Understanding impediments in healthcare innovation implementation

Radboud University Nijmegen

An evaluation of the encountered impediments in healthcare innovation implementation in Radboud University Medical Centre

Name: Drs. Florian Stoll
Student number: 3039986
Supervisor: Dr. Berber Pas
Second reader: Dr. Dirk Vriens
Supervisor Philips: Drs. Thijs Sondag
Date: 01-11-2016
Preface

With this thesis I finish my time at the Radboud University, where I received a master in clinical psychology, and now finish my study in Business Administration. By means of this thesis I tried to combine my knowledge of and curiosity for both the world of healthcare and the world of Business Administration. In my work as a psychologist I encounter patients with impressive life stories and different (mental) disorders, which we (as mental healthcare providers) try to cure by different treatments and approaches. There are many organizations in caregiving and healthcare, which all operate from a common vision to improve health and life for society. The same applies to the Radboud University Medical Centre and the department for Process Improvement and Innovation (PVI). The stories of my good friend Thijs Sondag, a former PVI employee, about PVI and their activities caught my interest, which encouraged me to look at healthcare (and quality of life improvement) from a different perspective. The perspective of innovation implementation in service of improving healthcare was new to me.

Because my first attempt to combine Business Administration and Healthcare failed early in April, Thijs committed himself and guaranteed me that, with some effort, it is was possible to conduct a study at the department of PVI, which I did. At the same time Dr. Berber Pas committed herself to the academic part of conducting a study in Business Administration. She encouraged me to write, think and explain. By her sharp and intelligent approached in the discussion, which I enjoyed, she helped me to develop this thesis.

Thanks to the supervision of Dr. Berber Pas at the Radboud University, the guidance of Thijs Sondag and the time and effort of the interviewees of PVI, I was able to conduct this research and finish my study of Business Administration. I would like to express my gratitude for their contributions in this final part of my study.
Abstract

Due to the aging population and the increase in chronic diseases the demand for healthcare and associated costs are increasing. This requires more effective ways of treatment and healthcare. The PVI department is aimed at the implementation of process innovations in the Radboud University Medical Centre in order to provide the means to deal with this increasing demand. PVI encounters a wide variety of impediments in their practice of innovation implementation which have never been clearly identified and described. Therefore, the encountered impediments, their interrelations and their effect on practice were studied qualitatively. Interviews were conducted with 6 PVI employees which were analyzed by means of the 3-Dimensional model for interventions in organizations. This prescriptive model for guiding interventions was used to evaluate the encountered impediments and to illustrate the interrelations of several impediments. The encountered impediments on the first dimension of the model (the infrastructural dimension) are within the organization of PVI itself. The encountered impediments on the second dimension (the social dimension) are all hampering the acceptance and integration of the innovation of the targeted departments. The impediments on the third dimension (the functional dimension) are related to the steps in the innovation implementation process. Furthermore, funding appeared to be an impediment that had its effect on all three dimensions. The identified impediments affect the practice of PVI in such a way that PVI employees experience frustration on the one hand, or disappointment on the other hand. The employees react to these impediments in a pro-effective way or in a less assertive way. In the analysis of the interrelations it appeared that some impediments are strongly interrelated through a vicious circle. Based on the findings and the context in which PVI operates, four practical recommendations were given. The first is aimed at circumventing the financial obstacle. The second is framing the innovation implementation as a scientific study to overcome resistance to change. The third is aimed at the hampered transfer between PVI and the other involved department. A clear division of labor can prevent many encountered obstacles. The last recommendation concerns the feeling of incompetence of the PVI employees. By increasing their competence, the resistance of the targeted people can be tackled. Furthermore, this study contributed to the knowledge of innovation implementation obstacles and demonstrated the multiple functions of the 3D-model for interventions in organizations.

Keywords: Innovation implementation, Healthcare, Obstacles/impediments
# Table of contents

Chapter 1: Introduction ................................................................................................. 7

Chapter 2: Theoretical background ............................................................................. 11
  2.1 Innovation in healthcare ....................................................................................... 11
  2.2 Obstacles in innovation implementation .............................................................. 14
  2.3 3D model of organizational interventions ............................................................. 17

Chapter 3: Methodology ............................................................................................... 24
  3.1 The PVI department ............................................................................................. 24
  3.2 The interviewees .................................................................................................. 26
  3.3 The interviews (data collection) .......................................................................... 27
  3.4 Data analysis ....................................................................................................... 28
  3.5 Research quality and ethics .................................................................................. 28

Chapter 4: Results ......................................................................................................... 30
  4.1 Impediments on the infrastructural dimension ....................................................... 31
  4.2 Impediments on the social dimension ................................................................... 34
  4.3 Impediments on the functional dimension ............................................................ 38
  4.4 The obstacle of funding ....................................................................................... 42
  4.5 The interrelation of obstacles .............................................................................. 45

Chapter 5: Conclusion and Discussion ....................................................................... 49
  5.1 Conclusion ........................................................................................................... 49
  5.2 Theoretical discussion ......................................................................................... 54
  5.3 Limitation of the study ....................................................................................... 56
  5.4 Reflexivity ........................................................................................................... 57
  5.5 Recommendations .............................................................................................. 58

References ...................................................................................................................... 63

Chapter 6: The Appendices .......................................................................................... 69
  6.1 The interview format ........................................................................................... 69
  6.2 Codetree interview format .................................................................................. 71
  6.3 Quotes and Codebook .......................................................................................... 72
  6.4 Methodological changes ...................................................................................... 79
Chapter 1: Introduction

In an era in which living conditions are considerably improved, life expectancy is continuously increasing. Along with an aging population, the increase in chronic diseases affects the societal demand for and costs of healthcare. Although Dutch healthcare is of excellent quality (World Health Organization, 2000), our population puts an increasing demand on our healthcare system. More people need qualitatively better care because they are confronted with more health problems during their longer lives. Due these greater demands and rising costs, the current organization of healthcare is under pressure and a transition towards sustainable healthcare is necessary (Nordhaus, 2002; Janssen & Moors, 2013).

Along with political changes, innovations in healthcare are required to make this transition towards sustainable healthcare. These innovations take many shapes and sizes, and throughout the years several definitions and distinctions were formed in the innovation literature (Fagerberg, 2004). Nevertheless, when an attempt to carry out a certain first idea is mentioned, we refer to the term of innovation (Fagerberg, 2004), whereby the specification of ‘process innovation’ refers to an attempt to carry out first ideas in broad, cross-functional organizational processes (Davenport, 2013). According to the review of Djellal and Gallouj (2006), innovation in healthcare takes particularly place in hospitals because hospitals give a certain place to the implementation of these innovations.

Although these innovations are strongly desired for the sustainability of healthcare (Nordhaus, 2002; Janssen & Moors, 2013; Scott, 2009) and for survival in a competitive market (Damanpour, 1991), healthcare is a slow adapter of these innovations (Berwick, 2003; Dixon-Woods et al., 2011) and many effective healthcare innovation implementations tend to fail (Damschroder et al., 2009; Berwick, 2003; Herzlinger, 2006; Birken, et al., 2015). Often, valuable insights, procedures and technologies in healthcare become available from scientific research, but only a small minority are adapted into daily practice of hospital and patient care (Grol, Wensing, Eccles & Davis, 2013). Generally, obstacles are encountered in the healthcare innovation development and the corresponding process of innovation implementation. These obstacles are encountered on many levels of an organization, such as the level of leadership (West et al., 2003), the level of middle managers (Birken et al, 2012) and the level of the physicians (Dansky et al., 1999; Doola & Bates, 2002). Furthermore, implementations are hindered by several forces, such as governmental restrictive regulations, a lack of funding and contradictory stakeholder interests (Herzlinger, 2006). Also the used
implementation method and the actual way of implementing are identified as obstacles (Grol et al., 2013). Hence, healthcare innovation implementation is complex and hindered by obstacles on many levels.

Hospitals like Radboud University Medical Centre (RadboudUMC) try to meet the desire to innovate and to cope with the corresponding implementation obstacles by the establishment of departments merely focused on innovation development and innovation implementation. The advisory group for Process Improvement and Innovation (PVI) is the department with the task to implement innovations in the RadboudUMC. PVI consist of circa 40 affiliated employees with different educational backgrounds and multiple functions within the RadboudUMC (who do not work exclusively for PVI but other in-house departments as well). The goal of this department is to “successfully implement (process) innovations in the domain of quality, safety, expediency, networks and optimal Electronic Patient Dossiers (EPDs) in the RadboudUMC” (RadboudUMC, 2014, Strategieboek). The PVI department faces several obstacles in the implementation process of innovations which they wish to overcome.

The aim of this study is to identify the impediments that the department of PVI encounters during their innovation implementations at the RadboudUMC. PVI is aware that there are obstacles and impediments which hamper their work and the implementation of innovations. However, what these obstacles and impediments exactly are has not been subject of study yet. Furthermore, the interrelation of these impediments and the way in which these impediments affect the implementation practice of PVI, needs to be unraveled.

The aim of this study is therefore threefold, captured in the following three research questions that need to be answered:

1. What impediments hamper PVI’s work during the innovation implementation process, according to PVI employees?
2. How do these impediments (appear to) affect the implementation practice of the PVI staff and what kind of coping strategies are used by PVI employees to cope with these impediments?
3. How are the encountered impediments interrelated?

The results of this study could give a clear insight in the impediments in hospital innovation implementation, the interrelations of these impediments and their effect on practice. An insight in the impediments that are encountered in innovation implementation
and the link between these impediments and its practice, are necessary because many innovations in healthcare tend to fail (Berwick, 2003; Herzlinger, 2006; Birken, et al., 2015). These insights could not only contribute to the existing literature on innovation implementation and its impediments, but also to the practice of innovation implementation. The knowledge of the actual practice of innovators could contribute to the improvement of healthcare innovation, and the knowledge of the influence of impediments on practice, could lead to some clear recommendations to stimulate innovation process. That will contribute to the RadboudUMC its mission statement: ‘To have a significant impact on healthcare’.

In addition to the practical relevance, this study can contribute to the knowledge of innovation, its impediments and associated practice, in a revealing way. By using the 3 Dimensional model for organizational interventions by Achterbergh, Vriens and Doorewaard (2009) as a supportive tool for studying innovation implementation, another strength of this model is demonstrated. In this way, a multidimensional perspective is given on the relevant variables in innovation implementation and its impediments. This model consists of three dimensions which each consist of several steps and activities that are necessary for a successful organizational intervention such as an innovation implementation. These three dimensions are (1) the functional dimension; in which the sequential activities are defined for organizational intervention (diagnosis, design, implementation and evaluation), (2) the social dimension; which describes the steps for the acceptance of the intervention by the organizational members, and (3) the infrastructural dimension; which describes the design of the infrastructure that is necessary to realize the goals of the functional and social dimension (Achterbergh, Vriens and Doorewaard, 2009). The model provides the opportunity to capture all the relevant variables. Furthermore, the 3D-model will be used to evaluate innovation implementation, which is an extension of its described prescriptive function. The qualitative research method assists in the comprehension of the complexity of the phenomenon of implementation impediments by using a wide approach angle. Unlike other literature on impediments in healthcare innovation implementation, this study does not aim at one single organizational level to understand the obstacles. This study has an extended scope in an attempt to identify all encountered impediments in healthcare innovation implementation.

To answer the elaborated research questions, six interviews will be conducted with those who are employed by the PVI department in the RadboudUMC. In these interviews the employees will interviewed on (1) the impediments they encounter, (2) how these impediments are interrelated and (3) how these impediments affect their implementation
practice. With these three main interview objectives in the domain of innovation implementation impediments and the possibility to question in these interviews, this qualitative study could reach a complete understanding of innovation implementation obstacles. These domains will be questioned on basis of the afore mentioned 3D-model for interventions in organizations, because the 3D-model (Achterbergh et al., 2009) is set up as a normative guideline for intervening in organization. According to Achterbergh et al. (2009) intervention organizations (like the PVI department) should follow the 3D-model in order to successfully intervene in organizations (implement innovations in hospitals). Therefore, the 3D-model is appropriate for evaluating the innovation implementation in which PVI is involved and the obstacles they encounter. Hence, the impediments, their effect on practice and the obstacles interrelations will be investigated on the functional dimension, the social dimension and the infrastructural dimension. This will result in a better understanding of the complexity of innovation implementation.

In chapter two of this study, a description is given of current innovation literature and its definitions, in relation to the practice of PVI. The second paragraph zooms in on the obstacles and impediments in innovations and the known impediments in healthcare innovation. Subsequently, we will make a link between innovation impediments and the practice of innovation implementation by means of explaining the 3D-model of intervention, its dimension and its activities and steps. Furthermore, the strengths of this model will be elaborated in contrast with other models for innovation and organizational change.

In the third chapter the methodology will described. A thick description is given of the PVI department and the interviewees. Moreover, the process of innovation implementation which is done by PVI is described in the whole of the RadboudUMC innovation process. In addition, a description is given of the data, the data analysis and the methodological choices. Subsequently, the research quality and ethics are described for possible assessment.

In chapter four the main findings will be described on basis of the three dimensions of the 3D-model. Furthermore, one impediment is described that affects all three dimensions and, finally, the interrelations between the impediments are illustrated by using three examples.

In the last chapter the research questions will be answered and the main conclusions will be outlined. Furthermore, the practical and theoretical implications and the limitations of this study will be discussed, and directions for further research are given.
Chapter 2: Theoretical background

This chapter outlines the theoretical background of this thesis. The first paragraph consists of a brief overview of the extensive literature on innovation, it contains a definition of innovation, distinctions in different forms of innovation and a description of the work of PVI regarding the innovation literature. The second paragraph is aimed at the literature on obstacles in innovation implementation. The findings of studies on impediments in innovation implementation are described with a focus on innovation implementation impediments in healthcare. The last paragraph consists of a description of the 3D-model for interventions in organizations (Achterbergh et al., 2009), followed by the description of alternative models, approaches and theories on organizational change.

