Barriers of developing and implementing IT-innovation in healthcare

A process study of challenges in eHealth development

Sandra Ericsson
Abstract

Healthcare in Sweden is in need of eHealth innovations to meet the requirements of a highly developed society. However, to develop and implement eHealth in the healthcare system is challenging because the system is experienced as complex, conservative, and fragmented. In this thesis, a qualitative single case study has been conducted to further investigate challenges of development and implementation of eHealth. This study demonstrates that it is challenging to understand the complexity of the healthcare system and that this has an impact on eHealth development. Involvement of potential users and collaboration between stakeholders are seen as a suggested solution to understand this problem. This thesis has also shown that involving users and collaborators is challenging as well. Further, the study has shown that there are technological challenges in realizing eHealth in the healthcare system and there is a challenge to develop and implement information systems because of regulatory limitations. Despite years of experience in healthcare or IT-development, many of the respondents find that these factors challenge innovation efforts.

Keywords: eHealth, healthcare innovations, engaged scholarship.

1. Introduction

Healthcare has for many years been characterized by innovation concerning the development of treatments, medications, and healthcare information systems. In order to meet the requirements which are placed on healthcare in highly developed societies, more new innovative solutions are needed which are different from the traditionally applied (Bessant, Kunne & Möselein, 2012).

While other big industries have adopted the advantages of the information technology since the 1980s, the healthcare sector has been quite slow to do the same, especially regarding coordination and cooperation between institutions (Bessant et al., 2012).

There exist a lot of good ideas about improvements in the healthcare system, but only a few are implemented, and it appears to be challenging to diffuse successful innovations when they are developed (Hovlin et al., 2013). Healthcare systems work with quality and continuous improvements. But innovation development is about something new or significantly improved, it involves a degree of radicality (Chesbrough, 2006).

The traditional innovation strategy is mainly used in healthcare today, but Chesbrough (2006) advocates a more open model of innovation approach for healthcare to be able to meet growing demands. A basic assumption of open innovation is that one can and should use external as well as internal ideas in the innovation process and depart from the idea that the most skilled people in the industry are situated within their own organization (Chesbrough, 2006). Murray, Caulier-Grice & Mulgan (2010) point out that the way in which an innovation is developed is at least as important as the innovation itself.

The study reported in this paper regards the challenges related to development and implementation of IT-innovations for healthcare or so called eHealth innovations. A process in a start-up company working with development and implementation of an innovation has been the case for this study.
A group of innovative actors with different backgrounds and roles like healthcare providers, professionals and staff, patient associations, IT-developers, politicians, researchers and students participated in a co-creation workshop during the spring 2013. The workshops purpose was to serve as a platform in order to enable the various stakeholders to discuss problems and innovative solutions related to information technology in healthcare.

During the workshop a business concept was developed and a more concentrated team formed to start a company. Despite a promising idea and knowledge and competence from different actors it has been proved challenging to develop and implement the innovation.

In this thesis a qualitative case study has been conducted with all the participants of the company in order to provide an in-depth investigation of challenges regarding realization of their business concept, how they experience the challenges and why they are important to overcome.

To my knowledge there is a gap of research regarding the challenges of development and implementation of eHealth innovations in the Swedish healthcare system. Most research in this area tends to focus on the problems in the healthcare system and they often present solutions to them without keeping in mind that these solutions may provide further challenges.

Against this backdrop the aim of this thesis is to create a deeper understanding of the challenges of developing and implementing information technology innovations (IT-innovations) for healthcare.

The research question is:

- What are the challenges of developing and implementing IT-innovations in healthcare contexts?

This thesis will mostly focus on how the challenges are experienced - how a group of actors with different backgrounds experience the challenges of developing an eHealth innovation together. To do this I have followed and participated in this group for almost a year and therefore this thesis is written from an engaged scholarship perspective.

By answering this question new knowledge will be added to the field of IT-based innovation in healthcare. This will be done by providing an overview of the experienced challenges in the development of IT-innovation in the field of healthcare from a company consisting of healthcare professionals, IT-professionals, students, researchers and marketers.

2. Related research

The population is increasing and growing older which generates higher demands on the healthcare. Consequently there is a need for improved healthcare by fostering a climate for innovation (Gard & Melander Wikman, 2012). IT-innovations are seen as an essential part to meet these requirements and therefore IT is growing in the field (Jordanova & Lievens, 2011; Dansky et al., 2006).
Actors and stakeholders of the healthcare and IT fields states that IT is reforming healthcare and improving it by increasing quality and efficiency when at the same time decreasing costs (Jordanova & Lievens, 2011). Enormous amounts of data flow through the healthcare system and therefore the IT development is driven by requests for increased flexibility and dynamic and effective information management (Birkler & Ronald Dahl, 2014).

Bessant et al. (2012) state that without radical innovation it seems unlikely to sustain the kind of healthcare which is associated with highly developed societies. A challenge here is to find ways to spread knowledge, to seize the open collective innovation ideas and to find ways to engage potential users much more actively. This challenges the traditional method by involving external actors such as caregivers or patients during the whole innovation process, from the idea generation phase to the conceptualization to the development or prototyping (Bessant et al., 2012).

Extant research has demonstrated that the conservative structure associated with healthcare is challenging for innovative actors (Sanandaji, 2012). A change in the work process may therefore take a long time to implement, and it has been proved difficult to change both health professionals' behavior, method of treatment and the structure of the healthcare system (Pesola, 2013). Compared to other industries they are less inclined to experiment with new solutions because it regards patients’ life and health (Hovlin, Arvidsson & Ljung, 2013). Socialdepartementet (2010) states that there is and should be an increased focus on adaption, use and benefits of the technology rather than the technical development per se. Ensuring healthcare professionals' acceptance of IT-innovation tools is a further challenge (Friedman, Iakovidis, Debenetti & Lorenzi, 2009).

The healthcare sector is often hierarchically built and healthcare managers seldom provide sufficient support when implementing new technologies and innovations (Sanandaji, 2012). Moreover, healthcare in Sweden is not a united system. It consists of a large number of different systems where the county council is working for themselves and the municipality for itself. The various health centers rarely discuss the development outside their own borders (Bullinger, Rass, Adamczyj & Moeslein, 2012). IT-innovations are therefore largely developed in response to local healthcare needs and therefore they do not become widely used or fail to become a part of the medical context as a wholeness (Bates and Wright, 2009).

Nonetheless there is pressure from the county council that the healthcare sector should improve their use of IT-innovations and their own innovativeness (Socialdepartementet, 2010). Policymakers should increase the encouraging and affirmation of innovation within the system as well as among private actors to accelerate the development of new IT-innovation products and services. The county councils are jointly investing around a total of 6.7 billion SEK annually on various IT-innovation services and an increasing amount allocated in addition to the joint development budget (Socialdepartementet, 2010).

However, even though there is a lot of encouragement from the policymakers, as well as plentiful opportunities and advantages with IT-innovation developments it is a risky business to manage. There are many more failed projects than there are successes in the market (Berg, 2001). The more complex the information system is and the bigger the
segment of customers are the more difficult it is to achieve the objective (Berg, 2001). One solution to this challenge seem to be to involve the customers during the development process because they have the best knowledge about their work practice and the problems they encounter but today it is mainly the IT-industry who is developing the innovation for healthcare (Sanandaji, 2012).

