and market formation (Bergek et al., 2010) are closely connected and overlapping.

Provide a marketing tool

FieldLab Eerstelijnszorg can also contribute to market formation (Bergek et al., 2010) because the review that it provides can serve as proof of the product. That in turn can be used as a marketing tool by the product developers, especially when FieldLab Eerstelijnszorg builds up a good image. The evaluation report (Büchner, 2017) and the experiences of one of the respondents show that this already has occurred. However, some of the respondents notice that FieldLab Eerstelijnszorg should be careful that they do not advertise for a specific product themselves. *"Selling of such a product or advertising for such a product is actually, I think that the supplier should do that, that is not what the*

[23] *"Eén van de belangrijkste determinanten of een technologie in de zorg gebruikt wordt of niet, dat zit hem in de perceptie die de toekomstige of potentiële gebruiker heeft, van gaat dit mij iets opleveren of niet."*
[24] *"Ik denk dat je door het testen van die technologie in de zorginstellingen en met je cliënten, daardoor kan die technologie zijn meerwaarde bewijzen. Of de technologie kan worden aangepast, omdat de testen dat uitwijzen, dat dat nodig is. En daarmee werk je wel aan de sociale acceptatie."*
[25] *"Als in die implementatie bewezen kan worden dat die technologie een meerwaarde heeft, pas dan zijn ze bereidwillig om het te kopen."*
[26] *"Maar ja degene die deelnemen, [je] mag hopen dat ze dat doen omdat ze zelf ook daarna het product willen blijven gebruiken."*

FieldLab should do."[27] (Respondent 2, HAN). *"They have to stay independent. So ... they cannot do product marketing."*[28] (Respondent 11, product developer).

Knowledge about the innovation process

Another lack of knowledge of product developers is about the review of their products by users. They do not always know how to tackle this review. FieldLab Eerstelijnszorg can support product developers with this by providing them the required information, which is also show by arrow 16 in Figure 4.1. *"There are a lot of companies that are internally not so good in carrying out research and a lot of healthcare organizations neither. So it is also an assurance of the quality of tests and the research that is done."*[29] (Respondent 3, other FieldLab). FieldLab Eerstelijnszorg can provide this information themselves, but they can also bring product developers in contact with knowledge institutes, in this case HAN, since they have a partnership, to exchange this knowledge. Actually this is the same situation as with the knowledge about the healthcare sector, so, as was explained before, in this way the FieldLab contributes to knowledge development and diffusion (Bergek et al., 2010).

FieldLab Eerstelijnszorg can also contribute to the function of entrepreneurial experimentation and management of uncertainty and risk (Bergek et al., 2010) by carrying out the test with the product. In practice they cooperate with HAN to do this. HAN lets students participate in these tests to gain practical knowledge. In this way HAN can also get more knowledge about the innovation process, which respondent 2 (HAN) indicates as a need. They can also use this knowledge for following reviews in which they participate.

Knowledge exchange with other FieldLabs

In the field of knowledge about innovation, knowledge can also be diffused in another way. FieldLab Eerstelijnszorg can also exchange knowledge about innovations with the other FieldLabs it was established with. Since these act in the same system as FieldLab Eerstelijnszorg and they work on the same process, they have to deal with the same or comparable actors and encounter comparable problems. *"But the systematic of how to do that in a field lab environment, how can you make yourself validable, how can you make yourself indispensible and how do you construct the process and the front desk, how do you plan the coordination at the back, how do you start the conversation with the stakeholders, at these point FieldLabs could learn a lot from each other."*[30] (Respondent 4, General practitioner). At the moment, the coordinators of the FieldLabs come together once in a while, but they do not exchange much knowledge about innovation. *"In the recent years, we came together regularly. Whereby the focus was too little on knowledge exchange and too much on the business model and how to maintain the organization."*[31] (Respondent 6, Health Valley).

Respondent 1 (Oost NL) suggested that the FieldLabs can also exchange knowledge about products they develop, because these products might also be of value in other areas of healthcare. In both of

---

[27] *"Het verkopen van zo'n product of het reclame maken voor zo'n product is wel echt, denk ik dat de leverancier moet doen, dat moet het Fieldlab niet gaan doen."*
[28] *"Zij moeten onafhankelijk blijven. Dus ... zij kunnen geen productmarketing doen."*
[29] *"Er zijn heel veel bedrijven die nu helemaal niet goed zijn intern in het uitvoeren van onderzoek en heel veel zorgorganisaties ook. Dus het is ook een stukje kwaliteitsborging van het testen en het onderzoek dat gedaan wordt."*
[30] *"Maar de systematiek van hoe doe je dat in een proeftuinomgeving, hoe kun je jezelf valideerbaar maken, hoe kan je jezelf onmisbaar maken eigenlijk en hoe richt je het proces in en hoe richt je het loket in, hoe richt je de coördinatie aan de achterkant in, hoe ga je in gesprek met stakeholders, daar konden die Fieldlabs natuurlijk veel van elkaar leren."*
[31] *"Ja we hebben regelmatig afgelopen jaren rond de tafel gezeten. Waarbij de nadruk te weinig lag op kennisuitwisseling en te veel op wat is het business model en hoe houden we dit in stand."*

these cases, FieldLab Eerstelijnszorg contributes to the function knowledge development and diffusion (Bergek et al., 2010).

Practical support

Product developers can also use some support with the practical things around the review of a product, for example the planning of meetings, according to Respondent 11 (Product developer). Since FieldLab Eerstelijnszorg already is in contact with care providers, it is easier for them to make such arrangements. On the other side, it is not desirable to put this in the hands of care providers, because their workload is already very high. *"[The general practitioner] must not direct, coordinate and make project agreements, no that should really, there he should be fully helped with. ... He should be unburdened from all the hassles around it, because that is not what the general practitioner is for. They are also too scarce for this."*[32] (Respondent 9, other FieldLab). It can be said that manpower is needed for this practical support. So by providing this support, FieldLab Eerstelijnszorg delivers human resources. These human resources are needed for innovation to take place, so in this way FieldLab Eerstelijnszorg contributes to the mobilization of resources (Bergek et al., 2010).

Financial resources

FieldLab Eerstelijnszorg can contribute to resource mobilization (Bergek et al., 2010) in another way too. Most product developers have the biggest need for financial resources. *"The main question that product developers often have, what they do not directly tell, is 'we need money to develop the product'."*[33] (Respondent 1, Oost NL). As the product developer does not earn any profit from the product under development, he needs to find another way to finance the development. This is often solved by getting subsidy or vouchers. However, these are only for a specific part of the development. So the product developer needs to find new resources for every step that needs to be taken. FieldLab Eerstelijnszorg seems not the suited party to alter this system, since there are already other parties that are specialized in financing. What FieldLab Eerstelijnszorg can do is refer the product developers to other parties that can help them with finances. *"So if the FieldLab manages to get subsidy schemes for the parties who would like to cooperate … Yes, that would help a lot in my opinion."*[34] (Respondent 7, MedValue). It seems the most logic that FieldLab Eerstelijnszorg refers product developers to Oost NL, since this organization has the goal to support product developers with financing innovation. So if FieldLab Eerstelijnszorg also gets involved in this, double work will be done. FieldLab Eerstelijnszorg can attempt to make an arrangement with Oost NL that if a product developer wants a review of their product, that Oost NL makes sure that this is financed. *"We as Oost NL help the product developers to gain funding somewhere to help them further develop their product. I would not do it double. I would make good agreements with the people who already do those things."*[35] (Respondent 1, Oost NL). In this way FieldLab Eerstelijnszorg does not mobilize the resources itself, but it does contribute to it.

---

[32] *"[De huisarts] die moet niet regisseren, coördineren en projectafspraken maken, nee dat zou echt, daar zou die volledig mee geholpen moeten worden. In het initiëren, in het idee fase, de ontwerpfase en de realisatiefase. Die moet eigenlijk ontlast worden in alle rompslomp er omheen, want daar is een huisarts niet voor. Daar is die ook te schaars voor."*

[33] *"De grootste vraag die ondernemers vaak hebben, wat ze niet meteen zeggen, is we hebben geld nodig om te ontwikkelen."*

[34] *"Dus als het Fieldlab het voor elkaar krijgt om subsidieregelingen voor de partijen die graag willen samenwerken, voor elkaar kunnen krijgen. Ja dat zou volgens mij heel erg helpen."*

[35] *"Wij als Oost NL helpen ondernemers om ergens financieringen vandaan te halen om hun product verder te ontwikkelen. Ik zou het niet dubbel gaan doen. Ik zou goede afspraken maken met de mensen die al dingen doen."*

Market pull

Until now, the contribution of FieldLab Eerstelijnszorg to the system is only discussed in the case that product developers approach FieldLab Eerstelijnszorg with a product they are developing. So this is all about technology push. However, as is shown in Table 4.2, multiple respondents suggested that the demand of users should be the starting point, which is called market pull. Some of the respondents suggested that FieldLab Eerstelijnszorg can communicate the needs and desires of care providers and patients to product developers so that these can come up with new ideas for products. A disadvantage of this method is that it often takes a lot of time to develop a product. So if the product developer only has an idea and still has to develop the product, it takes a lot of time before the desire is granted. However, in this way supply and demand can be more aligned, which is needed according to most of the respondents. The alignment of demand and supply is also a typical function of an intermediary (Van Lente et al., 2003).

Besides, another function of an intermediary is to articulate needs and options (Van Lente et al., 2003), so FieldLab Eerstelijnszorg is the eminent party to do this. In this way FieldLab Eerstelijnszorg also influences the direction of search and identification of opportunities (Bergek et al., 2010). By communicating specific needs and desires of care providers and patients, they create concrete handles for product developers to work with. Besides, this is also a contribution to knowledge development and diffusion (Bergek et al., 2010), as FieldLab Eerstelijnszorg provides product developers with information about the customer. This again shows that there is overlap between the different functions of the system.

If FieldLab Eerstelijnszorg chooses to proactively do research about the desires of care providers and patients, which is explained later, it searches for information to fill a knowledge gap. In this way they contribute to the function of knowledge development and diffusion (Bergek et al., 2010).

"Often it is useful that there is a problem that asks for a solution and not that there are solutions and then start looking for a problem. Because generally we do not need that."[36] (Respondent 8, STIELO)
"Yes I think that there is still too much technology push in general. … So they begin with the solution and create the solution and then they think of it 'ok, which problem can I best solve with this?' And according to me that is by definition the wrong way around."[37] (Respondent 7, MedValue)
"But what works the best is simply when the urgency and the bottleneck are experienced by the healthcare sector itself and they come forward with that, yes then you just have a lot more traction to make a step. Because then the care providers really want a company that helps them. So that is better for the company itself."[38] (Respondent 9, other FieldLab)
"And a lot of questions from healthcare are not by definition answered by innovations from the business, because they do not know what the question is."[39] (Respondent 4, General practitioner)
"The other side is that the care providers themselves also have some fresh ideas, where … a

[36] *"Vaak is het handig als er een probleem is wat om een oplossing vraagt en niet dat er oplossingen komen die een probleem gaan zoeken. Want daar zitten we niet op te wachten over het algemeen."*
[37] *"Ja ik denk dat het in algemeen dat er nog te veel technology push is. … Dus ze beginnen bij de oplossing en dan hebben ze de oplossing gemaakt en dan denken ze van 'oké, welk probleem kan ik daar nou het beste mee oplossen?'. En volgens mij is dat per definitie verkeerd om."*
[38] *"Maar wat het meeste werkt is gewoon als de urgentie en het knelpunt vanuit de zorg zelf wordt ervaren en ze komen daar mee naar voren, ja dan heb je gewoon veel meer tractie om een stap te maken. Want dan willen de zorgverleners ook echt dat er een bedrijf komt die hen helpt. Dus dat is voor het bedrijf beter."*
[39] *"En dat veel vragen vanuit de zorg niet per definitie worden beantwoord door innovaties vanuit het bedrijfsleven, omdat ze niet weten wat de vraag is."*

technology or possible designing technology is sought."[40] (Respondent 2, HAN)
"But I think it is better if it really fits with an intrinsic need from those care providers themselves and that is why it is so important to have that question clear, because then you really support them with their primary need to better help patients."[41] (Respondent 6, Health Valley)

Table 4.2 The need for market pull

Research about needs and desires

To enable the communication of the needs and desires of care providers and patients to the market, which is represented by arrow 16 in Figure 4.1, it should first be clear what these needs and desires exactly are. The care providers indicate that they have a need for improvement of healthcare. However, this is very broad, so this should be more specified. With the establishment of FieldLab Eerstelijnszorg, the board formulated three themes on which they wanted to focus. These are the prevention of illness, the bundling of care for multiple illnesses and the digitalization of healthcare. FieldLab Eerstelijnszorg also tried to involve the care providers in the consideration of their specific needs and desires for products, at the beginning, and also an innovation agenda was composed. However, it turned out to be difficult for care providers to think about specific innovations. *"[For] most people it is very difficult to think innovational.. or at least to place themselves out of their daily work and to get loose from it to think about what is really needed, This requires a kind of freedom of thought that not everyone necessarily has or likes to apply."*[42] (Respondent 4, General practitioner). So most care providers lack creativity to think about innovation. However, this creativity is needed for innovation. Since creativity produces the novel and useful ideas that are turned into new products and processes by innovation (Sarooghi, Libaers & Burkemper, 2015). Next to that, care providers often also do not have time to think about innovation. *"Plus another thing is that many professionals in the healthcare sector are just so busy with surviving, with running their practice, that there is also no room to think, to take some distance and to think about processes and how it can be different."*[43] (Respondent 8, STIELO). As it is difficult for most care providers to explicate their needs and desires, FieldLab Eerstelijnszorg can support them with this, this is represented by arrow 6 in Figure 4.1. *"So the FieldLab has to give some indication of where there is need for something."*[44] (Respondent 8, STIELO). The first step for this is already taken by the use of patient journeys. With patient journeys the pathway a patient takes through healthcare is mapped (Trebble, Hansi, Hydes, Smith, & Baker, 2010). This map shows at which points healthcare is ineffective and unnecessary. At these points the pathway can be altered to make healthcare more effective and efficient (Trebble et al., 2010). This method also helps to focus more on activities that are valued by the patient.