2.1 Innovation in healthcare

During the last 35 years, innovation is an extensively studied topic in scientific and management literature in part due to the increasing understanding that innovation is of key importance for organizational survival and a sustainable planet (Eveleens, 2010). Before delving into the definitions of innovation and its literature, we must bear into mind that it is a serious mistake to treat innovation as an exact and homogeneous thing that could easily be identified (Kline & Rosenberg, 1989). Nevertheless, innovation is most often referred to when we speak of an attempt to carry out a certain invention and invention is defined as the first occurrence of an idea (Fagerberg, 2004). While inventions may be carried out anywhere, innovation requires a certain place to give practice to the invention, for instance in firms or public organizations like hospitals. According to the early work of Schumpeter (1934) on economic development theories, innovations can be classified according to ‘type’. A distinction was made between five types of innovation, namely: new products, new methods of production, new sources of supply, the exploitation of new markets and new ways to organize business. A later distinction was made by Schmookler (1966), who defined innovation as (1) knowledge about how to create or improve products or (2) as knowledge about how to produce them. This distinction laid the foundation for the terms “product innovation” and “process innovation”, which were further elaborated by Henderson and Clark (1990). Furthermore, process innovation was split in (1) technological process innovation and (2) organizational process innovation (Edquist et al., 2001). Aside from the different types of
innovation, the level of radicalness is also a characteristic of innovation (Freeman & Soete, 1997). From this perspective, continuous innovation is considered incremental (less radical) and radical innovation is revolutionary and societally disruptive (i.e. opposed to continuous change).

In the area of healthcare innovation, a similar distinction is made by Christensen, Bohmer and Kenagy (2000), who question whether disruptive innovations could change healthcare. According to them, there are two kinds of innovations in healthcare: the sustaining innovations; the introduction of new and more advanced products that serve the more demanding customers, and the disruptive innovations; products that are cheaper, simpler and more convenient than earlier products, that will meet the needs of less demanding customers. Many great changes in society, organizations and also in healthcare are triggered by these kind of radical and disruptive innovations (Block, 2013). Another nuance is made by Herzlinger (2006), who states that the goal of innovation in healthcare is the improvement of healthcare itself and making it more affordable for everyone. In order to achieve this goal, healthcare institutions should focus on the patients, doctors and nurses, whether it is done with sustaining or disruptive innovations. When it comes to the implementation of healthcare innovation, it is said that much is known of effective interventions, but little of them are used to achieve important behavioural outcomes, and factors involved in successfully implementing innovation are not well understood (Fixsen, Naoom, Blase & Friedman, 2005). Likewise, Dixon-Woods et al. (2011), state that innovation in healthcare quality is complicated. Their findings show three paradoxes in healthcare innovation implementation: (1) Some limited proven innovations enjoy rapid uptake and other (proven) innovations never make it. (2) Secondly, the paradox of working cooperatively in innovation implementation; one of the most effective ways to ensure the implementation of new technologies, treatments and techniques is by cooperating with all the stakeholders, but relying solely on cooperation could kill and delay an innovation implementation. (3) The third paradox in healthcare innovation is that improvement (change) requires change; change always generates new challenges (Dixon-Woods et al 2011).

Therefore, innovation (implementation) is a widely studied subject, given its many distinctions and forms that are elaborated over the years. In addition, it can be said that innovation implementation in healthcare is complicated and many challenges still have to be addressed.
The advisory group for Process Improvement and Innovation (PVI) was created to implement innovations at the RadboudUMC and to face the complications of implementation. In the light of the innovation literature (with its described distinctions and characteristics), zooming in on the practice of PVI, two aspects which are unique to the situation of the PVI should be disclosed. (1) Firstly; the practice of PVI in the (linear) process in innovation and (2) secondly; the type of innovations that are implemented by PVI. (1) PVI is not a department which deals with inventing, this is done by the REshape department with which they closely collaborate, but PVI is the department that deals with the implementation of these inventions. Taken the five stages model of individuals’ innovation adaptation (Rogers, 2003), the work of PVI can be positioned in the fourth (and to a lesser extent in the fifth) stage of this model; the implementation stage. This stage is defined as the step in which the individuals employ/adopt the innovation to a certain degree, depending on the situation; see figure 1.

Knowledge → Persuasion → Decision → Implementation → Confirmation

![Figure 1: Five stages in the decision innovation process (Rogers, 2003)](image)

A different model that describes the process of innovation from a more performative perspective, is the simplified innovation process model of Tiwari, Buse and Herstatt (2007), see Figure 2. The practice of PVI can be positioned in the second phase of implementation, which is defined as the phase in which a product is (further) developed and tested, and a pilot is set up.

![Figure 2: Simplified Innovation Process (Tiwari, Buse & Herstatt, 2007)](image)

(2) Since PVI is focused on the implementation of innovations such as a new electronic patient dossier system, applications for videoconferences for professionals and
monitoring mobile applications for patients, their work could be categorized as ‘process innovation’ according to the definition of Henderson and Clark (1990). Both technological and organizational process innovations (Edquist et al., 2001) are implemented by the PVI department. Most of the innovations implemented by PVI are known technologies, therefore they should not be characterized as radical innovations (Freeman & Soete, 1997), but as sustaining innovations.

2.2 Obstacles in innovation implementation

The literature on the factors that affect innovation, clearly focuses on the factors that positively affect innovation (Amabile et al., 1996; Tourigny & Le, 2004), such as (team) empowerment (Kirkman & Rosen, 1999), encouragement of creativity (Amabile et al., 1996) and accountability (Kennedy and Schleifer, 2006). Less is known about the impediments and obstacles that hinder innovation and its implementation process, especially in healthcare.

Nevertheless, in the literature on innovation impediments, a clear distinction is made between (1) literature that is focused on the perception of impediments, and (2) literature that is solely focused on financial obstacles and their (stimulating or deterring) effects on the innovation process (D’este et al., 2012).

The impediments that hinder innovation in healthcare are both perceived and financial. However, the characteristics of hospitals and healthcare are unique and require further explanation. Not only because of its unique characteristics, but also because innovation implementation in healthcare is desired in order to cope with the current (and changing) situation in society (Scott, 2009).

Herzlinger (2006) studied innovation in healthcare and identified six forces that can drive or kill innovation in healthcare. These six forces are: (1) players; all the stakeholders involved in innovation in healthcare with each their own agenda. According to Barlow, Bayer and Curry (2006) is this one of the greatest difficulties in innovation implementation in complex multi-stakeholder environments; (2) funding; the challenge to fund innovation in healthcare and to find a funder for the innovation projects, (3) policy; the governmental regulation of healthcare can drive or kill innovation, (4) technology; technology is an important factor in healthcare innovation because sometimes the infrastructure is or is not ready for the proposed innovation, (5) customers; customers and their families are
increasingly empowered in healthcare, (6) accountability; the increasingly empowered costumers and players in healthcare are demanding accountability from healthcare and its innovators. These six forces combined make it very hard and complex to implement innovation in healthcare (Herzlinger, 2006). Because if it is impossible to work around, overcome and to take advantage of these obstacles (forces), the innovation implementation will likely stagnate somewhere during the process.

Likewise, other reasons for unsuccessful innovation implementation in healthcare were described by Grol, Wensing, Eccles and Davis (2013). They described several implementation obstacles in the area of healthcare optimizing, which entails the implementation of proven insights and procedures in the quality and safety in patient care (in hospitals). This domain is equal to the targeted area of the PVI department, which goal is to “successfully implement innovations in the domain of quality, safety, expediency, networks and optimal Electronic Patient Dossiers (EPDs) in the RadboudUMC” (RadboudUMC, 2014, Strategieboek). According to Grol et al. (2013) the nature, the effectiveness, and the applicability of the new working method as well as the professionals’ resistance to change, were identified as innovation implementation obstacles in healthcare optimizing. Structural, financial and organizational obstacles were also identified to have a negative influence on innovation implementation. Furthermore, the ineffectiveness of implementation was mentioned as an impediment in innovation (i.e. the way it is implemented or the implementation method itself, can become an obstacle in the process of innovation implementation (Grol et al., 2013)).

According to Ferlie and Shortell (2001), obstacles to innovation implementation in healthcare arise at multiple levels: the patient level, the team/group level, the organizational level and the market/policy level. From their findings they developed a multilevel framework for change, which demands attention for leadership, culture, team development and information technology at all levels (Ferlie & Shortell, 2001). These findings are supported by several studies. Birken, Lee and Weiner (2012) state that middle managers play an important role in innovation implementation in healthcare because teamwork designs (with middle managers) are increasingly favored in healthcare organizations. Middle managers in healthcare organizations are unique, they are often promoted on basis of their medical skill but in addition they may not have the (required) skills or education to run a hospital department, and they fulfill their management role in addition to their clinical responsibilities. Therefore, the role of middle managers in healthcare innovation implementation is critical for
improving implementation effectiveness and requires further research (Birken, Lee & Weiner, 2012). Similar are the findings of Somech and Drach-Zahavy (2013), who studied the role of team composition and climate for innovation implementation. When team objectives are unclear, team members are not involved in decision making and when the team is not open to change, the implementation of innovation was not likely to happen in the studied 1,200 clinics of the largest health maintenance organization in Israel. Beside the role of middle managers (Ferlie & Shortell, 2001) and, team composition and climate (Somech & Drach-Zahavy, 2013), leadership can comprise an implementation obstacle as well. Low level of leadership clarity and high conflict over team leadership were associated with low levels of innovation and low support for innovation implementation in breast cancer care teams and community mental health teams (West et al., 2003). Furthermore, on the level of patients, resistance to change and noncompliance to the (new) medical treatment disturb patient care as well (Butler, Rollnick and Stott, 1996). Patients often find it difficult to change lifestyle and to adopt new medical care. Therefore, can patients hinder the testing phase of an innovation implementation or the adaption of the implemented innovation.

Thus, innovation implementation impediments are encountered in various aspects and on different levels in healthcare. Still, during specific healthcare innovation implementations obstacles can be identified as well, for instance during the implementation of an information technology system like an Electronic Patient Dossiers (EPDs) (Øvretveit, Scott, Rundall, Shortell & Brommels, 2007). The implementation of such a system in a large Swedish academic hospital revealed the following obstacles: extra personnel time for the implementation in addition to regular work, earlier (negative) experiences with such an implementation, difficulties in involving doctors in the preparation work, and initial disagreements about much departments should pay for the system (Øvretveit et al., 2007). Furthermore, the acceptance of such an EPD information system by professional physicians was hindered by their computer experience, computer anxiety and the perception of organizational support (Dansky, Gamm, Vasey & Barsukiewicz, 1999). In other specific implementations, other obstacles were encountered, for instance, in the implementation of pay-for-performance system (for quality improvement of patient care). In the implementation process of a system that financially stimulates the adoption of specified processes or designated outcomes, resistance by the physicians was encountered (Rosenthal et al., 2005). Likewise, resistance by professional physicians was encountered by the implementation of a computerized order entry system in hospitals. This system was implemented to overcome the
miscommunication and errors due the illegible (doctors’) handwriting. Therefore, an electronic handheld device was developed, but this innovation implementation also encountered the resistance of physicians (Doola & Bates, 2002).

Hence, impediments in healthcare innovation implementation are encountered on different levels, from the level of the professionals to the organizational level. The impediments are encountered in different domains; there are financial impediments, obstructing policies and resistance to the innovation by organizational members. Furthermore, encounter specific healthcare innovation implementations specific obstacles. Consequently, the area of implementation obstacles in healthcare is multilayered and complex.

2.3 3D model of organizational interventions

As mentioned, the process of innovation implementation and the amount of factors that play a role in innovation implementation (organizational change) is hard to capture and very complex.

In an attempt to capture this complexity, Achterbergh, Vriens and Doorewaard (2009) developed a model for interventions in organizations, in which they include all factors involved in organizational change (and innovation implementation). This practice-oriented three dimensional model for interventions in organizations is developed to lead and support organizational interventions, in a step-by-step manner. According to this model, the aim of interventions in organizations is to solve organizational problems such as cultural problems, innovation problems, implementation problems and performance problems. To accomplish a (successful) intervention in an organization, a diagnosis of the problems is necessary. Therefore, the problem diagnosis is the meaningful first step in this model, which consist of several steps that lead to (1) a representation of the bottlenecks in practice, (2) the determination of the causes for these bottlenecks, and (3) the formulation of a solution direction. To cope with these diagnosed organizational problems, an intervention in the ‘organizational infrastructure’ can be used. This ‘organizational infrastructure’ is defined as a set of conditions under which the organizational processes take place. In order to realize the organizational goal, the organizational infrastructure must be realized. The organizational infrastructure consists of the people that are necessary in these organizational processes (human resources); the necessary tools (technology), such as ICT systems, buildings, and
process technologies; and the division of labor.

To realize these interventions in the organizational infrastructure, the sequential steps of the three dimensions of the model can be followed. These three dimensions are named as following: the functional dimension, social dimension and infrastructural dimension, as can be seen in Figure 3.

![Diagram of the 3D model for interventions in organizations](image)

Figure 3: The 3D-model for interventions in organizations (Achterbergh, Vriens & Doorewaard, 2009)

The first dimension is the functional dimension, which describes the sequential actions that are necessary to complete an intervention in an organization. This process starts with the first activity of diagnosis, in which one tries to establish a clear vision of the problem. As already mentioned consists this activity of ten steps, that altogether provide three broad activities: (1) a bottleneck analysis, in which the problem is studied with its interrelated variables. This analysis studies the norm values and the actual values of the problem-related variables. Subsequently, this reveals the gap between the problem-related norm values and the actual values. (2) A cause analysis, in which is searched for causes for the bottlenecks (for the causes that create the gap between the norm values and the actual values). In addition, a parameter analysis takes place, in which the actual value of the problem causing variables is compared with the norm value for the problem causing variable. (3) The last activity of the diagnosis is defining the direction for a solution, in which is searched for parameters that fall under the scope of regulation and are most effective in order to realize a solution for the problems found.

The second step of the functional dimension is the design; this activity consists of three steps: (1) the creation of ‘realizations’ for achieving the parameter norm value. Solutions that possibly change the actual parameter value to the norm parameter value are generated. (2) Creating a combination setup for all the ‘realizations’. (3) The selection of the appropriate
combination of ‘realizations’. Thus, in this activity, the infrastructural measures are selected that could overcome the diagnosed problems. The selection is a combination of possible HR measures, technology and division of labor needed to overcome the organizational problem. The third step is the implementation. This is the actual implementation of the selected design, for which norms are set which be fulfilled in order to realize the complete implementation activity. The last step of the functional dimension is the evaluation, where the desired effects of the implemented solutions are evaluated. It is investigated whether the implementation of the selected combination of the infrastructural measures lead to a realization of the set norm values.