The innovation processes in healthcare often lack the understanding and representation of the patients’ perspective and they are seldom involved in the development process (Bullinger et al., 2012). Patients and their relatives demand information and want to be involved in the care and rehabilitation process but it is challenging to get them involved in the development of the healthcare processes and in the improvement work (Gard & Wikman, 2012).

At the same time healthcare is changing and care no longer need to take place at hospitals and health stations. Care can also take place at the patients’ homes with for example telemedicine which are replacing physical meetings between caregivers and patients with virtual ones which poses new challenges to both professionals and patients as they have to adjust to and deal with these changes (Pesola, 2013). Physicians can even prescribe mobile applications as treatment for their patients today. This new technology is known as eHealth. eHealth is strongly connected to IT-innovations and it is a radical way to develop innovations for healthcare (Sanandaji, 2012). Development of radical innovations differs from the traditional ways to innovate in healthcare because eHealth endeavors towards high dispersion instead of development of innovations in individual health centers (Bullinger et al., 2012).

This section has highlighted the many challenges of developing and implementing IT-innovations for healthcare and also the solutions to several of these challenges. But what is still problematic is that these solutions are not always so easy to apply. Despite many years of experience in healthcare or development developing and implementing IT-innovations for healthcare is still challenging.

2.1 eHealth

Sweden approaches a new paradigm where the healthcare takes place not only at the hospitals or health centers but also in the daily life of the patients (Pesola, 2013). There seems to be no unanimous definition of eHealth but it is often associated with digital health services for the patients. The eHealth debate is broad and stretches over topics such as telemedicine, electronic records, going paperless, procurement, healthcare score cards, information systems etc. (Svensson, 2002). There is more than one definition of eHealth and different terms are used to describe this service (Jordanova & Lievens, 2011).

The Swedish counties term is based on World Health System’s definition of eHealth; health is described as a complete physical, mental and social well-being. By adding the "e" to the concept of health it signals the possibility to achieve these beneficial effects for individuals, maximized through a wide use of information and communication technologies (Socialstyrelsen, 2013).

Eysenbach (2001) states that it is important to understand that the “e” in eHealth does not only stand for electronic instead it includes factors as efficiency, enhancements of
quality of care, empowerment of consumers and patients, encouragement of a true partnership between the patient and healthcare professionals, education (continuing medical education) through online sources, exchange of information, extending the healthcare beyond national boundaries, ethics, equity and easy-to-use.

eHealth is transforming healthcare into use of new treatment approaches for caregivers and a new understanding of the healthcare for the patients. Examples of eHealth were in detail presented at World of health IT (WoHit) and Vitalis by researchers, entrepreneurs, county and counsels. A lot of the focus was on different administrative information systems as medical record systems, flowcharts for healthcare professionals and applications for improved contact with patients, such as telemedicine.

In a worldwide perspective eHealth is under development and the advantage it gives differs between countries as do the challenges of realizing it. Laws and regulations differ and so does financial aspects like funding for developments and health insurances.

A mutual challenge is that eHealth development is limited by legal, operational and economic barriers (Hill, Langvardt & Massey, 2007). These challenges restrict the developers since they need to apply global standards on their products (Socialdepartementet, 2010). Health data security, obtaining patient consent and managing access to information are identified as a key priority for a lot of countries (Friedman et al., 2009). In Sweden personal integrity and who should have access to patient data is protected by the “patient data law” (Patientdatalagen 2008:355). You always need to estimate the safety for the software you are developing (Birkler & Ronald Dahl, 2014).

Swedish eHealth is important because of the vast distances between healthcare center and the patients’ homes, limited access to public transportation in rural areas and the cold winters. eHealth can therefore figure as a solution for isolation, remoteness and centralized health services (Pesola, 2013). eHealth strategies such as Strategy for eHealth - Sweden and National e-health – strategy for accessible and secure information in health- and social care are focusing on implementation of new technical innovations in healthcare. The strategies aim to facilitate information exchange between systems, to make information and services available to citizens and to regulate the laws and guidelines so that they are better linked to the increased use of IT. Work with system development with focus on the individuals need is emphasized (Gard & Melander Wikman, 2012).

When designing eHealth a challenge is to develop adequate design of IT-systems to avoid poor performance that reduces the usability of the system (Berg, 2001). A user-interface that is not developed for the users or an IT-system with too slow response time for the users to perform their work is risky for the healthcare. “Badly designed and poorly integrated healthcare IT systems harm or kill more patients every year than do medications and medical devices” (Stair & Raynolds, 2010, p. 487).

One way of preventing badly designed eHealth systems is to involve potential future users. This prevents the user-interface to become illogical or the functions to be sequenced in a way that disturbs the working routines of the user (Berg, 2001). The involvement of users can increase the motivation by letting them comment on functions early on so they understand its purpose (Tidd & Bessant, 2013).
This is a really important aspect because it is a challenge to change a workflow in healthcare (Berg, 2001). “the members of the system should feel that they are able to actively take part in the processes the change requires” (Pesola, 2013).

One more challenge is to know who you should involve in the innovative work. Tidd & Bessant (2013) states that active and interested users, called lead-users, often carry out ideas for the new improvements, therefore they can be helpful in the innovative process and they are often early adopters of such innovations (ibid.).

Another challenge is to involve users that can represent the majority. Different healthcare system has different sizes, different leadership styles, different cultures, different financial situations and different environments and that means that one and the same concept or implementation strategy may not fit all places (Berg, 2001). The medical profession is strongly specified and a strong profession can prevent changes that is not being initiated by them. It makes change from a holistic perspective challenging (Brattström, 2012).

There are different ways in which you can involve users. One solution is to combine the healthcare system with IT-industry by providing open innovation platforms with these actors invited (Orre, Schimmer, & Forsgren, 2013). This may be done by for example workshops, seminars, conferences or new startups. With this method other challenges will occur. For example in the meeting between different fields there is a language barrier to overcome. The fields may speak with different terms and there is even a risk that the same terms may differ in meaning and interpretations between actors (Spinuzzi, 2008). Project management factors must also be handled such as finance, time and scope (Schwalbe, 2010).

3. Research design

Holme and Solvang (1997) describe a method as a tool to gain knowledge in a specific research area, further to be able to solve a problem of interest. As mentioned earlier this thesis aims to create a deeper understanding of the challenges in developing and implementing IT-innovations in healthcare contexts. To be able to answer the research question a qualitative single case study has been performed in a context where different actors have met these challenges while working in a development process. In addition to that I have figured as an engaged scholarship to reach a deeper understanding.

3.1 Research case

There are a variety of perspectives that need to be taken into account to create an understanding of the complex needs that exist regarding healthcare development and IT implementation. There are a variety of actors that in various ways are involved in or affected by healthcare change and development. For example politicians who make decisions about healthcare initiatives, healthcare professionals who need to express their needs to those who develop IT-solutions and patients whose lives and health are at stake, and universities that performs research to improve the healthcare system.
During the spring of 2013 healthcare providers, professionals and staff, patient associations, IT-developers, politicians, researchers and students met to engage in co-design work for new healthcare solutions. The meeting platform aimed to establish an innovation-inspiring environment with focus on the healthcare system, to increase participants’ ability to see and understand their work and how it is affected by information technology today.

The process had dual purposes, firstly to figure as an integrated innovation- and competence developing activity where the actors from different fields gathered to share what problems they had experienced in healthcare and secondly to creatively and openly arise innovative solutions for improvement.