Another tool that FieldLab Eerstelijnszorg could use, to study the needs and desires of care providers, is technology roadmapping. A roadmap provides a structured framework about where the organization stands at the moment, where the organization wants to go to and how it can get there

[40] *"De andere kant is dat de zorgprofessionals zelf ook nog wel eens frisse ideeën hebben, waar dan als het ware een technologie of mogelijk te ontwerpen technologie bijgezocht wordt."*
[41] *"Maar ik zou het mooier vinden als het echt aansluit bij een intrinsieke behoefte vanuit die zorgverleners zelf en daarom is het zo belangrijk om die vraag helder te hebben, want dan ondersteun je ze echt met hun primaire behoefte om patiënten beter te helpen."*
[42] *"[Voor] de meeste mensen is het toch heel lastig om innovatief .. te denken of in ieder geval zich een stukje te verplaatsen uit hun dagelijkse werk en daar uit los te komen om te denken 'oh ja, waar is nou echt iets nodig?'. Daar is een soort vrijheid van denken voor nodig die niet iedereen per definitie heeft of graag toepast."*
[43] *"Plus een ander iets is dat heel veel professionals in de zorg gewoon zo druk zijn met overleven, met hun praktijk draaiende houden, dat er ook geen denkruimte is om wat afstand te nemen en eens over processen na te denken hoe het ook anders kan."*
[44] *"Dus het Fieldlab moet ook wel een beetje aangeven van waar behoefte aan is."*

(Phaal & Muller, 2009). However, to create such a roadmap with care providers, they need to be challenged to look ahead at the future, which turned out to be difficult for them sometimes. However, a technology roadmap can help overcome the problem that it takes a lot of time to develop products in response to a specific need. Since the roadmap shows the future requirements, in the extent to which that is possible, care providers and product developers can anticipate on that and start developing products in time.

In these ways FieldLab Eerstelijnszorg supports care providers and patients by making explicit what their needs are for possible innovations. With this FieldLab Eerstelijnszorg fills a knowledge gap and thus supports knowledge development and diffusion (Bergek et al., 2010). If the needs and desires of care providers and patients are more clear, it is also easier for FieldLab Eerstelijnszorg to communicate these to product developers.

Compensation for time investment

As was said before, most of the needs are associated with the product developers. However, the users have to make an effort to fulfill these needs. The care providers state that they want something in return for what they invest in the assessment of products. After all, the time that care providers invest in projects of FieldLab Eerstelijnszorg, costs them money because of the revenue model of the primary care. As was also explained before, the care providers only get paid for the time that they spend on treating patients. All the time they invest in innovation, they cannot spend on treating patients, which leads to less income. *"There are a few general practitioners involved in the FieldLab … and everything they invest in the FieldLab, they get less in salary."*[45] (Respondent 10, other FieldLab). *"And there often is no compensation for that. So then why would they cooperate?"*[46] (Respondent 6, Health Valley). However, the compensation for care providers does not necessarily need to be a financial compensation. It can also be in the form of an improvement of healthcare. *"If you as a care professional put time into something, then it is nice that you receive a kind of appreciation for that. And the question is if that should be money."*[47] (Respondent 8, STIELO).

Motivating care providers for innovation in general

Involving care providers in the innovation process, cannot only lead to acceptance of specific products, it can also create more motivation for innovation in general. *"Perhaps most importantly, ... is how to get the care professionals to get along. That they know what is going on, that they get excited, that they join, that they have commitment. And of course communication and information plays a very important role in that."*[48] (Respondent 4, General practitioner). Because the care providers are involved in the process, they also get to know more about what is going on in the field and how they can benefit from this. So they can get more information about the options that innovation offers. This can make that they are more open to the idea of innovation in general and are willing to make some effort for it. Van Lente et al. (2003) state that it is the function of an intermediary to articulate needs and options. So in line with this you can say that a function of

[45] *"In het Fieldlab zitten een paar huisartsen en die bij wijze van spreken, alles wat ze in het Fieldlab stoppen hebben ze minder salaris."*
[46] *"En er zit vaak ook geen vergoeding tegenover. Dus waarom zouden ze dan ook meewerken?"*
[47] *"Als je als zorgprofessional ergens tijd in steekt, dan is echt in ieder geval prettig dat je daar ook een bepaalde vorm van waardering voor krijgt. En de vraag is of dat altijd geld moet zijn."*
[48] *"Misschien het aller belangrijkst wel, ... is hoe die professionals voldoende meekrijgen in het geheel. Dat ze weten wat er speelt, dat ze enthousiast worden, dat ze aanhaken, dat ze commitment hebben. En daar speelt communicatie en informatie natuurlijk een heel belangrijke rol."*

FieldLab Eerstelijnszorg can be to inform care providers about the options that innovation has to offer.

Also, by motivating care providers to participate in the innovation process, FieldLab Eerstelijnszorg involves new actors to strengthen the functions of the system. So in this way it develops positive externalities (Bergek et al., 2010)

So FieldLab Eerstelijnszorg can fulfill the needs of the actors in multiple ways. First it can facilitate knowledge creation and exchange about the healthcare sector, about a specific product and about the innovation process in general. It can also give access to the healthcare sector and market and help gain legitimacy and a market for a product. Next to that, FieldLab Eerstelijnszorg can support the innovation process with providing human resources and with access to financial resources. Lastly, FieldLab Eerstelijnszorg can support the demand side by formulating specific needs and create motivation for participation in innovation. Though these are all possible functions for FieldLab Eerstelijnszorg, there are some logical combinations that can be distinguished. These are explained later in this chapter in section 444.4. First it is explained what the contribution of FieldLab Eerstelijnszorg can be during the different stages of the innovation process.

4.3. What can FieldLab Eerstelijnszorg contribute during the different stages of the innovation process?

Most of the respondents do not distinguish the stages of the innovation process in the way the stage-gate model (Cooper, 1990) does. The respondents use the stages of idea formulation, development of the concept, testing of the product and launch on the market. Although the respondents did not explicitly recognize the different stages of the stage-gate model (Cooper, 1990), the observations can still be mapped to the different stages of this model, because the activities of FieldLab Eerstelijnszorg that respondents mentioned could be linked to these stages.

According to Ballon et al. (2005) a living lab usually focuses on innovations that are medium mature, so it seems obvious that FieldLab Eerstelijnszorg can have a contribution to the stages of building the business case and the development of the product from the stage-gate model (Cooper, 1990). However, in the application for the subsidy (Schers & Hendriks, 2015) it is stated that FieldLab Eerstelijnszorg will focus on innovations that are almost market-ready, so this contradicts the theory of Ballon et al. (2005). Besides that, the board members indicate that they are open to innovations in all stages, it can range from a loose idea to a product that is almost ready to launch. And indeed it turned out that FieldLab Eerstelijnszorg can and does provide something to all of the stages. This is not surprising, considering that Cooper (2014) already suggested that users can be involved in every stage of the process and the essence of the FieldLab is just to bring product developers in contact with potential users of their product. Some respondents also state that when FieldLab Eerstelijnszorg gets involved during the later stages, they often have to go back to the start, to check whether the product really fits a problem. Sometimes this results in work that has to be redone or adjustments that have to be made which could have been prevented if users were involved earlier in the process. This makes it even more logical that FieldLab Eerstelijnszorg is also involved in the earlier stages of the process. More important, this shows that in the innovation process, steps are taken back and forth, so instead of being linear, it is an iterative process. At this point the innovation process in practice deviates from the stage-gate model (Cooper, 1990, 2014) as he only indicates iterative

spirals during one stage and not between stages. The process model of Bernstein & Singh (2006) on the other hand, does identify this link between different stages.

Some of the (possible) activities of FieldLab Eerstelijnszorg that were explained in the previous paragraph, can be linked to a specific stage in the innovation process, while others can occur during the whole process. Table 4.3 gives an overview of which activities can be linked to which stages. It also shows the link between the activities and the functions in the innovation system (Bergek et al., 2010).

Function in the innovation system (Bergek et al., 2010)	Activity	Stage(s) in the innovation process (Cooper, 1990, 2014)
Knowledge development and diffusion	**Provide knowledge about healthcare** Inform product developers about structure and processes of healthcare, how often diseases or treatments occur and what needs and desires of potential users are.	Idea generation; Idea scoping; Building the business case
	Provide knowledge about a specific product Inform product developers about the product that is developed with information about: • The need for a product/the opinion about the idea of the product by potential users • The effectiveness of the design of the product and prototypes • The degree to which the product can be embedded in the daily practice of healthcare	Idea scoping; Building the business case Development Testing and validation
	Provide knowledge about the innovation process Inform product developers about how a proper test is executed	Development; Testing and validation
	Exchange knowledge with other FieldLabs Exchange information with the other FieldLabs about the process of the organization and the products that are developed.	
Influence on the direction of search and identification of opportunities	**Communicate needs and desires to market** The communication of needs and desires of care providers and patients to the market, provides product developers concrete handles to start with the development of a new product.	Idea generation
Entrepreneurial experimentation and management of risk and uncertainty	**Provide tests with a specific product** Organize assessments of products to inform the product developer about which adjustments should be made to the product. • Gauge the need for the product/the opinion about the idea of the product by potential users • Let potential users participate in the design of the product and the testing of prototypes • Assess whether the product can be embedded in the daily practice of potential users	Idea scoping; Building the business case Development Testing and validation
	Gain acceptance for a product Prove the added value of a product to potential users, by involving them in the innovation process	All stages

Market formation	**Create a market** Motivate potential users to become a (launching) customer by proving the added value of the product.	All stages
	Provide marketing tool The tests that are done with products can be used as a marketing tool by product developers.	Launch
Resource mobilization	**Provide human resources** Support product developers by providing human resources that can take care of practical issues for the test of products.	Idea scoping; Building the business case; Development; Testing and validation
	Provide financial resources Direct product developers to other parties that can help them with funding of the process	
Legitimation	**Gain acceptance for a product** Prove the added value of a product to potential users, by involving them in the innovation process	All stages
Development of positive externalities	**Bring together different parties** By arranging that other parties cooperate (e.g. provide product developers access to healthcare), the execution of the other functions in the system is enhanced.	All stages
	Motivate care providers By showing the added value of innovation in general to care providers, they can be motivated to participate in the innovation process.	

Table 4.3 The activities of FieldLab Eerstelijnszorg linked to the functions in the system and stages in the process

During all stages FieldLab Eerstelijnszorg connects product developers with potential users of the product that is developed. In every stage information is transferred between these two parties. This can be information about the healthcare sector in general, or information about desires of users, or information about the specific product. FieldLab Eerstelijnszorg can also connect product developers with knowledge institutes to exchange knowledge about the innovation process in general. So in this way, FieldLab Eerstelijnszorg contributes to the function of knowledge development and diffusion (Bergek et al., 2010) during every stage. It is not surprising that FieldLab Eerstelijnszorg can have a big contribution to this function, since Lin & Wei (2018) state that an intermediary should bring together different actors and the requisite knowledge for innovation.

Another function that FieldLab Eerstelijnszorg contributes to during every stage is the function legitimation (Bergek et al., 2010). By involving users in the development of the product, they get to know more about the product itself and the benefits they can get from it. In this way legitimacy of the product is created. As was already mentioned before, gaining legitimacy for a product contributes to the diminishing of risk and uncertainty and to the formation of a market. So FieldLab Eerstelijnszorg can also contribute to these functions during every stage.

So it can be concluded that FieldLab Eerstelijnszorg can have a contribution to all the stages of the innovation process. However, this does not mean that FieldLab Eerstelijnszorg also has to do that. Multiple respondents indicated that it is favorable to involve users early in the process, because it often happens that products that are almost market ready, do not fit the desires of users or operations in the daily practice. By involving the users earlier in the process, you can overcome that work needs to be redone. *"I would like to see it more upfront I think. So you have an idea and you want to test that. You have to validate the business model and therefore you want to speak to as*

many stakeholders as possible, to test that. If you do that in the right way, it saves you a lot of energy further on in the process. So I think that phase is very important."[49] (Respondent 6, Health Valley). Other respondents on the other hand think that FieldLab Eerstelijnszorg should focus more on later phases such as the testing of products. *"So I think that the test phase, from my ecosystem point of view, I think that the test phase is an important one. And I think the FieldLab is suited to do that."*[50] (Respondent 2, HAN).

So the respondents do not have a clear view of what stages FieldLab Eerstelijnszorg should focus on, but some restrictions can be made.

The respondents agree on the fact that FieldLab Eerstelijnszorg should not interfere in the launch of products to preserve their objectivity. Since an important aspect of FieldLab Eerstelijnszorg is that it objectively gives feedback on product(ideas), they should be cautious with this. *"FieldLab must not have a the goal to push a product, but must have the goal to improve healthcare. Because otherwise they cannot justify their independent status."*[51] (Respondent 11, product developer).

In addition to that, MedValue, which is another actor in the system, already focuses on the rating of the business case. So if FieldLab Eerstelijnszorg also wants to participate in the stage of building the business case, it should make strict agreements with MedValue to prevent that they do double work. FieldLab Eerstelijnszorg could also choose to cooperate with MedValue and refer product developers that need help with the business case to MedValue or provide MedValue with knowledge that they need for the assessment of a business case. *"I can imagine that a party would like to know that and I say 'yes then you should go to MedValue', for example"*[52] (Respondent 5, FieldLab Eerstelijnszorg).

The stages in the process, on which FieldLab Eerstelijnszorg should focus also depends on other issues, which is explained in the next section of this chapter.

4.4. The selection of functions - additional findings

That FieldLab Eerstelijnszorg has multiple ways to fulfill the needs of other actors, does not mean that it has to do this all. Since the different needs and ways to fulfill them are very divergent, it seems wise to focus on a selection of them. To make a proper decision about what function(s) to carry out, FieldLab Eerstelijnszorg should first make clear what the target group is they serve.