The second dimension is the social dimension and is based on the model of change by Schein (1987). This model (and dimension) describes three steps that are necessary to complete an organizational change. According to the Schein (1987) and Achterbergh, Vriens and Doorewaard (2009), successful organizational change relies on the people in the organization. When the organizational members do not change and accept the proposed change, it is not likely that the desired values will be reached and a successful intervention in organization is incomplete. Therefore, the acceptance and integration of the infrastructural measures by the people in the organization is necessary. Just like the steps in the functional dimension these steps are sequential. The first step is unfreeze, in this phase readiness for change is created. This can be achieved under the following three conditions: (1) creating disconfirmation or a lack of confirmation. In this phase organizational members (people) have to realize that some variables are not in line with the organizational goal. (2) The second condition is the creation of guilt or anxiety, which induces commitment to the problem. By inducing commitment to the problem people realize that they are part of the problem and bear responsibility for a solution. (3) The last condition necessary for completing the unfreeze phase is the creation of a psychological safety. When people feel safe from disgrace, they tend to admit their possible role in the problem. If these three conditions are met, organizational members are willing and ready to change. The second step in this dimension is change, in which alternative modes of behavior are searched. This can be done by searching for role models in the organization or by scanning the environment for alternative behaviors. The last step of the social dimension is the refreezing phase. The aim of this phase is making sure that the alternative mode of behavior is incorporated into the daily work and that it becomes a routine. This integration should take place on a personal level and on an interpersonal group level. If this step is fulfilled, the intervention is fully accepted and integrated in the daily
The third dimension of this 3D-model for organizational interventions is the infrastructural dimension. This dimension describes the design of the infrastructure that is necessary to realize the goals of the functional and social dimension. This dimension includes three domains: (1) the infrastructure; in which the structure for the (temporary) organization is determined. In this domain the infrastructural measures for the organizational intervention are generated and created, such as the desired impact of the intervention, the scope of the intervention and the duration of the intervention. (2) The HR-measures; in which it is set which HR-measures have to be aligned to the realization of the goals of the functional and social dimension. In this domain HR-measures like rewards and leadership are set. Rewards and leadership are needed to stimulate and motivate the organizational members to change and to ‘complete’ the steps of the functional and social dimension. (3) The Technology; in this domain the technology is set that is needed to fulfill the goals of the functional and social dimension. This includes the communication technologies, equipment and researching methods, for realizing the intervention. The infrastructure with its three domains must be correctly established in order to realize the goals of the functional and social dimension, and so the goal of the organizational intervention.

Since this model was intended as a prescriptive guideline for implementing organizational change (e.g., implementation of innovation), it gives a clear norm for how PVI should proceed in their innovation implementation. This also implies that all the activities that PVI should perform in order to succeed in the innovation implementation could be evaluated by means of the different steps in the model. Besides its guiding function, this model is also ideal for evaluating the process of innovation implementation and its obstacles since this model provides possible domains and phases for obstacles and impediments and corresponding norms.

Although there are various models, perspectives and theories for and of organization change and innovation implementation, the prescriptive model of Achterbergh, Vriens and Doorewaard (2009) was chosen for several reasons.

The performative perspective on organizational change which is described by Tsoukas and Chia (2002) promotes itself by giving insight in the human agency, the microprocesses and the capturing of the continually mutating character of change. The same applies to the work of Weick and Quinn (1999), who promote a vocabulary transformation from ‘change’ to ‘changing’ because there is less attention for the important dynamics and ongoing character of
change. These performative perspectives on change are of great value, but in the case of a study focused on (evaluating) impediments in innovation implementation, such a perspective can only deliver insights in the actual practice and microprocesses of innovation implementation of one single implementation case. Such a perspective does not deliver a norm which can be applied to evaluation of a wide range of obstacles. By using a prescriptive and multidimensional model for evaluating the encountered obstacles (like the 3D-model for interventions) it is possible to identify all the encountered impediments by PVI and to evaluate them on multiple levels.

There is a great variety of change models, perspectives and theories on (organizational) change and innovation. Several models and theories can be related to the 3D-model for interventions in organizations (Achterbergh et al., 2009). There are models that are aimed at prescribing and evaluating change, such as the five stages model of individuals’ innovation adaptation, from Rogers (2003), the simplified innovation process model of Tiwari, Buse and Herstatt (2007), the model for organizational stability and change by Schein (2002) and the model for creating readiness for organizational change by Armenakis, Harris and Mossholder (1993). These models prescribe (sequential) steps or phases that need to be made or gone through to complete the adaptation of an innovation, the process of innovation implementation, the organizational change and/or the readiness for change. These models all cover one specific aspect of organizational change but fail to capture the complexity of innovation implementation and all domains of intervening in organizations. The 3D-model for interventions in organizations by Achterbergh, Vriens and Doorewaard (2009) tries to cover all aspects that are explained by the individual models.

<table>
<thead>
<tr>
<th>Prescriptive change models</th>
<th>Functional dimension</th>
<th>Social dimension</th>
<th>Infrastructural dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals’ Innovation Adaptation model by Rogers (2003)</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Innovation process model by Tiwari, Buse and Herstatt (2007)</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model for organizational stability and change by Schein (2002)</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Model for readiness for organizational change by Armenakis, Harris and Mossholder (1993)</td>
<td>X</td>
<td></td>
<td>(X)</td>
</tr>
</tbody>
</table>
Furthermore, several change theories have been developed over the years in addition to the prescriptive models for organizational change. These theories do not give prescriptive guidelines or norms to evaluate change, rather they give declarations of and explanations for several change aspects. These theories can be used to develop models, such as the change theories of Lewin that formed the basis of the change model elaboration of Schein (Schein, 1996). Therefore, theories on for example, leadership in organizational change (Nadler & Thushman, 1990) and theories on the motivation to work (Herzberg, Mausner & Snyderman, 2011), could be used to support the different appointed aspects/domains of organizational change.

Consequently, the 3D-model of Achterbergh, Vriens and Doorewaard (2009), covers all aspects of organizational change and innovation implementation in one model with its three dimensions; the functional, the social and the infrastructural. Besides, the 3D-model appoints aspects of change (such as leadership in organizational) of which several change theories exists. Therefore, the 3D-model for interventions in organizations is appropriate to use as a (normative) guide for interventions in organizations and innovation implementation, and it is very useful to study innovation implementation because it captures its complexity and all its domains and activities of intervening in organizations.

Besides capturing the complexity of innovation and the activities in innovation implementation, the 3D-model also enables the identification of a wide range of obstacles in this process of innovation implementation. Therefore (as an example), the aforementioned obstacles and impediments could be linked with the three domains of organizational intervention. The obstacles on a personal level, such as resistance to change by the physicians (Dansky et al., 1999; Doola & Bates, 2002), could be identified on basis of the social dimension. The encountered obstacles in the used implementation method (Grol et al., 2013), leadership (West et al., 2003) and payment method (Øvretveit et al., 2007), can be identified on basis of the infrastructural dimension. Moreover, on basis of the functional dimension impediments can be recognized as well. Contradictory stakeholder interests (Herzlinger, 2006) could affect the final diagnosis for a certain innovation implementation for instance. Nevertheless, the dimensions of intervening and implementing are closely connected, and so are their obstacles. Thus, a wrong diagnosis due to contradictory interests (functional
dimension) will affect the chosen leadership style (infrastructural dimension), which in turn, affects the adoption of the organizational members (social dimension).

In conclusion, the 3D-model offers a comprehensive normative guide for innovation implementation. Therefore, this model is ideal for studying innovation implementation and its obstacles.
Chapter 3: Methodology

To study the encountered impediments in healthcare innovation implementation, their effect on practice and their interrelations, a qualitative study was conducted. As described, innovation implementation and its obstacles are very complex and diverse (across situations). Therefore, interviews were conducted with employees of RadboudUMC’s PVI department, to gain insight in implementation obstacles and the associated practice, in this unique case. A qualitative approach was chosen due the fact that PVI had no overview and (enriched) understanding of the encountered impediments in their implementation processes, their effect on practice and the underlying mechanisms. By using a qualitative approach one can gather in-depth insights as deep as possible in a phenomenon (Verschuren, Doorewaard & Mellion, 2010). Therefore, the application of a quantitative research approach, with its hypothesis testing, was not applicable to the research questions in this study. Hence, due to the desire to get an enriched understanding of PVI’s practice concerning innovation implementation and its obstacles, a qualitative research approach was chosen.

The aim of this qualitative research was to gain insights, with which practical problems can be solved. Therefore, this is an applied research with a diagnostic and problem-analyzing form. This study tries to answer the applied research questions ‘What is going on?’ (diagnostic) and ‘What is wrong?’ (problem-analyzing/ signaling problem) (Verschuren & Doorewaard, 2007). With answers on these questions (scientific) insights are gained, by which problems in practice could be solved, as intended with applied research (Vennix, 2011).

3.1 The PVI department

The majority of this study was conducted at the department for Process Improvement and Innovation (PVI), at the Radboud University Medical Center in Nijmegen (RadboudUMC), the Netherlands. This department is located at the North-East side of the hospital area, in the same building as other hospital service departments, like Hospital Security, the department for Purchasing, Marketing, Advisory Service, Maintenance and Management. This building is on the edge of the hospital area and is connected to the treatment hospital area via underground tunnels. RadboudUMC is a university medical center which aspires to be a leading academic center for patient care, education and research. Their
mission is ‘to have a significant impact on healthcare’, by improving healthcare and making it more sustainable for future generations. They attempt to achieve this by delivering excellent quality, the deployment of supportive networks and making healthcare more participatory and personalized (RadboudUMC, 2014, Strategieboek).

The department of PVI is an advisory group focused on the implementation of healthcare innovation and, in particular, process innovation and improvement. Their role is to improve, to change and to implement innovation in processes in healthcare, education and research (RadboudUMC, 2014, Strategieboek). Its approximate 40 employees work on sustainable solutions in the area of the five goals (‘pillars’) of quality and safety, expediency, personalized healthcare, Electronic Patient Dossiers (EPD) and (supportive) networks. The orders for such solutions come from the Board of Directors or from in-house hospital departments. PVI is addressed by these departments when there is a desire for or an innovation in one or more of the above-mentioned pillars. The elaboration of these desired innovations goes along many roads, from which the start is mostly done in collaboration with the department of REshape.

REshape is set up by the RadboudUMC with the aim to make the ‘patient as partner’. By setting up conferences where REshape gives their vision on participatory healthcare and exchange thoughts, they try to effectuate a movement towards sustainable healthcare. To support their vision, they also do scouting for other healthcare innovations and research on sustainable healthcare innovations, all in order to invent and to share inventions and innovations in sustainable healthcare. The department of REshape consists of 14 employees, with different educational backgrounds and who are working in other hospital departments as well, such as the PVI department, the department for Advisory Service, Security and Infrastructure.

The beginning of an innovation implementation starts with the desire from the Board of Directors, a hospital department or the REshape department. In this beginning PVI collaborates with REshape in which both try to shape the desire into an applicable innovation. For example, shaping the desire to personalize healthcare into a digital dossier app on your computer or smartphone for having all your own medical data in-house. The beginning of this shaping is often done by REshape where the further shaping later in the innovation process is done more in collaboration with PVI. REshape takes account for the idea forming and PVI for the applicability of these ideas. When this idea is elaborated to an applicable innovation it is (completely) transferred to PVI. PVI has the responsibility for the implementation of the
innovation from there. This implementation often starts with the creation of an implementation plan, which is specific for each innovation implementation. This plan consists of the intended contact points, trainings, knowledge transfers and the needed competence. The PVI employees get down to work guided by this implementation plan. They try to find support for the innovation in the different hospital departments by convincing the department managers in one-on-one conversations and group presentations. Thereafter, when a department showed interest and agrees to collaborate, the PVI department creates/chooses a designated contact person, which will lead the implementation from inside the hospital department. From there, they try to further implement the innovation by arranging the necessary supportive technology networks, security and quality. When the innovation is actively working, the PVI employees have the task to create support for, and integration of the innovation by the targeted professionals, nurses and others. PVI tries to achieve this by giving presentations, conducting feedback and evaluation sessions and giving trainings in the use of the innovation. When the first implementation of an innovation is done, PVI evaluates the innovation, the implementation and the use of the innovation. When this is as desired, the innovation can be implemented in other hospital departments, commissioned by the Board of Directors or in desire of a hospital department itself. This first implementation is most often considered as a testing phase in which PVI and the hospital department explore the multiple capabilities of the innovation and its integration. Possible further developments and implementations can take place from there.

3.2 The interviewees

The six interviewees in this study were all related to the PVI department of the RadboudUMC. These six interviewees were selected by the contact person that was approached for this study. The contact person (a PVI employee at that time) brought these interviewees into contact with the researcher by email. The researcher and the interviewees came to an interview appointment from there. The interviews took place at the PVI department, the REshape department and in the Catharina Hospital in Eindhoven (where one was located for an innovation implementation project).

Because PVI is set up as an advisory group with different innovation implementation projects, most employees worked for more hospital departments. Many of the PVI employees
also worked for REshape or the departments for Service, Infrastructure, Advise or Security. However, the activities of the interviewees in this study consisted primarily of activities related to PVI. The employees are selected or invited to participate in a certain innovation implementation project depending their interest and knowledge. Since the implementation of innovation is just one step in the process of innovation, the employees closely collaborate with the involved departments. The interviewed employees all have different educational backgrounds, like business administration, technical business administration, social psychology, biomedical science and biomedical engineering. Their age ranged from late-twenties to mid-fifties, and two of the interviewees were female.

3.3 The interviews (data collection)

For a complete understanding of the obstacles in healthcare innovation implementation six face to face interviews were conducted with an average length of 60 minutes. The interviews were organized in a semi-structured way, in which several domains of questioning were fixed, see interview format (Appendix 6.1). There was a focus on the process of innovation implementation and its practice, the impediments in this process and the assessed interrelations between the impediments and practice. Furthermore, the three dimensions of the 3D-model were used to study these variables. It was studied if any of the mentioned obstacles could be identified on basis of the 3D-model by this way. Hence, the different domains of interests and theories were formed into interview questions, see code tree (Appendix 6.2). By the code tree a large number of categories(domains), subcategories and items can be organized in a clear hierarchal structure (Morse & Field, 1995).

In consultation with the interviewees some terms and conditions were added. Interviews were to be processed anonymously. Furthermore, the names of the PVI and the REshape department may and will be used in this study. None of the interviewees expressed interest in reading the transcripts to check (and modify) their statements. Nevertheless, after each interview a summary and the understanding of the researcher of the discussed topics was provides. Moreover, two of the interviewees were willing to discuss and brainstorm about the interview interpretations, results and conclusion during the data analysis-phase.