That was the start of a long process. After a few meetings a team invitation was sent out to all participants for realization of one of the solutions. During the autumn 2013 both the idea and core team around the idea has been concentrated and formed. Today there is a main team consisting of nine participants working with this solution. An innovation specialist, two physicians, one of whom also works with management for the county council, one IT-developer, one researcher focused on informatics and healthcare, one marketer, one with business focus, one professor and me, a student in informatics. We all had different backgrounds and different interest regarding the healthcare field but the goal was similar; we wanted to realize a business concept which has great potential to give healthcare professionals more time for their patients and improved treatment in which the patient also have a chance to participate more in his/her own care.

The idea of the company, which details I choose to keep anonymous, can be considered an innovative concept. The concept consists partly of a new kind of eHealth software that can manage the large, complex and sensitive patient data in a new way by a graphic representation. This software is meant to streamline and facilitate for the physician and to build the knowledge needed about the patient in an efficient way before the consultation. It provides new opportunities for developed interaction between patients and healthcare professionals during the consultation. Patient records are perceived as a time consuming resource rather than a resource for clarity and support. A central part of the challenge with large and complex data in healthcare can therefore be found in the daily management and work with the patient record. It often takes several minutes for health professionals to acquire a relevant overview of the patient's medical history, examinations carried out, and possibly health status prior to each visit. A visualization of these data would provide the opportunity for financial savings and enhanced patient safety. Different kinds of visualizations of patient data were presented at the eHealth conferences WoHIT and Vitalis during spring 2014.

The other part consists of development work to create new processes for development, implementation and sales of eHealth.

The actors in this project, as I said, originate from various industries and have already full-time jobs or full-time studies. This impacts the project and creates additional challenges. Cooperation with other external companies is desirable among participants to gain access to more development time and financials in exchange of access to the different competencies within the company.
3.2 Research approach
This study examines a specific case in order to identify specific challenges that a company encountered in the development and implementation of IT innovation in the healthcare. Case study is a method used to do a comprehensive description of particular circumstances (Yin, 2014).

I am a part of the company studied in the case and there for I have applied the engaged scholarship approach. Van de Ven & Johnsson (2006) state that there is a gap between theory and practice and several researchers agrees that academic research has become less useful for solving practical problems (Anderson, Herriot, & Hodgkinson, 2001; Rynes et al., 2001 in Ven & Johnsson, 2006). Ven & Johnsson (2006) also refers to several researchers when stating that findings from research is not useful in practice and that it is the same way around, that practitioners are not using relevant research and that they do not produce written theory from their practice. This leads to slow learning systems and repeated failures. It is a knowledge transfer problem (Ven & Johnsson, 2006). An important factor here is that research and practice is not the opposite of each other. It rather complements each other.

Ven & Johnsson (2006) propose engaged scholarship as a solution to bridge this gap. The definition of engaged scholarship is collaboration between academics and practitioners to merge both perspectives and competencies to “leverage their different perspectives and competencies to coproduce knowledge about a complex problem or phenomenon that exists under conditions of uncertainty found in the world.” (Ven & Johnsson, 2006, p. 803).

With this approach my aim is to complement my practical work with research and to put the practice into written theory. Firstly, the case itself is built upon this idea. Researchers, healthcare professionals and IT-developers are working together to improve healthcare, both in practice but also in theory. Secondly I have two different roles in this case. I am researcher for the thesis, but I also work as a healthcare practitioner with an informatics approach.

3.3 Data collection
A significant part of this data has been collected by interviews, both face-to-face and by phone. The purpose of conducting interviews was to receive a picture of the participants' own experiences about developing and implementing an IT-innovation in healthcare.

Bryman (2011) argues that researchers can use a relatively low degree of structure when conducting qualitative interviews, because it will give the respondents the opportunity to direct the interview towards the factors they value as relevant and important - something that is often interesting in the qualitative research.

For this study it was important to ask open questions to not affect the respondents to much with my own opinions of the challenges I encounter with them. Therefore I used a semi-structured design and shaped the interview template with open questions in different categories (See appendix 1). This gives the interviewee space to formulate answers the way they want (Bryman, 2011).
The template was divided into two parts; the first part touched upon categories divided in time perspective - past, present, future where the respondents themselves openly talked about the challenges they experienced as the most relevant and important ones for themselves. The second part touched upon internal and external collaboration, future user involvement, financials, and personal visions. The second part was formed from my pre-understanding and secondary data collection from participations in this process and my participation in the conferences and related research. The respondents often talked about these challenges in the first part but here I asked them to discuss them deeper. The interview where performed in Swedish, quotations presented in the analysis are translated into English by myself.

The respondents where contacted by email, most of them already knew that I was writing this thesis and that I was going to use the case for the study but I presented the thesis further when asking them for an interview.

There are several ethical issues that should be noted while collecting data. To relate to these issues is a very important part of qualitative research so that no one involved would feel insulted or abused (Bryman, 2011). In the emails I therefore included that I was going to write about challenges with development and realization of IT-innovations in healthcare; that I wanted to use the concept and the company as case. I also informed them that the interview would regard questions about how they have experienced the process so far and what challenges they saw in front of them. I informed them that both the respondents and the company would be anonymous.

During the first stage of the interview the respondents of my research were informed about the objective of the interview again. The respondents were reminded that the case was going to be presented anonymous and that none would be listed by name. I also asked them if I could record the interview for transcription and further analysis and informed them that the data was only going to be used for the study.

Upon presentation of the interviews I have chosen to include respondents’ professional role, but the name and gender of the persons has been anonymized and for the transcription I have chosen to encode the interviewees to Respondent A, Respondent B, C, etc.

All the actors, in the design of the business concept, where asked to participate, except for me. All of the eight persons in the team participated in individual interviews. Below there is a summary (see Table 1) of all interviews to give a picture of distribution of roles, interview forms and length.

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Role</th>
<th>Interview form</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondent A</td>
<td>Innovation specialist</td>
<td>Physical meeting</td>
<td>30min</td>
</tr>
<tr>
<td>Respondent B</td>
<td>Physician/County representative</td>
<td>Physical meeting</td>
<td>27min</td>
</tr>
<tr>
<td>Respondent C</td>
<td>Developer</td>
<td>Physical meeting</td>
<td>21min</td>
</tr>
<tr>
<td>Respondent D</td>
<td>Researcher</td>
<td>Phone</td>
<td>28min</td>
</tr>
<tr>
<td>Respondent E</td>
<td>Physician</td>
<td>Phone</td>
<td>25min</td>
</tr>
<tr>
<td>Respondent F</td>
<td>Marketer</td>
<td>Phone</td>
<td>15min</td>
</tr>
</tbody>
</table>
Table 1. Overview of completed interviews.

<table>
<thead>
<tr>
<th>Respondent G</th>
<th>Business</th>
<th>Phone</th>
<th>17min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondent H</td>
<td>Professor</td>
<td>Physical meeting</td>
<td>22min</td>
</tr>
</tbody>
</table>

Secondary data collection has also been conducted for this thesis. This study is made after development of a broad pre-understanding of a combination of methods; by a bachelor thesis in the field and a one year work with challenges of realizing IT-innovation in healthcare. Before the research was conducted I also visited two eHealth conferences which included presentations of challenges that different actors in the field experienced; IT-developers, healthcare professionals, county councils for example. The differences between countries regarding challenges of development, laws and regulations, standards, financing, patient and healthcare professionals’ involvements and patient safety were discussed.