Again, most needs are associated with or are focused on product developers. This is also the main reason that FieldLab Eerstelijnszorg was established. It can be argued that FieldLab Eerstelijnszorg was established as a combination of an enabler-driven and a utilizer-driven living lab (Leminen et al., 2012), since it is focused on a specific region, which is a characteristic of an enabler-driven living lab, but its goal is to promote product and business development, which indicates a utilizer-driven living lab. In this case utilizer means the user of the living lab and not of the product, so the product developer is the central actor. *“You could say, at least that is my view, that according to the project*

[49] *"Ik zou het meer aan de voorkant denk ik willen zien. Dus je hebt een idee en dat wil je toetsen. Je moet je business model valideren en daarvoor wil je zo veel mogelijk stakeholders spreken om dat te toetsen. Als je dat heel goed doet, dan scheelt dat verderop in het traject heel veel energie. Dus die fase vind ik heel belangrijk."*
[50] *"Dus die testfase vind ik, vanuit een ecosysteem blik, vind ik die testfase een belangrijke. En daar is het Fieldlab geschikt voor denk ik."*
[51] *"Fieldlab moet geen doel hebben om een product er doorheen te krijgen, maar moet het doel hebben om de zorg te verbeteren. Want anders kunnen ze hun onafhankelijke status niet verantwoorden."*
[52] *"Ik kan me voorstellen dat een partij dat graag wil weten en dat ik zeg ‘ja dan moeten jullie bij MedValue zijn’ bijvoorbeeld."*

proposal and the idea of the province, the FieldLab is a sort of service provider for entrepreneurs."[53] *(*Respondent 5, FieldLab Eerstelijnszorg). However, it is striking that care providers and patients need to make quite an effort by investing time for free, to fulfill the needs of the product developers. The care providers and patients can also benefit from this, because healthcare can improve by these innovations, but for most actors this seems to be a side issue. Next to that, the system already contains several organizations that support the product developers, for example MedValue, Health Valley and Oost NL. The care providers and patients do not have such supporting organizations for innovation, so this seems to be a gap in the system. FieldLab Eerstelijnszorg has the possibility to fill this gap. Then it will become a user-driven living lab (Leminen et al.,2012), which focuses on solving everyday-life problems of care providers and patients. This can be seen as a method to create market pull, as the users are in this case the initiators of innovation. It is important that patients will also be included then, since they now often are forgotten. *"Because the products are often tested by or discussed with care providers, but often not with the end user."*[54] *(Respondent 6, Health Valley).*

The choice of FieldLab Eerstelijnszorg about what type of living lab they want to be, also influences the function it has in the innovation system. As a utilizer/enabler-driven living lab, they focus on fulfilling the needs of product developers. In this case their most important contributions are providing knowledge about the healthcare sector, providing access to the healthcare sector, providing knowledge about the innovation process, assessing the added value of products, providing support with practical issues and providing connections to parties that can offer financial support. It turns out that the function of FieldLab Eerstelijnszorg in the innovation system also influences the stages it can have a contribution to, as these activities can be linked to the stages of idea scoping, building the business case and testing and validation of the stage-gate model (Cooper, 1990, 2014), as was earlier explained. This was not taken into account in the conceptual model of the research.

As a user-driven living lab, on the other hand, FieldLab Eerstelijnszorg will focus on the needs of care providers and patients, so then it focuses more on how to improve healthcare. It still has to review products and assess whether those can be embedded in daily practice, since these are the tools to improve healthcare. So then it still contributes to the stage of testing and validation (Cooper, 1990, 2014). However, in this case it will also exercise research about the needs and desires of the users to communicate these to the product developers, which is part of the idea generation stage (Cooper, 1990, 2014) and provide users with information about the opportunities that innovation offers to motivate them. In this way FieldLab Eerstelijnszorg can indirectly fulfill the needs of product developers, because they motivate users to take part in innovation. So this also makes it easier for product developers to align with users. However, for FieldLab Eerstelijnszorg this is a positive side effect.

A third option that FieldLab Eerstelijnszorg has is to focus on the needs of HAN. HAN wants to develop theory and do research about innovation. This is a characteristic of a provider of innovation, so in this case it would be a provider-driven living lab (Leminen et al., 2012). This would mean that they focus on creating knowledge about the innovation process in general, creating knowledge about what factors influence the adaptation of products and experiment with methods to carry out tests of products. So then the focus is also on the stage of testing and validation (Cooper, 1990, 2014).

[53] *"Je zou kunnen zeggen, tenminste dat is mijn opvatting, dat in het projectvoorstel en de ideeën van de provincie het Fieldlab een soort van dienstleverancier is voor ondernemers."*
[54] *"Want de producten worden vaak getest met of besproken met zorgverleners, maar vaak niet met de eindgebruiker."*

The choice for which group of actors to serve, also brings up other questions that relate to this. Another choice that the board of FieldLab Eerstelijnszorg has to make is the geographical scope they want to focus on. In the current situation, FieldLab Eerstelijnszorg was established by the province of Gelderland to improve innovation in the region of Nijmegen. However, the period for the subsidy is coming to an end, so this might open up chances to focus on a bigger scope, as is suggested by a few respondents. One function that is specifically influenced by the choice between a focus on the region of Nijmegen or a bigger scope, is the development of positive externalities (Bergek et al., 2010). When FieldLab Eerstelijnszorg chooses to focus on a bigger scope, then they could start new partnerships with care providers that are not connected to STIELO. The products under development can then be tested by a more dispersed group of users. According to Respondent 5 (Other FieldLab), this will increase the validity of the assessments that FieldLab Eerstelijnszorg executes. Thus, in this way the quality of the research of the FieldLab increases and this benefits the reputation of FieldLab Eerstelijnszorg itself.

A subsequent choice that the board of FieldLab Eerstelijnszorg has to make is to what degree they want to specialize to one subgroup of healthcare. In the preliminary research about possibilities for field labs (Hoogendijk & Pluimers, 2013) it was already stated that some specialization for the FieldLabs is desirable, since the healthcare sector is very broad. FieldLab Eerstelijnszorg focuses on primary care, which already excludes a big part. However, primary care still contains a lot of different care providers. Physiotherapists presumably encounter completely different problems than general practitioners, who in turn have different needs and desires than midwives. That is why FieldLab Eerstelijnszorg could also choose to focus on one of these subgroups. This does not have any impact on which function(s) the FieldLab can have in the system, but it does impact the capacity that is needed. With research about preferences and desires, for example, the workload is a lot higher if all primary care providers are included instead of one particular subgroup.

The choices about the specialization and geographical scope, can be plotted together. This leads to four possible configurations of FieldLab Eerstelijnszorg, which is shown in Figure 4.2. At the moment the FieldLab is a local generalist, so it focuses on primary care in the region of Nijmegen.

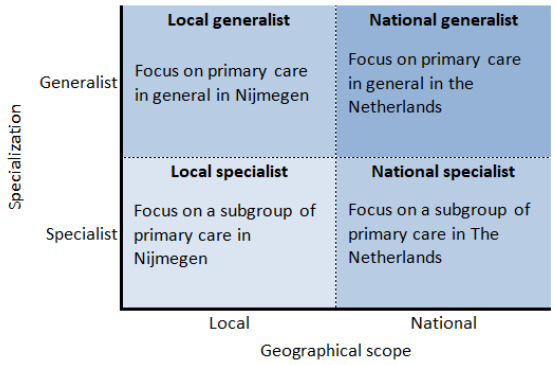

Figure 4.2 Configurations for organization

These configurations do not influence the functions that FieldLab Eerstelijnszorg could perform, but it does have an impact on the amount of functions it can perform at the same time and on the capacity that is needed. It also influences the financial resources that FieldLab Eerstelijnszorg needs. About this, a decision needs to be taken too.

The subsidy for FieldLab Eerstelijnszorg was provided for three years and these three years are almost over now, so the board has to look for new ways of financing. It might request for subsidy again. However, the respondents also mentioned several other options for financing. First of all, product developers can pay for the services of FieldLab Eerstelijnszorg. Although, when FieldLab Eerstelijnszorg is a utilizer-driven living lab (Leminen et al., 2012), this is not desirable, since the product developers already have a shortage of financial resources. So if you want to support them, you want to provide them with money instead of taking it from them. Then resource mobilization (Bergek et al., 2010) is an important function of FieldLab Eerstelijnszorg. On the other hand, when FieldLab Eerstelijnszorg chooses to focus on users of products, as a user-driven living lab (Leminen et al., 2012), an allowance of product developers is a way to compensate care providers and patients for their effort. Another option is that the care group invests money in FieldLab Eerstelijnszorg. However, care providers also already invest their time, so it seems unreasonable to also let them pay for it. Especially in the primary care this is an issue, because all money that care providers invest in innovation, is subtracted from their own income. The respondents suggested that health insurers could be of meaning in this issue. Since they cover the costs of healthcare, they have the option to compensate care providers for the income that is lost to spending time on innovation. After all, if healthcare improves, health insurers also benefit from this. If FieldLab Eerstelijnszorg can arrange this, it also contributes to resource mobilization (Bergek et al., 2010), but then focused on users. Another option for financing is that FieldLab Eerstelijnszorg cooperates with a party outside the innovation system that supports the organization with financial resources. This can for example be a big company that wants to do take some corporate social responsibility. By financing FieldLab Eerstelijnszorg, the company enables social development in the area of healthcare. The last option that FieldLab Eerstelijnszorg has is to get vouchers to finance their projects. However, every voucher is a short time solution, so then FieldLab Eerstelijnszorg has to keep looking for new options.

An overview of the configurations in which the different types of living labs (Leminen et al., 2012) are linked to the functions in the innovation system (Bergek et al., 2010) they focus on, the focus on the stages in the process (Cooper, 1990, 2014) and the possible ways of funding, is given in Table 4.4.

Type of living lab	Functions to focus on	Stage(s) to focus on	Possible ways of funding
Utilizer-driven focus on the needs of product developers	Knowledge development and diffusion; Entrepreneurial experimentation and management of risk and uncertainty; Market formation; Resource mobilization; Legitimation	Idea scoping; Building the business case; Testing and validation	Subsidy; Vouchers; Big company
User-driven focus on the needs of care providers	Knowledge development and diffusion; Influence on the direction of search and the identification of opportunities; Entrepreneurial experimentation and management of risk and uncertainty; Legitimation; Development of positive externalities	Idea generation; Testing and validation	Fee for service by product developers; Health insurers; Big company
Provider-driven focus on the needs of HAN	Knowledge development and diffusion; Entrepreneurial experimentation and management of risk and uncertainty	Testing and validation	Subsidy; Fee for service by product developers; Big company

Table 4.4 Configurations of living labs

All these choices come down to the choice of FieldLab Eerstelijnszorg for a specific business model. A tool to do this is the business model canvas (Osterwalder & Pigneur, 2010). The outcomes of the different decisions will all lead to a different completion of this business model canvas. The target group, which is the customer segment in the business model canvas, is the starting point and this influences the interpretation of the other components. The function in the innovation system can be seen as a basis for the key activities, while the decision about funding influences the cost structure and revenue streams. Thus, filling in the business model canvas can support a thorough decision for the board of FieldLab Eerstelijnszorg.

4.5. Adjusted conceptual model

At the start of this research, it was expected that the function of FieldLab Eerstelijnszorg in the innovation system, depends on the needs of the other actors in the system and the stage that the innovation is in. These relations turned out to be right, but some additions can be made. It turned out that the contribution of FieldLab Eerstelijnszorg to the different stages partly depends on the needs that the other actors in the system have and that the stage of the innovation, also influences the needs that the other actors have. Besides, the contribution that FieldLab Eerstelijnszorg can have during the different stages, also depends on the function that it has in the system. The function of FieldLab Eerstelijnszorg in turn is not only influenced by the stage of the innovation and the needs of other actors, it also partly depends on the business model of FieldLab Eerstelijnszorg. And the other way around, the function of FieldLab Eerstelijnszorg in the system also influences its business model. This results in the adjusted conceptual model that is show in Figure 4.3.

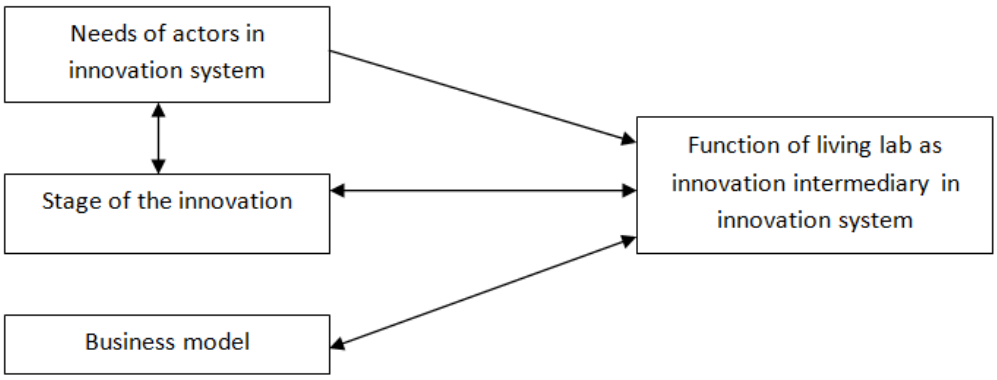

Figure 4.3 Adjusted conceptual model

5. Conclusion and discussion

In this chapter, first an answer to the main question is given. Next is an explanation of the impact of this conclusion on the existing theory followed by an explanation of the practical implications. The chapter concludes with the limitations of the research and possibilities for further research.

5.1. Conclusion

The main question of this research is 'What could be the function of FieldLab Eerstelijnszorg in the innovation system?'. To answer this question, first some sub questions are answered. The answers to these sub questions are elaborated in the previous chapter, this chapter gives a summary of these findings to keep a clear overview. Then an answer to the main question is elaborated.

- What are the actors in the innovation system and how do they relate to each other?
  The firms contain varying product developers and service providers for product developers, such as MedValue. The group of demand consists of the care providers of STIELO and patients. Research institutes and universities in this system are Hogeschool van Arnhem en Nijmegen and Radboud University (Medical Centre). The infrastructure is shaped by the province of Gelderland and health insurers. Lastly, there are several intermediaries. Those are Oost NL, Health Valley, REshape and the other FieldLabs.

- What are the needs of the actors in the innovation system and what can FieldLab Eerstelijnszorg do to fulfill these needs?
  The first important need that actors in the system have is the need for knowledge. This can be knowledge about the market (e.g. the structure and processes of healthcare and the needs and desires of care providers and patients), knowledge about innovation (e.g. how you have to set up a trial), and knowledge about a specific product (e.g. what is the added value of a product and does it fit in the daily practice). FieldLab Eerstelijnszorg can provide this knowledge itself or it can bring together different actors that can exchange this knowledge. Another need in the system is to get access to healthcare. FieldLab Eerstelijnszorg can provide this access, because it already is in contact with care providers. Product developers also seek for acceptance of their product. By involving users in the process, FieldLab Eerstelijnszorg contributes to gaining this acceptance. By gaining this acceptance, FieldLab Eerstelijnszorg also creates potential for launching customers and a market, which product developers sometimes also have a need for. FieldLab Eerstelijnszorg can also serve as a coordinator that deals with the practical issues of the involvement of users in the process, such as planning meetings, since product developers and care providers do not have time for that. Product developers can also be supported by FieldLab Eerstelijnszorg in their search for financing. FieldLab Eerstelijnszorg can direct them to parties that have these financial resources. Care providers have the need for improvement of healthcare. FieldLab Eerstelijnszorg can support care providers and patients with formulating specific needs and desires. In this way, care providers can also be motivated to participate in innovation, since this motivation lacks often. Last is the need for alignment of demand and supply. FieldLab Eerstelijnszorg can communicate the needs and desires of users to product developers, in this way they can align their offered products with the demand.