All interviews were transcribed verbatim, which is the is a common strategy in qualitative research (Halcomb & Davidson, 2006).
3.4 Data analysis

Data analysis was done through ‘template analysis’ with hierarchal coding. First the narrow and more specific themes in the transcripts were coded, from there the broader and umbrella themes were identified, see code book (Appendix 6.3) In this analysis no fixed number of levels of coding was used. The used a priori themes, which were based on the three research questions and the dimensions of the 3D-model, were formulated into the interview format (Appendix 6.1), and were constructed in a hierarchical manner, see code tree (Appendix 6.2). Furthermore, codes emerged from reading and analyzing the interview transcripts. Consequently, a combination of a priori themes from theory and emergent (inductive) codes from analyzing the date was used (Appendix 6.3). This analyzing method was used because it is highly adequate for studying broad and complex phenomena, like the implementation obstacles in innovation and its practice. Furthermore, ‘template analysis’ gives the possibility to tailor the methods to the goal of the research (Symon & Cassell, 2012).

3.5 Research quality and ethics

In this study the quality was assessed with the assessment criteria of Guba and Lincoln (1989). By using these criteria for qualitative research, several domains that are associated with the quality of this study can be judged, namely on the domain of credibility, transferability, dependability and confirmability.

To find a good fit between ‘the constructed realities of respondents and the reconstructions attributed to them’ (Guba & Lincoln, 1989, 237), the credibility is provided by the following. During this study the place of interest (the PVI department) was studied, and, therefore, also been described, because the setting and context have an effect on the behavior of the interviewees and the researcher. With the given description of the interviewees, their work, and their role in the organization and its processes, one can question to which extent the setting affected the research findings. Additionally, during this study a few moments of reflection and reflexivity were planned, in which the researcher was questioned about its interpretations, its role and its assumptions, in and during this study. This was done in cooperation an external study supervisor from the Radboud University in Nijmegen, with the internal study supervisor of the PVI department and with three of the
interviewees. Furthermore, summaries were given during and at the end of the interviews to check whether the interview was interpreted right according to the interviewees. Besides, the interviewees were given the option to check the transcripts (which all of them declined) and to check the results and interpretations (in which three of them were interested). As a result, the study interpretations and results are as close as possible to the vision of the studied interviewees.

With the given thick description of this case and the interviewees (see paragraph 3.1 and 3.2), it is possible to judge if this context of study is similar to any others. And therefore, can be transferred and generalized to any other (similar) cases. Hereby, the transferability of this study can be judged.

To assess the dependability, methodological changes during the study can be demonstrated and described, which then can be evaluated. During the process of data analysis, the changes in the codes and themes were recorded (see code book, appendix 6.3), for the evaluation of dependability. Furthermore, mayor changes in methodology, if occurred, will be described (appendix 6.4).

The confirmability can be assessed by providing a detailed description of the data collection, the analysis and its process. To enhance confirmability, descriptions and the codebook (as a result of the coded transcripts) is given, and there was actively searched for negative instances that contradict the prior observations, which are described in the results.

Along with the assessment criteria for qualitative research, this study tried to serve the ethical expectations and desires of the respondents. Through, an oral agreement the interviewees accepted the vocal recording of the interview. They were guaranteed that the data was analyzed and processed anonymous. In agreement with the internal study supervisor of PVI, it was agreed to keep the true organizational name and identity. Furthermore, care and safety of the data was guaranteed and all the people involved had the right to know the purpose of this study. The purpose was notified in advance of the interviews.
Chapter 4: Results

By conducting interviews with PVI employees the impediments in healthcare innovation implementation, the effect of these impediments on the practice of PVI and the interrelation between the impediments were studied. The data was analyzed based on the 3D-model for interventions in organizations (Achterbergh et al., 2009). The results are therefore organized in the same way as the 3D-model with its three dimensions. First, the findings concerning the infrastructural dimension are described, after which the results concerning the social dimension and the functional dimension are explained successively. In those three sections the effect of the obstacles on the practice of PVI and the coping strategies of PVI are mentioned as well. Hereafter, the most important impediment, with its effect on all the dimensions of the 3D-model, is discussed. Finally, the interrelations between the obstacles are illustrated and described based on three examples. Before the description of the results an explanation is given of PVI’s goal, primary process and their essential variables, to better understand why the described obstacles are considered as impediments and how they affect their practice.

PVI is deployed by the RadboudUMC to cope with innovation implementations in four type of goals related to hospital healthcare, namely: quality and safety, expediency, sustainable networks and person-centered care (RadboudUMC, 2014, Strategieboek). Hence, in striving for improvement in these domains PVI works on behalf of the Board of Directors of the RadboudUMC and the individual hospital departments. PVI is deployed as a project team that is merely focused on the implementation of innovation. In their daily practice PVI tries to implement (already invented) innovations in the targeted and willing hospital departments of the RadboudUMC. The innovations are aimed at making healthcare more sustainable for the future which entails, for example: the reduction of workload for the professionals, making healthcare cheaper and more adapted to needs of the patients. Essential for PVI, in evaluating their goal-aimed practice, is client (the hospital departments and Board of Directors) satisfaction, the satisfaction of the patients and the degree of successful innovation implementations. The identified obstacles below withhold PVI from reaching these goals.

Reading this section, one must realize that the three dimensions of the 3D-model are strongly interconnected, in order to realize a successful organizational intervention. An
obstacle on one dimension will automatically result in a stagnation or impediment on another dimension, which will be illustrated in paragraph 4.5. Therefore, the categorization of the identified impediments is sometimes more nuanced than outlined in the first four paragraphs but due to the infinity of these (organizational) interrelations and processes is it limited to the following.

4.1 Impediments on the infrastructural dimension

To realize the described goals an infrastructural set-up is created, including the infrastructure of PVI, its HR-measures and the needed technology. Although PVI encounters implementation problems in the targeted hospital departments, they also encounter problems in their own infrastructural set-up. These obstacles are found in the domain of different educational backgrounds, the hampered innovation transfer between REshape and PVI and the lack of responsibility taking for the innovation implementation.

Different educational backgrounds

The first identified obstacle on the infrastructural dimension is the lack of medical content knowledge of PVI and the difference in the educational background of the PVI employees and the targeted people (mostly doctors and nurses). During the process of innovation implementation, PVI employees try to convince professionals to support and integrate the innovation. During the conducted interviews the PVI employees indicated that they have the feeling they are not qualified enough to discuss, convince and instruct the professionals because they do not know the exact practice or the theoretical knowledge behind the professional practice. The next statements are an example of that:

*I’ve trained nurses in using the patient portal or the patient dossier in the beginning and I noticed that, when I said ‘well, I studied psychology, I am not a nurse’, their attention dropped. (Young Female L., with a background in Psychology)*

Another statement was given by a male coworker:

*But you often have, I would say, a kind of disadvantage when you have a conversation with a specialist or a caregiver in general because we [PVI*
employees aren’t experts on the content. So who are you, and in my case, who am I to tell him or her how it should be in the communication with patients. (Young male E., with a background in Bio-medical Science)

The educational background difference and lack of medical content knowledge leads to the possibility of a misfit in the innovation implementation. Since PVI does not completely know the professionals’ practice a misfit in diagnosis, design or implementation can occur, which in turn can stagnate the implementation process due the necessary adjustments that must be made in the case of a misfit. In order to cope with this, the interviewees try to better understand the professionals and their practice by starting the conversation, watching their practice and try to involve the professionals during the complete innovation (implementation) process. Another result of this lack of (medical) content knowledge is the feeling of incompetence, which results in a subordinate and cautious role in discussions, which is clearly illustrated in the underlined part of the second quote: ‘who am I to tell him or her…’. Taking this subordinate role could suggest that the PVI employees are somewhat insecure and perhaps impressed by the medical doctors and their work, who – based on professional image – might create a paternalistic relationship between the doctor and patient, or other non-medical professional in this particular case (Brase & Richmond, 2004). Due this (unequal) relationship, PVI is unable to get the innovation implemented as desired, which delays the implementation process.

Hampered transfer

The second impediment is the hampered transfer or the lack of a good transfer. In the complete process of innovation implementation, PVI is responsible for successfully implementing the innovation. The first steps in this process are done by REshape which is responsible for the invention, they generate an idea that is aimed at improving healthcare. They develop this idea into a certain concept where after the innovation is transferred to PVI, who is responsible for unrolling and implementing the innovation. According to several PVI employees this transfer between REshape and PVI is too sparse. Often there is a misfit between the invented concept and the possibilities in practice, or there is a transfer- and development phase is missing. A side effect of this (hampered) transfer is the indistinctiveness about the responsibility for the innovation. When the innovation is transferred back and forth between REshape and PVI, the responsibility for implementing is
shifted as well. This will lead to blaming and in turn to stagnation in the innovation implementation process.

*The fact that there is a transfer is an obstacle itself, I think. It actually causes that the people of REshape, who are taking care of the fun job of inventing and developing, think ‘we could do this and that’. Then they throw the innovation over the fence to PVI and say ‘You guys, take care of the implementation’. Doing so, they [REshape] also dissociate themselves for the responsibility. Thereafter, PVI receives something with which they have to deal although they are not satisfied about it. How the innovation looks, how it works or whatever. So by that, PVI doesn’t feel the complete responsibility for that product.* (Young male U., with a background in Psychology and Business Administration)

An emotional result of this transfer is frustration, as can be distilled out of the quote and the words of choice, see underlined part in quote. This frustration is interrelated with the diffusion of responsibility for the innovation and its implementation. Through giving the innovation back and forth between REshape and PVI for modifications on both sides, a diffusion of responsibility appears. In this socio-psychological phenomenon people are less likely to take responsibility or undertaking action when others are present in the same setting (Genovese & Eichmanns, n.d.). This could also occur with an innovation, due to the many involved stakeholders and the unclear terms of reference, the innovation (and all the involved responsibilities) get shifted back and forth between stakeholders. According to the interviewees, this results in a decline of energy and effort for the innovation implementation, a shift of attention to more ongoing projects and thus in stagnation of the innovation implementation.

**Lack of responsibility taking**

The third obstacle on the infrastructural dimension is the lack of responsibility taking and dedication to the innovation. According to the interviewees, PVI employees do not always take responsibility for the innovation and the corresponding implementation, and are not fully dedicated to the implementation. The cause for this lack of responsibility taking is not identified by the interviewees but it could be caused by PVI’s limited power (they are a hired project team and they are at the service of the RadboudUMC and its departments, as said), by PVI’s dependency on other stakeholders (like REshape and the hospital departments) and because PVI is functioning in a financially safe organization. The following
quotes are a reflection of these findings by young male U., with a background in Psychology and Business Administration:

*It’s not their own baby or something.*

*You really have to go too crazy before they fire you*

*‘It's 5 o’clock, I go home’*

This lack of responsibility taking could rather be an effect of implementation obstacles (such as the hampered transfer) than an obstacle itself. Nevertheless, lack of responsibility taking and dedication affects job performance (Dudley, Orvis, Lebiecki & Cortina, 2006). Because the lack of responsibility taking and dedication to the job falls within PVI’s own HR-measurements, it could be identified as an obstacle on the infrastructural dimension.

### 4.2 Impediments on the Social Dimension

One of the main tasks of PVI is affecting the adaption of the innovation by the targeted departments. In order to achieve this adaptation, they try to involve the departments in the innovation development in the beginning. Later on, they try to persuade the (non-involved) departments to participate in the innovation. Furthermore, they strive for a total acceptance and integration of the innovation which they try to accomplish by comprehensive communication with the involved stakeholders. Most innovations are targeted at (and in) the practice of the concerned medical professionals, nurses and patients. Based on the conducted interviews, some clear impediments appeared in achieving this total acceptance and integration of the innovation. Professionals, nurses and department supervisors do not always feel the need to change with which PVI has to cope. The resistance to change is based on several assumptions and attitudes of the medical professionals. According to PVI medical professionals are tired of innovations, possibly by the continuous trend to change and the fact that innovation promises have not been kept. The innovations take time and energy on top of their existing work. Furthermore, professionals are being held responsible for patientcare, so a cautious attitude for new ways of doing prevails, due to the fear it might affect the quality of the treatment/patient care. Finally, the culture and the education of the professionals is mentioned as an obstacle to implement innovation in healthcare.
Professionals are tired of innovations

The first impediment on the social dimension is the tiredness of the medical professionals and staff. According to the interviewees, the RadboudUMC staff is tired of the continuous changes and innovations.

_The staff has become a kind of tired. They have seen a lot passing by. The staff have been smashed with all kinds of new systems, rules and legislation, and such. But also innovations and improvements._ (Young male U.)

Besides the tiredness, results the continuous innovations in frustration. The underlined part in the next quote is a cited doctor, who clearly expresses his frustrations about innovation implementation.

_Uuhm and if there isn’t a problem ‘I am putting effort in it, while everything is alright. Why should I do that for god sake?!’_ (Middle-aged male S.)

This tiredness and frustration may be caused by the overload of changes and innovations. Also the breach of innovation promises may cause this tiredness and frustration. Over the years many promising innovations have been presented to the professionals in the departments of which several left a lot to be desired in their implementation and use. The failure to honor these promises (due the encountered innovation implementation impediments) may cause resistance to change and tiredness for the next innovation. Thus there is a downward spiral, innovation implementation failure leads to resistance and tiredness which in turn leads to innovation implementation failure.

_While that actually, uuhm, to those departments, which you promise a lot, it is really unfair. Departments spend time, money and energy, they invest in it and they just receive something that is not ready or doesn’t work. With that PVI loses willingness for a next innovation._ (Young male U., with a background in Psychology and Business administration)

Extra work on top of daily practice

The second obstacle that leads to resistance to innovate is the investment in terms of time, money and energy of the departments. The adaptation of a new innovation cost a lot of time, money and energy in addition to the existing workload. The professionals, nurses and supervisors at the different hospital departments have to invest a lot while they have little
possibilities and get little in return. The departments in the RadboudUMC work as individual departments, with their own management, administration and budget. Therefore, departments are responsible for their own survival, which can make innovation implementation a (financial) risk or a possible burden.

_So often it feels like extra work for the nurses, especially in the beginning when the IT-systems aren’t interconnected. Then the innovation use is not in their primary (work) process._ (Young male U., with a background in Psychology and Business administration)

Hence, the department supervisors and professionals say that the want to improve patient care but when it is at the expense of their own benefits, they will not. Supervisors and professionals may see an innovation implementation as a threat to their used working method, or their financial benefits, which will be discussed in paragraph 4.4.