Table 2. Secondary data collection

<table>
<thead>
<tr>
<th>Secondary data collection</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Conferences</td>
<td>Participated in the WoHit (The World of Health IT) conference in Nice and Vitalis (Nordic eHealth meeting).</td>
</tr>
<tr>
<td>Legal statements</td>
<td>Laws and regulations for eHealth development.</td>
</tr>
<tr>
<td>Discussions</td>
<td>Discussion with exhibitors at conferences but also with the actors in the case.</td>
</tr>
<tr>
<td>Observations/participation in meetings</td>
<td>Experiences from participation in development meetings.</td>
</tr>
<tr>
<td>Documentation from meetings</td>
<td>Documentation from meetings.</td>
</tr>
</tbody>
</table>

3.4 Data analysis

My data analysis is influenced by grounded theory which is useful to develop descriptions and explanations of a specific phenomenon in a context (Bryant & Charmaz, 2007). I have not fully adopted it because I had some prior knowledge before the studies were conducted.

The interviews for this study were transcribed shortly after they were conducted and analysis of the interviews began when all the transcriptions where finished.

Holme and Solvang (1997) presents two forms of analysis in grounded theory: overall and deeper analysis and according to them one should start with studying the material as a whole and further search for certain key categories relevant to the study. Deeper analysis is made to build an interpretation of the investigated case (ibid.). The best results are reached by combining the two analysis methods because it gives a qualitative understanding of the research (Holme & Solvang, 1997). I have used this approach by keeping my mind open to new findings that where not based on my pre-understanding and thereafter I made a deeper analysis by interpreting the challenges found.

I chose to first do an open coding to allow for an emergence of core categories and further use of selective coding matching further challenges until saturation (Bryant & Charmaz, 2007).
This study started with prepared problem definitions and purposes, the responses I got from the interviews were partly very clear where they directly expressed the challenges. Other times it was expressed more indirectly and I needed to use my pre-understanding, to understand what the respondent experienced as challenging.

I read the transcribed interviews line-by-line to identify possible challenges mentioned, both directly and indirectly. Next step I took was to code these identified challenges to later on sort them into categories. Table 3 shows an example of the analysis where I have identified a challenge in the text and then coded the sentence.

<table>
<thead>
<tr>
<th>Challenge identified</th>
<th>Code</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Few actors in the company dare to take a step forward and take the lead, most of them are very cautious.”</td>
<td>Leadership</td>
<td>Management</td>
</tr>
<tr>
<td>“In our project I think it [the collaboration] works well, but I think that kind of platforms are generally missing in healthcare today and I believe it is extremely important to develop cooperation.”</td>
<td>Cooperation platforms</td>
<td>Collaboration</td>
</tr>
<tr>
<td>&quot;It is difficult to know how open you can be and it is difficult to know how to evaluate the impressions you get, what others intend for the system and the project, there may be hidden agendas.”</td>
<td>Openness</td>
<td>Collaboration</td>
</tr>
</tbody>
</table>

Table 3. Examples of coding and transformation into categories.

3.5 Method discussion

My involvement in this team, which includes the respondents, may have an impact on the study. I may therefore be seen as too subjective. I have considered it not being within the scope of the research time for this thesis to do a study from the ground without any prior knowledge. However, I believe that the reliability of the study is increased because I have asked open-ended questions in the interviews so as not to lead respondents into what I consider to be the challenges of innovating for healthcare. Part two of the interview template is designed from the literature read before the creation of the template along with my pre-understanding gained through working with these challenges and my participation in the conferences.
The literature I have chosen to use is mainly linked to informatics but I have also supplemented with literature related to healthcare specifically. A large number of articles and books that were used are written for and focused on United States so to receive a better understanding of the innovation processes in healthcare. I have used the reports from Vinnova because I have not been able to find sufficiently large samples of academic articles relating to Swedish healthcare which is important to lift because that kind of reports are not subjected to the same scientific scrutiny as the articles I retrieved from peer-reviewed journals.

At first I aimed to conduct all interviews face to face but because of the fact that I was traveling to the various eHealth conferences during the start of the thesis period and then the time constraints of my respondents, half of the interviews were conducted by telephone.

Telephone interviews are not used that often in qualitative research, but there is some evidence that the answers you get are not so different from those conducted by face to face interviews (Bryman, 2012), so I decided to use this technology because it was of value to interview all the actors even if neither I or they did have time for a physical meeting. Drawbacks to conduct interviews over the phone may be that one is not able to see the individuals body language or reactions and that technical problems can occur (ibid.). My telephone interviews worked out fine overall, except for one interview which I had to conduct in an environment where my respondent had a little hard to hear what I was asking but that was solved easily by me repeating the question.

The single case study is often criticized for not having enough breadth (Bryman, 2012, p.392) but in a qualitative study you examine peoples’ personal experiences and the focus is to create a deeper understanding of what a few people think (ibid.). This provides a result which does not need to be generalized but the results represent the people who participated in interviews and creates an understanding what they have experienced.

The case is presented from how I have experienced it and what aims have been presented during all the meetings we have had during the year but also what the respondents have told me in the interviews. It may be so that any of the actors would not agree with me about the description of the aim but from my understanding I have presented the basic idea behind the company even if the visions have varied.

4.0 Results

The identification of the core categories related to challenges of realizing IT-innovations for Swedish healthcare lead to six overarching categories.

1) Understanding the healthcare system
2) User involvement
3) Collaboration
4) Creation of a joint vision
5) Technological challenges
6) Project management
These six groups of challenges are related to each other because the team needs to work with them simultaneously and they affect each other; one must consider how to shape the company for the development of the business concept and, in turn, the concept must adapt to the healthcare context. Some of these challenges have emerged from solutions to other challenges and these results shows that solutions presented in related research is not always that easy to apply because with the solutions comes new challenges.

4.1 Understanding the healthcare system

This case study has foremost shown that the innovative work for the healthcare system in Sweden is complex in many ways and there are several reasons for it. Respondent D thinks that there is a special process to develop and implement IT-innovations in healthcare. That it has its regulatory restrictions and guidelines that are framing the work. Respondent E agrees that it requires a lot to realize an IT-innovation for healthcare and that the laws influence the work, for example the patient data law.

“It requires a lot to realize a product in healthcare [...] regulation limitations in different fields like patient data law [patientdatalagen]. If we want the county as primary customers, they also have their procurement [policies].” (Respondent E)

Other respondents discuss how important information management are and that the software must be safe for the patients’ health and life and it must maintain high quality standards while being cost effective. The international standards must also be followed and they argue that it is challenging to develop safe software for visualization of patient data that is shared across healthcare boundaries.

Respondent E has also experienced that another challenge connected to the organizational factors is that the information technology develops faster than the healthcare system is able to implement new products, software and/or work approaches.

“The technological development is so fast so one must get through the complex organizational factors before the technology which you want to develop is too old.” (Respondent E)

Respondent E further states that there is a challenge in selling software to the healthcare system. The respondent means that the demand of this business concept exists, but laws and regulations regarding the healthcare system are complicating the development of eHealth. There are many different segments where visualization of data can be useful; for the citizens, the healthcare system, sports or education. It is challenging to choose where to distribute the business concept but the respondent prefers to sell the business concept to the healthcare system.