- What can FieldLab Eerstelijnszorg contribute during the different stages of the innovation process?
  FieldLab Eerstelijnszorg can have a contribution to all of the stages. It can provide product developers with opportunities for innovation during the idea generation stage. Then it can provide more information about the need for a product during the stage of idea scoping. During the building of the business case it can provide more detailed information about the needs and preferences of users. During the development stage it can provide feedback of users about the design of the product and during the testing and validation stage it can provide feedback of users about the usability of the product in daily practice. Last, to the launch of the product, FieldLab Eerstelijnszorg cannot have a direct contribution, however the review that it provides in earlier stages can be used as a marketing tool by product developers.

Answer to the main question

It can be concluded that FieldLab Eerstelijnszorg brings together different actors who together have the knowledge to develop a product. This is also in line with Lin & Wei's (2018) definition of an intermediary that it brings together different organizations and requisite knowledge for innovation. Also, this can all be reasoned back to the major functions that Van Lente et al. (2003) identified for intermediaries. The articulation of needs and options (Van Lente et al., 2003) comes back in the communication of the needs of care providers and patients to product developers and by informing care providers about opportunities that product developers offer. All activities lead to the alignment of relevant actors (Van Lente et al., 2003), but specifically the access to the healthcare sector and the search for needs and desires of care providers and patients support this. And lastly, FieldLab Eerstelijnszorg supports processes of learning and experimenting (Van Lente et al., 2003) by facilitating knowledge creation and exchange between different parties. So it can be said that FieldLab Eerstelijnszorg fulfills the functions of an intermediary, according to Van Lente et al. (2003). With the fulfillment of these functions of an intermediary, FieldLab Eerstelijnszorg also contributes to the functions that a system should perform according to Bergek et al. (2010). FieldLab Eerstelijnszorg can have a share in fulfilling all of the seven functions, however, it can carry out these functions in multiple ways.

- Knowledge development and diffusion
  In the innovation system there is need for different kinds of knowledge. This can all be grouped to three themes. There is need for knowledge about the healthcare sector (e.g. what are the needs and desires of care providers), knowledge about the innovation process (e.g. how can a proper trial be executed) and knowledge about a specific product (e.g. what is the added value of the product). FieldLab Eerstelijnszorg can create this knowledge itself and potentially share this with others but it can also bring together different parties that can exchange this knowledge. So in this way it facilitates knowledge diffusion. Since FieldLab Eerstelijnszorg is an intermediary, who by definition has the function to bring actors together, it seems logical that it focuses on facilitating this knowledge exchange.
  According to Nonaka (1994) knowledge can be created in four ways, the combination of knowledge is one of these ways. So when FieldLab Eerstelijnszorg facilitates knowledge exchange, then it contributes to knowledge creation of other actors. Next to that, FieldLab Eerstelijnszorg itself can also create knowledge, for example by making needs and desires of

care providers and patients explicit and by sharing this with other actors. So FieldLab Eerstelijnszorg can contribute to knowledge development and diffusion in multiple ways.

- Influence on the direction of search and the identification of opportunities
  Multiple actors suggested that there should be more market pull, instead of technology push. This means that the starting point should be a specific request from users, in this case care professionals or patients. FieldLab Eerstelijnszorg can contribute to this by communicating needs and desires that users bring up, to product developers. Next to that, FieldLab Eerstelijnszorg can also take a step further and do research about these needs and desires itself, for example by setting up a survey under care providers and patients or walking along with them for a period of time. In this way FieldLab Eerstelijnszorg does not direct the search for innovations, but it does indentify opportunities. The specific needs and desires of users can be seen as specific handles to which product developers can respond. So in this way FieldLab Eerstelijnszorg provides them with opportunities for innovation.
- Entrepreneurial experimentation and management of risk and uncertainty
  FieldLab Eerstelijnszorg provides product developers with a review of the product that is developed. This creates information about the rate to which the product fits the needs of potential users, what the added value of the product is, whether the product is practical in use and/or if the product can be embedded in the daily practice of potential users. FieldLab Eerstelijnszorg obtains this information by presenting the idea of the product to care providers and patients or by letting them test (a prototype of) the product. With their feedback the product developer can decide whether the product is ready to launch on the market or that it should be altered and in what way. This information diminishes the risk and uncertainty for the product developer when the product is launched, because he already knows what can be expected. So in this way, FieldLab Eerstelijnszorg facilitates entrepreneurial experimentation and management of risk and uncertainty.
- Market formation
  As was explained before, the activities of FieldLab Eerstelijnszorg can create acceptance for a specific product under care providers. With this, motivation is created for care providers to eventually buy the product, this contributes to market formation. If the care providers want to serve as launching customer, FieldLab Eerstelijnszorg also really forms the market. Next to that, a review of a product by FieldLab Eerstelijnszorg can serve as a marketing tool for product developers. This also supports market formation. The activity of really launching the product, on the other hand, is not desirable to be performed by FieldLab Eerstelijnszorg. Mostly because then the objectivity of the organization might come into question. Besides, this also requires another business model and resources so then FieldLab Eerstelijnszorg should make big changes in the organization.
- Resource mobilization
  Resources can be financial resources, human resources and materials. For this function, FieldLab Eerstelijnszorg again can choose whether to have these resources themselves or to cooperate with other parties in the system that posses them. Then FieldLab Eerstelijnszorg can facilitate the exchange of these resources. This question mainly is about financial resources. Product developers can use financial support for the development of their product, while care providers would like to get some compensation for the time they invest. As FieldLab Eerstelijnszorg has to look for new ways of funding, it is important to know whether they should provide these financial resources, because then they would need more

money than when they only have to keep the organization running. However, it seems not logical that FieldLab Eerstelijnszorg provides product developers with financial resources. Oost NL is also part of the same system and they focus on supporting product developers with funding. So if FieldLab Eerstelijnszorg would do this too, work is done double. It seems more logical if FieldLab Eerstelijnszorg cooperates with Oost NL and that it directs product developers that need help with funding to Oost NL. For the compensation of care providers about the same story holds. Care providers are paid by health insurers for their efforts in healthcare, but not for innovation. So FieldLab Eerstelijnszorg could start a conversation with the health insurers to look for a situation in which care providers do get paid for the time they invest in innovation.

For the building of the product, product developers do not need help, or at least not from FieldLab Eerstelijnszorg, so FieldLab Eerstelijnszorg does not have to mobilize materials. FieldLab Eerstelijnszorg can contribute to the mobilization of human resources in one specific way. It can support product developers with practical issues around the trial of a product. In this way it takes work out of their hands, so this can be seen as a form of human resources.

- Legitimation

  FieldLab Eerstelijnszorg can contribute to the legitimacy of products that are developed. By involving care providers in the process, they get insight in what they can gain from the product and this can decrease the resistance against a product. The same holds for the innovation system in general. By providing care providers with information about innovation and the opportunities it offers, they can see the added value of innovation and be more open to it.

  Besides that, FieldLab Eerstelijnszorg can increase the acceptance of a product in general, for example by publishing about it. However, as the respondents agree on the fact that FieldLab Eerstelijnszorg should be independent of products to remain objective, this should not be marketing for a specific product.

- Development of positive externalities

  FieldLab Eerstelijnszorg primarily brings together different actors in the innovation system. In this way it facilitates that these actors can perform the other functions in the system, for example knowledge diffusion. In this way FieldLab Eerstelijnszorg strengthens the performance of the other functions, which is a contribution to the development of positive externalities. Next to that, FieldLab Eerstelijnszorg can also ensure that care providers are motivated to cooperate in innovation, by showing them the benefits. The involvement of these care providers is needed to perform some of the other functions, for example the identification of opportunities or legitimation. By doing this FieldLab Eerstelijnszorg also strengthens the performance of the other functions.

  Another contribution of FieldLab Eerstelijnszorg to the development of positive externalities is in the area of knowledge. As FieldLab Eerstelijnszorg carries out reviews, it creates knowledge, as was explained earlier. FieldLab Eerstelijnszorg can learn from this and take this with it for following assignments. In this way, the implementation of the other functions can be improved.

  As the last option, FieldLab Eerstelijnszorg can develop positive externalities by involving new actors in the system. These new actors can strengthen the other functions, for example because they possess new knowledge or resources. Positive results and the image of FieldLab Eerstelijnszorg can make it easier to persuade new actors to cooperate.

This overview of ways to fulfill the functions in the innovation system, once again shows that the functions are closely connected. For example, legitimation contributes to entrepreneurial experimentation and management of risk and uncertainty and to market formation (Bergek et al., 2010). It also turned out that the functions are sometimes difficult to distinguish in practice.

Based on the findings of this research, a combination of the functions of Bergek et al. (2010) and ways to carry them out can be substantiated in three configurations. These configurations are based on the target group of which the board of FieldLab Eerstelijnszorg wants to fulfill the needs. The three possible target groups are product developers, users and knowledge institutes.
With the focus on product developers, FieldLab Eerstelijnszorg becomes a utilizer-driven living lab (Leminen et al., 2012). Then the functions it can mainly contribute to, are knowledge development and diffusion, entrepreneurial experimentation and management of risk and uncertainty, market formation, resource mobilization and legitimation (Bergek et al., 2010). In the innovation process the focus will be mainly on the stages of idea scoping, building the business case and testing and validation (Cooper, 1990, 2014) A focus on the users of products on the other hand, results in a user-driven living lab (Leminen et al., 2012). In this case FieldLab Eerstelijnszorg can mainly contribute to knowledge development and diffusion, influence on the direction of search and identification of opportunities, legitimation and the development of positive externalities (Bergek et al., 2010). Then the stages that it focuses on are idea generation and testing and validation (Cooper, 1990, 2014). In the last configuration, FieldLab Eerstelijnszorg functions as a provider-driven living lab (Leminen et al., 2012) with a focus on knowledge institutes. The main contribution then is to knowledge development and diffusion (Bergek et al., 2010) and the stage of testing and validation (Cooper, 1990, 2014).

These configurations show that a living lab can always contribute to knowledge development and diffusion (Bergek et al., 2010). This also proves that a living lab is an outstanding example of an intermediary, as Lin & Wei (2018) state that an intermediary brings together the knowledge that is needed to create successful innovation.

Other decision that need to be made, and that are linked to the choice for a specific target group, are the geographical scope, the degree of specialization in healthcare and the way of funding of FieldLab Eerstelijnszorg. The way of funding is related to the function of resource mobilization (Bergek et al., 2010), as the amount of money FieldLab Eerstelijnszorg can get, determines whether they can support other actors financially. Geographical scope and the degree of specialization on the other hand, influence the capacity that is needed to execute the different functions.

5.2. Theoretical contribution

The literature about the functions of an innovation system (e.g. Bergek et al., 2010; Hekkert & Negro, 2008) primarily discusses these functions in innovation systems in the sector of renewable energy. This study is about FieldLab Eerstelijnszorg, which is part of the healthcare sector, so it proves that the theory about the functions in an innovation system is also applicable to other environments.

Bergek et al. (2010) did identify the seven functions an innovation system should perform, but they did not explain which actors should perform them and in what way. This study shows how a specific organization, FieldLab Eerstelijnszorg, which is an intermediary in the system, can give substance to the functions. FieldLab Eerstelijnszorg can develop and diffuse knowledge about healthcare, the

innovation process and a specific product by doing research itself. More importantly it can provide the creation and exchange of knowledge by bringing together different actors that can do this. It can also bring parties together for the mobilization of resources. FieldLab Eerstelijnszorg can identify opportunities for innovation by articulating the needs and desires of users to the market. Besides it can manage risk and uncertainty by providing reviews of ideas, prototypes and complete products. With these reviews FieldLab Eerstelijnszorg can also gain acceptance for products, which is part of the function legitimation. This acceptance in turn contributes to market formation. Last, FieldLab Eerstelijnszorg can develop positive externalities by involving care providers in the innovation process.

This study also shows that the different functions are closely related. Especially the functions legitimation, market formation and entrepreneurial experimentation and management of risk and uncertainty impact each other and are sometimes difficult to distinguish.

Besides, this study shows logic configurations of the functions, which is also not done in the theory of Bergek et al. (2010). These configurations are based on different target groups, which are product developers, users of products and knowledge institutes, and focus on the functions that fulfill the needs of these actors.

Also, this study shows that an intermediary has the primary function of bringing together different actors that can perform the functions in the system. However, Bergek et al. (2010) do not account for such a function, while it seems to be important. So this might be a good extension to the existing functions. This study can serve as a base for the substantiation of the theory. However, the results account for a very specific situation, so now it should be tested whether these results also hold in other contexts.

This study also strengthens the literature of living labs. FieldLab Eerstelijnszorg presents itself as a living lab, so by specifying the function that the organization can have in the system, a basis is created for a more general theory about the function of a living lab in an innovation system.

According to the results of this study, a living lab is an entity that takes along different stakeholders in the innovation system and gives them the opportunity to jointly experiment with products and exchange knowledge about whether and how a product can be embedded in the daily work of potential users. This is in line with the definition of Ballon et al. (2005) that a living lab is "*an experimentation environment in which technology is given shape in real life contexts and in which (end) users are considered 'co-producers'" (p.3).* Besides, this also corresponds to the definition of innovation intermediaries: *'organizations that facilitate innovation by providing the bridging, brokering, and knowledge transfer necessary to bring together the range of different organizations and knowledge needed to create successful innovation'* (Lin & Wei, 2018, p. 22). Thus, it can be said that a living lab is a specific kind of innovation intermediary and accordingly has the function of an intermediary in the system.

At some points, the results of this study deviate from the existing theory about living labs. Ballon et al. (2005) state that a living lab focuses on products that are medium mature. However, this study shows that it is often too late when the living lab is involved at that point. So it seems that a living lab should also focus on earlier stages in the innovation process. Besides, FieldLab Eerstelijnszorg can also contribute to the stage of testing and validation (Cooper, 1990, 2014). In this stage the products

are almost market ready, which Ballon et al. (2005) see as high maturity, so a living lab can also focus on products with high maturity.