**Responsibility for patientcare**

Another obstacle that is underlying resistance to change by professionals is the responsibility for patients. According to the interviewees, professionals are careful to innovations because they are being held responsible for patientcare. The professionals must be able to justify every step in their practice, mostly based on scientific research. The current problem is that innovations are not often completely scientifically proven. Therefore, professionals are not able to (scientifically) justify the steps of their treatment including the innovation, which hinders professionals to innovate out of fear for declining treatment quality and accusations when something goes wrong. Although not identified by the interviewees, the cause for this obstacle may lay in the design of the innovation on the functional dimension, which will be illustrated in paragraph 4.5.

_I mean, I wanted to go to the professionals and doctors, they are really cautious to accept new things which haven’t been proven. Because they are, eventually, responsible for the patient._ (Middle-aged male S.)

**Doctors’ education and attitude**

The last mentioned obstacle that is fundamental to resistance, is the difference in attitude and educational background between, on the one hand REshape and PVI, an on the other hand medical professionals and nurses. According to the interviewees, doctors profile
themselves as authoritarian and the hospital staff has a highly respectful attitude towards the doctors. Based on the interviews, the work quality of the professionals is hard to question because their comprehensive medical education. Besides, the hierarchical education and structure in the hospitals causes some kind of immunity to discussion. Therefore, professionals are less inclined to adopt and accept new ways of working.

Uuhm, doctors are really, they are being educated like 100 years ago, in a really hierarchical relation. Patients are getting more empowered but it is really hard to question the quality of doctors. (Middle-aged male S.)

The doctors’ authoritarian attitude towards PVI and clients increases the chance of rejecting and boycotting an innovation implementation. The imposition of an innovation may create resistance by which the innovation implementation in hampered. This interrelation will be further discussed and illustrated in paragraph 4.5.

Based on the statements several innovation implementations remain in the unfreeze phase of the social dimension, in which the need to change is not felt: It is not burning enough. Or it isn’t even burning, so why should we move? (Young male U.), or the contentment of the currents situation is expressed by doctors: ‘I already see my patients. I don’t want to speak to them through a portal’ (Young Female L.). Additionally, some of the implementations remain in the change phase due a lack of good alternatives: As long as it doesn’t generate any benefits or it even endangers their operating income, they [the professionals] won’t say ‘We are going to do that!’ (Young male U.). Hence, shift towards a change phase and later the refreeze phase is desired, to achieve a full adaptation and integration of the innovation.

In shifting towards the change (and refreeze) phase, PVI employs several strategies. They try to make the innovation implementation a more joint responsibility by cooperating with the professionals. They try to involve most of the stakeholders and question them about their innovation- and implementation desires. In doing so they avoid a breach of trust, that affects the future innovation implementations. Furthermore, they try to use the resistance to make adjustments to the innovation and the corresponding implementation. The last strategy is using a testing phase in the implementation process. By testing the innovation, they hope to deduct the resistance to change, as stated in the following quote:
You must imagine that, when people have to change something in their job and they don’t directly see why, they develop some kind of resistance. So with innovation and its implementation it is really important to test and reveal the obstacles of the staff and the patients in the process, to be able to overcome them. (Middle-aged female D., with a background in Technical Business Administration)

4.3 Impediments on the functional dimension

The goal of PVI is to successfully implement an innovation in the targeted departments on behalf of the Board of Directors or the departments themselves. The actions that are needed for successful implementation are the provision of a diagnosis, the development of a design to overcome the diagnosed problem, the implementation of the design and the evaluation (Achterbergh et al., 2009). According to the interviewees many of the obstacles appear during these actions. Mentioned by all interviewees is the obstacle in technology: the technology of the innovation itself is not functioning or the supportive technology for the innovation is not operating effectively. The second mentioned obstacle is the organization of the RadboudUMC. The RadboudUMC is structured in a way that departments are autonomous, they are responsible for their own management, budget and interest in innovation. The third obstacle consists of the laws and regulations that form an obstruction for implementation. Moreover, the applied methodology in the implementation and the doctor responsibly are considered as obstacles. The last obstacle, which is interrelated with all of them, is the complexity of the stakeholders. In healthcare innovation implementation many stakeholders are involved, who have different interests with different elaborations.

Technology

The obstacles of technology appear when PVI makes the innovation feasible. REshape delivers PVI a prototype of a technological innovation which they make operable to implement, but often a dysfunctionality appears in the technology itself. Due to a wrong diagnosis or design the technology does not function as intended. Also a too rapid transfer from design to implementation could cause this stagnation in the implementation of the intended innovation.
You often want a technological connection [between different technological applications]. It may be possible but when operating, it appears the technology is not functional and workable. The technology is then not really proven. You can encounter that. So, you really want something with it but it is still in development. (Middle-aged female D., with a background in technical Business Administration)

In the technology, safety sometimes seems to be insufficient. Due to the fact that privacy rights, patient data and dossiers have to be kept private, the security of the used technology is of great importance but often insufficient.

Yes, of course it requires some work and thinking to establish a technological innovation. Especially regarding the data safety and privacy rights. Those things are a real obstacle. (Young male K., with a background in Bio-Medical Engineering and more focused on REshape)

Not solely the technology of the innovation but more often the supportive technology is mentioned as an obstacle in the implementation. Hence, the technology itself works but in the implementation phase PVI encounters the (unforeseen) impediment of non-supportive technology.

At a certain moment it became clear that the problem wasn’t the technology of the product (the video calls) itself but it seemed to be a problem of our whole IT-system and how the new technology functioned within this system. (Young male E., with a background in Bio-medical Science)

That digital work environment has another speed than a computer because it is a server which entails more power and speed. Our video call construction took too much power for the digital work environment. So, you have a brilliant solution, like Skype which works everywhere. Well, not with us. (middle-aged male S. with experience in consultancy)

In facing this obstacle of technology PVI attempted several strategies to deal with it, such as the usage of technological proven innovations: Yes, and using proven technology as much as possible. Choose for technologies that work and don’t choose for technologies that are in the test phase (Middle-aged female D). In addition, they adopt technologies from elsewhere: Literally getting American technologies (Young male E.). Or by trying to solve these problems by adjusting and avoiding: Just try to get around and solve the problem (Middle-aged female D). Despite these strategies, PVI still encounters undesirable and nonfunctional technology in their process which requires (continuous) technological adjustments. These adjustments cause a delay in the process of innovation implementation.
Therefore, the nonfunctioning technology can be considered as an impediment on the functional dimension.

The organization of the RadboudUMC

The second encountered impediment, is the structural organization of the RadboudUMC. The departments of the hospital are autonomous departments with their own management, administration and (financial) responsibilities. Although they are autonomous in their practice, they are being controlled by the Board of Directors. This entails that departments are sometimes free to innovate (and sometimes they are not, by decision of the Board of Directors). Since patients often move from one department to another, they can face different facilitating innovations. This can cause several problems for patients, doctors and for implementing an innovation, as illustrated in the quotes. Therefore, can the organization of the RadboudUMC hinder the goal of PVI to improve healthcare by implementing healthcare innovations. Perhaps, the design of the innovation is not adjusted to the difference between the different hospital departments.

It would have my preference to implement at the moment you really start with the innovation. Since, patients go to department A, and department A works with ‘MyRadboud’ [dossier management innovation] which gives them access to the dossier and such. Thereafter, the patient goes to department B, where the doctor hasn’t even heard about ‘MyRadboud’. The doctor doesn’t know how it works and the patient canceled the appointment through the ‘MyRadboud’-portal. Then, department B isn’t aware of that cancelation and they say ‘Why is that appointment cancelled? We didn’t know’. So, you lag behind the promises you made the patients. (Young Female L., with a background in Psychology)

Well, you have 10 nurses with each certain tasks. Then you have a change [an innovation implementation] whereby you need 8 nurses and 3 logisticians, but those logisticians are already working in a different department. This means that you have to transfer information, money and people from and towards departments. That’s always really hard. (Middle-aged female D., with a background in Technical Business Administration)
Laws and regulations

The third obstacle on the functional dimension that hinders the innovation implementation of PVI, is laws and regulations. When implementing an innovation PVI has to deal with several healthcare authorities and inspections. Concerning innovations, laws and regulations are not yet available because application of these innovations have never occurred. Hence, before introducing a product it must be tested for a significantly longer period to prove its value. Only then the healthcare authorities release the innovation use and support the corresponding implementation. Therefore, this requires a considerable testing time, perseverance to convince the authorities and possible adjustments to the innovation: Laws are per definition lagging behind [the innovation] (Young male K., with a background in Bio-Medical Engineering). It is therefore hindering innovation implementation. Although both parties have the same goal of improving healthcare, the interviewees experience hinder from the development of laws and the imposed regulations.

And then you have the whole guidelines, quality demands and juridical stuff. Those things are always coming to the end of their journey. Often it we are able to fix that but sometimes it could strangle us. (Middle-aged female D., with a background in Technical Business Administration)

The used method

Another obstacle is the used method in the implementation. Before implementing a complete innovation, an innovation is tested in a test phase. In this test phase the innovation is used next to the existing work of the professionals. By doing so, no complete integration of the innovation takes place, and therefore is it hard to test the effects of the innovation, which can result in a falsely rejection of the innovation.

It is also the way we implement things though. What often happens, is that you have a kind of process, what a nurse does during the day, so to speak. That we are implementing an innovation, perhaps unconsciously, often on top of his process. He first needs to complete his process and, in addition, he must also register something in another application. Instead of, that the application is fully integrated in the primary process of the nurse. (Young male U., with a background in Psychology and Business Administration)

Thus, the used method does not have the desired and planned effect. This is explained by one of the employees as a result of a lack of knowledge of the primary processes (obstacle on the infrastructural dimension), as earlier described, and the inability to learn the primary
processes due regulatory restrictions. Moreover, a wrong framing of PVI (due to the inability to learn the primary medical process or the resulted the feeling of incompetence) could result in an unclear activity description of the innovation process. As a result, the operators of the innovation activities have no directive guideline for their practice. This could lead to a wrong diagnosis, design and implementation by which it is not possible to effectively evaluate the successfullness of the innovation. As described, this obstacle is interrelated with other obstacles on other dimensions, it is therefore further illustrated and explained in paragraph 4.5.

Complexity of stakeholders

In the process of implementation PVI has to cooperate with numerous stakeholders, such as: the patients, the doctors, the supervisors, the department management, the Board of Directors, the NZA (Dutch Health Authority), healthcare insurance companies, the IGZ (Inspection for Healthcare), REshape, supportive services and funders. Cooperating with all those stakeholders is difficult because these stakeholders are involved in different activities of the innovation implementation process and stakeholders could have contradictory interests, which can possible result in a delay of the innovation implementation. Many of the described obstacles are interrelated with the stakeholders. PVI is dependant on many of them, for instance in the innovation transfer of REshape, the laws and regulations of the healthcare authorities, funding of insurance companies and the desires of doctors. Besides, it is often unclear to PVI which stakeholders are involved in which part of the innovation implementation process. The combination of the many involved stakeholders, the encountered obstacles and the unclarity about the stakeholders’ involvement in the activities make the innovation implementation complex. Therefore, the complex relation with all the stakeholders can be considered as an obstacle, which reveals on all the steps of the functional dimension.

4.4 The obstacle of funding

In this paragraph the obstacle of funding and financing is discussed because this obstacle affects all dimensions of the 3D-model and was, by far, the most mentioned obstacle by the interviewees. Therefore, this obstacle could be considered as one with the most impact on the innovation (implementation) process. Financing the PVI employees is considered as a
funding obstacle on the infrastructural dimension. Fear of losing income is the second financial obstacle. By implementing innovations, the professionals’ workload is sometimes reduced which results in a decline of income, professionals only receive income from face-to-face consultation. This fear of losing income is fundamental for resistance; it is therefore an obstacle on the social dimension. It could also be considered as an obstacle on the functional dimension because this fear for losing income by efficient patientcare (‘income reducing innovations) can be initiated by a wrong innovation design. The third financial obstacle is the funding of the innovation itself, this can be considered as a funding obstacle on the functional dimension. Although the funding obstacle addresses the different dimension, they are all about getting funds and the results of (not) getting that funds.

Financial reward system

The financial reward system used by the RadboudUMC is mentioned by the interviewees as an obstacle that, after consideration, could be positioned on the infrastructural dimension. The employees of PVI and REshape are on the hospital’s payroll, they have permanent contracts for fixed hours. Therefore, the environment in which these employees work is quite safe and without any (strong) financial pressure.

> If we as Radboud, as REshape, for instance develop a product and it doesn’t work. Well that’s really inconvenient. It is a lot of money but everybody has a permanent contract. (Young male U., with a background in Psychology and Business Administration)

This used financial reward system is identified by the interviewees as an impediment because this safe work environment (without financial pressure) could (in combination with the encountered obstacles) lead to less dedication, less responsibility taking and resignation in the end: Yes, it is inconvenient sometimes. Yes, sometimes. If you experience it [obstacles] a lot, you get way more resignation (Middle-aged female D). This in turn can result in a delay in the implementation process. It could also be that this mentioned obstacle is more a desired recommendation of the interviewees to discourage the lack of responsibility taking and dedication in the implementation.
Fear of losing income

Most innovations by REshape and PVI are in some way aimed at more efficient patientcare which includes the elimination and reduction of the professionals’ workload, for instance with digital home monitoring by the patients or with digital consults, like eHealth. This reduction of workload will result in less consults, which in turn lead to less income. This because the financial system is organized in such a way that the departments get paid per consultation. Therefore, they cut in their own budget when implementing innovations that contribute to more efficient patientcare which reduces professionals’ workload.

Another obstacle are the compensations. Healthcare is compensated by healthcare insurance companies, in the end by yourself of course. But those things always fall behind on innovations. If we want to be more effective with the amount of consults, for example, you get less revenues. Because funds are based on face-to-face consultations. (Middle-aged female D., with a background in Technical Business Administration)

Hence, the department supervisors and professionals say that the want to improve patient care but when it is at the expense of their own (financial) benefits, they will not. At the basis of this resistance lays the financial reward system. So, in this case, the financial reward system is causing resistance to the innovation, and therefore an obstacle to the implementation of an innovation.

This phenomenon could also be considered as an obstacle on the functional dimension. By a wrong diagnosis and design, the innovation does not respond to the desire of the hospital departments. Their wish is apparently not to lose any revenue which is not heard by PVI.