“Should you turn to medical record system developers, the county council or go through the consumer in any way or turn towards the patient? I would hope that we
can come in through the organization of healthcare first, so to speak.” (Respondent E)

According to respondent C there are two very specific segments to innovate for in healthcare. Either you focus on the healthcare system and aim for procurement or the patients and use the national service platform (Nationella tjänsteplattformen)\(^1\) that were developed to promote innovative work. The respondent means that it is easier to develop eHealth applications for commercial use than medical devices for healthcare and he/she thinks that it is because of patients’ safety. A health application should be safe but it is not needed to the same extent as in healthcare because the caregivers are an authority that many trust completely and it is easier to remain critical to an application.

Another challenge stated by the two healthcare professionals in the team is that they have experienced that other healthcare providers are critical to new IT-systems.

“If you mean caregivers as the employees, the readiness is not that big for new systems. It is the opposite; they do not want any more of those crappy systems. ‘You need to make those we have work to begin with, before you implement new ones.’ I think that is the attitude, they are quite frustrated and disappointed in these systems that have been introduced in recent years.” (Respondent B)

The healthcare professionals also states that training the caregivers in using the systems is getting increasingly common but that it seldom leads to a positive outcome. The healthcare professionals are most often offered training for use of new IT-systems but it is not obligatory to attend and therefore many physicians prioritize other things, like patient consultations. Respondent B states that the healthcare professionals think they would understand the IT-system anyway. Respondent E agrees that healthcare professionals seldom have the time to attend the training sessions but that it is still needed. The challenge here is therefore to motivate the physicians to attend the training sessions and that the implementation of this software should include a training that appeals to the physicians. The majority of the respondents say that one way to do that could be to include the physicians in the design of the training or even involve them in the whole process but with that new challenges arise and those will be explained in next section.

Different challenges have been identified in this category. This section showed that the Swedish healthcare system is experienced as complex because of the regulatory restrictions. This challenges the processes of developing and implementing innovations for it. It may be time consuming so an additional challenge is to develop and implement the IT-system fast enough to keep pace with the market of IT.

A less challenging way of developing for healthcare is to aim the product or software towards the citizens rather than the caregivers, but it may not achieve the same impact and improvement in the healthcare sector. Another challenge working towards the healthcare

\(^1\) The service platform is a national technology platform that simplifies, secures and streamlines
sector is the limited openness for new innovations and the willingness to learn how to use the new IT-systems or new functionalities in the old IT-systems.

4.2 User involvement

Respondent E (which is a physician in the company and one the potential future users) begins the interview with answering why he/she have chosen to participate in the development of this business concept. The reason is that he/she thinks that there is a need of improved IT-solutions in healthcare and that physicians should be involved in the creation of these solutions because they know how the information systems work today, how their workflow is and how it could be improved. Respondent B, who is also a healthcare professional, agrees with this statement and says that:

"One challenge is to motivate the employees involvement in the development of new innovations so it becomes user-friendly to both employees and preferably also to our patients." (Respondent B)

The team has strived towards involving users early in the development process. The business concept development began with potential users discussing the problems with IT-systems in healthcare and the concept is defined as a solution to one of the problems found. Today two of nine in the group are potential users and a few more have a strong connection to healthcare in other ways. The aim is still to involve more potential users and to test the concept in a clinic context.

Further in the interview respondent E states that there is a tendency in healthcare especially between physicians to complain about everything but to not having the will to do something about it. This, the respondent E continues, makes it a challenge to involve the potential users.

"We have an ambition to involve end users early (...) I do not think it would be wrong to invite interested and potential end users to comment on functional descriptions and provide development requests already in the early stages of development." (Respondent E)

Patient involvement is also a factor the respondents aim for but the opinions about when to involve them are divided. Some of the respondents want to focus on the healthcare professionals with the argument that they are going to be the end users. Others points out that the intended use of the software is as a communication tool between healthcare professionals and patients, therefore patient involvement is important during the whole process.

A person from a patients’ organization was active during the idea phase of the business concept but after that the patient perspective had been overshadowed by the lack of interest from both patients and the respondents that wants to focus on caregivers. One respondent says in the interview that patients should be involved later because he/she thinks that the primary aim is to meet the needs of the healthcare professionals.
"We do not have any (patients), but maybe we should involve them at a later stage. I think that for now we will develop a product primarily to meet the needs of the nursing staff. But then, we have said that this is going to work towards the patients too, and then they must surely be involved." (Respondent B)

Respondent G have experienced that it is hard to get in contact with patients and caregivers for co-development. There must exist time and a demand for the solution to motivate them to get involved. He/she also points out that patients are patients for a reason and that it is a challenge to involve someone that is ill.

To summarize this section I would like to make a point that this category of involvement of potential future users is often seen as a solution for the development of user-friendly IT-systems, that it would facilitate the implementation and training of healthcare providers in the use of the IT-systems (See related research and 4.1). However, the challenges with involvement of potential future users are seldom spoken of in relation to this. Involvement of potential future users causes challenges as deciding upon whom to involve and to motivate them to actively participate. Regarding patient involvement in this case it has been experienced as challenging because it is hard to define who is a patient, is it you? Or me? Or is it someone who does more frequently visit the care centers? The last alternative may make more sense because they have more experience of the healthcare system but they may also be the most challenging to involve because of their illnesses.

4.3 Internal and external collaboration

Communication about the vision inside the team is an important challenge to overcome. An identified challenge regarding collaboration is how to communicate within the team when the team members speak different languages derived from the healthcare profession and the IT profession. The respondents agree upon that the communication works well within the team even though they have different backgrounds and understandings. One solution to bridge this gap and to consolidate the team even more is by having more regular meetings to share ideas, experiences and knowledge.

"We are still a loosely composed group and given the circumstances, I think it actually works well but there is a risk that we may lose consensus if we do not work harder, with more regular meetings, to brief each other." (Respondent D)

Another challenge is how to handle external collaboration and communication. One of the respondents thinks that platforms for broader communications regarding eHealth innovations are missing today.

"In our project I think collaboration works well, but I think that this kind of platforms are generally missing in healthcare today and I believe it is extremely important to develop cooperation." (Respondent E)
Another challenge that is discussed regarding collaboration with external partners is the openness. Several respondents mention openness as a challenge. The aim is to find trustful partners to collaborate with but to actually rely on other companies is challenging because you have to learn to interpret their intentions.

"It is difficult to know how open you can be and it is difficult to know how to evaluate the impressions you get, what others intend for the system and the project, there may be hidden agendas." (Respondent E)

Even though respondent E thinks that it is hard to create these kinds of structures because of thrust issues he/she says that it is extremely stimulating to meet actors from other professions to exchange and create something together. Further the respondent tells me that he/she believes that many other stakeholders of healthcare would have felt the same but that it is challenging to create these opportunities.

As we can see here collaboration between different actors may also be a solution to IT-systems that are not user-friendly today because it lacks the right perspectives. The healthcare system seems to lack platforms that promote this kind of meetings between different stakeholders. The company in my case constitutes as one of these platforms but even though it is seen as a solution it involves challenges.

Collaboration between different stakeholders is challenging because the members have different backgrounds and educations, they may not use the same language or terms when speaking. They need to cross these barriers. You also need to know how open you can be about your idea to not risk giving it away. A further challenge while involving a lot of different actors as potential future users or external development partners is to create a joint vision of the business concept.