The last contribution of this study is about the relationships between the different concepts. It turns out that the needs of other actors do not only influence the function of the living lab in the system, but also the contribution of it during different stages in the innovation process. Besides, these activities during the stages are also influenced by the functions in the system and not only the other way around.

5.3. Practical contribution

The conclusion of this study is that FieldLab Eerstelijnszorg could contribute to all functions that should be performed in the innovation system (Bergek et al., 2010). Given the definition of Lin & Wei (2018) that an intermediary should bring together different actors and the requisite knowledge for innovation, it seems obvious that FieldLab Eerstelijnszorg should focus on the function of knowledge development and diffusion and the development of positive externalities (Bergek et al., 2010), as these are respectively about knowledge creation and exchange and involving new actors. However, these functions can be executed in different ways. Besides, there are other issues that impact the selection of functions.

The board of FieldLab Eerstelijnszorg first has to make a decision about the purpose of the organization and what the target group is. Besides, decisions need to be made about the degree of specialization, the geographical scope and the way financing is regulated for FieldLab Eerstelijnszorg.

So FieldLab Eerstelijnszorg has to make a decision about its purpose and then build a business model around this. A tool that can be of help is the business model canvas. An important part of this business model canvas is the target group. According to the results of this study, three target groups can be distinguished, which are product developers, users of products and knowledge institutes.

When product developers are chosen as target group, FieldLab Eerstelijnszorg has to focus on fulfilling the needs of these product developers. Then the stages that it can contribute are idea scoping, building the business case and testing and validation (Cooper, 1990, 2014). In this case FieldLab Eerstelijnszorg can contribute to knowledge development and diffusion by facilitating knowledge about the market, about the innovation process and about a specific product, especially about the added value of this product. It does not provide any influence on the direction of search and identification of opportunities. The contribution to entrepreneurial experimentation and management of risk and uncertainty is the testing and reviewing of products. As a contribution to market formation, the test that FieldLab Eerstelijnszorg executed can be used as a marketing tool. In this case FieldLab Eerstelijnszorg can also make a contribution to resource mobilization by supporting product developers with practical issues and directing them to other actors for financial support. It can contribute to legitimation by gaining acceptance for a specific product. And last, the development of positive externalities is focused on involving care providers and patients that are interested in the products of the product developers. FieldLab Eerstelijnszorg in this case can be classified as a utilizer-driven living lab (Leminen et al., 2012).

Another configuration can be made with users as target group. In this case the needs of care providers and patients are the focus. FieldLab Eerstelijnszorg can then make a contribution to the stages of idea generation and testing and validation (Cooper, 1990, 2014). The functions of Bergek et

al. (2010) are also executed in a different way. Knowledge development and diffusion focuses on knowledge about the market, specifically about needs and desires of user, and knowledge about a specific product, especially focused on which problem(s) it can solve. As a contribution to the influence on the direction of search and identification of opportunities, FieldLab Eerstelijnszorg can communicate the needs and desires of users to product developers as opportunities for innovation. The contribution to entrepreneurial experimentation is mainly focused on embedding the products in the daily practice. In this case FieldLab Eerstelijnszorg does not contribute to market formation. Legitimation is primarily focused on gaining legitimacy for innovation in general by showing the benefits for healthcare and the development of positive externalities is focused on involving product developers that can solve problems of users. According to Leminen et al. (2012), FieldLab Eerstelijnszorg then is a user-driven living lab.

The last configuration takes the research institutes and universities as a starting point, so then the needs of HAN and possibly RU(MC) are the focus. In this case the activities primarily take place during the testing and validation stage (Cooper, 1990, 2014). The contribution to knowledge development and diffusion is then focused on knowledge about the innovation process, especially on methods to properly test products and reasons why developed products are adapted or not. The contribution to entrepreneurial experimentation and management of risk and uncertainty is still by testing products, but then the goal is to gain knowledge about test methods. Positive externalities are developed by involving new actors that can provide knowledge about the innovation process. There is no contribution to the other functions. In this configuration FieldLab Eerstelijnszorg can be seen as a provider-driven living lab (Leminen et al., 2012).

Based on this study, some recommendations can be made about the choice for a target group.

- The choice for a specific target group influences the way FieldLab Eerstelijnszorg should be organized, based on the functions it can execute then. When the focus is care providers and patients, research has to be done about their needs and desires. This requires researchers with different knowledge than the testing of products requires, which is a primary activity when the focus is on product developers. So when making a choice about the target group, it is wise to keep in mind which resources FieldLab Eerstelijnszorg has access to.
- One option seems particularly interesting. The system already contains multiple organizations that focus on supporting the supply side of products, which are product developers. There is not one organization that focuses on the support of care providers and patients, the demand side. FieldLab Eerstelijnszorg can distinguish itself in the system by supporting this demand. Besides, a living lab should facilitate user involvement in the innovation process (Ballon et al., 2005), so it should ensure that this can happen. A prerequisite for that is that all actors are willing to cooperate. However, it turned out that care providers are often not motivated to participate in innovation, especially not in the primary care. As long as that is not present, it stays hard for product developers to develop new products, so if innovation in the primary care needs to be promoted, then these care providers should be motivated. FieldLab Eerstelijnszorg is the designated party to take care of this, otherwise it cannot facilitate user involvement. This can be done by providing information about the benefits of innovation and tracking what the needs and desires are. Since it is a function of an intermediary to articulate needs and options (Van Lente et al., 2003), this is an outstanding function of FieldLab Eerstelijnszorg. Thus, it seems that FieldLab

Eerstelijnszorg can add the most value by focusing on care providers and patients. In this way it can promote the whole innovation system.

Next to choosing a target group, the board of FieldLab Eerstelijnszorg also has to make a decision about the geographical scope and specialization of the organization. The board has to choose whether it wants to focus on the region of Nijmegen or on a bigger area, for example the whole country. The other choice is whether FieldLab Eerstelijnszorg wants to focus on primary care in general or on a subgroup of primary care. The choice for specialization and geographical scope influence the capacity that is needed to perform the functions and the network that FieldLab Eerstelijnszorg should have. If both are narrow, then the needed capacity is low, but the validity of the tests that are done is questionable. On the other hand, if both are very wide, then the validity of the tests might be high, but the needed capacity is also very high. So it seems wise to narrow down at least one of these two, as is also done in the current situation.

The last decision that the board of FieldLab Eerstelijnszorg has to make is about the funding of the organization. For this decision, a lot of conflicting interests need to be taken into account. As the product developers already have a lack of money and the care providers already invest their time, it is not likely that they are willing to cover the cost, so the board of FieldLab Eerstelijnszorg has to look for other ways of financing. Three options were mentioned that can provide a long-term solution.

- The subsidy that FieldLab Eerstelijnszorg received at the start, comes from the economic sector of the province of Gelderland, so this is meant to be used in a way that stimulates the economy. If FieldLab Eerstelijnszorg continues to focus on product developers, then it can look for support on economic grounds again. On the other hand, when the board chooses to focus on the improvement of healthcare, by focusing on care providers and patients, there might be other sectors that want to give financial support.
- It seems wise that FieldLab Eerstelijnszorg starts the conversation with health insurers. Especially when the target group is the demand side of the system, health insurers can benefit from the activities of FieldLab Eerstelijnszorg. Since the biggest health insurers in the Netherlands pay a lot of attention to innovation and experimental gardens, according to their websites, it seems that they are open for initiatives such as FieldLab Eerstelijnszorg, so this is a chance to discover the possibilities.
- The board of FieldLab Eerstelijnszorg can look for a big company that wants to finance the organization. The company can stage this financial support as fulfillment of their corporate social responsibility, since they support the improvement of healthcare with it. However, FieldLab Eerstelijnszorg should then be aware that their objectivity might be questioned. Objectivity is just an issue that FieldLab Eerstelijnszorg should protect, because this contributes to their own reputation.

Based on this study, some other recommendations can be made in general.

- The innovation system already contains a lot of parties that support the innovation process, so it is wise that FieldLab Eerstelijnszorg cooperates with these parties. For example, it can direct products developers to Oost NL for help with funding and direct them to MedValue for the assessment of the business case. In this way double work can be avoided.

- Multiple respondents questioned whether FieldLab Eerstelijnszorg is well known, so it seems wise to put some effort in this. Possibly FieldLab Eerstelijnszorg can do some marketing itself and not only rely on Health Valley for this.

5.4. Limitations and suggestions for further research

- During this study, the whole innovation system was mapped and a lot of different actors were included in the data collection, so the study does give an overview of the different and sometimes conflicting opinions that exist in the system. However, not all actors were included, because of limited time and availability. The overview would be even more complete if all actors were included. Especially the opinion of health insurers could give some added value, as they finance healthcare and in this way have a big impact on innovation that occurs.
- Most of the respondents spoke about care providers as users and not about patients. That is why the focus of this study is also more on care providers than on patients. The study would be more complete if patients were more integrated in it.
- The respondents did not use the stages of the stage-gate model (Cooper, 1990) to distinguish different stages in the innovation process. Afterwards it would be better if the more general process model of Bernstein & Singh (2006) was used. These authors acknowledge that the stages in the process are interacting and interdependent and that there are a lot of links inside and outside the organization during the process. This seems to fit more with the network environment in which FieldLab Eerstelijnszorg exists.
- Another problem that appeared because the respondents did not use the stages of the stage-gate model (Cooper, 1990) is that the researcher sometimes had to judge to which stage an activity belonged. This can cause misinterpretations.
- The conceptual model turned out to be not complete. A mutual link should be added between the needs of the actors and the stage of the innovation and from the function in the system to the stage in the system. Also, the business model turned out the have an influence on the function in the innovation system. If these additions were known before, then the interview questions might have been formulated differently.
- It also turned out that there are some issues with the validity of the constructs of this research. With coordination the researcher meant steering innovation in a certain direction. However, most respondents interpreted it as making arrangements. So this required some explanation. It also turned out that knowledge had some subgroups and customer information can be included in one of these groups. The last issue is that knowledge exchange lacked in the operationalisation, while that is an important concept in this study.
- In this study, only one case was taken into account, so the generalizability of the results is very low. This study can be redone for different cases to check whether the findings maintain in other situations. Specifically other living labs in the healthcare sector are interesting to study. When these cases substantiate the findings of this research, more general conclusions can be made about living labs in healthcare. On the other hand, it is also interesting to study more cases of utilizer-driven, user-driven and provider-driven living labs, to substantiate the findings of this study about the configurations of functions.
- The innovation system of FieldLab Eerstelijnszorg contains some relations that are very specific for the healthcare sector, for example care providers treat patients, but they get paid for it by health insurers. This limits the transferability of the findings to other contexts.

- This study shows that a living lab can contribute to all the functions an innovation system should perform. However, to determine how big the impact on the functions really is, a comparison should be made between cases in which a living lab was involved in the innovation process and cases without the involvement of a living lab.
- Another finding of this study is that knowledge development and diffusion is an important function in the innovation system. It seems interesting to further specify knowledge creation in such a system. A well known theory about knowledge creation is that of Nonaka (1994). However, this theory is about knowledge creation for a single organization. This study shows that knowledge can also be created for an entire system, so an option for further research is to study how this impacts the theory about knowledge creation.
- FieldLab Eerstelijnszorg was established by the province of Gelderland with a certain purpose, to support product developers with accelerating the development of their products. However, this study shows that FieldLab Eerstelijnszorg can be of more meaning when it supports (potential) users of products. This is an example that shows that the power of one organization can cause another organization to not fully use its potential. As the actors in the innovation system are all related to each other and some have power over others, it can be interesting to study what the influence of this power is on the constitution and functioning of the innovation system.

References

Almirall, E., Lee, M., & Wareham, J. (2012). Mapping living labs in the landscape of innovation methodologies. *Technology innovation management review*, *2*(9), 12-18. Retrieved from https://timreview.ca/

Ballon, P., Pierson, J., & Delaere, S. (2005). Test and experimentation platforms for broadband innovation: Examining European practice. doi:10.2139/ssrn.1331557

Bergek, A., Jacobsson, S., Carlsson, B., Lindmark, S., & Rickne, A. (2008). Analyzing the functional dynamics of technological innovation systems: A scheme of analysis. *Research policy*, 37(3), 407-429. doi:10.1016/j.respol.2007.12.003

Bergek, A., Jacobsson, S., Hekkert, M., & Smith, K. (2010). Functionality of innovation systems as a rationale for and guide to innovation policy. In R. E. Smits, S. Kuhlmann, & P. Shapira (Eds.), *The theory and practice of innovation policy* (pp.117-146). Cheltenham, England: Edward Elgar.

Bernstein, B., & Singh, P. J. (2006). An integrated innovation process model based on practices of Australian biotechnology firms. *Technovation, 26*(5-6), 561-572. doi: 10.1016 /j.technovation.2004.11.006

Bleijenbergh, I. (2015). *Kwalitatief onderzoek in organisaties* (2nd ed.). Den Haag, The Netherlands: Boom Lemma.

Boeddrich, H. J. (2004). Ideas in the workplace: a new appr oach towards organizing the fuzzy front end of the innovation process. *Creativity and innovation management, 13*(4), 274-285. doi:10.1111/j.0963-1690.2004.00316.x

Boeije, H. (2014). *Analyseren in kwalitatief onderzoek: Denken en doen* (2nd ed.). Den Haag, The Netherlands: Boom Lemma.

Buchanan, D.A., (2012). Case studies in organizational research. In G. Symon, & C. Cassell, (Eds.), *Qualitative organizational research: Core methods and current challenges* (pp. 351-370). Los Angeles, CA: Sage

Büchner, M. (2017). *Evaluatie Embedded Field Labs Zorginnovatie*. Retrieved from Oost NL.

Buggie, F. (2001). The four phases of innovation. *Journal of Business Strategy, 22*(5), 36-42. doi:10.1108/eb040197

Centraal Planbureau (2016). Middellange termijnverkenning 2018-2021. Retrieved from https://www.cpb.nl/publicatie/middellangetermijnverkenning-2018-2021

Chesbrough, H. W. (2003). *Open innovation: The new imperative for creating and profiting from technology*. Boston, MA: Harvard Business Press.