One of PVI’s ways to cope with this problem is to involve the Board of Directors in this problem. According to one of the interviewees the Board of Directors is involved to cover the financial gap that arises when implementing a workload-reducing innovation:

It is more often that the Board of Directors say: ‘Guys, we will cover the difference. If you take care of reducing the hospital visits than it isn’t at the expense of your [financial] results’. (Young male U., with a background in Psychology and Business Administration)
Funding of the innovation

Funding of the innovation itself can be considered as an obstacle on the functional dimension. PVI does not have the financial capabilities (infrastructural obstacle) to develop and implement an innovation themselves, therefore (external) funds are needed. According to the interviewees finding funders requires some effort. Because it is not always clear who will benefit from the innovation, funders are sometimes hard to find and convince. This obstacle mostly appears in the first few steps of the functional dimension but it could also appear during the implementation when the implementation costs are higher than expected.

First money must be invested. Well, to collect that money, that’s always difficult. Yes, well, find someone how want to invest in such a thing. (Young male K., with a background in Bio-Medical Engineering)

4.5 The interrelation of obstacles

Now that the encountered obstacles are identified and mapped on the related dimensions of the 3D-model for interventions in organization, the interrelations between the obstacles can be illustrated and described. As described by Achterbergh, Vriens and Doorewaard (2009), the dimensions with its goals, phases, activities and infrastructural measures are together able to realize an organizational intervention. Impediments in these different phases, activities and infrastructural measures will hamper the (combined) goal of the dimensions, therefore the identified obstacles (also) are interrelated. Hereby, the obstacles on the infrastructural dimension affect the processes on the functional and social dimension. Likewise, obstacles in the processes of the functional dimension hamper the processes on the social and infrastructural dimension and vice versa. As an explanation of these interrelations, three examples are illustrated and described of how the identified obstacles are interrelated in the 3D-model. The first example is an obstacle interrelation that is hard to get around for PVI, namely the financial structure of healthcare and its innovations. The second and third examples are more within the capabilities of change for PVI, and serve as a foundation for the recommendations, namely the used method and the difference in education and attitude.
The financial structure

The obstacle of financing was mentioned in many different forms by the interviewees and hinders the activities and phases of all dimensions. (1.) The lack of financial capabilities makes it hard for PVI to innovate and to implement an innovation. This can be considered as an infrastructural impediment. (2.) This lack of funds affects the processes on the functional dimension. By not having enough financial capabilities the activities of implementation and evaluation cannot be completely accomplished, which can result in the dispense of an evaluation. When an innovation is not evaluated, the value and competence will not be proven. Therefore, (3.) doctors resist the implementation. Doctors argue that they do not want to use unproven innovations. The resistance affects the credibility of PVI, which in turn makes it hard for PVI to find external funders (4.). The obstacle on the functional dimension (2.: halfhearted activities of implementation and evaluation) also affects the infrastructural dimension. Being not able to prove an innovation results in a lack of external investments (4.), which in turn leads to less financial capabilities of PVI. These reduced capabilities (1.) make it impossible for PVI to financially compensate doctors. Most innovations contribute to more efficient patientcare (such as home monitoring) which reduces the professionals’ work load, and thus income, because doctors’ financing is based on face-to-face consultation. (3.) This encourages resistance to change by doctors.

Hence, the obstacles of financing of all dimensions are interrelated in such a way the obstacles themselves and their results support the restraint attitude to invest of external funders (4.), which make it really hard to break this vicious circle.
The used method

The second example of the interrelation between the obstacles on the different dimensions is the used method. (1) Unclear frame setting by PVI or Reshape can be considered as an obstacle on the infrastructural dimension. It can lead to unclear borders of the activities on the functional dimension (2). When the innovation implementation process is not correctly planned and framed, the operators of the implementation and evaluation have no directive guideline for their practice. These cluttered activities encourage doctors resist change (3), which is an obstacle on the social dimension. When it is unclear for doctors where the innovation is about and which activities it entails, they are more likely to resist to change. Doctors then consider the innovation implementation and the use of the innovation as ‘extra work’ and argument that they only want to use proven innovations. The unclear frame setting also affects the resistance to change directly. When the innovation implementation frame is unclearly set by PVI (1), the doctors do not see the added value of the innovation (3), which in turn leads to stagnation in the implementation process (2).

The difference in educational background

The last example of the interrelationship of the obstacles is the difference in educational background between on the one hand the employees of PVI and Reshape, and on the other hand the doctors. The obstacle on the infrastructural dimension is the fact that PVI...
and REshape employees have a different education than doctors (1.). By this educational difference a misfit can occur in the activities of the functional dimension, such as the diagnosis, design and implementation of the innovation (2.). Basically because PVI and REshape do not have the medical content knowledge, they can make mistakes in the functional activities. A wrong diagnosis, design or implementation may frustrate the doctors which is expressed as resistance. Another effect of a misfit is the enhancement of the authoritarian attitude of doctors (3.). A misfit confirms the doctors’ supposition that PVI employees and other supportive staff are not as knowledgeable as them. This enhanced authoritarian attitude of doctors affects the contact with the PVI employees. The PVI employees are impressed the doctors’ knowledge and their white coat, maybe because PVI employees were once patients themselves and attributed admirable characteristics to the doctors (Brase and Richmond, 2004). This emphasizes the difference in educational background. That the PVI employees have a lack of medical knowledge and that they are being impressed strengthens the authoritarian attitude of the doctors (3.), which in turn leads to a greater chance of disapproval and boycott of the innovation implementation (2.), which increases the feeling of incompetence of the PVI employees (1.).

Now that the encountered obstacles are identified and their effect on practice is described in the first four paragraphs of this chapter, and the interrelations between the obstacles is illustrated in paragraph 4.5, some conclusions can be drawn. In the next chapter the main conclusions are drawn, the study is reflected and the theoretical- and practical implications are discussed.
Chapter 5: Conclusion and Discussion

This chapter will discuss the following: firstly, the answers to the research questions will be given and discussed. Secondly, the theoretical relevance of this study and the used theory (the 3D-model) is discussed where after directions for further research are given. Thirdly, a reflection on the used research method is given and the role of the researcher is discussed. Finally, the practical relevance of this study is considered from which some operable recommendations for PVI.

5.1 Conclusion

Three research questions were formulated in collaboration with PVI to identify the encountered impediments in healthcare innovation implementation by PVI, their effect on practice and the interrelations between the identified impediments. Six employees of the PVI department were interviewed to share their experience regarding the encountered impediments in the process of innovation implementation. These interviewees were questioned how these impediments affected implementation practices and how they try to cope with the obstacles. The analysis used the 3D-model for interventions of Achterbergh, Vriens and Doorewaard (2009) to identify all the mentioned obstacles, as presented in Chapter 4. The three research questions were:

1. **What impediments hamper PVI’s work during the innovation implementation process, according to PVI employees?**
2. **How do these impediments (appear to) affect the implementation practice of the PVI staff and what kind of coping strategies are used by PVI employees to cope with these impediments?**
3. **How are the encountered impediments interrelated?**

The goal of PVI must be adhered to before answering the three research questions. PVI is employed to implement innovations in targeted hospital departments of the RadboudUMC. Their goal is to successfully implement innovations in order to make healthcare more sustainable for the future. The identified obstacles (in the next sub-paragraph) withhold PVI of achieving their goal, therefore the obstacles hamper client satisfaction, patient satisfaction, and the degree of successful innovation implementations.
The identified impediments that hinder the innovation implementation process are encountered on all three dimensions of the 3D-model for interventions. Some obstacles could be identified as obstacles on the infrastructural dimension, others on the social or functional dimensions, and one obstacle is encountered on all three dimensions.

Three obstacles on the infrastructural dimensions were identified. The lack of medical content knowledge of the PVI employees compared to the targeted medical professionals, which is created by an educational background difference. Additionally, the PVI employees are feasibly impressed by the doctors, which emphasizes the educational difference, which in turn increases the rejection chance of doctors for a certain innovation implementation. The second obstacle is the (lack of) transfer between REshape and PVI. Often there is no clear transfer of the innovation from REshape to PVI, this transfer is missing activities and clear borders. This hinders the innovation implementation process since this transfer creates a diffusion of responsibility. This is also interrelated with a non-responsible attitude of the PVI employees, which is identified as the third obstacle on the infrastructural dimension.

The identified obstacles within the social dimension create the underlying resistance to change. Resistance of the medical professionals, supervisors, and nurses was triggered by several obstacles. The first obstacle is created by the continuous trend to change which makes the RadboudUMC staff tired of innovations. The disappointment of the (medical) professionals in innovation implantations, which is created when innovation promises have not been kept, and the extra investments needed for the implementation were also identified as obstacles on the social dimension. The third obstacle is the responsibility for patientcare by medical professionals. Medical professionals are being held responsible for patientcare, thus a cautious attitude towards new ways of doing prevails, due to fear of affecting the quality of treatment/patientcare. The last obstacle is the culture and the education of the professionals, which is strongly related with obstacles on the other dimensions. These four obstacles create resistance to change, which hinders the innovation implementation of PVI. It appeared that some implementations by PVI remained in the phase of unfreeze and change, and do not reach the refreeze phase. Identifying resistance to change as an obstacle in healthcare innovation implementation is in line with Grol et al. (2013), who identified the professionals’ resistance to change as innovation implementation obstacles in healthcare optimization.

Five obstacles were identified in the sequential steps of the functional dimension. The first obstacle consists of technology of the innovation itself and technology of the (supportive)
targeted infrastructure. These appeared to be insufficient and hinder the innovation implementation, which is in accordance with the findings of Herzlinger (2006). The second impediment is the organization of the RadboudUMC. The autonomy of the different hospital departments causes incongruence in the used supportive attributes, such as dossier keeping or appointment making. This difference creates incongruence in innovation implementation since every department has a different set-up for the innovation. The fact that laws and regulations are never set before an innovation implementation is hindering the implementation process. Because rules and regulations are not available at the moment of innovation implementation they must be set, which requires waiting time. Furthermore, the used method in which the innovation is tested before the implementation was identified as an obstacle since the use of an unclear method could lead to unclear borders of innovation implementation and incomplete activities (absence of an evaluation). By this used method, no complete integration of the innovation takes place, and therefore is it hard to test the effects of the innovation, which can result in a falsely rejection of the innovation. The last impediment was the complexity of stakeholders. The process of innovation implementation involves many different stakeholders with different interests and all other roles in the implementation process. The indistinctness about the stakeholders’ involvement in the activities and the quantity of stakeholders make the innovation implementation complex for PVI.

The obstacle that affects all dimensions is financing. Financing the PVI employees and the lack of financial capabilities of PVI is considered a financial obstacle on the infrastructural dimension. Fear of losing income is the second financial obstacle, by implementing innovations that increase the effectiveness of patientcare, the medical professionals’ workload is reduced, which means a decline of income. This fear of losing income can be considered an obstacle on the social dimension on the one hand, and an obstacle on the functional dimension on the other hand, since the fear of losing (‘income reducing innovations’) can be initiated by a wrong innovation design. The third financial obstacle is the funding of the innovation itself, which can be considered an obstacle on the functional dimension. Although the funding obstacles address the different dimensions, they all concern fundraising and the failure of getting those funds.

Impediments are encountered on all three dimensions of the 3D-model. They range from practically to socially grounded obstacles, some of which are within the power of adjustment by PVI and others are on a macro level which requires a societal transformation. All identified impediments, however, hamper PVI in reaching their goals. This variety of
results correspond with the idea that obstacles in innovation implementation in healthcare arise at multiple levels, on the level of the patient, the team, the organizational and, the market/policy (Ferlie & Shortell, 2001).

(2). The effect of the impediments and coping strategies

The identified obstacles have different effects on the practice of the PVI employees. The impediments affect the practice of PVI in such a way that PVI employees experience frustration on the one hand, or disappointed and resignation on the other hand. The employees react in a pro-effective way to that or in a less assertive way. The pro-effective way profiles the search for and the use of coping strategies. The less assertive way is usually expressed in a motivation decline or blaming others. The pro-active coping strategies are discussed first, followed by the less pro-active behaviors.

The PVI employees use different coping strategies to deal with the encountered obstacles in a pro-active way. PVI tries to involve the targeted departments in their implementation. They hope to eliminate a mismatch between the design of the innovation and the desires of the professionals by cooperating with the involved stakeholders (professionals, nurses, supervisors and patients). They appoint an innovation ambassador in collaboration with the stakeholders at the targeted department who becomes the link between the department and PVI. Another coping strategy is finding loopholes in laws and regulations. Other rules are applied to innovation testing and consequently to the official innovation implementation and adoption. Additionally, PVI tries to involve important stakeholders in order to overcome the financial obstacles. They try to reach arrangements with the Board of Directors or insurance companies in order to fill the financial gap that arises when implementing a workload reducing innovation. PVI uses the testing of an innovation and a training with the innovation to discover the obstacles in the implementation, and uses testing to weaken the resistant professionals for the innovation implementation. Some of the PVI employees take a subordinate role in communication with medical professionals in order to elicit sympathy and cooperation. The last assertive, and logical, reaction to the encountered obstacles is the adjustment of the innovation and its implementation in order to make the innovation successful.

PVI employees similarly show a less proactive reaction to these impediments as well. They become demotivated and find it hard to continue in the implementation when facing an
obstacle. They sometimes even withdraw from the innovation implementation, shown by one employee who made a shift from striving for a successful innovation implementation in the RadboudUMC towards creating awareness for a rearrangement of the healthcare system by writing a book. PVI employees additionally start blaming other departments for the failure of the innovation or shift the responsibility for the innovation towards other stakeholders, as expressed in the conducted interviews.

Despite these negative effects of the encountered obstacles, the PVI employees appeared empowered and fairly determined to continue in their job to have a significant impact on healthcare and making it more sustainable for the future.

(3). The interrelation between the impediments

This study revealed that the encountered obstacles are strongly interrelated in some cases. The three illustrated interrelations show that an obstacle on one dimension strengthens or causes an obstacle on another dimension, which in turn affects a third dimension. This was the case for the financing in healthcare innovation implementation, the used innovation implementation method and the difference in educational background between the medical professionals and the PVI employees. The interrelation of the financing impediments can be explained as the following: PVI has no financial capability, which can result in an incomplete innovation implementation process, leading to resistance. This resistance is based on the doctors’ argument that they only want to implement proven innovations. The absence of sufficient funds impedes the completion of an implementation innovation which makes it hard to scientifically prove an innovation. The financial incapability of PVI effects resistance directly, since PVI has no possibility to financially compensate for the more efficient patientcare innovations which reduces professionals’ workload. The second illustration of the interrelation is the used method in the innovation process. The unclear frame setting of PVI does not provide the innovation implementation operators with directive guidelines for their practice. These cluttered activities encourage doctors to resist change. The last illustration of the interrelation between the encountered obstacles is the difference in educational background. This difference could cause a misfit in the innovation diagnosis, design or implementation, resulting in the frustration of doctors and the confirmation of their supposition that PVI employees and other supportive staff are not as knowledgeable as they consider themselves. This enhanced authoritarian attitude of doctors affects the contact with the PVI employees who react subordinately to their attitude.
These three examples give an illustration of the interrelatedness of innovation implementation obstacles. It also illustrates the nature of these interrelations. Most of the obstacles affect the other in a reinforcing way, which continues in a vicious circle.

