Crossing Boundaries

Transferring eHealth services across the Northern Periphery

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For Valma
Abstract

Health care organisations in Finland, Norway, Scotland and Sweden face similar challenges when it comes to providing health services in the sparsely populated rural areas. Vast distances, centralized health services, harsh climate and limited access to public transport can make accessing health services difficult. In order to provide health services for the population of the Northern Periphery it is necessary to develop health care service models which can address the problems of isolation, remoteness and centralized health services. One way of overcoming these issues is to develop eHealth services that focus on increasing access to health services in the rural areas.

As health care organisations’ resources are often limited, the possibilities to develop, test and implement eHealth services can be restricted. Thus, transferring existing eHealth services across organisational and national boundaries can be beneficial, as the services have already been tested in practice. Taking advantage of the knowledge health care organisations in different countries have can support organisations in their drive to develop service provision models that reach out to the population of the Northern Periphery.

The main objective of this thesis is to understand how local conditions influence the outcomes of eHealth transfer. In order to do so the transnational implementation of five eHealth services was investigated in five case studies. This research gives insight into how differences in organisational structure, ICT infrastructure and the size of the patient base impact health care organisations’ possibility to transfer and utilize existing eHealth services. In addition, this research offers rich insights into how these factors impact the sustainability of eHealth services. The case studies also illustrate how stakeholder collaboration and knowledge exchange impact the process of transferring eHealth services, and how patients’ and professionals’ level of trust in eHealth services can materialize in practice. In addition, this thesis demonstrates why the benefits obtained with a specific eHealth service may, or may not be duplicable in another organisational context. The research discussed in this thesis also contributes to the understanding of how assessing organisational readiness prior to transferring and eHealth services can facilitate the implementation process.

Keywords: eHealth, eHealth transfer, implementation, health care, toolkit, normalisation, organisational readiness
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Chapter 1: Introduction

1.1 Research background and objectives

The rural areas of Sweden, Finland, Norway and Scotland face similar challenges in providing health care due to the areas being both sparsely populated and remote. Access to health services can often be low due to service centralization, a harsh climate, limited access to public transport and vast geographical distances. The growing number of elderly is a new challenge to the health care service providers, increasing the need to provide a variety of essential services locally. In addition to these demographic and geographic challenges, the migration of young people to towns and cities where career opportunities are better has resulted in problems with recruiting and hiring of young health care professionals. Therefore, in order to maintain health care services for the population of remote European regions it is necessary to develop health care service models that can address the chronic problems of isolation and remoteness. Information and communication technologies (ICT) can provide health care organisations with the possibility to develop new ways of providing services by overcoming problems related to service centralization (see, for example, Norman, 2006; Strømgren, 2003), and professional isolation and recruitment (see, for example, Marttos et al., 2012).

eHealth services are largely developed in response to local health care needs and are therefore often isolated, local trials that do not become widely used or fail to become part of the clinical context altogether (Bates and Wright, 2009; May et al., 2003). One of the core questions of eHealth research is to understand why some eHealth services become frequently used, permanent parts of clinical processes while others never ‘take’, or become truly embedded in the clinical context. How implementation of eHealth impacts clinical routines, the relationship between patients and professionals and the overall quality of care are not fully understood. Even though there is an increasing body of research regarding the barriers and facilitators impacting eHealth implementation and normalisation of health care practices (Gagnon et al., 2012; Gravel et al., 2006), far from all eHealth initiatives become normalised, and the impacts of implementation are still difficult to predict although, thanks to research in this area, our understanding of these factors is growing. Some services are however, a great success. As the use of ICT in transmitting radiological images demonstrates, ICT can become widely utilized by health care organisations across organisational and national boundaries (Kreutzer et al., 2008; Ruotsalainen, 2010).

Factors influencing the outcomes and the success of an eHealth service are varied; the service has to be a relevant one which is needed or perceived as needed by the staff who are to receive and run it, it has to be welcomed by the
user group of patients and it has to be cost effective and arguably increase the quality of care afforded to the patient by a worthwhile amount. Cost effectiveness and quality of care are not primary concerns of this thesis, and neither is the success or failure of a service. Instead, I aim to examine how local conditions impact the outcomes of eHealth transfer and health care organisations’ ability to utilize the potential of eHealth. To do this I have followed the implementation of five eHealth services across Finland, Norway, Sweden and Scotland. The implementations have been carried out within the Competitive Health Services project funded by the European Union’s Northern Periphery Program, which focused on international exchange of eHealth services. Thus, five existing eHealth service provision models have been transferred to a new country and to a new context. The five transferred services have demonstrated good results in the original context of implementation, and they were assumed to create similar benefits in other countries that share the same demographic and geographic challenges.

Therefore, this thesis aims to gain an understanding on the role of the local context and how its prevailing conditions impact the outcomes of eHealth service transfer. This thesis aims to answer the following research questions:

- What local conditions impact international eHealth transfer?
- How do these conditions facilitate and/or inhibit the transfer of eHealth services?

The implementation of ICT and eHealth in health care organisations can be challenging, as it often entails a change on organisational and individual levels. Several factors can influence the organisations’ and the individuals’ willingness to adopt a new way of working, such as the impact the change would have on workload or on the quality of care. As a response to the complicated task of implementing ICT in health care organisations, health care specific frameworks for assessing organisational readiness to implement ICT have been developed (see, for example, Li et al., 2010; Khoja et al., 2007; Wen et al., 2010; Wickramasinghe et al., 2005). The frameworks aim at smoothing the implementation process by identifying potential problems that may impact the implementation process and its outcomes. If the potential problems are detected prior to implementation, the organisation has the chance to work on the issues or adapt the implementation to better match the needs of the organisation. The number of available frameworks is still limited, as well as the knowledge of the value of these tools in a real-life context. In this thesis I have chosen to assess one method of evaluating the readiness of an organisation to receive a new eHealth service, namely, the eHealth implementation toolkit (eHIT) developed by Murray et al. (2010a). The third research question addressed in this thesis is therefore:
Is the eHealth implementation toolkit (eHIT) a useful instrument for identifying potential problems in the context of transnational eHealth implementation?

To answer the third research question, all five international eHealth transfers described in this thesis have been preceded by evaluations on the receiving organisations’ readiness to implement eHealth. The eHIT has been used by health care professionals involved in implementing the eHealth services in order to assess the normalisation potential of the service and to detect potential problems that may hamper the implementation. The results of these eHIT evaluations are contrasted with the actual implementation process, in order to find out if the eHIT facilitates the implementation process by accurately detecting and counteracting problems, thus aiding the organisation in carrying out the implementation.

The five case studies presented in this thesis demonstrate the opportunities and challenges health care organisations face when eHealth services are transnationally implemented. They also show how the results on assessing organisational readiness to implement eHealth services can be used to plan and carry out the implementation. This research contributes to an understanding of factors influencing the normalisation of eHealth and how local conditions facilitate and limit the health care organisations’ possibilities to implement and utilize eHealth innovations in clinical work.

Finally, this thesis is aimed at professionals involved in implementing eHealth services, or considering doing so, and researchers interested in eHealth, implementation science or organisational change. I hope it increases understanding of the challenges faced when crossing international boundaries with eHealth services and that it will incidentally increase the quality of care provided to those who most need it.

1.2 Thesis outline and previously published material

This thesis consists of four parts:

The first part (chapter 1) introduces the research area and clarifies for the objectives of the research presented in the thesis.

The second part (chapters 2-3) presents theories related to organisational change and change readiness, normalisation of ICT in health care and discusses the impacts of using ICT in health care organisations.

The third part (chapters 4-11) describes the empirical investigation carried out within the Competitive Health Services project and how this has impacted the research design. The results of the five case studies regarding the transfer of eHealth services across the Northern Periphery are described.
The final part (chapters 12-13) of the thesis discusses the results of the empirical investigation in relation to normalisation of eHealth and assessing organisational readiness to change. In addition, local conditions impacting the transfer of eHealth are discussed, as well as the limitations of the study and future research needs.

The research presented in this thesis has been conducted within the Competitive Health Services project, funded by the European Union’s Northern Periphery Program. Some of the material presented in this thesis has been previously published in project reports.

Reports published within the Competitive Health Services project:


Competitive health services (2010). A roadmap to transnational exchange of eHealth innovation.

Other publications:


Chapter 2: Theoretical frameworks

Understanding the factors influencing ICT implementation and its outcomes has long been of interest for researchers. At its best ICT is easily implemented in organisations and the changes new technologies bring are welcomed on an individual and organisational level. At times, however, implementation of ICT and the organisational change it causes can lead to unexpected, contradictory or unwelcome results (see, for example, Ash et al., 2004; Campbell et al., 2006; Harrison et al., 2007; Wachter, 2006; Wimelius, 2011).