Cooper, R. G. (1990). Stage-gate systems: a new tool for managing new products. *Business horizons*, *33*(3), 44-54. Retrieved from https://www.journals.elsevier.com/business-horizons

Cooper, R. G. (2008). Perspective: The stage-gate® idea-to-launch process—update, what's new, and nexgen systems. *Journal of product innovation management*, *25*(3), 213-232. doi:10.1111/j.1540-5885.2008.00296.x

Cooper, R. G. (2014). What's next? after stage-gate. *Research Technology Management, 57*(1), 20-31. doi:10.5437/08956308X5606963

Cooper, R. G., & Edgett, S. (2012). Best practices in the idea-to-Launch process and its governance. *Research-Technology Management, 55*(2), 43-54. doi:10.5437 /08956308X5502022

Cooper, R. G., & Sommer, A. F. (2016). Agile-Stage-Gate: New idea-to-launch method for

manufactured new products is faster, more responsive. *Industrial Marketing Management, 59*, 167-180. doi:10.1016/j.indmarman.2016.10.006

Docherty, M. (2006). Primer on open innovation: Principles and practice. *PDMA Visions*, *30*(2), 13-17. Retrieved from https://www.pdma.org/page/visions_magazine

Doorewaard, H., Kil, A., & Ven, A. (2015). *Praktijkgericht kwalitatief onderzoek: Een praktische handleiding.* Amsterdam, The Netherlands: Boom Lemma.

Grönlund, J., Sjödin, D. R., & Frishammar, J. (2010). Open innovation and the stage-gate process: A revised model for new product development. *California management review*, *52*(3), 106-131. doi:10.1525/cmr.2010.52.3.106

Health Valley. (n.d.). *Menukaart Test je zorginnovatie in de praktijk* [Brochure]. Retrieved 2018, August 31, from https://www.healthvalley.nl/getattachment/Services/Embedded-Field-Labs/EmbeddedFieldLabs_Menukaart_Test-je-zorginnovatie-in-de-praktijk.pdf.aspx?lang=nl-NL

Hekkert, M. P., & Negro, S. O. (2009). Functions of innovation systems as a framework to understand sustainable technological change: Empirical evidence for earlier claims. Technological forecasting and social change, 76(4), 584-594. doi:10.1016/j.techfore.2008.04.013

Hoogendijk, R. C., & Pluimers, D. J. (2013). *Embedded Field labs voor zorginnovatie Verkenning en Advies*. Retrieved from Oost NV.

Hughes, G., & Chafin, D. (1996). Turning new product development into a continuous learning process. *Journal of Product Innovation Management, 13*(2), 89-104. doi:10.1111/1540-5885.1320089

King, N. (1992). Modeling the innovation process: An empirical comparison of approaches. *Journal of Occupational and Organizational Psychology, 65*, 89-100. doi:10.1111/j.2044-8325.1992.tb00487.x

King, N. (2012). Doing template analysis. In G. Symon, & C. Cassell, (Eds.), *Qualitative organizational research: Core methods and current challenges* (pp. 426-450). Los Angeles, CA: Sage

Leithold, N., Haase, H., & Lautenschläger, A. (2015). Stage-Gate® for sMEs: A qualitative study in germany. *European Journal of Innovation Management, 18*(2), 130-149. doi:10.1108/EJIM-07-2014-0070

Leminen, S., Westerlund, M., & Nyström, A. G. (2012). Living Labs as open-innovation networks. *Technology Innovation Management Review*, *2*(9), 6. Retrieved from www.timreview.ca

Lin, M., & Wei, J. (2018). The impact of innovation intermediary on knowledge transfer. *Physica A: Statistical Mechanics and Its Applications, 502,* 21-28. doi:10.1016/j.physa.2018.02.207

Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. O*rganization science, 5*(1), 14-37. doi:10.1287/orsc.5.1.14

Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: a handbook for visionaries, game changers, and challengers.* Retrieved from https://www.wiley.com/en-us

Phaal, R., & Muller, G. (2009). An architectural framework for roadmapping: Towards visual strategy. *Technological Forecasting and Social Change, 76*(1), 39-49. doi:10.1016/j.techfore.2008.03.018

Saren, M. (1984). A classification and review of models of the intra-firm innovation process. *R&d Management, 14*(1), 11-24. doi:10.1111/j.1467-9310.1984.tb00504.x

Sarooghi, H., Libaers, D., & Burkemper, A. (2015). Examining the relationship between creativity and innovation: A meta-analysis of organizational, cultural, and environmental factors. *Journal of*

business venturing, 30(5), 714-731. doi:10.1016/j.jbusvent.2014.12.003

Schers, H. J., & Hendriks, I. (2015). *Field Lab Eerstelijnszorg, FIELD LAB met lead partner Thermion: Subsidievoorstel Embedded Field Labs.* Retrieved from FieldLab Eerstelijnszorg.

Schuurman, D. (2015). *Bridging the gap between Open and User Innovation?: exploring the value of Living Labs as a means to structure user contribution and manage distributed innovation* (Doctoral dissertation, Ghent University). Retrieved from https://biblio.ugent.be/publication/5931264

Sørensen, E., & Torfing, J. (2011). Enhancing collaborative innovation in the public sector. *Administration & Society*, *43*(8), 842-868. doi:10.1177/0095399711418768

Trebble, T. M., Hansi, N., Hydes, T., Smith, M. A., & Baker, M. (2010). Process mapping the patient journey through health care: an introduction. *Bmj*, *341*(7769), 394-397. Retrieved from https://www.bmj.com/

Van Ewijk, C., Van der Horst, A., & Besseling, P., (2013). *Toekomst voor de zorg.* Retrieved from Centraal Planbureau website: https://www.cpb.nl/publicatie/toekomst-voor-de-zorg

Van Lente, H., Hekkert, M., Smits, R., & van Waveren, B. (2003). Roles of systemic intermediaries in transition processes. *International journal of Innovation management*, *7*(03), 247-279. doi:10.1142/S1363919603000817

Verschuren, P., & Doorewaard, H. (2015). *Het ontwerpen van een onderzoek* (5th. ed.). Amsterdam, The Netherlands: Boom Lemma.

Yin, R. K. (2014). *Applications of case study research*. Los Angeles, CA: Sage.

Appendices

1. Used websites

Organization	Link
FieldLab Eerstelijnszorg	https://fieldlabeerstelijn.nl/
Oost NL	https://oostnl.nl/nl
Health Valley	https://www.healthvalley.nl/
MedValue	https://medvalue.nl/
REshape	http://radboudreshapecenter.com/
STIELO	http://www.stielo.nl/

2. Topic list - first version

Introductie

- Wat houdt het onderzoek precies in: welke functie(s) kan het Field Lab Eerstelijnszorg vervullen in het systeem van innovaties. Hierbij wordt gekeken naar de wat de behoeften zijn van de andere partijen in het systeem en de stadia waarin innovaties zich bevinden.
- Hoe lang gaat dit gesprek ongeveer duren
- Toestemming vragen voor opname
- Informed consent formulier invullen

Vragen: Field Lab/Provincie

- **Wat doet het Field Lab nu precies?**
  - In welke fase van het innovatieproces?
    - *begin van idee formuleren*
    - *uitwerking van idee*
    - *business case opzetten*
    - *eerste ontwikkeling van product*
    - *testen met gebruikers*
    - *op de markt brengen van product*
- **Wat is de reden dat het Field Lab opgericht is?**
  - Welke behoeften waren er?
    - *gebrek aan kennis*
    - *coördinatie*
    - *resources/middelen*
    - *legitimiteit/sociale acceptatie*
    - *netwerk*
    - *klantinformatie*
- **Wat mist er volgens jullie nog bij de ontwikkeling van innovaties en wat zou het Field Lab Eerstelijnszorg hier in kunnen betekenen?**
  - Welke behoeften zijn er?
    - *gebrek aan kennis*
    - *coördinatie*
    - *resources/middelen*
    - *legitimiteit/sociale acceptatie*
    - *netwerk*
    - *klantinformatie*
- **Wat zien jullie als de taken die het Field Lab op zich kan nemen in de samenwerking met andere patijen?**
  - Welke functies kan het aan bijdragen?
    - *Kennisontwikkeling en verspreiding*
    - *Identificeren van nieuwe kansen*
    - *Experimenteren en risico en onzekerheid beperken*
    - *Vergroten/vormen van markt*
    - *Middelen beschikbaar stellen*
    - *Legitimiteit/sociale acceptatie verkrijgen*
    - *Nieuwe samenwerkingen aangaan*
- **Waar zou het Field Lab zich op moeten focussen?**
  - Op welke fase van het proces en welke functies binnen het systeem?
- **Zijn er nog dingen die niet benoemd zijn, maar die volgens u wel van belang zijn voor dit onderzoek?**

Vragen: Oost NL/Health Valley/Medvalue/RUMC/HAN/Zorggroepen/Ondernemers

- **Waaruit bestaat jullie samenwerking met Field Lab Eerstelijnszorg?**
  - In welke fase van het innovatieproces?
    - *begin van idee formuleren*
    - *uitwerking van idee*
    - *business case opzetten*
    - *eerste ontwikkeling van product*
    - *testen met gebruikers*
    - *op de markt brengen van product*
- **Wat is de reden dat jullie deze samenwerking zijn aangegaan?**
  - Welke behoeften waren er?
    - *gebrek aan kennis*
    - *coördinatie*
    - *resources/middelen*
    - *legitimiteit/sociale acceptatie*
    - *netwerk*
    - *klantinformatie*
- **Wat mist er volgens jullie nog bij de ontwikkeling van innovaties en wat zou het Field Lab Eerstelijnszorg hier in kunnen betekenen?**
  - Welke behoeften zijn er?
    - *gebrek aan kennis*
    - *coördinatie*
    - *resources/middelen*
    - *legitimiteit/sociale acceptatie*
    - *netwerk*
    - *klantinformatie*
- **Wat zien jullie als de taken die het Field Lab op zich kan nemen in de samenwerking met andere patijen?**
  - Welke functies kan het aan bijdragen?
    - *Kennisontwikkeling en verspreiding*
    - *Identificeren van nieuwe kansen*
    - *Experimenteren en risico en onzekerheid beperken*
    - *Vergroten/vormen van markt*
    - *Middelen beschikbaar stellen*
    - *Legitimiteit/sociale acceptatie verkrijgen*
    - *Nieuwe samenwerkingen aangaan*
- **Waar zou het Field Lab zich op moeten focussen?**
  - Op welke fase van het proces en welke functies binnen het systeem?
- **Zijn er nog dingen die niet benoemd zijn, maar die volgens u wel van belang zijn voor dit onderzoek?**

<u>Afsluiting</u>

- Interview wordt getranscribeerd en naar de geïnterviewde gemaild ter controle
- Data wordt vertrouwelijk bewaard (op de server van de RU)
- Anoniem gebruik van data in verslag
- Afspraak maken over inzien van resultaten
- Kan er achteraf contact opgenomen worden als er nog vragen zijn?
- Bedanken voor deelname

3. Topic list - adjusted version

Introductie

- Wat houdt het onderzoek precies in: welke functie(s) kan het Field Lab Eerstelijnszorg vervullen in het systeem van innovaties. Hierbij wordt gekeken naar de wat de behoeften zijn van de andere partijen in het systeem en de stadia waarin innovaties zich bevinden.
- Hoe lang gaat dit gesprek ongeveer duren
- Toestemming vragen voor opname
- Informed consent formulier invullen

Vragen: Field Lab/Provincie

- **Wat is uw functie en op welke manier bent u betrokken bij het Fieldlab Eerstelijnszorg?**
- **Wat doet het Field Lab nu precies?**
  - In welke fase van het innovatieproces?
    - *begin van idee formuleren*
    - *uitwerking van idee*
    - *business case opzetten*
    - *eerste ontwikkeling van product*
    - *testen met gebruikers*
    - *op de markt brengen van product*
- **Wat is de reden dat het Field Lab opgericht is?**
  - Welke behoeften waren er?
    - *gebrek aan kennis*
    - *coördinatie*
    - *resources/middelen*
    - *legitimiteit/sociale acceptatie*
    - *netwerk*
    - *klantinformatie*
- **Wat mist er volgens jullie nog bij de ontwikkeling van innovaties en wat zou het Field Lab Eerstelijnszorg hier in kunnen betekenen?**
  - Welke behoeften zijn er?
    - *gebrek aan kennis*
    - *coördinatie*
    - *resources/middelen*
    - *legitimiteit/sociale acceptatie*
    - *netwerk*
    - *klantinformatie*
- **Wat zien jullie als de taken die het Field Lab op zich kan nemen in de samenwerking met andere patijen?**
  - Welke functies kan het aan bijdragen?
    - *Kennisontwikkeling en verspreiding*
    - *Identificeren van nieuwe kansen*
    - *Experimenteren en risico en onzekerheid beperken*
    - *Vergroten/vormen van markt*
    - *Middelen beschikbaar stellen*
    - *Legitimiteit/sociale acceptatie verkrijgen*
    - *Nieuwe samenwerkingen aangaan*
- **Waar zou het Field Lab zich op moeten focussen?**
  - Op welke fase van het proces en welke functies binnen het systeem?
- **Zijn er nog dingen die niet benoemd zijn, maar die volgens u wel van belang zijn voor dit onderzoek?**

Vragen: Oost NL/Health Valley/Medvalue/RUMC/HAN/Zorggroepen/Ondernemers

- **Wat is uw functie en op welke manier bent u betrokken bij het Fieldlab Eerstelijnszorg?**
- **Waaruit bestaat jullie samenwerking met Field Lab Eerstelijnszorg?**
  - In welke fase van het innovatieproces?
    - *begin van idee formuleren*
    - *uitwerking van idee*
    - *business case opzetten*
    - *eerste ontwikkeling van product*
    - *testen met gebruikers*
    - *op de markt brengen van product*
  - Op welke manier kan het Fieldlab het ontwikkelingsproces versnellen?
- **Op welke manier is uw organisatie betrokken geraakt bij het Fieldlab Eerstelijnszorg?**
  - Zijn ze benaderd vanuit de provincie, zijn ze benaderd vanuit het Fieldlab, zijn ze zelf naar het Fieldlab toe gestapt?
- **Wat is de reden dat jullie deze samenwerking zijn aangegaan?**
  - Welke behoeften waren er?
    - *gebrek aan kennis*
    - *coördinatie*
    - *resources/middelen*
    - *legitimiteit/sociale acceptatie*
    - *netwerk*
    - *klantinformatie*
- **Wat mist er volgens jullie nog bij de ontwikkeling van innovaties en wat zou het Field Lab Eerstelijnszorg hier in kunnen betekenen?**
  - Welke behoeften zijn er?
    - *gebrek aan kennis*
    - *coördinatie*
    - *resources/middelen*
    - *legitimiteit/sociale acceptatie*
    - *netwerk*
    - *klantinformatie*
- **Wat zien jullie als de taken die het Field Lab op zich kan nemen in de samenwerking met andere patijen?**
  - Welke functies kan het aan bijdragen?
    - *Kennisontwikkeling en verspreiding*
    - *Identificeren van nieuwe kansen*
    - *Experimenteren en risico en onzekerheid beperken*
    - *Vergroten/vormen van markt*
    - *Middelen beschikbaar stellen*
    - *Legitimiteit/sociale acceptatie verkrijgen*
    - *Nieuwe samenwerkingen aangaan*
- **Waar zou het Field Lab zich op moeten focussen?**
  - Op welke fase van het proces en welke functies binnen het systeem?
- **Zijn er nog dingen die niet benoemd zijn, maar die volgens u wel van belang zijn voor dit onderzoek?**

Vragen: Andere FieldLabs

- **Kunt u kort uitleggen wat uw organisatie doet?**
- **Wat is uw functie?**
- **In welke fase van het innovatieproces zitten jullie werkzaamheden?**
  - In welke fase van het innovatieproces?
    - *begin van idee formuleren*

- *uitwerking van idee*
- *business case opzetten*
- *eerste ontwikkeling van product*
- *testen met gebruikers*
- *op de markt brengen van product*

❖ **Wat is de reden dat het Field Lab opgericht is?**
- Welke behoeften waren er?
  - *gebrek aan kennis*
  - *coördinatie*
  - *resources/middelen*
  - *legitimiteit/sociale acceptatie*
  - *netwerk*
  - *klantinformatie*

❖ **Op welke manier is uw organisatie betrokken geraakt bij het Fieldlab Eerstelijnszorg?**
- Zijn ze benaderd vanuit de provincie, zijn ze benaderd vanuit het Fieldlab, zijn ze zelf naar het Fieldlab toe gestapt?