5.2 Theoretical discussion

This paragraph describes the advantages and disadvantages of the use of the 3D-model for interventions in this study and in general, the theoretical relevance of this study and the directions for future research.

To study all encountered impediments and their interrelation the 3D-model for interventions in organizations by Achterbergh, Vriens and Doorewaard (2009) was used. By using the 3D-model, a clear overview has been provided of the encountered obstacles on the different dimensions and their interrelations. In contrast with other models concerning innovation processes, the 3D-model covers three aspects of an intervention: the infrastructural, the social and the functional. The 3D-model does not only concern the perspective of the adaptors like the individuals’ innovation adaptation model (Rogers, 2003), nor the innovation process (Tiwari et al., 2007), it covers three aspects in one model. Besides, the 3D-model appoints aspects of change (such as leadership in organizational) of which several change theories exists. This is a great advantage of the 3D-model because it gives the ability to support the invention in all domains.

Furthermore, the model appeared to be useful because it forced the categorization of phenomena (impediments in this case) in three different dimensions. By using this model, the encountered obstacles could be located on the dimensions which helped in forming the practical recommendations.

Additional, the 3D-model has proven its strength in evaluating interventions by this study. Although the model is intended as a prescriptive model, it can also be used for evaluation. By investigating the steps of the three dimensions of a completed intervention, one can evaluate certain phases, activities or infrastructural measures. This evaluation can be used for next interventions. By using the model, it forces one to consider the different aspects of an intervention.
Nevertheless, the 3D-model also involves some disadvantages, in general and specifically in this study. The model is developed to support interventions in organizations on a sequential manner and for one intervention at the time. Previous interventions and organizational history are not explicitly taken into account. The identified obstacles are strongly interrelated which can create a vicious circle of effects, as described. When starting a new innovation in practice, the model does not take explicitly account for previous interventions which could affect the intervention process. Therefore, in practice, previous (unsuccessful) interventions and organizational history could affect the current intervention. It could be argued that previous interventions and the corresponding effect on the targeted people is captured in the social dimension but not only the people are affected by previous interventions. Also the used infrastructure and the process of intervening is affected by previous interventions. Hence, the model does not explicitly acknowledge and display the ongoing character of change (as promoted by Tsoukas and Chia (2002)). The model is therefore too simplistic for capturing the complex ongoing character of interventions in organizations.

A second limitation of the 3D-model is the unilaterality of the model. The model is focused on one intervention at the time while in practice PVI is occupied with the several innovations and corresponding implementations at the same time. One can imagine that the innovation implementation process of one innovation can affect the infrastructural measures, the functional activities and the social phases of acceptance. Consequently, the use of this model to study all encountered impediments by PVI, made it hard investigate the interrelations between the obstacles. Due to the fact that the impediments in general were questioned based on the 3D-model, the specific interrelations between the impediments in interventions could not identified and mapped. The actual relations between the impediments could therefore be distorted (in this study) because of different obstacles in different innovation implementations.

Furthermore, the 3D-model is dependent on the chosen perspective. When the same research questions were studied from within the perspective of doctors, the obstacles identified as obstacles on the social dimension would change to obstacles on the infrastructural dimension. This makes it hard to study relations as well. Additionally, this perspective dependency makes it hard to come with solutions, because it is hard to pinpoint causes and consequences.
In conclusion, the 3D-model for interventions has proven its strength (again) in involving three dimensions of an intervention. Additionally, the model can be used for the illustration of interrelations between phenomena like innovation implementation impediments. Furthermore, the model can be used for the evaluation of interventions in a way that it forces you to think about multiple aspects of an intervention. Using the model for evaluation is appropriate for solely one intervention at the time. The 3D-model does not take account of organizational history, previous interventions and the occurrence of multiple interventions at the same time which are interrelated. Besides, the dependency on the chosen perspective of this model make it hard to identify the causes for- and results of phenomena, which makes it hard to come with solutions to the identified problems.

The deeper evaluation value of the model can be elicited in future research, by studying one innovation implementation at the time, which can contribute to a better understanding of the interrelations between phenomena as obstacles in innovation implementation. The model is likely to show its value when evaluating one process from multiple perspectives. The veracity about innovation implementation impediments will be more nuanced if this approach is applied. An additional comment must be made on using the 3D-model for interventions. The model (or any given other model) gives the illusion of controllability (King & Anderson, 2002). When using the model one (managers) gets the feeling they are able to control the (described and illustrated) situation but forces outside the organization also effect the process within the organization. The illusion, that managers could perfectly manage interventions as desired and prescribed, must be made conscious.

5.3 Limitation of the study

Although the study provided some practical implications that will be outlined in paragraph 5.5, and showed its theoretical value and scientific relevance, some methodological mistakes and missteps were made, which could not be avoided beforehand.

In this study solely interviewees were used, which made the investigation of the effect of impediments on practice incomplete. The identified effects on practice are only based on the experiences of the employees. These experiences are of great value but by doing so the effect of the impediments on the actual behavior of the PVI employees was not studied. By
using observations and/or analyzing documents, next to interviews, the effect of the encountered obstacles could be studied more comprehensive and gain more in-depth insights. Additionally, the interviewees were selected by the first contact point of PVI, who told them that the study was about obstacles in healthcare innovation implementation. They were the closest colleagues of the contact point, and were therefore likely to collaborate with this study. That these specific selected employees were willing to participate in this study, could affect the study results. Maybe those employees were the ones who were not content about the current situation of PVI, so an interview could give them an opportunity to digress and indulge in name-calling.

Due to the limited time and access in the organization at the beginning of this study, it was chosen to do solely interviews which were arranged by the contact point.

In analyzing the interviews it appeared that a context was missing to the many identified obstacles in the practice of innovation implementation of PVI. No comprehensive context description was studied which made it hard to pinpoint the obstacles on the different dimensions and to illustrate the interrelations later in the analysis. Hence, by studying one specific innovation implementation, the 3D-model for interventions could be fully appreciated and a more in-depth insight could be given of the encountered impediments and their interrelations. The limitations of the 3D-model (as described in 5.3) and conducting interviews were not acquainted at the start of this study, this in conjunction with the desire of PVI to indicate all the encountered obstacles, made it impossible to gather more in-depth information.

5.4 Reflexivity

The researcher and his decisions represented a great part of this research. This issue demanded an assessment of quality and a questioning of the research ethics and research integrity, which were conducted in Chapter 3. What follows here is a discussion on the role of the researcher and his assumptions.

The goal of a researcher is to stay objective throughout a study and capture the data in its purest form, but despite this, the researcher himself and his assumptions will occasionally influence the study. Knowledge and human development is socially situated and constructed via interaction with others (McKinley, 2015), wherefore my role as a researcher cannot
remain undiscussed.

The object of study (the PVI employees) and I affected each other mutually during the study, which in turn affected the research process and the outcome in a positive and negative manner (Alvesson and Sköldberg, 2000). I placed myself in contact with the interviewees during the interviews. This contact enabled me to conduct interviews in a comparable manner as to a psychologist-patient setting. This includes, but is not limited to, asking open questions, giving reflections on content and emotion, and making summaries of what I understood of the content. This manner of conducting an interview created a context in which all the encountered obstacles and corresponding effects on practice could be considered. It also ensures a focus on the social aspects of a phenomenon. My personality and the emphatic manner of interviewing could have affected the interviews in such a way that the interviewees had the feeling that they were heard, allowing them to speak honestly which in turn enriched the gained information on the one hand. On the other hand, due to my job and personality this study could be slightly more focused on the psychological aspects of innovation implementation than when this study was conducted by others.

My awareness of the used procedures and methods in healthcare and treatments in my own field of expertise, being psychology, could influence the questioning about the medical processes and the innovations within. This could lead to a lack of interrogation of the medical treatment processes, which could lead to reduced understanding of the context.

5.5 Recommendations

What follows are several practical recommendations for PVI to improve their innovation implementation process. The practical implications are based on the findings of this study and the context in which PVI operates. PVI is employed by the Board of Directors of the RadboudUMC to implement innovations in targeted hospital departments of the RadboudUMC. Their goal is to successfully implement innovations in order to make healthcare more sustainable for the future. Successful innovation implementations, client- and patient satisfaction and a positive review by the Board of Directors are essential for survival.

The next subparagraphs will provide four considerations and recommendations. One concerning an obstacle that is beyond PVI’s power, namely the financial structure. This obstacle has a great impact on the practice of PVI but is beyond the power of PVI. Three
practical recommendations can be given based on the identified obstacles of the used method, the lack of transfer and educational background difference.

The impact of financing on the process of innovation implementation is huge according to the interviewees. The illustration of the interrelations between the financial obstacles (paragraph 4.5), illustrates that this vicious circle is really dependent on external funders. The medical professionals are currently paid for the quantity of face-to-face consultations, which makes it unattractive for professionals to invest in patientcare efficiencies which reduces their workload. A payment system in which medical professionals are financially compensated for the occurred workload reduction could stimulate healthcare innovation implementation. The Board of Directors of the RadboudUMC is already compensating this income loss by efficient patientcare innovations, which is a great incentive for innovation implementation and would be highly advised to continue.

The used method of unclear framing appeared to be an obstacle within the infrastructural dimension, which effected the other dimensions in a way the innovation implementation was hindered, see paragraph 4.5 ‘The interrelations of obstacles’. The implementation process was hindered and resistance stimulated by using unclear framing, mostly because a lack of evaluation. The medical professionals argued that they only want to implement proven innovation. It is quite hard to prove an innovation because an innovation is the attempt to carry out a certain invention, in which an invention is defined as the first occurrence of an idea (Fagerberg, 2004). The resistance can be muted by framing the innovation implementation in a different manner than which is currently in use. If the innovation and the corresponding implementation will be framed as a scientific study with an adequate evaluation by PVI, the medical professionals can contribute in interest of union branches. This will clearly define the activities of the implementations and is likely to positively affect the total process.

The lack of transfer between PVI and REshape is fundamental to several impediments in the innovation implementation process. The diffusion of responsibility and the misfits that are made in diagnosis, design and implementation are related with the lack of transfer between PVI and REshape. An improved collaboration between the two departments is needed. The current situation is such that REshape invents an innovation, which PVI has to implement. The innovations are therefore somewhat forced towards PVI and the involved hospital departments. A way to overcome the corresponding obstacles due to this lack of
transfer, is a better separation between the departments. Reshape, on the one hand, delivers the innovations and continue delivering innovation. Those innovations are kept; they are added to a ‘toolbox’. PVI, on the other hand, is more connected with the hospital departments. PVI studies the desires and necessities of the departments from which they select an innovation (‘tool’) from REshapes’ toolbox. This process does not force the innovation upon PVI, which can overcome misfits in diagnosis, design and implementation, and clearly structures the collaboration between REshape and PVI. Both departments can thus continue unimpeded without mutually blaming each other or inducing a shift of responsibility.

The difference in educational background between the PVI employees and the medical professionals has an effect on the attitude and behavior of PVI employees and medical professionals, and on the innovation implementation process. The PVI employees lack medical knowledge which strengthens the authoritarian attitude of doctors. This authoritarian attitude of doctors leads to a greater chance of a disapproval and boycott of the innovation implementation which in turn increases the feeling of incompetence of the PVI employees. This vicious circle, which is extensively described and illustrated in paragraph 4.5, can be partly breached by a competence increasing training for PVI employees. A training or education in (medical) hospital procedures and assertiveness will increase the confidence and competence of PVI employees, leaving them more critical of the attitude of doctors. The doctors, in turn, become aware of the competence of PVI, which increases the likelihood of an approval of the innovation implementation.
References


Chapter 6: The Appendices

6.1 The interview format

Introductie:
Voorstellen + iets over het onderzoek vertellen (master OD&D, onderzoek naar innovatie obstakels in de zorg)

Vragen of het opgenomen mag worden

Vertellen dat het anoniem verwerkt wordt

Opening:
1. Wat is uw huidige functie bij PVI?
2. Welke activiteiten vallen hieronder?
3. Kun je een voorbeeld geven van een project waar je nu werkzaam in bent, waarbij een innovatie wordt geïmplementeerd in een bestaand proces binnen het UMC?

Innovatie:
4. Wat doet PVI? (In dit innovatieproces)
5. Wat doet u precies in dit innovatieproces?
6. Welke andere partijen zijn daarin betrokken? Wie zijn hun partners?

Obstakels:
7. Welke moeilijkheden komt u tegen in het implementatie proces?
   a. Kunt u daar een voorbeeld van geven
8. Hoe ontstaan deze obstakels?
9. Met welke dingen hangen deze obstakels samen?
10. Hoe hangen deze obstakels met elkaar samen?
11. (Eventueel, in achterhoofd houden) Hebben deze te maken met:
   a. Functional Dimension (diagnose, design, implementation, evaluation)?
   b. Social dimension (unfreeze, change, refreeze)?
   c. Infrastructural dimension (infrastructure, HR, technology)?

Practice:
12. Welke effecten hebben deze obstakels op uw werkzaamheden?
13. Hoe beïnvloeden deze obstakels de werkzaamheden van anderen?
14. Hoe gaat u hiermee (de obstakels, het contact met anderen) om?
   a. Hoe lost u het op?
   b. Wat werkt wel?
   c. Wat werkt niet?