Assessing organisational readiness for change prior to implementing ICT can be beneficial and ease the implementation process. The assessments have the potential to help organisations to become more tuned to detecting potential barriers and facilitators for implementing a change (Holt et al., 2010; Légaré et al., 2010). In addition to understanding the factors influencing organisational readiness to implement ICT, evaluating the actual outcomes of the implementation is of interest. Several frameworks focusing on assessing the outcomes of ICT implementation have been developed, including the widely used frameworks for assessing the success of information systems (see, for example, Seddon, 1997; Delone and Mclean, 1992; Delone and Mclean, 2003) which enable a detailed analysis of the outcomes of ICT implementation.

This chapter discusses theories related to organisational change and presents in detail two toolkits that can be used to evaluate organisational readiness to implement ICT in health care organisations. Further, theories for examining the normalisation processes of ICT are described and the complexity of assessing the outcomes of health care interventions is discussed.

2.1 Organisational readiness for change

Organisational readiness can be described as the willingness of the members of an organisation to commit to and carry out a change. Thus, increasing organisational readiness for change means influencing the way individuals feel about the current situation, and how they see the change influencing the future. Ultimately, not only individual beliefs and attitudes are altered, but collective behaviour as well (Armenakis et al., 1993; Weiner, 2009).

Several factors that can contribute to increased readiness for organisational change. One of the key factors is the message the organisation sends to its members regarding why a change is necessary. If the organisation is able to convince its members that a change is needed, for example, based on increased need to produce services or lack of resources, the members of the organisation may find it easier to support the change. Further, the members of the
organisation should feel that they are able to actively take part in the processes the change requires. If the members of the organisation do not agree with the purpose and motivation behind the need for change, it can lead to the members resisting the change (Armenakis et al., 1993). Implementing a change often leads to situations where some members of the organisation are committed to the goal, while others are not. The more committed the members of the organisation are to reaching the goal of the implementation, the easier it is to obtain change (Weiner, 2009).

Armenakis et al. (1993) focuses on the importance of social dynamics in relation to organisational readiness. As collectives consist of individuals, the impact each individual has on the collective should be taken into account. Individuals impact others, and their opinions of implementing change fluctuate, therefore the degree of organisational readiness is dynamic and the change process is subjected to continuous evaluation and discussion where its meaning and importance is assessed. Some individuals in the organisation can be seen as opinion leaders, who provide behavioural and cognitive models for other members of the organisation to follow. If these opinion leaders express a positive or a negative attitude and behaviour towards change, other members of the collective can feel encouraged to follow the opinion leader.

Assessing organisational readiness prior to implementing ICT will support the organisation in shaping a strategy that can be used to support the implementation of change (Jones et al., 2005). Several strategies for influencing attitudes towards change have been described in relation to increasing organisational readiness. Armenakis et al. (1993) focuses on the importance of making the members of the organisation feel like they are actively participating in the change process and thoroughly justifying the importance of organisational change via persuasive communication. Klein and Knight (2005) have identified several factors which can contribute to organisational readiness ultimately leading to efficient implementation. The first factor, learning strategies, emphasises that organisational investments in staff training and education pay off, as the members of the organisation will become more eager in trying out new things, as they are not afraid of making mistakes. Ultimately, the staff members’ perspective on change alters, making it less intimidating, contributing to increased readiness for change. The second factor is organisational climate. If the organisation has a climate which supports and prioritises implementation of innovations, the change the implementation leads to will be seen as a positive thing, and the organisational priority of implementing innovations will be reflected on the individual level. The third factor focuses on the role of the management. If the management shows commitment to implementing the innovation, it will encourage others to do the same. The fourth factor highlights the importance of having access to adequate resources to implement the innovation. As the organisational costs are likely to increase during implementation, it is important to make sure the necessary resources are available. In addition, the management needs to take into
consideration that implementing change may have an initially negative effect on the organisational performance.

Weiner (2009) states that “change valence” is one of the core determinants of organisational readiness to change. If the members of the organisation feel that the change is welcome, and they see value in the proposed change, they are more likely to support and act out the change. How the members of the organisation value the change can be based on, for example, the assumption that the change will solve a current organisational problem or benefit the individual personally. It is not necessary that all members of the organisation share the same motivation regarding the implementation of change, however it is desirable that the members value the change as this is a key component of carrying out the implementation.

The members of the organisation assess the efficacy of the change based on three determinants: task demands, resource perceptions and situational factors, meaning that the members of the organisation assess their capabilities to carry out the change based on what the change demands from them and what resources they have access to in the current situation. If the staff members conclude that given the current situation they are able to commit to the change and have the resources to do so, the organisation has a high degree of “change efficacy” (Weiner, 2009).

Contextual factors are important when assessing the organisational readiness for change. For example, organisational history in terms of the individuals’ experiences regarding previous organisational change can influence their attitude towards the planned change. Organisational culture, which is positive towards innovation and supports learning, can contribute to a high readiness towards change. The higher the organisational readiness for change, the better the chances of successful implementation are. High organisational readiness does however not automatically translate into a successful implementation outcome. Organisations can, for example, inaccurately assess the degree of readiness, or the planned change can be poorly prepared for or be based on false information and inaccurately projected outcomes. The organisational readiness to implement change can be positively impacted, for example, by demonstrating the potential benefits the anticipated change creates, and illustrating how the proposed change relieves experienced organisational problems (Weiner, 2009).

Klein and Sorra (1996) discuss two factors that contribute to organisational readiness as well as the results of implementation, namely “organisational climate” and “innovation-values fit”. The authors argue that a strong organisational climate, which supports implementation of change, is created by ensuring that the members of the organisation have the necessary skills to use the innovation that is implemented, the use of the innovation is structurally supported by incentives and not using the innovation is discouraged. In
addition, the organisation should try to eliminate potential reasons for the members of the organisation not to use the innovation. The innovation-values fit component focuses on how the members of the organisation, as a collective, feel their core values match the innovation. Work collectives can have several values with different degree of priority, ranging from low-intensity values to high-intensity values. The organisational readiness is high when the high-intensity values the work collective has match the innovation. The two factors, organisational climate and innovation-values fit, can jointly be used to predict the degree to which the members of the organisation will use the innovation. The use of the innovation can vary from resisting the innovation and the change it induces to feeling neutral or enthusiastic about it. In addition, the support the innovation received from the members of the organisation can vary between both individual users and groups. When user groups value the innovation differently, the organisational climate will determine the destiny of the innovation. If the organisational climate is positive towards innovation and change, the organisation is likely to agree with the user group with the most positive attitude towards the implementation, thereby ensuring the continuation of the change process. In addition, the authority user groups have may impact the future of the innovation. Employees with high authority are more likely to get their opinion heard than employees with low authority, hence influencing the implementation to the benefit of the group with higher authority. Cunningham et al. (2002) report similar findings; employees who are characterized as having challenging jobs with authority and active work roles are more likely to participate in change processes and have higher individual readiness for organisational change than employees with passive work roles.

Finally, organisational readiness for change should always be assessed regarding a specific context, instead of readiness for change being seen as a general state the organisation can have. Organisational readiness for change is at its highest when the members of the organisation are committed to the change and willing to act collectively on implementing it. Having the necessary resources to implement a change is not enough; active participation from the members of the organisation is required in order for a change to take place (Weiner, 2009).

Health care organisations are no exception when it comes to encountering difficulties in implementing change. In order to smooth the implementation process and to predict potential obstacles standing in the way of successful implementation health care specific frameworks for evaluating organisational readiness to implement ICT have been developed (see, for example, Khoja et al., 2007; Lehman et al., 2002; Li et al., 2010; Parker Oliver and Demirirs, 2004; Snyder and Fields, 2006; Wen et al., 2010; Wickramasinghe et al., 2005). Sections 2.5 and 2.7 describe in detail two toolkits with their underlying theories, which can be used to evaluate health care organisations readiness for implementing ICT. But first, the complexity of evaluating the success and the outcomes of ICT implementation is discussed.
2.2 Frameworks for analysing information systems outcomes

In addition to assessing the organisational readiness to implement ICT, it is important to assess and understand the outcomes the actual implementation leads to. One widely used framework is Delone and Mclean (1992) information systems success model, which aims at providing a framework for analysing and evaluating success factors related to information systems. Since its original publication the model has been updated by the authors (Delone and Mclean, 2003) and currently consists of the following six categories: information quality, system quality, service quality, intention to use and use, user satisfaction, and net benefits.