❖ **Wat mist er volgens jullie nog bij de ontwikkeling van innovaties en waar spelen jullie zelf op in?**
- Welke behoeften zijn er?
  - *gebrek aan kennis*
  - *coördinatie*
  - *resources/middelen*
  - *legitimiteit/sociale acceptatie*
  - *netwerk*
  - *klantinformatie*

❖ **Wat zien jullie als de taken die het Field Lab op zich kan nemen in de samenwerking met andere patijen?**
- Welke functies kan het aan bijdragen?
  - *Kennisontwikkeling en verspreiding*
  - *Identificeren van nieuwe kansen*
  - *Experimenteren en risico en onzekerheid beperken*
  - *Vergroten/vormen van markt*
  - *Middelen beschikbaar stellen*
  - *Legitimiteit/sociale acceptatie verkrijgen*
  - *Nieuwe samenwerkingen aangaan*

❖ **Waar zou het Field Lab zich op moeten focussen?**
- Op welke fase van het proces en welke functies binnen het systeem?

❖ **Zijn er nog dingen die niet benoemd zijn, maar die volgens u wel van belang zijn voor dit onderzoek?**

<u>Afsluiting</u>
- Interview wordt getranscribeerd en naar de geïnterviewde gemaild ter controle
- Data wordt vertrouwelijk bewaard (op de server van de RU)
- Anoniem gebruik van data in verslag
- Afspraak maken over inzien van resultaten
- Kan er achteraf contact opgenomen worden als er nog vragen zijn?
- Bedanken voor deelname

4. Codebook

Codegroup	Code (topic)	Sub-codes	Description	Sample quotes
Needs of actors in the innovation system	Influence direction for innovation (coordination)		The need for steering of the direction of innovation.	"Dus het matchen van, nou laten we het maar even noemen vraag en aanbod, is daar een onderdeel van.
	Knowledge		The need for knowledge in general.	
		Knowledge exchange	Exchange knowledge with other parties.	" Maar als er goede afspraken zijn tussen de andere Fieldlabs, dat je ook goed van elkaar weet 'Oké, wij hebben producten ontwikkeld die misschien niet passen bij onze patiëntengroep of onze eindgebruiker, maar misschien wel voor jullie'. Ik denk dat er heel veel informatie is, maar dat dat gewoon niet goed wordt doorgegeven." " We werken niet samen. Nee, de samenwerking zit echt op het niveau van de coördinatie. Ik heb het eerste jaar veel bij die gesprekken en bijeenkomsten gezeten, [naam] doet dat nu natuurlijk vanuit zijn rol, en dat zit hem zuiver op het niveau van degene die het Fieldlab aanstuurt en coördineert binnen de setting. Dus de rest van de mensen die af en toe zich binnen die proeftuinomgeving bewegen hebben geen contacten met andere Fieldlab settings."
		Need for knowledge about a specific product	The need for knowledge about a specific product that is developed. What it is, how it works, how it fits in daily practice, etc.	"Maar wat je dus nu wel ziet is dat bedrijven nog steeds heel erg behoefte hebben om te toetsen en te bepalen dat wij zij hebben ook van toegevoegde de waarde is want je ziet ook dat als iets ondanks dat het kosten effectief is. Hè, dus het is goedkoper dan wat er als is. Dat dat niet automatisch betekent dat mensen jouw product in de zorg gaan gebruiken."
		Need for knowledge about healthcare	The need for knowledge about the healthcare sector. What do the processes look like, what is the revenue model, what problems occur, etc.	"Wat vaak ook ontbreekt is kennis van het specifieke deelterrein van de zorg. En daarvoor heb je dan wel de mensen nodig die daar goed in thuis zijn, om die bij een innovatie te betrekken."
		Need for knowledge about innovation	The need for knowledge about the innovation process, what are best practices, what determines whether a product is adapted or not, etc	"Wat we er mee in onderzoek en in onderwijsvernieuwing mee kunnen doen." "Dat betekent dat we die resources leveren vanuit de kenniscentra van de HAN. Dus zeg maar de onderzoekgroepen van de HAN. En door studenten in te zetten, dat is leerzaam voor die studenten en tegelijkertijd helpen ze dus mee in het testen van die producten."
		Need for knowledge about innovation opportunities	Knowledge about what is happening in the field of innovation, what options it offers and what it can gain.	"En daarom is juist die verbinding met die buitenwereld zo interessant, omdat je dan kunt putten uit oplossingen die elders bedacht zijn en die je misschien kunt omvormen om in te zetten in de zorg. Terwijl we daar zelf niet op komen, omdat we die sectoren niet kennen, omdat we die oplossingen niet in beeld hebben."
		Need for	The need for knowledge about	"Als zij dus inderdaad laagdrempelig beschikbaar zijn, dan kan al heel snel gekeken worden of

		knowledge about needs and desires of users (customer information)	the needs and desires of potential users of products.	het probleem wel echt een probleem is, of de artsen er wel op zitten te wachten, maar ook of het wel past, of het wel praktisch is, of het wel past in het werkproces, of het knopje wel op de goeie plek zit.”
	Legitimacy		The need for acceptance of the product.	“Als in die implementatie bewezen kan worden dat die technologie een meerwaarde heeft, pas dan zijn ze bereidwillig om het te kopen. Dus daar, die implementatie is eigenlijk net een onderdeel dat de technologieleverancier niet op zijn vizier heeft en waar die vaak niet aan denkt.” “Dus het gaat ook heel erg over hoe je telkens in elke context er aan werkt om het werkend te maken en geaccepteerd te krijgen. Waarmee je dingen natuurlijk niet nodeloos door mensen hun strot kunt duwen, als er echt weerstand is zal dat niet lukken.”
	Need for access to healthcare		The need to get in contact with care providers and patients.	“Nou wat ik wel signaleer als grootste barrière is die toegang tot die zorg.” “De zorg is ook moeilijk toegankelijk voor dat soort bedrijven. Ze kunnen wel een arts bellen, maar de kans dat ze daar respons op krijgen is gewoon heel laag. Dus wij zijn ook altijd op zoek naar plekken waar zij dan vervolgens laagdrempelig met hun innovatie een aantal dingen kunnen valideren.”
	Need for alignment of demand and supply		Parties look for connection and conformity.	“En wij worden in de zorg geconfronteerd met allerlei innovaties waar vaak weinig over na is gedacht, waar vaak weinig interactie is geweest tussen professionals en ontwikkelaars en bouwers en zakenlieden, etc. En mede daardoor heel veel onaffe producten zijn, producten waar veel energie in gaat dat zinloos is, dat veel potentiële goede ideeën niet op de markt of verkeerd op de markt komen. Dus dat is wat ik zie vanuit de zorg. En dat veel vragen vanuit de zorg niet per definitie worden beantwoord door innovaties vanuit het bedrijfsleven, omdat ze niet weten wat de vraag is.”
		Market pull	Develop new products in reaction to specific needs and desires.	“Maar wat het meeste werkt is gewoon als de urgentie en het knelpunt vanuit de zorg zelf wordt ervaren en ze komen daar mee naar voren, ja dan heb je gewoon veel meer tractie om een stap te maken. Want dan willen de zorgverleners ook echt dat er een bedrijf komt die hen helpt. Dus dat is voor het bedrijf beter.” “Je moet bij het probleem beginnen dus je moet, je moet weten wat het probleem is in de zorg en dan kijken of je dat op kan lossen.”
		Technology push	The ideas for new products come from product developers.	“En dat betekent dat bedrijven daar ook meer moeten doen, maar dus ook hun eigen ideeën daar meer doorduwen. En dat is soms heel goed hè, want soms is dat heel disruptief.”
	Need for coordinating party		The need for a party that coordinates between the different actors and takes care of the practical issues.	“Wat ik dan mis is dat er geen, een body is om alle partijen echt bij elkaar te zetten.” “Wat heel erg fijn is, is als daar inhoudelijke projectbegeleiding is. Mensen die bijvoorbeeld de vergaderingen organiseren, die de notities maken, die de vervolgafspraken maken. Een soort projectmanagement.”
	Need for economic stimulation		Innovations in the healthcare sector need to be accelerated to stimulate the economy.	“Het gaat om innovatieve zorgoplossingen en versnelling van de doorontwikkeling van prototypes en het testen van prototypes (product en technologie) naar marktrijpe producten voor de gezondheidszorg.” “Ook dient deze aanpak uiteindelijk te leiden tot meer bedrijvigheid en werkgelegenheid in de

				Gelderse zorgmarkt."
	Need for improvement of healthcare		The need to improve healthcare by organizing it in a smarter way, decrease the workload, decrease the costs or increase the quality.	"En tegelijkertijd denk ik van ja hè, innoveren is wel van belang voor de zorg. We moeten straks toch met minder mensen weer meer werk doen en dat gaan we niet redden als we praktijkverkleining bijvoorbeeld in de huisartsenpraktijk alleen maar gaan doorvoeren, want daar hebben we gewoon de dokters niet voor. Dus iemand zal toch moeten investeren in dat innoveren." "Want voor mij zou het ook, de drive er moeten zijn om de zorg te verbeteren en dan de zorg naar de thuissituatie te verplaatsen of zorgprofessionals ontlasten qua werkdruk."
	Need for innovation agenda		Care groups need to make clear which direction they want to go with innovation.	"En de tweede is dat de zorg, dus het kost ons moeite bij de zorgbedrijven om een redelijke visie te vormen op waar ze heen willen met hun eigen innovatie." "Een zorgorganisatie of zorgorganisaties die zeggen 'wij willen een Fieldlab' zullen zelf een visie moeten hebben op waar willen we nou eigenlijk dat, waar moeten innovaties worden ingezet zegmaar. Dus je moet een soort van innovatieagenda hebben om te zeggen van 'oké, we gaan contact leggen met die en met die en met die, want we hebben zelf ook doelstellingen om te halen'."
	Need for market		Product developers look for a market for their product.	"Het bedrijfsleven zoekt klanten, soms launching customers."
	Network		Actors want to get in contact with other parties.	"Als je het hebt over een samenwerkingsrelatie die wij hebben met het Fieldlab, dan moet het Fieldlab hier ook een lokaal netwerk hebben. En aanvullend zijn op ons netwerk."
	Resources		The need for financial resources, human resources and goods.	"De grootste vraag die ondernemers vaak hebben, wat ze niet meteen zeggen, is we hebben geld nodig om te ontwikkelen. Dus het zal zeker helpen als er een bepaalde manier middelen beschikbaar zijn om die onderzoeken te doen, dat wel die ondernemer niet het volledige bedrag zou hoeven te betalen." "Dus ergens een steuntje in de rug en dan niet alleen om het Fieldlab te laten draaien, maar juist ook om de partijen die hulp nodig hebben, om die te helpen die stap te zetten. Want alles wat ze moeten doen, ze hebben heel weinig geld, ze kunnen het maar één keer uitgeven en ze moeten daar enorm over nadenken."
Stage of the innovation	Build business case		Elaborate the business case of the product.	"Ik zou het meer aan de voorkant denk ik willen zien. Dus je hebt een idee en dat wil je toetsen. Je moet je business model valideren en daarvoor wil je zo veel mogelijk stakeholders spreken om dat te toetsen."
	Development		The construction of the product under development.	"Hou je soort van ontwerpsessie met huisartsen. Die geven dan informatie. Dan maak je een prototype en dat presenteer je. Daar krijg je weer feedback op." "Maar soms ook een plek om een product echt door te ontwikkelen met eindgebruikers."
	Idea generation		Come up with ideas for new products.	"Maar je kunt ook proactief zeggen van nou kijk, dit, het Fieldlab eerstelijnszorg ziet ik noem maar, tien challenges uit de eerstelijnszorg, de huisartsen hebben problemen met. Ik denk dat je er wel heel veel kunt vinden. Als je die op de één of andere manier zou kunnen koppelen aan, dit zijn onze challenges, help ons die op te lossen, wij hebben faciliteiten om het te testen. Dat zou ik ook een hele mooie vinden." "De andere kant is dat de zorgprofessionals zelf ook nog wel eens frisse ideeën hebben, waar dan als het ware een technologie of mogelijk te ontwerpen technologie bijgezocht wordt."