4.4 Creation of a joint vision

The respondents are a combination of healthcare professionals, informatics, marketers and businessmen. An important challenge to overcome while working in this kind of team has been stated to be the creation of a joint vision of what should be done and what the end software should include.

The respondents state that the end customer needs to be clear to decide which platform the software should be developed for, if it should be integrable medical technology software or a standalone application for patients. Depending on the customer segment different challenges needs to be met.

At this point in the discussion respondent A mentions that he/she does not have a total overview of the challenges. He/she thinks that the team members have experienced different situations and therefore have different pictures of the problems within healthcare. This has resulted in different requirements for the functions and the design of the software.

“To lean towards the various partial competences included in the group in this area is very important; it has meant that different people have taken different roles in highlighting key areas that we have to work with.” (Respondent A)
At the same time as it makes the group strong with competencies from different areas but it is a challenge to overcome, to actually merge these competencies to exploit its full potential. That is not only a challenge for this case but also in a broader spectrum. One of the physicians announce that a platform to seize the ideas and visions of healthcare professionals is important overall and to incorporate those ideas together with the ideas and developers from the IT-industry and the research world.

One of the respondents states that involvement of the actual users of the systems is important in the development process to make a joint vision of what a user-friendly system is, one that does not create frustration, as many new systems do today.

When working with an open innovation approach the companies will often share information about the project with other companies to exchange knowledge. In this case the company has spread their ideas and the team has been contacted by other fields than they have focused on. Respondent H states that the more open they are with the idea, the more opportunities and fields are opening up in front of them. The respondent says that this type of visualization of data could for example be useful in health and sports situations. He means that it is important but challenging to choose whether to keep focus, broaden or change direction. Sometimes it is challenging to keep a focus when you get proposals in other fields that could be a quicker solution to reach the market.

This chapter has addressed the challenges of creating a joint vision when involving different stakeholders and what stakeholders to involve for creation of a vision of what a user-friendly system is and what one should include when aiming for a user-friendly system and which technological challenges may be experienced.

4.5 Technological challenges

Respondent A explains that the first version of the business concept was not developed from a technological perspective. The perspective was rather situational with ideas about intended use and intended user from the patients, physicians or nurses’ point of view. Respondent G states that the first challenge was to decide the functionalities of the product. This created a technological challenge further into the project and Respondent F states that it became a bigger technological challenge that he/she thought in the beginning.

Respondent H thinks that this business concept still includes the same challenges as any other IT project; from creation of software, to positioning it into context.

The view of some of the technological challenges differs between the roles in the team. The healthcare professionals have experienced that there are loads of technological challenges where the IT-professional states that there is not that many technological challenges but rather organizational ones.

“There are a lot of technological challenges. The users will have very high standards for functionality. It [the IT-system] must be able to demonstrate complex information in a very smooth way. It should not be very laggy (...) It must flow well.” (Respondent E)
“Initially, I believed that the main challenges would be technical where we would be working with unstructured patient data. However, it turned out that this challenge did not really exist because the data is much more structured than we thought. So the technical challenges as I see it is linked to the process required by the developers of medical devices. You always have to plan the work. You must always specify the intended user and the intended use. So the big problem is to make risk assessment and to really develop after those statements. I do not think the big problem in this industry is the technical challenges because solutions will always exist. Instead it is more organizationally specific challenges.” (Respondent C)

Respondent C means that you always have to estimate the safety for all the situations the software might be used in and by the person it might be used of.

All the respondents mention that the safety aspects of the software are a challenge. Respondent H states that it is a challenge to make sure that the information system is totally free from bugs and that it is really important, especially that there are no life threatening bugs. Respondent A states that another challenge regarding technology is to integrate the software with other information systems in healthcare.

"There is a massive frustration and fear that all the new systems will make it more difficult to work. It creates more administrational work, it demands more safeguards that one must log through and everything becomes more complicated because of that." (Respondent E)

There are many technologically advanced forms of software and products on the market which are competing with the software of the studied company to reach to healthcare system, but the respondents in my case offer not only software but also a new way of working with technological developments and implementation. By providing both operational expertise that is linked to the value issues and the use of technology and new ways of working they have something more to compete with. Respondent H states that another challenge is to build an IT-system which suits both the patients and the healthcare professionals.

"If we look at what we see in front of us it is not only a technological development, but we shall also work with a concept development which means that we will be able to sell this product in a way that others do not. Thus, for example through working with workshops and co-creative work, especially about how to change work situations and working cultures that exists in healthcare." (Respondent D)

This section has dealt with technological challenges which the company have met. The business concept started from an intended user and intended use perspective. When starting from this perspective the technological challenges will appear during the process.

These challenges may be experienced in different ways depending on education and profession. This may regard most ongoing IT-project but a specific challenge identified in
this case is that the software may not be tested that easily because in the healthcare system it may regard life and death. Therefore the management of the project may differ from other fields.

4.6 Project management

When starting up a company with a team that has emerged from an open innovation platform specific challenges appears according to the respondents. Respondent H states for example that in the beginning of a startup you will enter multiple phases where you as a team start to see only problems and challenges. Respondent E also talks about the startup phase and that it was challenging to start up a company with mostly actors from the public sector and says that they may have another focus than the private sector. They are for example not driven by economic factors.

To bring the group together has also been identified as a challenge by the respondents.

“Just to succeed in bringing the group together, as we have successfully done, even though we all come from different directions has been a challenge.” (Respondent E)

To facilitate group meetings a leadership role has been presented as desirable. A leader has also been considered as important when it comes to pushing the project forward. Since the team has been created without a member taking a clear leader role different people has driven various processes. The respondents believe that there has been an obvious caution in the group where no one has taken a clear leadership role.

“The big challenge is to find ways to push it further.” (Respondent B)

“Few actors in the company dare to take a step forward and take the lead, most of them are very cautious.” (Respondent D)

Respondent F argues that some parts of the process take a very long time without an official leader, for example to write a business plan and to sign the company agreement. The respondent also states that there are leader figures in the team but they have full time jobs beside this project and to manage that combination is in itself an accomplishment. Respondent F also states that it is of importance to gather as much knowledge as possible about the challenges and what has to be done to push it further.

4.6.1 Funding

All of the respondents state that funding the development of the software is one of the challenges they faced.

“One challenge was to arrange adequate funding so that we could develop a really good, sharp model that would hit the world by surprise.” (Respondent B)

How this problem was going to be phased was not agreed upon in the team from the beginning. Some respondents thought that they should apply for contribution money, some
that they should invest private money and others aimed for a stable partner with economic muscles. A challenge identified here was to agree upon what strategy to aim for and thereafter how to define the business concept to present it for the investors. One respondent state that they needed to decide whether the company should develop this slowly with a low amount of funding based on private money and develop the software themselves or collaborate with a strong industrial partner.

4.6.2 Marketing
Promoting the software and the concept around it to the healthcare system has also been presented as difficult. Respondents state that it is important to be able to prove the usefulness of the concept with distinct studies.

"I think we need to do some more studies where we really prove that this concept saves time, is safer for the patient and so on.” (Respondent B)

“A challenge with the distribution is to prove the advantages. Our basis is that we think it is going to be faster, you can save time and time is money, it is also safer for the patients. So a challenge is to, in a sharp environment, do user studies that prove our thesis.” (Respondent B)

One respondent state that we need more developers for this software and that it means marketing the product before it is finished.