The first component, system quality focuses on the characteristics the system has. In terms of success the system quality can be, for example, measured based on how easy it is to learn and to use, and how responsive and flexible the system is. The second component, information quality focuses on the outputs of the system, and how these outputs can be assessed regarding, for example, information accuracy and information relevance. The service quality component focuses on evaluating the success and the quality of a service that is produced, for example, using several systems or to evaluate an organisational division’s success. The parameters included in the service quality component can, for example, include aspects of responsiveness and reliability, depending on the context of evaluation (Delone and Mclean, 2003).

The next component, use, represents actions users take. These actions can vary from obligatory to voluntary, and the results of the use can vary from unproductive to productive use of the system. The use intention dimension aims at measuring the attitudes towards the information system, as well as attitudes that impact on the actual use. The user satisfaction component evaluates how the user feels about the use of the system and can include measurement parameters such as enjoyment (Delone and Mclean, 1992).

The net benefits component focuses on the benefits the use of the information system creates for its users. When the net benefits are evaluated, it is critical to define who’s point of view is being examined. Different system users and user groups may experience the net benefits differently, which is why the definition of the object of the analysis is important. Further, the perspective of the analysis regarding net benefits needs to be determined, the net benefits can, for example, vary depending on whether the information system is being evaluated from an organisational or individual point of view (Delone and Mclean, 2003).
Petter et al. (2008) highlight that the information systems success model should be used with reservations. The user of the model must have a thorough understanding on the information system under investigation, and understand the organisational context the system is used in. Understanding these factors is critical, as the user of the model must define the exact parameters used to evaluate each of the components included in the model. The user of the model determines the factors included in each component and decides which factors to use in order to measure the success of an information system. The information systems success model provides its users with the important notion of carefully selecting the parameters that are measured, and emphasises the importance of defining from whose perspective the information system is evaluated.

The model of information systems success model has at times been adjusted to fit different contexts; Yusof et al. (2008) adapted the model for evaluating health information systems, and Hu et al. (2002) revised the model to better match the needs of evaluating telemedicine systems. The original information system success model has been criticized as it does not explain why the implementation of a specific information system can lead to varying outcomes in the same context (Tsiknakis and Kouroubali, 2009).

2.3 The complexity of evaluating ICT outcomes in health care

As Petter et al. (2008) point out, in order to evaluate IS outcomes it is important to define the parameters that are being assessed and decide from whose perspective the evaluation of information systems success is approached. Despite several evaluation frameworks focusing on assessing the outcomes of implementing ICT in health care organisations (see, for example, Dixon et al., 2010; Grigsby et al., 1995; Khoja et al., 2013; Yusof et al., 2008) the
body of evidence gathered on information systems success, e.g. in relation to
the clinical and economical benefits of implementing ICT in health care
organisations, remains limited (Davalos et al., 2009; Johansson and Wild, 2010;
Wootton et al., 2005; Chaudhry et al., 2006; Black et al., 2011). Furthermore,
there is currently no consensus about which evaluation methods should be
used and which parameters should be assessed when the outcomes of ICT
implementation in health care are examined (Lilford et al., 2009).

According to Catwell and Sheikh (2009) it is vital to develop methods for
systematic and continuous evaluation of implementing ICT in health care, and
to develop methods for collecting evidence on the benefits and downsides of
these implementations. The authors argue that eHealth services should
undergo the same rigorous evaluation processes as new drugs. Gathering
evidence on the outcomes of ICT implementation in health care is however
challenging, due to the lack of widely implemented services, small samples and
the lack of methods. Ammenwerth and Shaw (2005) argue for quality control
and continuous evaluation of ICT in health care, and suggest that by closely
evaluating ICT throughout its life cycle the unwanted and potentially lethal
effects of implementing ICT in health care organizations could be avoided.

According to Bates and Wright (2009), eHealth researchers should focus on
defining the benefits eHealth solutions can bring to the clinical work and to
evaluating the impact eHealth has on health care organizations. The authors
also point out the need to strive to move from local and regional eHealth
applications to international collaboration. By increasing co-operation across
national boarders it would be possible to generate more knowledge with the
possibility of data interchange. The authors argue that it is vital to agree on a
set of international standards that define how outcomes of eHealth
interventions should be measured as well as how the actual eHealth services
are described. The authors see these two factors as crucial for further
development and wide-scale use of eHealth applications. They also highlight
the need for cross-cultural validation of the instruments that are used to
measure health care professionals and patients’ satisfaction with telemedicine.
Comparing results of eHealth implementation internationally has proven to be
specially challenging, due to the lack of cross-national implementation and
collaboration, as well as lack of international, standardized evaluation methods.
The authors argue that in order to overcome problems related to evaluating
eHealth, international standards for assessing the outcomes of eHealth need to
be developed. The same reasoning regarding evaluation of treatment results
and assessing the quality of health care is supported by Loane and Wootton
(2002) discussion on evaluating telemedicine outcomes, where the authors call
for randomized controlled studies to investigate the effects of ICT in health
care.

Mcmanus (1996) takes the opposite stand. He argues that evaluating the
outcomes and the quality of health care interventions needs to be evaluated
from a wider perspective. Randomized controlled studies form an important,
but a small part of the overall evaluation of health care interventions, and should only be used to evaluate the outcomes of drug treatments. He argues that health care processes should be seen as a system, driven by interacting, different and sometimes conflicting interests and expectations as well as experience and knowledge. Randomized controlled studies are therefore inadequate for evaluating the multi-faceted and complex outcomes of the health care system, and should not be used to measure the quality of health care. McManus continues to argue against the call for conducting randomized controlled trials to measure the quality and safety of health care interventions by comparing health care providers to airplane manufacturers and asking the following:

But can we imagine how randomized controlled trials would ensure the quality and safety of modern air travel, without which few of us would be willing to fly? Whenever aeroplane manufacturers wanted to change a design feature on a commercial jet airliner they would make a new batch of planes, half with the feature and half without, taking care not to let the pilots know which features were present on the particular plane they were flying. Carefully, slowly, the planes would be studied over the next decade or so, and if the group with the modification crashed less often, then the feature would become permanent; if not, then the plane would return to its previous form.

(Mcmanus, 1996, p. 127)

Instead of randomized controlled trials the author emphasizes the need to utilize existing theories and experience in evaluating the quality and safety of health care interventions. Heathfield et al. (1998) argue that evaluating the outcomes of ICT implementation in health care organisations should not just focus on providing evidence about potential clinical and financial benefits by conducting randomized controlled studies. Evaluations should also provide understanding of how ICT impacts and shapes the outcomes of health care interactions, as this knowledge functions as a base for further development and implementation of ICT in health care. In order to fulfill this aim the evaluation of the outcomes should not merely focus on measuring financial and clinical outcomes. Other factors, such as impact on patients' quality of life, should also be taken into consideration.

May (2006) and May and Finch (2009) approach evaluating the outcomes of implementing ICT in health care organisations by examining factors which contribute to normalisation of ICT. The authors argue that ICT should not be evaluated as an isolated entity; rather, it should be evaluated as a part of the health care delivery process, and attention should be paid to understanding the factors that lead to ICT becoming normalised. This approach is discussed in more detail in the next sections.
2.4 Normalisation process theory

Normalisation process theory focuses on examining why some practices of a material character become embedded in organisations while others do not. The theory tries to explain what happens in an organisation when material practices become normalised. The theory is based on the assumption that people have to actively and continuously work with the material practice in order to sustain the practices integration. Normalisation process theory analyses how material practices are influenced and shaped by collective work relationships in organisations (Gallacher et al., 2011; May and Finch, 2009).

According to normalisation process theory the implementation of material practices is carried out in an interactive process based on four components: coherence, participation, collective action and reflexive monitoring. In addition, each of these components can either support the implementation or block its use (May and Finch, 2009). The first component, coherence, focuses on understanding the relation and interaction between material practices and work carried out in an organisation by its members. Material practices are assigned meaning and notions about how they could be used and how useful they could be to collectives in a specific context. Material practices are defined by their users as they give meaning to the practices. Depending on the degree of coherence - how much sense the material practice makes to its users in the context the practice and its users are in - the users either see value in it, or they do not (May and Finch, 2009; Gunn et al., 2010).