Afsluiting:

15. Samenvatting geven, van wat ik begrepen heb + deze checken (klopt dit, moet er nog iets aan toegevoegd worden)?
16. Wilt u in dit kader nog iets vertellen?
17. Hoe vond u het gesprek (ervaring)!?
18. Bedanken voor gesprek
6.2 Codetree interview format

Codetree interview format; from main topic to interview questions. ‘Q’ indicates question number.
6.3 Quotes and Codebook

Q1: Ja ik stond al meteen een nul achter, maar ik dacht wel ik vind dat ik het moet benoemen en dan maak ik het wel weer waar gedurende de training. Maar je triggert ze juist door ze te laten zien, ik ken je werkproces. Maar als je daar als verpleegkundige gaat staan, dan zie je gewoon mensen, ‘zij weet waar ze het over heeft’, ‘zij kent de zorg’, ‘zij kent de vloer’. En zo is het bij artsen ook, daar wordt ook weleens. Ik heb ook weleens tegen over een arts in discussie over een bepaald beleid gehad waarbij je dan eigenlijk terugkrijgt van: ‘ik zit al 10 jaar met patiënten om tafel’. Ja, dan heb ik geen tegenargument, ik niet inderdaad. *(Young Female L., with a background in Psychology)*

Q2: Ja, wat ik merk bij innovaties die hier Radboud worden bedacht en ontwikkeld. Ik spreek niet voor allemaal, maar in veel gevallen merk je dat het moeilijkste punt is, als je eenmaal het idee heb uitgedacht en een soort van prototype hebt gemaakt om dan de vervolg stap te zetten. *(Young male E., with a background in Bio-medical Science)*

Q3: De verantwoordelijkheid hoort ook bij het collectief. Ik heb hier nog nooit gehoord van: ‘als dit project niet lukt, dan verlengen we je contract niet’. Bij wijze van spreken. En zeker omdat heel veel mensen hier een vast contract hebben dan kan er niet heel veel gebeuren. Je moet wel hele gekke dingen doen wil je er hier worden uitgegooid. Hehe. Dus dat is wel een belangrijk obstakel. *(Young male U., with a background in Psychology and Business Administration)*

Q4: Uuhm, ja. Wat nog wel in het implementatieproces zelf. We hebben natuurlijk ook dat EPD geïmplementeerd. Medewerkers worden ook wel een beetje moe. Ze hebben best wel veel, uuh, al langs zien komen. Medewerkers worden gewoon kapot gegooid met allerlei nieuwe systemen en regels en wetgeving en dergelijke. Maar ook met innovaties en verbeteringen. *(Young male U., with a background in Psychology and Business Administration)*

Q5: Het heeft ook te maken met hoe wij sommige dingen implementeren hoor. Wat er dus vaak gebeurd is dat je van een soort proces hebt, wat een verpleegkundige doet op een dag, bij wijze van spreken. Dat wij een innovatie gaan implementeren en dat we het dus vaak, en
misschien ook onbewust, bovenop zijn proces leggen. Hij moet zijn proces afwerken en daarnaast moet hij dus ook nog iets registreren in een op andere app. In plaats van dat die app helemaal in het primaire proces van die verpleegkundige zit. *(Young male U., with a background in Psychology and Business Administration)*

Q6: Daar zit ook meteen de tweede grote belemmering, dat is het overtuigen van artsen. Uuhm, artsen en zorg professionals zijn op dit moment in ons systeem de absolute eindverantwoordelijke voor de uitkomsten van de behandeling *(Middle-aged male S. with experience in consultancy)*

Q7: Dus op het moment dat ik een arts ga vertellen wat hij of zij gaat doen dan is het eigenlijk al meteen mis, dus wat heel erg helpt in mijn ogen is dat je ook dat werkelijk een arts tegen arts laat vertellen van ‘he dit gaan we met z’n allen doen en ik ben niet enthousiast over en zo kunnen we dit doen’. *(Young Female L., with a background in Psychology)*

Q8: Het kan ook zijn, dat het, een ander punt waar je tegenaan loopt, is de vergoedingen. Zorg wordt natuurlijk vergoed door zorgverzekeraars, uiteindelijk jezelf natuurlijk, maar. Dat soort dingen lopen altijd achter op innovaties. En als we bijvoorbeeld efficiënter willen omgaan met het aantal bezoeken, krijg je in feite ook minder geld. *(Middle-aged female D., with a background in Technical Business Administration)*

Q9: Uuhm, wij hebben bij het Radboud ziekenhuis overal wifi. En we hebben hele ouderwetse tv’s hangen, dus ik zei tegen iemand: ‘waar gaat dit over, iedereen heeft toch een Netflix account’. Geef iedereen een tablet als die binnenkomt en laat ze lekker hun Netflix kijken. Maar die man zei: ‘wat denk jij dat, dat aan wifi kost’. Dan stopt onze EPD er mee, dat kunnen wij helemaal niet aan. Dus het is zo’n grote concentratie van technologie die daar samenkomt van infrastructuur, van informatie stromen, dat het heel moeilijk is om dat technisch mogelijk te maken. *(Middle-aged male S. with experience in consultancy)*
Q10: En de Radboud cultuur is eigenlijk over het algemeen, je hebt gewoon afdelingen en dit zijn allemaal eigen bedrijfjes. Dus afdeling A kan kiezen om patiënten portaal te doen, maar als B er geen zin in heeft doet zij het niet en C die zegt 'ik doe het half'. *(Middle-aged female D., with a background in Technical Business Administration)*

Q11: Iemand kan een super goede bloeddrukmeter maken, die kan heel betrouwbaar lijken of zijn maar als hij niet door een of andere ethische medische molen gaat dan kun je hem eigenlijk niet inzetten. *(Young Female L., with a background in Psychology)*

Q12: Dat je tijd te kort komt. Dat kan. Dat je het zelf misschien niet goed hebt ingeschat, bepaalde periodes. Eigenlijk meer tijd nodig dan dat je hebt. *(Middle-aged female D., with a background in Technical Business Administration)*

Q13: Risico, dus als ze voor zo een innovatie gaan. Stel ze gaan implementeren en het flopt volledig. Dan vergooi je ook een beetje je eigen geloofwaardigheid en investeringen, die gooi je gewoon weg. *(Young male U., with a background in Psychology and Business Administration)*

Q14: Wat wel een beetje is, in de zorg. We weten dat het moet, maar we kijken een beetje van wie gaat er als eerst bewegen. He, we leggen de schuld bij de overheid of bij de NZ, of IGZ of bij, noem maar een instantie. Iemand anders moet beginnen met veranderen. *(Middle-aged male S. with experience in consultancy)*

Q15: Uuhm. Maar stel dat ze dan ziek zijn, dan proberen we, eigenlijk is de roep altijd, zo goedkoop mogelijke zorg, de hoogste kwaliteit voor die patiënt. Uhm, maar uiteindelijk willen we dat als puntje bij paaltje komt niet, omdat het ons geld kost. *(Middle-aged male S. with experience in consultancy)*

Q16: Waar bij andere altijd het op neer komt natuurlijk, om iets neer te zetten moet er geld zijn, wat later waarschijnlijk wel terugkomt of wat zich wel terugbetaald. Maar goed er moet eerst geld in een investering, om dat geld bij elkaar te krijgen is dat lastig, want ja vindt maar eens een geldschieter die daar iets in wilt steken. *(Young male K., with a background in Bio-Medical Engineering and more focused on REshape)*
<table>
<thead>
<tr>
<th>Quotes:</th>
<th>1ste order codes:</th>
<th>2nd order codes:</th>
<th>Themes: (obstacles on..)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1: Ja ik stond al meteen 1-0 achter, maar ik dacht wel ik moet het benoemen en dan maak ik het wel weer waar gedurende de training…</td>
<td>Feeling of shortfall in contact with professionals</td>
<td>Different educational backgrounds</td>
<td>Infrastructural dimension of the 3D-model</td>
</tr>
<tr>
<td>Q2: Ja, wat ik merk bij innovaties die hier Radboud worden bedacht en ontwikkeld. Ik spreek niet voor allemaal, maar in veel gevallen merk je dat het moeilijkste punt is, als je eenmaal het idee heb uitgedacht en een soort van prototype hebt gemaakt om dan de vervolg stap te zetten.</td>
<td>Stagnation in process form idea to further development</td>
<td>Hampered transfer</td>
<td></td>
</tr>
<tr>
<td>Q3: De verantwoordelijkheid hoort ook bij het collectief. Ik heb hier nog nooit gehoord van: ‘als dit project niet lukt, dan verlengen we je contract niet’. Bij wijze van spreken. En zeker omdat heel veel mensen hier een vast contract hebben dan kan er niet heel veel gebeuren. Je moet wel hele gekke dingen doen wil je er hier worden uitgegooid. Hehe. Dus dat is wel een belangrijk obstakel.</td>
<td>Safe work environment so no risk and responsibility taking</td>
<td>Lack of responsibility taking</td>
<td></td>
</tr>
<tr>
<td>Q4: Uuhm, ja. Wat nog wel in het implementatieproces zelf. We hebben natuurlijk ook dat EPD geïmplementeerd. Medewerkers worden ook wel een beetje moe. Ze hebben best wel veel al langs zien komen. Medewerkers worden gewoon kapot gegoooid met allerlei nieuwe systemen en regels en</td>
<td>Professionals are tired of innovations</td>
<td>Resistance to new innovations and changes</td>
<td></td>
</tr>
</tbody>
</table>
wetgeving en dergelijke. Maar ook met innovaties en verbeteringen.

<table>
<thead>
<tr>
<th>Q5: Het heeft ook te maken met hoe wij sommige dingen implementeren hoor. Wat er dus vaak gebeurd is dat je van een soort proces hebt, wat een verpleegkundige doet op een dag, bij wijze van spreken. Dat wij een innovatie gaan implementeren en dat we het dus vaak, en misschien ook onbewust, bovenop zijn proces leggen. Hij moet zijn proces afwerken en daarnaast moet hij dus ook nog iets registreren in een op andere app. In plaats van dat die app helemaal in het primaire proces van die verpleegkundige zit.</th>
<th>Extra work on top of daily practice</th>
<th>Resistance to do more work next to their daily practice.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q6: Daar zit ook meteen de tweede grote belemmering, dat is het overtuigen van artsen. Uuhm, artsen en zorg professionals zijn op dit moment in ons systeem de absolute eindverantwoordelijke voor de uitkomsten van de behandeling</td>
<td>Responsibility for patientcare</td>
<td>Resistance to change due risk of innovation implementation</td>
</tr>
<tr>
<td>Q7: Dus op het moment dat ik een arts ga vertellen wat hij of zij gaat doen dan is het eigenlijk al meteen mis, dus wat heel erg helpt in mijn ogen is dat je ook dat werkelijk een arts tegen arts laat vertellen van ‘he dit gaan we met z’n allen doen en ik ben niet enthousiast over en zo kunnen we dit doen’.</td>
<td>Doctors culture and education</td>
<td>Resistance to change due authorial behavior of doctors</td>
</tr>
<tr>
<td>Q8: Het kan ook zijn, dat het, een ander punt waar je tegenaan loopt, is de vergoedingen. Zorg wordt natuurlijk vergoed door zorgverzekeraars, uiteindelijk jezelf natuurlijk, maar. Dat soort dingen lopen altijd achter op</td>
<td>Financial gap</td>
<td>No financial compensation as cause for resistance</td>
</tr>
</tbody>
</table>
innovaties. En als we bijvoorbeeld efficiënter willen omgaan met het aantal bezoeken, krijg je in feite ook minder geld.

**Q9:** Uuhm, wij hebben bij het Radboud ziekenhuis overal wifi. En we hebben hele ouderwetse tv’s hangen, dus ik zei tegen iemand: ‘waar gaat dit over, iedereen heeft toch een Netflix account’. Geef iedereen een tablet als die binnenkomt en laat ze lekker hun Netflix kijken. Maar die man zei: ‘wat denk jij dat, dat aan wifi kost’. Dan stopt onze EPD er mee, dat kunnen wij helemaal niet aan. Dus het is zo’n grote concentratie van technologie die daar samenkomt van infrastructuur, van informatie stromen, dat het heel moeilijk is om dat technisch mogelijk te maken.

**Mismatch between technology innovation and supportive (infrastructural) technology**

**Wrong technological design**

**Q10:** En de Radboud cultuur is eigenlijk over het algemeen. je hebt gewoon afdelingen en dit zijn allemaal eigen bedrijfjes. Dus afdeling A kan kiezen om patiënten portaal te doen, maar als B er geen zin in heeft doet zij het niet en C die zegt ‘ik doe het half’.

**No conformity among departments**

**Wrong diagnosis (solely on departments, not as a whole)**

**Q11:** Iemand kan een super goede bloeddrukmeter maken, die kan heel betrouwbaar lijken of zijn maar als hij niet door een of andere ethische medische molen gaat dan kun je hem eigenlijk niet inzetten.

**Laws and regulations**

**Counteracting laws and regulations during implementation**

**Functional dimension of the 3D-model**

**Q12:** Dat je tijd te kort komt. Dat kan. Dat je het zelf misschien niet goed hebt ingeschat, bepaalde periodes. Eigenlijk meer tijd nodig dan dat je hebt.

**Wrong time estimation**

**The used method**
<table>
<thead>
<tr>
<th>Q13: Risico, dus als ze voor zo een innovatie gaan. Stel ze gaan implementeren en het flopt volledig. Dan vergooi je ook een beetje je eigen geloofwaardigheid en investeringen, die gooii je gewoon weg.</th>
<th>Responsibility of doctors</th>
<th>Design does not meet doctors’ desires</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q14: Wat wel een beetje is, in de zorg. We weten dat het moet, maar we kijken een beetje van wie gaat er als eerst bewegen. He, we leggen de schuld bij de overheid of bij de NZ, of IGZ of bij, noem maar een instantie. Iemand anders moet beginnen met veranderen.</td>
<td>Wait and see attitude of stakeholders</td>
<td>Complexity of stakeholders makes it hard to go through the intervention process (D-D-I-E)</td>
</tr>
<tr>
<td>Q15: Uuhm. Maar stel dat ze dan ziek zijn, dan proberen we, eigenlijk is de roep altijd, zo goedkoop mogelijke zorg, de hoogste kwaliteit voor die patiënt. Uuuhm, maar uiteindelijk willen we dat als puntje bij paaltje komt niet, omdat het ons geld kost.</td>
<td>Financial gap</td>
<td>Financial gap by wrong diagnosis and design</td>
</tr>
<tr>
<td>Q16: Waar bij andere altijd het op neer komt natuurlijk, om iets neer te zetten moet er geld zijn, wat later waarschijnlijk wel terugkomt of wat zich wel terugbetaald. Maar goed er moet eerst geld in een investering, om dat geld bij elkaar te krijgen is dat lastig, want ja vindt maar eens een geldschieter die daar iets in wilt steken.</td>
<td>Funding of the innovation</td>
<td>Obstacle in the design phase of the innovation</td>
</tr>
</tbody>
</table>
6.4 Methodological changes

No mayor methodological changes were made during this study, merely the change of the codes. The second order quotes were converted to first order quotes and the second order quotes were developed on basis of the activities and phases of the 3D-model.