“Our biggest challenge right now is to sell the concept before it is finished to be able to develop it. We cannot build it ourselves. Unfortunately.” (Respondent C)

Another respondent agrees and indicates that it is a challenge to recruit the right people. He/she states that it does not necessary need to be a person with neither healthcare experience, nor an IT-professional but the person needs to have an understanding of the impact IT has on the health systems and its employees.

4.6.3 Time constraints
Respondent E states that one of the biggest challenges has been to practically bring the group together in a timely fashion. He means that as a healthcare professional it is hardly possible to obtain time during work hours nor is it easy to get a replacement for the time you work with your innovations.

Another respondent mention time as a challenge when discussing leadership, the group had no clear leader from the beginning and no one did voluntarily take that role because they all had limited time for the concept development. In this phase of the process the respondent claims that one can discern a leader but that person said in the interview that he/she needed to put time into the project which he/she does not really possess. The work with challenges in healthcare is time consuming and it is a challenge in itself to find the time to do it.
“I think we all need time to deal with the other challenges in perhaps a better way than we have managed to do so far. One challenge we have is that we must try to create more development time and also involve more people in the development.”
(Respondent D)

To summarize, project management is experienced as challenging in several different ways when working with an open innovative approach; especially when the actors are mostly from the public sector. They are not used to aim for profit but in this case they need to because they want to increase the opportunities for participation from different actors and that would involve costs. Funding the project is therefore challenging but also how to market it. These challenges are time consuming but all the participants are full time workers beside this improvement project.

5. Discussion

The purpose of this study was to examine the challenges regarding development and implementation of IT-innovations for healthcare. The area is relevant because healthcare is under pressure to evolve quickly to meet the demands of modern society which requires solutions to pass through these identified challenges.

The result also presents how these challenges are experienced by an innovative-focused company to outline a deeper understanding of the challenges. Some of the categories in the result section are often presented as solutions to challenges of eHealth development in related research but my research have also identified the challenges of the solutions. That there is not that easy to implement these solutions as it may seem in related research. The company in my case study has been working with these challenges and tried to apply suggested solutions but it have not always been that easy but even though they have years of experience and knowledge of development of innovation work it has been challenging. They have needed to work through new challenges.

The challenges identified in related research are many. One challenge found in related research is to develop an innovation that fits all parts of the healthcare systems because healthcare differs between countries. Counties and municipalities of Sweden differ too and even the clinics in close areas.

It is also challenging for single clinics to create successful implementation because of healthcare’s conservative structures, which makes changes difficult. It is challenging to change health professionals’ behavior, method of treatments and their work flow. Therefore it is also challenging to develop IT solutions that healthcare professionals are willing to accept.

The innovation development is also limited by laws and regulation. The development of safe solutions is extremely important. It has been found that it is risky to experiment with innovations in healthcare since new solutions regard patient’s life and health. This is seen as a challenge because you are restricted to meet different requirements to be able to sell it as medical software. It is also of importance, for healthcare systems, to develop useable
information systems with good performance and fast response time because they often need to handle massive amount of data.

The process of the innovation work is as important as the result of it. One solution for challenges of developing eHealth is to include different stakeholders. There is a need but also a challenge to establish platforms for collaboration between the IT-industry and the healthcare system. The same applies involving the patient perspective in the innovative work because they are hard to involve because of their illnesses. Involvement of external stakeholders has raised a challenge about how open you can be about your ideas.

My findings from the interviews conducted confirm the related research but they also fill some gaps. The results shows that it is a challenge to create an understanding for the healthcare system, involve potential future users in innovation work, establish collaboration within the team and with external actors, create of a joint vision of the innovation, develop a user-friendly technological solutions, manage a project with different actors and associated factors such as funding of the development of innovations, selling of the innovation to the healthcare system and to detach time to participate in innovative work if you have another obligation.

Many of these challenges are important to understand and get through to realize eHealth innovation inside the healthcare system. The challenges can be generalized to some extent. One specific case is studied but there are such similarities between related research and my results which mean that we can find these challenges in other cases where the improvement and development of healthcare take place as well. It can be analytical generalizable because it can provide guidance for what will happen in another situation.

My findings and related research has shown that the healthcare is as stated both fragmented, with little integrations between functions, and hierarchical organized. As Tidd & Bessant (2013) state this organizational structure is unlikely to be supportive for new innovations and it affects teamwork negatively and contributes to a slow rate of change. The results derived from the analysis of the interviews shows that it is challenging to create a complete picture of the Swedish healthcare system because it is fragmented. That also regards the needs and demands of new innovations and requirements of innovations.

As we can understand from the results my respondents aim to pass through this organizational challenges by involving potential future users in the development of the business concept. Research shows that innovations often occurs in complex relationships between different actors and that it is therefore important to strengthen the relationship between public and private actors in healthcare (Sanandaji, 2010).

Pesola (2013) argues that the members inside the system need to be ready to commit and carry out a change. How the members adjust to the context matters for how the change will influence the future. Both individuals and collective behaviors affect how open they are to change (Armenakis, Harris & Mossholder, 1993). As the company in my case study aim for a whole business concept that includes implementation issues as readiness and adoptability of eHealth. One should design beyond the IT software and integrate the interaction between people and digital technologies, to create an IT-system that improves the working environment instead of solely focus on features (Kaptelinin & Bannon, 2012).
It is essential to involve users, by doing so it is possible to increase the potential users understanding of the advantages of the information system. If the intended users do not agree with the purpose and motivation behind the need for change, it can lead to the users resisting the change (Armenakis et al., 1993). As we can understand from this statement, user involvement is presented as a solution to increase readiness and adoptability but what is seldom shown in this context is that with these types of solutions, new challenges arise.

Regarding the involvement of potential future users such as healthcare professionals and/or patients there is a challenge to motivate them to actually contribute to the development of eHealth. My result shows that if it is not the willingness of users preventing them from participating they might be affected by either time limitations or management issues, as not being open for change and innovativeness, or even both. Tidd and Bessant (2013) state that leaders of the organizations should create free time for individuals with good ideas enabling them to develop their ideas without having to leave the organization to do so.

The challenge with involving patients is to routinely collect information on how the patient perceives care; the patients’ own observations about their medical conditions and treatments (Sanandaji, 2010). Bessant et al., (2012) argue that patients are the largest group of stakeholders in healthcare; they have gained experiences by their medical appointments or through ill relatives or friends. As a result many patients have developed ideas of how to make the process of care more efficient, how to improve a medical device, or how to test new ways of treatments. From an innovation perspective patients can serve as valuable knowledge resources. This is also what the respondents of my study have perceived and they aim to include them in the future even though it is challenging to know whom to include, because who can represent all patients and who counts as a patient? At the idea phase in the process one person from a patients system participated but the person chose, without further explanation to not participate in the start-up of the company.

Related research has also shown that co-design helps dealing with the customization argument rather than trying to design one size that fits all. Involvement of potential future users allows configurations which bring their particular set of needs and wishes into the equation (Bessant et al., 2012). It may be hard to know if the ones involved represent the system in a sufficiently large extent so even if user involvement is a solution to customization challenges there is still a challenge to involve the right stakeholders.