The second component, cognitive participation, focuses on the work the users of the material practice put into engaging with the practice and on how the collective work force acts to legitimise the material practice. If the material practice has been assigned with a meaning and value that supports the work carried out in the organisation the organisation enrols to use the practice. Depending on an individual’s position in the organisation the enrolment to use the material practice can be voluntary or mandatory. The role individuals have in different organisational networks acts as an incitement to enrol or not to enrol to use the practice. Finally, the organisational networks and work collectives legitimise the use of the material practice by collectively engaging with it and by assigning it a value (May and Finch, 2009; May et al., 2009).

The third component of normalisation process theory is collective action. Collective action focuses on the work carried out within the organisation in order to make the interaction with the material practice take place or not take place. The collective action is defined as an active, collective effort to reach a joint goal. The goal does however not need to be directed to actively using a material practice; instead it can be a collective attempt not to engage with the material practice. The collective action component highlights the fact that material practices will affect the way members of a collective interact with each other and the outcomes of these interactions. When a material practice is
implemented, it changes the demands on the knowledge individuals must possess in order to use it. It can also change the way individuals interpret other people’s actions. Material practices can also have an impact on how work is divided among collectives as well as the collective work processes and the organisational structures supporting these processes (May and Finch, 2009).

The final component of the theory is reflexive monitoring. This component focuses on continuously monitoring material practices through feedback. Feedback may be formalised or less formal and in either case may come from an individual or from a group. Feedback should be recorded and acted upon if necessary, leading to reconfiguration in which the feedback, which may be positive or negative, is used to reconfigure or reconstruct the system. This leads to increased notions of significance and ‘buying in’ by the actors in the process. In addition, the changes in feedback and appraisal regarding the system indicate whether or not the material practice is becoming embedded in the organisation. When the feedback and assessment on the practice turns from outspoken to unspoken, it can be seen as an indication of normalisation (Murray et al., 2010b; May and Finch, 2009; Finch et al., 2007; May et al., 2009).

Normalisation process theory provides a framework for examining collective work and social processes, and their interaction with material practices. It is an empirical tool that can be used to assess the probability of material practices becoming embedded in organisations. It provides a framework against which the normalisation processes can be examined and understood, for example in the context of remote and telehealth services (Bouamrane et al., 2011; May et al., 2011b) or in primary care organisations (Gunn et al., 2010; Kennedy et al., 2010). Normalisation process theory can be used to highlight potential facilitators and barriers that influence the embedding of practices (Murray et al., 2011).

Although normalisation process theory focuses on predicting the normalisation of a material practice, it can never fully predict the outcome of an implementation, as the context and the object of implementation are constantly evolving and changing. However, it is possible to anticipate the course of the implementation process and to assess the normalisation potential the object of implementation has, at least to a certain extent (May and Finch, 2009). Furthermore, the application of normalisation process theory in empirical contexts can provide concrete information on potential issues affecting normalisation. The information can be utilized by the service implementers in order to overcome and work through problems inhibiting normalisation as well as to improve the material practice being implemented (Murray et al., 2010b).

2.5 Normalisation process theory toolkit

Normalisation process theory has been further developed into a toolkit (NPT toolkit) that can be used to reason around an implementation and integration
processes. The contents of the toolkit are based on the normalisation process theory, and its four components; coherence, participation, collective action and reflexive monitoring. The components have been simplified and translated into a set of statements, which form the NPT toolkit. By simplifying the four components of the normalisation process theory the contents have been made more usable and more easily approachable in practical contexts for professionals and researchers who want to assess the potential of new technologies to become normalized. The NPT toolkit can be used without in-depth knowledge and understanding of the normalisation process theory (May et al., 2011a).

The toolkit is available electronically\(^1\). It consists of 16 statements that mediate the contents of the normalisation process theory. The respondent can answer each statement by using a slide bar giving alternatives from “Not at all” to “Completely”. In the toolkit each statement has an additional explanation, which clarifies the meaning of the statement. Following are the statements as they are described in the toolkit by May et al. (2011a, p. 245)

1. Participants distinguish the intervention from current ways of working
2. Participants collectively agree about the purpose of the intervention
3. Participants individually understand what the intervention requires of them
4. Participants construct potential value of the intervention for their work
5. Key individuals drive the intervention forward
6. Participants agree that the intervention should be part of their work
7. Participants buy in to the intervention
8. Participants continue to support the intervention
9. Participants perform the task required by the intervention
10. Participants maintain their trust in each other’s work and expertise through the intervention
11. The work of the intervention is appropriately allocated to participants
12. The intervention is adequately supported by its host organization
13. Participants access information about the effects of the intervention.
14. Participants collectively assess the intervention as worthwhile
15. Participants individually assess the intervention as worthwhile
16. Participants modify their work in response to their appraisal of the intervention.

Once the respondent has answered the statements a report is automatically generated. The report consists of two parts; one where the strength assigned to each of the 16 statements is individually represented, and a second part where the four constructs of the normalisation process theory are presented. The toolkit can be used for example to evaluate implementation processes and the potential of an intervention to become normalised in an organisation. However, the toolkit should be considered as an instrument that facilitates critical

\(^1\) Available at www.normalizationprocess.org/npt-toolkit.aspx
thinking, rather than a tool for reaching normalisation of new interventions (May et al., 2011a).

### 2.6 Normalisation process model

Whereas normalisation process theory focuses on normalisation of material practices in general, the normalisation process model explains why and how complex technology interventions are accepted or rejected by health care organisations. The model provides a detailed account of factors that influence the normalisation of new technologies in health care organisations and aims at creating an understanding of the processes that take place in organisations when ICT becomes normalised. The model supports the identification and evaluation of practical issues and processes that affect the normalisation of technological innovations and provides a way of understanding the organisational context in which new technologies become unified with clinical work (May, 2006; May et al., 2007).

Technology becomes normalised when the users take it for granted. Implementation of new technologies in health care organisations does not however automatically lead to normalisation. Instead of the technology becoming normalised in clinical work, the users can choose to, for example, work around the system, completely reject it or decide to discontinue its use over time. According to the normalisation process model the degree to which new technologies become normalised depends on four constructs: interactional workability, relational integration, skill set workability and contextual integration. Following is a summary of each of the constructs based on May (2006) and May et al. (2007).

**Interactional workability:** The first construct gives us the opportunity to examine how new technology will influence the interactions between health care professionals and patients. When new technology is implemented it may change the normal communication patterns and affect the outcomes of the interaction. Technology is more likely to normalise if it affects the interactional workability in a positive manner by supporting the goals of the interaction and if it improves working relationships and makes work easier.

**Relational integration:** This construct allows us to map out how well the ICT solution matches the existing working relationships and how the use of ICT impacts the division of accountability and responsibility among staff members. If ICT is used by one group of staff, and another group is held accountable for the outcomes, normalisation of the intervention may be difficult to obtain. The construct also investigates how health care staff members carry out work as a collective effort and how they jointly understand the work and how they facilitate it. If the planned IT solution matches with the existing relationships among staff regarding, for example, power-relationships the solution is more
likely to normalize. Furthermore, if it increases trust between user-networks it has a better chance of becoming normalized.

**Skill-set workability:** This construct allows us to analyse in what way ICT affects how the staff members experience their professional role, distribution of work and whether or not new skills are required in order for the staff to use the intervention. If the ICT intervention doesn’t require learning new skills and if it matches with current work practices, the intervention is more likely to normalise. If the professionals feel that the outcomes of ICT use are not equal to the outcomes obtained with traditional methods, the likelihood of reaching the state of normalisation regarding the use of the ICT intervention decreases. Overall, the normalisation of a complex intervention is more likely to happen if the ICT intervention is anchored to existing skill sets, division of work, work roles and practices.

**Contextual integration:** The fourth construct, contextual integration, focuses on how the ICT intervention matches with the organisational goals and structures, and whether or not these structures are compatible with the ICT intervention. Contextual integration highlights the importance of having adequate resources available for carrying out the changes implementation of ICT will entail. Normalisation is more likely to happen when the ICT intervention is integrated to the organisational structures, procedures and policies.

The four constructs described above influence the degree of normalisation an ICT innovation can reach in a health care organisation. The constructs support the examination of factors that can facilitate or hinder implementation and normalisation of ICT in health care organisations. Normalisation process model provides a framework for discussing and evaluating the potential of ICT innovations to become normalised in health care organisations. The model specifies elements influencing normalisation and divides the normalisation process into a number of definable components (May, 2006; May et al., 2007). The model has been criticized, as it does not take into account how professionals work collectively to implement eHealth services. Furthermore, it does not examine how and why collectives decide to start using a specific service or how they assessed it, nor does it explain how the adoption or diffusion of eHealth takes place in health care organisations (May and Finch, 2009; May et al., 2011a).