	Idea scoping		Elaborate the idea for a new product.	"Ja je zou kunnen verkennen van 'zou het iets kunnen zijn' en dan kunnen wij als professional zeggen van 'nou, het lijkt ons wel aardig, maar dan zul je iets verder moeten zijn voordat we er echt iets concreet mee kunnen', het kan ook zijn dat we zeggen 'joh, dat wiel is al tien keer uitgevonden, doe maar niet'." "Het begint aan de voorkant bij ideeënvorming en het nadenken over concepten van innovaties. De denkkracht en praktische input van professionals in deze fase van een ontwikkelproces kan cruciaal zijn voor de kansrijkheid van innovaties en prototypes."
	Launch		Bring the product to the market.	"Maar het verkopen van zo'n product of het reclame maken voor zo'n product is wel echt, denk ik dat de leverancier moet doen, dat moet het Fieldlab niet gaan doen." "Het eerstelijns Field Lab wordt geen mede-ondernemer bij productverkoop. De belangenverstrengeling die daarbij zou gaan ontstaan is strijdig met het onafhankelijke principe en de status van het Field Lab."
	Testing & validation		Test the new product and validate its use in daily practice.	"Dat is dus wat mij betreft het toetsen van producten en ideeën bij grotere groepen mensen." "Nou ik geloof dus heel duidelijk dat het Fieldlab zich moet richten op de testfase net voor marktintroductie."
	Post-launch trajectory		Support product developers after they launched the product.	"En de eerste fases daarna. Dus de introductiefase en dan de groeifase. Dan kun je zeggen oké dan kan je nog concepten uitontwikkelen, optimaliseren dat is wat je wil."
Function in the innovation system	Development of positive externalities		Expand the innovation system to support the other functions.	"Alleen ik zie denk ik de relatie met ondernemers, die zie ik als van tijdelijke aard zegmaar. Terwijl het netwerk van zorgverleners of, dat is natuurlijk van iets wat permanenter aard, omdat je zou proberen telkens nieuwe projecten, ik zeg even weg te zetten in die omgeving."
	Entrepreneurial experimentation and management of risk and uncertainty		Experiment with new products and diminish risk and uncertainty.	"Ik denk dat het Fieldlab in eerste instantie zeg maar gewoon testen moet doen en kijken of het werkt of niet." "Ja wat het Fieldlab kan betekenen, en dat geldt voor al die Fieldlabs die in die zorginstellingen zijn, is het echt uittesten van producten in, om te testen of die kunnen worden geïmplementeerd in de zorgprocessen. En dat betekent dus ook, een onderdeel van die implementatie is dat die producten voldoende aansluiten bij de werkmethode van zorgprofessionals of van patiënten, cliënten. En eventueel mantelzorgers."
	Function to accelerate innovation		Speed up the process of innovation.	"Vanuit het programma Topsectoren en Innovatie hebben de Field Labs als doel de marktintroductie van innovaties te versnellen, partijen te verbinden om zo samen sterker te staan in zorginnovatie."
	Function to align parties		The function to align the different parties of supply and demand.	"Nou ik denk dat de kracht van het Fieldlab er in zit dat je partijen die niet van nature met mekaar in gesprek gaan, over innovaties, om die bij elkaar te brengen." "Dus ik zie het echt als een verbindend netwerk. Als een brugfunctie die zorgt dat de partijen bij elkaar komen die mogelijk iets voor elkaar kunnen betekenen."
	Function to apply focus		The function to support care providers with creating a vision for innovation.	"Maar dat blijkt toch heel ingewikkeld om bij zorgverleners op te halen wat zij willen en ook na te denken van hoe kun je daar niet alleen maar armer van worden en alleen maar op toeleggen."
	Function to execute proper research		The FieldLab has to execute research of high quality.	"Er zijn heel veel bedrijven die nu helemaal niet goed zijn intern in het uitvoeren van onderzoek en heel veel zorgorganisaties ook. Dus het is ook een stukje kwaliteitsborging van het testen en het onderzoek dat gedaan wordt."

	Function to improve healthcare		The function to create opportunities for improvement of healthcare.	“Fieldlab moet geen doel hebben om een product er doorheen te krijgen, maar moet het doel hebben om de zorg te verbeteren. Want anders kunnen ze hun onafhankelijke status niet verantwoorden.”
	Function to motivate parties		The function to motivate care providers to participate in innovation.	“Maar tegelijkertijd ook de zorgwereld bij wijze van spreken meenemen in ontwikkelingen die ook interessant kunnen zijn.” “Activeer die zorgverleners, dat is het allerbelangrijkst.”
	Function to provide access to healthcare		The FieldLab can provide access to the healthcare sector.	“Of het Fieldlab zien als entree naar de markt, wat ook wel vaker voorkomt.”
	Influence on the direction of search and the identification of opportunities		Look for opportunities for innovation and steer the direction of it.	“Dus het Fieldlab moet ook wel een beetje aangeven van waar behoefte aan is.” “Dus wat je net zei ook hè, ‘vind je dat ze de problemen moeten verzamelen?’ Nee, dat denk ik niet, maar als een zorgorganisatie denkt: ‘ik heb dit probleem’, en zij denken dat daar meerdere mensen last van hebben, dan kunnen ze wel naar zo’n Fieldlab als die een goede achterban heeft, ‘speelt dit bij meer organisaties?’.”
	Knowledge development and diffusion		The function to create knowledge and exchange knowledge with other parties.	“De link leggen tussen zorg en bedrijfsleven. Dat die kennis met elkaar uitleveren om tot een beter product te komen.” “Ik denk dat het Fieldlab gezien de wortels, hè verbonden toch wel met onderwijsinstellingen, kan ik me voorstellen dat zij dat zien als hun taak ook om kennis te verspreiden. Is het nodig voor innovatie? Ja dan hangt er vanaf hoe veel van die kennis generiek is en hoe veel specifiek voor die innovatie.”
	Legitimation		Gaining acceptance for new products and innovation.	“Ik denk dat je door het testen van die technologie in de zorginstellingen en met je cliënten, daardoor kan die technologie zijn meerwaarde bewijzen. Of de technologie kan worden aangepast, omdat de testen dat uitwijzen, dat dat nodig is. En daarmee werk je wel aan de sociale acceptatie.” “Ja het is user-acceptance testen, is eigenlijk wat je doet in een Fieldlab. Voor een breder publiek, het liefst organisatie onafhankelijk.”
	Market formation		Create a market for the product that is developed.	“Maar het verkopen van zo’n product of het reclame maken voor zo’n product is wel echt, denk ik dat de leverancier moet doen, dat moet het Fieldlab niet gaan doen.” “Het Field Lab zelf is niet primair gericht op verkoop of marketing van geteste prototypes.”
	Resource mobilization		Mobilize financial resources, human resources and goods.	“Ik zie Fieldlab nog niet als een soort investeringsvehikel of als een fonds waar je bij wijze van spreke start-ups een fase verder helpt. Die fondsen die zijn er en de vraag is of dat de rol zou moeten zijn.”
Innovation system	Fragmented innovation process		During the innovation process you have to deal with a lot of different actors.	“Dus eigenlijk moet je, vind ik, je regionaal je innovatie-infrastructuur helder en scherp hebben en die moet niet versnipperd zijn. En dat is die nu wel.” “Het realiseren van een innovatie in de gezondheidszorg is extra moeilijk vanwege de complexe financieringsstructuur in de zorg, het grote aantal partijen dat in en rondom de zorg actief is en de vaak starre en geprotocolleerde organisatiestructuur van de zorg.”
	Parties in innovation system		What are the parties in the innovation system.	“Het netwerk, als ik kijk naar het Health Valley netwerk, nou ja wij hebben alleen al 260 partners die dingen zouden willen doen. Wij hebben een heleboel andere partijen die met een Fieldlab dingen zouden kunnen gaan doen dus er zijn allerlei netwerken al die kunnen doorverwijzen

				naar zo'n Fieldlab."
	Offer of other actors		What are the activities of the other actors in the system.	"MedValue is een spin-off bedrijf van het Radboud UMC en wij kijken naar de toegevoegde waarde van innovaties." "Health Valley is bij uitstek de geschikte partij om voor de centrale aansturing en collectieve promotie te zorgen. OOST NV kan het projectmanagement en het (door)ontwikkelen van de gezamenlijke methodologie voor haar rekening nemen."
		Acquisition for FieldLab	In what ways do product developers get in contact with the FieldLab.	"En ik geleid bedrijven die interesse hebben om met zo'n zorginstelling of Fieldlab samen te werken, die geleid ik door naar het betreffende Fieldlab." "Deelname aan een Field Lab kwam in de meeste gevallen tot stand vanuit bestaande contacten tussen de bedrijven en de zorginstellingen."
Organisation of FieldLab	Side conditions		Side conditions that the FieldLab has to deal with.	
		Infrastructure of FieldLab	The structure and processes of the FieldLab.	"Elk Field Lab heeft een eigen karakter, organisatievorm en partnerschap." "Nou ik vind wel dat Fieldlab een rol heeft om zeg maar de infrastructuur op orde te hebben. Dus als wij zeggen dat wij een expertise bieden, dan heb je dus professionals die meewerken met je. En dan heb je daar ook de coördinatie van en het toezicht. Daar moet je dus voor zorgen dat het er is."
		Marketing of FieldLab	Marketing for the FieldLab and communication about it.	"Dus wij doen communicatie, marketing, we geven de Fieldlabs de mogelijkheden om op events van ons zich ook te presenteren, dus dat gebeurt ook jaarlijks."
		Objectivity of FieldLab	The FieldLab needs to be objective.	"Dus om die proeftuinomgeving te kunnen handhaven heb je denk ik wel nodig om een soort onafhankelijkheid te houden ten opzichte van producten of uitkomsten."
		Profiling of FieldLab	The identity of the FieldLab and what it stands for.	"En een duidelijk profiel misschien ook wel. Waar ben je nou voor en waar ben je niet voor. Dus als je het hebt over eerstelijnszorg, wat zijn dan echt thema's waar je op wilt richten, waarvan de zorgverleners uit dat Fieldlab zeggen 'dat is nou iets, daar willen we ons mee onderscheiden'."
	Size of FieldLab		What is the capacity of the FieldLab and its focus.	"En dat betekent waarschijnlijk ook dat het dan, ja daar zal ook denk ik, binnen het Fieldlab zou daar dan ook, ja meer handjes, meer denkkracht moeten komen om die volgende stap te kunnen maken. Want dat kun je niet bij wijze van spreken met de huidige bezetting blijven doen."
		Scope of FieldLab	On what geographical scope does the FieldLab focus.	"Ook is gebleken dat de meeste huidige initiatieven zich sterk richten op regionale samenwerking, waarbij het medisch inhoudelijk thema ontbreekt of zeer breed is geformuleerd."
		Specialisation of FieldLab	To what extent does the FieldLab specialize in subsections of healthcare.	"De gezondheidszorg heeft zo'n breed speelveld dat een algemeen Field Lab voor allerhande zorginnovaties niet wenselijk is omdat het dan te lastig is om verbinding te houden met de juiste zorgprofessionals."
	Target group		What is the target group that the FieldLab focuses on.	
		Focused on care providers	The activities of the FieldLab are focused on supporting care providers.	"Want als je alleen maar je deur open zet voor ondernemers om binnen te komen, maar aan de achterkant je zorgverleners niet goed opgelijnd hebt staan en uitlegt waarom ze met die bedrijven moeten gaan samenwerken, dan loop je vast."

		Focused on product developers	The activities of the FieldLab are focused on supporting product developers.	“Je zou kunnen zeggen, tenminste dat is mijn opvatting, dat in het projectvoorstel en de ideeën van de provincie het Fieldlab een soort van dienstleverancier is voor ondernemers.”
	Ways of funding		There are different options of funding for the FieldLab.	“Dat is een uitdaging voor het Fieldlab denk ik komend jaar om te kijken van ‘hoe kunnen wij nu toch ook wel middelen structureel krijgen om die proeftuinomgeving overeind te houden’.”
		Funding by care providers	Funding of the FieldLab by care providers.	“En ik denk aan de professionele kant is er nu geen verdienmodel voor om dit te doen, dit kost ons gewoon geld.”
		Funding by health insurers	Funding of the FieldLab by health insurers.	“En ik vind eigenlijk zelf ook dat wel verzekeraars daarin zouden moeten investeren. Dat ze met innovatie als geheel aan alle patiënten ten goede komt en dat je zegt ‘nou, als je aantoonbaar daar goeie dingen in doet, dan kan je best aan het einde afrekenen. Dan krijg je een opslag per ingeschreven patiënt voor jouw activiteiten binnen een proeftuin omgeving.”
		Funding by other parties in the system	Funding of the FieldLab by other parties in the system.	“Onze voorkeur gaat uit naar een verdienmodel waarbij de partners in het Embedded Field Lab een bepaald commitment afgeven die tot uiting komt via inzet in uren en een bijdrage in gezamenlijke kosten.”
		Funding by product developers	Funding of the FieldLab by product developers.	“En ondernemers betalen niet vanzelfsprekend.” “Fee for service, waarbij betaald wordt voor afgenomen diensten.”
		Funding by support of government (subsidy)	Funding of the FieldLab by the government.	“De provincie Gelderland heeft een subsidie beschikbaar gesteld van 200.000 euro per Field Lab voor een periode van drie jaar. Deze subsidie is bedoeld voor ondersteuning van het projectmanagement van de Field Labs. De zorginstellingen moesten met deze subsidie een stevige basis voor de toekomst leggen.”
		Funding by taking part in intellectual property	Funding of the FieldLab by taking part in the intellectual property of products.	“Het IP Model Hoewel er (theoretisch) mogelijkheden zijn voor het gezamenlijk ontwikkelen van intellectueel eigendom en het (op termijn) verkrijgen van inkomsten hieruit, blijkt dit in de praktijk ingewikkeld te organiseren.”
		Funding by third parties	Funding of the FieldLab by other parties that are not part of the innovation system.	“Ik denk dat er wel andere partijen zijn die dat zullen doen. Alleen dan moet je kijken wat er voor hun dan aan return on investment is, wat er voor hun als het ware terugvloeit.”
Other	Compensation for efforts		Care providers want to get some compensation for the time they invest in a project.	“De mensen die betrokken zijn, ja, die moeten ook een vergoeding daarvoor krijgen. Die zitten gewoon standaard in hun werkritme en daar kan je niet van verwachten.”
	Limited time and resources for product developers		Product developers have limited time and financial resources during the development of the product.	“Ondernemers hebben ook vaak heel erg behoefte aan snelheid en het moet even snel duidelijk worden.”
	Workload of care providers		Care providers have a high workload.	“Want de professional die is altijd druk, krijgt het alleen nog maar drukker.”