Involvement of a lot of different stakeholders may also lead to a challenge of attaining a joint vision of what the business concept should turn out to be and which customer segment to focus on. It seems to be one of the most challenging tasks because with many different actors from different fields there will exist as many different visions and desires in the team. Involvement of the potential users of the IT-systems is also important in the development process to create a joint vision of what a user-friendly system is (Söderström, 2010). No one has a better understanding of experiences of the work than the employees themselves (Sanandaji, 2010). Some benefits from involving users in the design processes are, for example, higher quality of the designed or developed system and a greater sense of satisfaction from customers and users (Kujala, 2003). The result shows that it can also
shorten development time and that it can serve as training for users even before it is implemented.

By involving the potential future users the company will have more perspectives to take in account. The diversity of perspectives is a challenge in the process of forming a common ground of understanding. As related research has shown it is of importance to articulate and communicate a vision to build motivation and confidence (Tidd & Bessant, 2013) but also to promote creativity and innovativeness. A mutual perspective on the problem creates a momentum in an organization to carry out innovation development (Hovlin et al., 2013).

Collaboration with external partners as other eHealth innovation-providers has been identified as important for the company in my case study. Collaboration across functional boundaries within and between systems is something that is proven to have a major impact on successful innovations - it enables one to see the big picture instead of just the parts (Brattström, 2012). The result has also shown that collaboration is a challenge. The respondents express that they are not sure how open they can be about their idea of the business concept.

As we could see in related research time, cost and scope are important factors to manage for a successful innovation project. Time must be estimated, cost planned and scope defined (Schwalbe, 2010). Management of innovations is a complex and uncertain process, especially when people with different disciplinary backgrounds, responsibilities and goals are involved. This complicates promising inventions to reach the market, a key individual or strong leadership is needed to provide energy and enthusiasm to push it further (Tidd & Bessant, 2013). The respondents state that they would need more routine meetings to push the project forward but healthcare system does not allow development meetings at the level that is desirable. I have experienced that this is one of the factors that causing many of the participants from the workshop to decide not to join the development of this business concept despite the fact that the will existed. The team included a nurse for a period of time, but the person had to drop out due to time constraints.

The project in my case study also requires funds to be carried out. Many IT-projects are never executed because of lack of funds or for lack of understanding of accounting and finance principles (Schwalbe, 2010). When it comes to marketing it is advantageous to start small while clearly showing the benefits of the innovation. Diffusing innovations requires an ability and willingness in the system to receive those (Hovlin et al., 2013). There has to be a clear communication channel between the hospital managers and the staff in describing the benefits of the implemented IT-systems and that it contributes to the overall mission and vision of the hospital. To spread an innovation it is of importance to understand that it is nearly impossible to develop an innovation that will fit in all places. Therefore it is also important to revise the innovation by the context (Hovlin et al., 2013). Here we are once again back on the user involvement as a solution but as we know that includes its challenges too.

One of the greatest threats to successful projects is a failure of communication (Schwalbe, 2010). As concluded, communication about the vision inside the team is an important challenge to overcome. A challenge identified regarding collaboration is how to communicate within the team when the team members speak different languages derived
from the healthcare profession and the IT-profession. Different terms can have different meanings in different professions (Randall, Harper & Rouncefield, 2007).

5.1 Discussion as engaged scholar
The use of this method has contributed to a deeper understanding of the challenges that the company is going through. My pre-understanding has proven itself useful in the understanding of the interviews where I could connect their statements with my experiences and therefore it has facilitated the presentation of the results and the context around them. My own experience of the challenges correspond well with those of my colleagues, however, I feel that they have not been able to express all the challenges we have gone through regarding the development and implementation of the business concept. I believe this is because you rarely express everything in an interview but also because they drew the conclusion that I already knew about some challenges and thought they did not need to express them. For example, a patent of the business concept are well discussed at meetings but to apply for patent for this concept has not been perceived as easy. No novelty examination is completed but the analysis done so far suggests that the protection of trademark, design and copyright is probably much more important than to apply for patent protection. Our assessment is that there are no patents that could prevent the development and implementation of our concept.

Another challenge I have experienced as an engaged scholar regards collaboration with international companies. Establishment of satisfying collaboration was presented as a challenge and discussed in every interview but what was never mentioned is the collaboration with international companies that the company had established. In my experience that creates further challenges because all the countries do not apply the same laws and regulations regarding development and implementation of eHealth in the healthcare systems.

In the other direction - from theory to practice; I want to add that I have learned useful theory from related research about eHealth development which I can now use in practice.

5.2 Further research
This thesis is limited to study the experienced challenges in the planning phase. An evaluation of the end business concept could be made later to receive an understanding of what advantages it gives to involve actors from different fields together with potential future users. As Sanandaji (2010) and Tidd & Bessant (2013) state, the products and services should not only be implemented, it should also have its following ups with evaluation for continuous improvements.

Due to time limitations I could neither do a deeper study of every detail in the challenges. I recommend for example a deeper research about how to develop a training program for the caregivers and how to deepen the understanding of why they do not attend the training sessions and what could be done to motivate them further.
6. Conclusion

The healthcare system is complex, conservative, fragmented and is affected by many different laws. Therefore users of the eHealth solutions should be involved in development of new innovations to overcome the challenges of creating user-friendly, adoptable and diffusible information systems. However, as demonstrated in the case of my research context, the involvement of potential future users involves its own set of specific challenges such as motivating them to participate, overcoming time limitations and how and whom to involve.

Managers of the healthcare system should promote innovative thinking for an innovative climate and culture. While this represents a core issue, changing existing cultures and structures has been proved difficult.

A platform for collaboration between different stakeholders of eHealth may stimulate innovations despite the challenge that regards trust and openness. A combination of experiences and perspectives from patients, healthcare professionals, IT-developers, researchers, students and politicians may lead to development of a versatile innovation.

Therefore it is of worth to tackle the challenges of gathering a team that includes all stakeholders and create a joint vision of the end concept. Even though it involves costs and time challenges it may save lives or at least improve the health of the citizens. This thesis contributes with a description of what the challenges are of development and implementation of innovations in healthcare but also the solutions and what further challenges arise when applying those recommended solutions.
References


Pesola, U-M. (2013). *Crossing Boundaries: Transferring eHealth services across the Northern Periphery*. Department of Informatics, Umeå University


Question template

Introduction
Why have you chosen to be part of developing the Avatar?
What is your role in the project?
- What do you think you can add to the project?

Part one

Past
Do you consider that the group has made it through some of the challenges you have seen ahead?
- What are the challenges?
Have your view of the challenges changed during the process?

Future
What challenges do you see with the realization of IT innovations in healthcare? (In general)
What challenges do you see in the development of the concept in order to meet the various demands it faces?
- How would you like us to be taking on these challenges?
What challenges do you see with the sale of the concept?
What challenges do you see with the implementation of the concept?

Part two

Have you worked with healthcare innovations in the past?
- Has that work differed from the Avatar?
- Did you encounter other challenges then?
Do you think one could facilitate for entrepreneurs who want to develop innovations to healthcare?
- How?
Research, business and county indicates that cooperation between actors is important to create innovations in healthcare.
- How do you feel that cooperation with other works?
Involvement of users, such as healthcare providers and patients is also considered important for a useful product.
- How do you think the group has applied that?

For the healthcare professionals
How open are healthcare providers for new systems?
- What do you think is the best way, to sell new IT solutions to healthcare?

Closure
Are there any other challenges that you have not mentioned, either as the group has made it through or that they have in front of them?
What would a successful project of this concept mean to you?