### 2.7 eHealth implementation toolkit (eHIT)

Implementing eHealth services in health care organisations can be a challenging and a complex task, involving considerable risks and impacts on service cost and delivery. It is in everyone’s interest to get it right the first time and to have resources allocated in services, which improve care processes and have a positive impact on the quality of care. It is useful when preparing for the implementation process that the target health care organisations analyse their
organisational readiness to implement new technology with a tool, which takes the complexity of implementing eHealth services into consideration. One tool developed for assessing health care organisations’ ability to successfully implement eHealth services is the eHealth Implementation Toolkit (eHIT). The eHIT has been derived from the normalisation process model discussed previously (section 2.6) in order to provide health care organisations with a practical tool for assessing the normalisation potential of an eHealth service before implementing it (Murray et al., 2010a).

The toolkit aids in evaluating, for example, an eHealth service's compatibility with national and local health care policies and targets and examines issues related to organisational culture and its influence on eHealth implementation. The eHIT allows staff members to be consulted in the planning stage; it accepts that the potential actors in the process are the ‘on the ground’ experts and that they have a lot to offer. It may assist in the ‘buy in’ of staff members when they eventually experience the trial of the new service, and as they have already been consulted, it may encourage open and critical discussion, thus aiding in more rapid progression of the service implementation process (Murray et al., 2010a).

The eHealth implementation toolkit is available as an electronic online survey², aimed specifically at health care professionals and staff members involved in implementing eHealth services. The instructions included in the toolkit recommend that all categories of staff that are likely to be involved in the implementation of eHealth should use the toolkit so that several opinions about the implementation can be obtained. As the respondents go through the statements included in the toolkit they are encouraged to consider the factors that are most likely to influence the implementation process and the normalisation of the service. The toolkit is divided into 3 sections (the context, the intervention and the workforce), which include a total of 21 statements. Each of the statements is given a score between 0-10 based on how well the statement matches with the respondent's opinion regarding the eHealth initiative. In addition to the scores the respondents are encouraged to write down the “evidence” supporting their opinion as free text comments (Murray et al., 2010a).

² Available at http://www.ucl.ac.uk/pcph/research-groups-themes/e-health/resources/toolsresources/e-hit
Figure 2.2 Example of statements included in the eHIT workforce section.

Following is a summary of the toolkit components based on Murray et al. (2010a).

Section 1- Context focuses on examining how the proposed eHealth service fits into the organisational context.

- **National policy**- the first set of questions sets out to examine whether or not the proposed eHealth service is compatible with current and planned national policies. It also examines if the implementation of the service would support achieving national priorities and targets.
- **Local policy**- the purpose of the section is to get the respondent to reflect on what the current and future local policies are and whether or not the implementation is aligned with them.
- **Local culture**- the third set of questions aims at examining how the staff members would react to the implementation; if they are likely to support it or not, and how the existing work relationships could come to influence the implementation. In addition the staff members’ attitude towards change and eHealth services is investigated. The toolkit aims at
identifying the organisation’s opinion leaders and assessing how they would react to the implementation as well as identifying local sponsors that are available and interested in supporting launching the service. The staffs’ abilities to work together within and across professional groups as well as their communication- and problem solving skills are examined.

- **Resources** - The aim of this section is to estimate whether or not the organisation has the necessary resources to carry out the implementation. The included statements asks the respondent to assess the resources the implementation requires in terms of monetary resources, staff training and increased workload. It also investigates how the implementation would impact the allocation of resources.

- **Risk** - the aim of the risk section is to get the respondent to assess if the proposed eHealth service is aligned with the overall risk management policies the organisation has.

**Section 2 - Intervention**

The second part of the toolkit focuses on assessing the impacts the eHealth service would have on the provision of health care services and whether or not the staff members have the necessary skills to run the service.

- **Impact on clinical practice** - the purpose of the section is to examine how the proposed service will impact the interaction between professionals and patients. The respondent is asked to estimate if the service will support interaction or if there is a risk that the implementation will disrupt communication or add new tasks to the care situation that might have a negative impact on the outcomes of the interaction. In addition the reliability, confidentiality and security of the eHealth service are assessed.

- **Ease of use of the system** - section asks the respondent to assess how easy the proposed service would be to use and if the outcomes of the service use are aligned with the intended use.

- **Effectiveness and cost-effectiveness** - focuses on assessing the services expected outcomes in terms of effectiveness and cost-effectiveness. The respondent is requested to consider the results of previous studies or experiences gained in other health care organisations when these aspects are assessed.

**Section 3 - Workforce**

The final part of the toolkit focuses on the staff members and how likely they are to adopt the service, and how the implementation will impact or change their current work situation.
• **Impact on work and workflow**-section focuses on the work-related changes health care professionals may experience when a new eHealth service is implemented. The respondent is asked to assess if the implementation will lead to increased workload or changes in how the staff members carry out their work. In addition, the likelihood of changes in the division of work among the staff members is estimated, as this may alter the areas of responsibility among professionals and lead to new challenges, which may not always be welcomed.

• **Education and training**-examines how much training the staff members need in order to successfully run the service. In addition to the immediate training needs in conjunction with the implementation, the respondent is requested to take into consideration how the training will be provided and whether or not there is a need to provide on-going training for the staff members throughout the lifecycle of the service.

• **Relationships between different professional groups**- the goal of the section is to assess how the eHealth service will impact the relationships between the staff members. The implementation may be easier to carry out if it will not alter the power relationships between professional groups and if it boosts staff members trust in each other’s competence. In addition to the power-relationships and issues related to trust and competence, the respondent needs to assess the staff members’ accountability regarding the use of the eHealth service. Problems may rise if accountability for the outcomes of the service use is shifted from the actual users to another professional group. This may make the implementation and gaining the full support from all professional groups challenging.

Once the respondent has completed the toolkit by giving numeric responses to the statements included in it and added free text comments to the statements, summaries of the scores and the free text comments are automatically generated (Murray et al., 2010a).

![Figure 2.3 Example of a summary on “the intervention” section of the eHIT.](image-url)
Finally, the eHIT provides its users with an overview on the degree of readiness to implement the proposed eHealth service. The percentages shown on context, the intervention and the workforce are based on the scores the respondent has given to the statements included in the toolkit.

The results obtained with the eHIT can be used to get an overall idea of whether or not the organisation is ready to implement a particular eHealth service, and what the potential problems may be. Identifying potential problems in advance may help counteracting them thereby facilitating the implementation process. Furthermore, the staff members involved in implementing eHealth may look for explanations in the toolkit topics if problems occur during the implementation. The eHIT was originally created to evaluate the organisational readiness to implement eHealth services within the National Health Service (NHS) in United Kingdom and it had not been used outside NHS context (Murray et al., 2010a) prior to the initiation of the Competitive Health Services project, within which the case studies presented in this thesis have been carried out.

In this thesis, the eHIT has been used to assess the organisational readiness to implement eHealth services across health care organisations in Finland, Norway, Scotland and Sweden. The eHIT was selected as it is generic enough to be used to assess organisational readiness to implement several different types of eHealth services, and it addresses the most common barriers and facilitators impacting the use of eHealth services. In addition, the eHIT is derived from the normalisation process model that has been successfully used to explain the normalisation of complex health care interventions such as decision support technologies (Elwyn et al., 2008), processes of collaborative care (Gask et al., 2010) and telecare in chronic lung disease (Mair et al., 2008).

One of the aims of this thesis is to find out if the eHIT is a useful instrument for detecting potential problems in the context of transnational eHealth implementation. The case studies presented in chapters 7-11 give a detailed account on how members of health care organisations used the eHIT to
evaluate organisational readiness to implement eHealth services, and how the predictions obtained with the eHIT materialised when services were implemented.
Chapter 3: Using ICT in health care organisations

This chapter discusses how the use of ICT in health care organisations can impact the professionals and the patients as well as the outcomes of health care services. In addition the potential benefits and risks related to the use of eHealth are examined.

The use of ICT solutions to provide health care related services is often referred to as providing “eHealth” services. Currently, there is no generally accepted single definition of eHealth although the term is widely used by researchers, health care professionals, and the general public (Oh et al., 2005). Wyatt and Liu (2002) define eHealth as:

*The use of internet technology by the public, health workers and others to access health and lifestyle information, services and support; it encompasses telemedicine, telecare, etc.*

(Wyatt and Liu, 2002, p. 809)

The following definition by Eysenbach (2001) illustrates the multiple layers of eHealth, not only focusing on the technical aspects of eHealth, but also on the characteristics of eHealth.

*e-health is an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment to networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology.*

(Eysenbach, 2001, p. e20)

Mitchell (2000) defines eHealth as an umbrella term that covers the use of ICT in health care, and sees, for example, telemedicine and telehealth as subsections of eHealth. In this thesis, I use the term eHealth in the same manner as Mitchell, as I see eHealth as an overarching term for the use of ICT in health care. The term eHealth is also used to describe the transferred ICT-
enabled health services that have been implemented across the Northern Periphery within the Competitive Health Services project.

3.1 The potential of eHealth

eHealth services are often local services that rarely become long-lived or the subject of wide implementation. This in turn limits the possibilities for making general statements about the impacts or benefits of eHealth (May et al., 2003; Roig and Saigi, 2011). There are, however, examples of eHealth services that have created benefits for both the patients and health care organisations, as described next.

The use of eHealth can create substantial benefits for health care organizations as well as for patients in relation to quality of care, clinical effectiveness, access to health care services and cost-savings (see, for example, Gray et al., 2000; Harno et al., 2000; Hofstetter et al., 2010; Jennett et al., 2003; Norman, 2006; Whited, 2010). In addition, eHealth services can reduce the need for patients to travel in order to receive health care services (see, for example, Ferrer-Roca et al., 2010; Mrak et al., 2009; Rendina et al., 2001; Tsilimigaki et al., 2001) and can save resources for society and for health care organizations by decreasing travel-related reimbursements (Strömgren, 2003).

eHealth can also be utilized in order to avoid unnecessary referrals to specialist care, by, for example, using remote consultation to obtain specialist evaluations (Ignatius et al., 2010; Moya et al., 2010; Turk et al., 2011; Van Der Heijden et al., 2010). This can lead to increased professional competence as health care staff members are able to discuss patient cases with other professionals (Marttos et al., 2012). For example, video consultations can have an educational value for participating staff members, leading to increased competence among personnel and improved care processes. In the long run, increasing staff competence will create economic benefits for health care organizations. It can however be difficult to specify precisely how these financial benefits are obtained and what the monetary value is (Strömgren, 2003).

The use of eHealth can also benefit rural areas that face problems recruiting and retaining health care professionals to work at remotely located health care organisations (Gagnon et al., 2011). Utilizing eHealth in clinical work can have a positive impact on job satisfaction by counteracting professional isolation, as staff members are able to participate, for example, in training activities. Remote consultations taking place between professionals can further support knowledge exchange and increase staff competence (see, for example, Sargeant et al., 2004; Gagnon et al., 2011; Watanabe et al., 1999; Duplantie et al., 2007).

Eysenbach (2001) article “What is e-health?” provides a snapshot of the potential benefits eHealth can bring for the patients and health care organisations, and also mentions some of the challenges the use of eHealth can
create. Following is a summary of the 10 e’s in e-health, as presented by Eysenbach (2001, p. e20)

1. **Efficiency** - one of the promises of e-health is to increase efficiency in health care, thereby decreasing costs. One possible way of decreasing costs would be by avoiding duplicative or unnecessary diagnostic or therapeutic interventions, through enhanced communication possibilities between health care establishments, and through patient involvement.

2. **Enhancing quality of care** - increasing efficiency involves not only reducing costs, but at the same time improving quality. E-health may enhance the quality of health care for example by allowing comparisons between different providers, involving consumers as additional power for quality assurance, and directing patient streams to the best quality providers.

3. **Evidence based** - e-health interventions should be evidence-based in a sense that their effectiveness and efficiency should not be assumed but proven by rigorous scientific evaluation. Much work still has to be done in this area.

4. **Empowerment** of consumers and patients - by making the knowledge bases of medicine and personal electronic records accessible to consumers over the Internet, e-health opens new avenues for patient-centered medicine, and enables evidence-based patient choice.

5. **Encouragement** of a new relationship between the patient and health professional, towards a true partnership, where decisions are made in a shared manner.

6. **Education** of physicians through online sources (continuing medical education) and consumers (health education, tailored preventive information for consumers)

7. **Enabling** information exchange and communication in a standardized way between health care establishments.

8. **Extending** the scope of health care beyond its conventional boundaries. This is meant in both a geographical sense as well as in a conceptual sense. e-health enables consumers to easily obtain health services online from global providers. These services can range from simple advice to more complex interventions or products such as pharmaceuticals

9. **Ethics** - e-health involves new forms of patient-physician interaction and poses new challenges and threats to ethical issues such as online professional practice, informed consent, privacy and equity issues.

10. **Equity** - to make health care more equitable is one of the promises of e-health, but at the same time there is a considerable threat that e-health may deepen the gap between the "haves" and "have-nots". People, who do not have the money, skills, and access to computers and networks, cannot use computers effectively. As a result, these patient populations (which would actually benefit the most from
health information) are those who are the least likely to benefit from advances in information technology, unless political measures ensure equitable access for all. The digital divide currently runs between rural vs. urban populations, rich vs. poor, young vs. old, male vs. female people, and between neglected/rare vs. common diseases.

(Eysenbach, 2001, p. e20)

Further, the author states that eHealth has the potential to change health care processes for the better with regard to, for example, quality, cost-effectiveness and access. Recent research does however show that eHealth struggles to fulfill its potential. Black et al. (2011), in an overview of the quality and safety of eHealth, point out that so far, despite the general assumption of eHealth services being financially beneficial for health care organisations, the cost-effectiveness of eHealth services cannot be verified. In addition, the evidence for eHealth’s positive impact on the outcomes of health services is limited. Ekeland et al. (2010) report similar findings in their review of reviews on the effectiveness of telemedicine. The authors conclude that the cost-effectiveness of telemedicine cannot be determined, and call for further research on what the impacts of telemedicine are for patients and organisations. A systematic review by Hersh et al. (2001) on the outcomes of telemedicine shows similar results; there is a lack of evidence regarding the benefits of using telemedicine. Although almost a decade passed between the Ekeland et al. (2010) and the Hersh et al. (2001) reviews, it is surprising to see that the body of evidence about the benefits of telemedicine is still as limited. According to May et al. (2003) one of the main reasons behind the failure to reap the benefits eHealth services could create is the lack of long term planning when eHealth is implemented. In practice this is demonstrated by the characteristics of implementation; eHealth services are often initiated as projects or trials that are not embedded in the organisational context in a way that would support maintaining the service in the long run, past the trial stage. Consequently, this makes assessing the long-term implications of eHealth challenging.

The next section discusses the impact eHealth has on health care organisations and the clinical work health care personnel conduct, as well as how the use of eHealth impacts the care relationships between staff members and patients.

### 3.2 Impacts of eHealth

Patients are used to actually visiting established bricks and mortar health care facilities to receive health care services. eHealth has the potential to change the situation as it can be used to alter the physical boundaries of where health services can be provided, for example, provision of health monitoring services at the patients’ home via ICT or provision of specialist services in remote general health clinics far from the city. Patients and professionals, like anyone, may be reluctant to change but may respond better if the changes are perceived
as positive, for example, by increasing access to health services or by improving the quality of care. Replacing face-to-face meetings between health care professionals and patients with virtual ones poses new challenges to both professionals and patients, as they have to adjust to and deal with changes.

Implementing eHealth in health care organisations often leads to changes in work processes and how work is organized. Several examples of how health care professionals clinical work processes have been changed due to implementation of eHealth have been documented, see for example; De Bont and Bal (2008); Lehoux et al. (2002); Mcconnochie et al. (2009). Implementation of eHealth does not only affect work processes, it can also affect the division of clinical work among staff members. Nicolini (2006) points out that implementation of ICT in health care organisations can lead to situations where tasks previously carried out by medical professionals are carried out by employees without the necessary training, causing a collision with health care organizations’ policies and legislations, and influencing the quality of care negatively. Furthermore, the use of ICT enables forming new relationships between professionals, which can lead to bypassing existing relationships, ultimately leading to financial burdens for the organisation.

Replacing face-to-face meetings and physical examinations with technology-mediated interaction can be challenging. Guaranteeing that, for example, the outcomes of remote consultations are equal to the patients actually visiting a specialist may be even more difficult. Maheu et al. (2001, p.195) illustrates problems with relying on video feeds to diagnose patients by describing how the use of compressed video might harm the diagnostic procedure if information is lost due to compression. Conducting the same diagnostic procedure face to face does not create these types of problems.

Not all clinical processes can or should be carried out remotely. In order for a health care professional to successfully conduct, for example, medical consultations via video it is vital to establish new clinical protocols that support practicing care at a distance and take these new challenges into consideration (Darkins and Cary, 2000, p.23). In traditional health care provision conducting physical examinations is a central aspect of the care process. Derse and Miller (2008) point out that conducting a physical examination is not always needed, as information can also be obtained in other ways, for example by measuring physiological parameters and from radiological examinations. However, the decision whether or not a physical examination is necessary needs to be carefully considered.

Another example of eHealth’s impact on the quality of care is presented in a study on telepsychiatry where implementation of videophones to conduct psychiatric interviews was initially enthusiastically received but later on completely rejected due to ICT’s negative affect on the therapeutic relationship (May et al., 2001). Sävenstedt et al. (2006) study of health care professionals
experience of using ICT in elderly care revealed that professionals fear that communicating via ICT might have a negative impact on the professional-patient relationship due to loss of intimacy and decreased feeling of closeness ultimately leading to dehumanized care. These examples show that replacing face-to-face meetings with virtual ones can create new challenges and lead to unexpected outcomes and should therefore be carefully considered.

On the other hand implementing eHealth can also have a positive effect on the quality of care. Patients with, for example, sexually transmitted diseases or other conditions that may be experienced as stigmatizing may seek care at an earlier stage of their condition if the care process is more depersonalized, e.g. via remote consultation (Miller, 2003). One of the potential benefits eHealth has to offer is making health care more accessible to the public. Utilizing ICT to bridge geographical distances is one side of eHealth, it can also increase access to health services for those who are close to the services but otherwise unable to take advantage of the services provided, such as people suffering from anxiety disorders or people with limited mobility (Maheu et al., 2001, p. 15).

I think that it is important to keep in mind that investing in ICT in health care organisations does not automatically lead to improvements regarding the quality of care, or even in patient safety. Sometimes investing in human resources rather than technological innovations might be the way to truly increase the quality of care patients receive. In the worst cases, the use of technology in health care has led to serious consequences for the patient, and the professionals. There are several documented incidents in health care where the implementation of ICT has not been successful; instead, the use of ICT has led to serious injuries or to patients’ deaths, (see for example: Myers et al., 2011; Beynon-Davies, 1999; Leveson and Turner, 1993; Williams, 2007; Han et al., 2005) causing a complete breakdown of patient-professional relationship and leading to the questioning of professional competence regarding what skills health care professionals working with ICT should have and how the safety of the patients can be guaranteed when ICT is implemented.

The use of ICT has enabled wider dissemination of health related information and increased access to information. Traditionally medical information has been mainly available for health care professionals. The Internet revolution has however changed the situation dramatically leading to changes in the amount and type of information patients have access to, further influencing the professional-patient relationship and contributing to empowering patients (Ball and Lillis, 2001; Broom, 2005; Henwood et al., 2003; Kassirer, 2000). It is not uncommon that the patient possesses more knowledge on his or her specific condition than the professionals involved in the patients care (Neuhauser, 2003). This has led to patients challenging the medical professionals’ knowledge and formal position. In addition, it has increased the demand on professionals to keep updated and raised a call for new strategies for maintaining a good professional-patient relationship (Mcmullan, 2006; Murray et al., 2003; Wald et al., 2007).
According to Neuhauser (2003) health care organisations could tackle some of the growing needs of providing health services by shifting some of the care responsibilities to the patients and by supporting patients’ self-efficacy. Alpay et al. (2010) state that eHealth services can be utilized in several ways to empower patients, and to support self-management of illness. Collecting patients’ health information in one place and allowing patients to access their personal information can facilitate their understanding of the illness they suffer from. This information is crucial for the patients, in order for them to be able to make informed decisions on how to best handle their situation (Alpay et al., 2010). Online health services and tele-monitoring services can be utilized to empower patients by increasing their self-efficacy and making the patients less dependent on health care professionals’ assistance (Bond et al., 2010; Riley et al., 2012; Trief et al., 2007; Zutz et al., 2007).

As empowering patients has become something of a fashion term, it is surprising to see how few studies actually been conducted to explore and understand how the patients experience their changing role. Patients have moved from being a passive receiver of health care services to an active partner participating and taking responsibility for medical procedures such as recording their own electrocardiographs (ECG) or selecting among available treatment forms. According to Salmon and Hall (2004) patient empowerment is usually seen as a good thing, and its appropriateness is rarely questioned, even though the evidence supporting this assumption is very limited. Oudshoorn (2011) study of how patients experienced the use of portable ECG equipment to self-monitor heart rhythm disturbances shows alarming results. Not all patients experienced self-management of their condition by recording ECGs as empowering or positive. Instead, the ECG equipment made some of the patients anxious and increased their feeling of being ill. Furthermore, some patients got so sick when they experienced heart rhythm disturbances, that they were not able carry out the ECG recordings. In these cases, the delegation of medical responsibilities from health care staff to the patients has not only been inappropriate, but also complicated the diagnostic procedure. Some of the patients who experienced the self-management as negative also avoided using the ECG equipment altogether, as they felt that they did not have the medical expertise to know if the heart irregularities they felt would be worth recording and of value for the health care professionals. The results of the study highlight the importance of acknowledging that, whereas some patients may indeed feel empowered by increased access to information and reassured by the presence of technology, in addition to coping well with being delegated new responsibilities, others may experience ‘the empowerment’ as a burden. These, I think are important notions to consider when tasks previously carried out by health care professionals are delegated to the patient, and when patient empowerment is promoted.
3.3 Ethical considerations

Fleming et al. (2009) point out that technology in itself never has an ethical value. When technology is connected to a context and purpose ethical questions surface. The authors state the following:

In short, telehealth, like any evolving healthcare technology, should be used in such a way that will promote optimal function of the healthcare professional, and bring into focus (rather than detract from) the humanity of the provider, as well as that of the patient

(Fleming et al., 2009, p. 798)

Ethical questions on the use of ICT in health care emerge across all fields of health care. Bauer (2001) raises an important discussion on the impacts of using ICT in home care. He highlights several areas of concern. The strain on families taking care of next of kin can already be considerable, adding medical responsibilities might make the situation even more straining.

In those cases, for example, where a sick loved one is chronically ill, home-based telemedicine may have profound and lasting implications for the lifestyle, financial status, and emotional and psychological well-being of family members who care for him or her

(Bauer, 2001, p. 141)

Bauer (2001) calls for limits to “familial duties” in order to avoid situations where family members take over health care professionals work to such an extent that it leads to the sick family member becoming a burden for the family. The blending of boundaries between home and health care institutions can lead to homes becoming “medicalized”. Consequently, wide-scale implementation of home-based eHealth services should be put on hold until we truly understand how medicalizing the patients’ home impacts how they experience their living conditions.

Another problem related to eHealth and ethics is access to ICT based health services. Bauer (2001) discusses the problems that might rise if eHealth solutions were to have higher quality than health services produced with traditional means. In that case, what is the societal responsibility to make sure that everyone has access to the necessary ICT to receive eHealth services? On the other hand, if health care services provided with traditional means are of higher quality than eHealth services, the consequences for the patients receiving health services via eHealth can be severe. In order to find out whether or not an eHealth service meets the standard of care, someone,
ultimately the patient, takes the risk. Problems arise when eHealth services are rolled out without knowing the effects of the two ways of providing health care services. Evidence based medicine should therefore be developed to include eHealth.

eHealth and the implications of the digital divide have been widely discussed. One of the potential benefits of eHealth is to make health care services and health-related information more accessible to the general public. However, it is argued that the people who would benefit from health information and eHealth services the most, for example, elderly people suffering from chronic illnesses living in remote rural areas, might not have access to it due to lacking ICT infrastructure and low computer literacy, increasing the digital divide and leaving the ultimate goal of equal access to health services unfulfilled (Ennis et al., 2012; Fortney et al., 2011; Kaplan and Litewka, 2008).

Ethical problems may also arise when eHealth is used to replace traditional health care services. Even though eHealth can support, for example, elderly people’s independent living by remote monitoring of their health status, it can also lead to unintended consequences. The elderly can become more socially isolated if visits by health care professionals or family members are replaced by ICT. On the other hand, it is possible to use ICT to improve a person’s social situation by opening up for new means of communication with friends, family members and health care professionals (Kaplan and Litewka, 2008; Sävenstedt et al., 2006).

To summarize, eHealth has the potential to improve health care processes and make health services more accessible. The evidence base on the benefits eHealth has so far created is however limited. In order to fully understand the consequences the use of eHealth services has for patients, professionals and health care organisations, more research on issues such as empowerment, cost-effectiveness of eHealth services, normalisation of eHealth, and ethical issues are needed.
Chapter 4: Competitive Health Services in Sparsely Populated Areas

The aim of the Competitive Health Services project was to increase access to health care services in the sparsely populated areas of the Northern Periphery by utilizing ICT in order to overcome problems imposed by long distances. The project ran for three years starting in January 2008. It was funded by the European Union’s Northern Periphery Programme\(^3\) that focuses on supporting international co-operation and knowledge sharing on topics such as health care. The Competitive Health Services project had partners from five countries. The County Council of Västerbotten from Sweden, Norwegian Centre for Telemedicine and University Hospital of North Norway, University of Aberdeen and Centre for Rural Health from Scotland and Northern Ostrobothnia Hospital District and University of Oulu from Finland and the National University of Ireland, although no eHealth services were transferred to or from Ireland.

The competitive health services project aimed at increasing access to health care services in the sparsely populated rural areas by cross-implementing eHealth services. Each partner country identified sustainable, local eHealth service-provision models that could be transferred, further developed and integrated into health care systems elsewhere in the partner regions. The second goal of the project was to create an eHealth database where information gathered on eHealth services used in the Northern Periphery and beyond would be stored. This information can be utilized by health care organisations interested in exploring or transferring available eHealth services. The third goal of the project was to create a framework for transferring eHealth services and test it within the project. The framework can be utilized by health care organisations interested in transnational implementation of eHealth services.

The following description of the different phases of the Competitive Health Services project provides background information for understanding the context in which the case studies presented in chapters 7-11 have been carried out.

- The first phase of the project focused on mapping existing eHealth services used in Northern Finland, Northern Sweden, Scotland and North Norway. A first round of evaluations was performed on the mapped eHealth services. Information on the mapping results was stored in eHealth database\(^4\) available for the project consortium and to

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\(^3\) More information can be found at www.northernperiphery.net

\(^4\) The database can be accessed at www.ehealthservices.eu
the public by request. An eHealth checklist and an interview manual were created in order to support the mapping of eHealth services.

- Each health care organisation participating in the project formed a local expert group consisting of medical experts across a variety of disciplines. The local expert groups function is to provide local knowledge and insight on the status of local health care delivery. The expert groups have identified areas in local health care that could benefit from implementing eHealth services.

- The mapping results on available eHealth services in the Northern Periphery were matched against the gaps in local health care provision.

- Local expert groups have identified potential eHealth services that could be transferred. In order to ensure that the proposed eHealth services fit the organisational context, evaluations on the organisational readiness to implement eHealth services were conducted by using the eHealth implementation toolkit (eHIT). The results of the eHIT are presented in case studies, in chapters 7-11.

- Once host organisations had been matched with eHealth services, pilots were launched. A total of five different eHealth services were implemented across several health care organisations during 2009-2010, in Sweden, Norway, Scotland and Finland.

Chapter 6 discusses the Competitive Health Services project in more detail, and summarizes the identified gaps in local health care provision. In addition, the eHealth services that have been transferred within the Competitive Health Services are presented.
Chapter 5: Research design

The empirical investigation in this thesis consists of five interpretive case studies. The case studies focus on the transfer of five eHealth services across the Northern Periphery. The following sections discuss the research methods and the process of data analysis.

5.1 Case studies

eHealth is a relatively new way of providing health care services, influencing health care organisations, staff members and patients in various, often unexpected ways. It would be challenging to study the processes that take place in health care organisations when eHealth services are implemented without having access to a real-life context. The Competitive Health Services project has provided me with an opportunity to study in real-time the transfer of five eHealth services across the area of the Northern Periphery. Case studies are ideal when: “A “how” or “why” question is asked about a contemporary set of events, over which the investigator has little or no control” (Yin, 2009, p. 13).

Case studies have been criticised, as the results they produce can be difficult to generalise and duplicate. The case study method is suitable for gaining deep understanding of events that take place in real life shaped by and shaping the context they exist in. Thus, case studies should aim to be sensitive to the context by carefully defining it and focus on looking at the case holistically as a multi-layered complex system. They can, however, create deep understanding of phenomena, and generate information that facilitates learning from the case (Patton, 1990, p. 53-54). Therefore, I have used case studies as a way to gain understanding of the processes and factors that influence and shape the outcomes of eHealth transfer. Incidentally, the results can also be utilized in practice when eHealth services are implemented transnationally.

Yin (2009, p. 19-20) defines circumstances when case study research is especially suitable. Case studies are particularly appropriate when investigating real-life situations that are so complex that they cannot be adequately examined by using only quantitative data or by constructing experiments. Case studies should also be used when the researcher aims to “describe an intervention and the real-life context in which it occurred” (Yin, 2009, p. 20). These circumstances seem particularly appropriate for this thesis, as the transfer of eHealth services is examined in the context it happened, and the goal of the research is to understand how local conditions impact the outcomes of transferring eHealth.
Based on the philosophical assumptions of the researcher, case studies can be of a positivist, critical or interpretive nature; the case studies discussed in this thesis can best be described as interpretive. Cavaye (1996) summarises the goal of interpretive case research as understanding phenomena in their natural context, without trying to separate the phenomena from the context. In this thesis, the focus is on understanding the local conditions that impact health care organisations’ possibilities to utilize eHealth services.

Walsham (1993) defines the aim of interpretive research regarding information systems as “…producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by its context” (Walsham, 1993, p. 4-5). Thus, an interpretive research approach can be used to generate understanding of how the context interplays with information systems (see, for example, studies presented in Jonsson, 2010; Westergren H, 2011; Wimelius, 2011). The previous definitions of the goals of interpretive research by Walsham (1993) match well to the aim and the nature of this research, which is to gain an understanding of how the organisational context impacts the outcomes of eHealth implementation, and how the implementation outcomes are connected to the local conditions.

5.2 Research sites

The case studies presented in this thesis were carried out within the Competitive Health Services in Sparsely Populated Areas - e-Health Applications across the Urban-Rural Dimension project. The project ran for three years starting in January 2008. Whereas it was clear from the start of the project that all involved health care organisations would implement at least one eHealth service, it was not clear in which units within the organisations’ services they would be implemented. The selection of the implementation units was informed by the eHealth implementation toolkit, and the results obtained with the eHIT are discussed in detail in chapters 7-11. The final decision regarding the implementation sites was taken by the health care organisations based on the local health care needs and the possibility to answer these needs by transferring a specific eHealth service. I have chosen to include all five transferred eHealth services in this thesis in order to increase the generalizability of the results and to make sure that the varying outcomes of transferring eHealth services are accounted for. In addition, this thesis focuses on understanding local conditions that impact the transfer of eHealth services in the Northern Periphery. For this purpose, it is important to examine the local conditions in all regions, where services have been transferred. Following is a table showing an overview of the transferred eHealth services, host organisations and implementation units.
<table>
<thead>
<tr>
<th>Name of eHealth service</th>
<th>Host organisation</th>
<th>Implementation unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EyeMo</td>
<td>The County Council of Västerbotten, Sweden</td>
<td>Lycksele Hospital, Ophthalmology unit</td>
</tr>
<tr>
<td>CheckUp</td>
<td>City of Oulu, Finland</td>
<td>Technology health centre of Kaakkuri</td>
</tr>
<tr>
<td></td>
<td>Troms County, Norway</td>
<td>Sifjord Nursing home</td>
</tr>
<tr>
<td>Remote speech therapy via video</td>
<td>Oulunkaari Joint Municipal Board, Finland</td>
<td>Pudasjärvi health centre</td>
</tr>
<tr>
<td></td>
<td>Northern Ostrobothnia Hospital District, Finland</td>
<td>Oulu University Hospital, Department of Phoniatrics</td>
</tr>
<tr>
<td></td>
<td>National Health Service Scotland</td>
<td>National Health Services Highland, Caithness and Sutherland area</td>
</tr>
<tr>
<td>Remote wound therapy</td>
<td>Oulunkaari Joint Municipal Board, Finland</td>
<td>Pudasjärvi health centre</td>
</tr>
<tr>
<td></td>
<td>Northern Ostrobothnia Hospital District, Finland</td>
<td>Oulu University Hospital, Department of Dermatology and Department of Surgery</td>
</tr>
<tr>
<td>Teledialysis</td>
<td>National Health Service Scotland</td>
<td>National Health Service Highland, Renal services</td>
</tr>
</tbody>
</table>

Table 5.1 Research site overview. The column “host organisation” defines the host organisation whereas the “implementation unit” column specifies the unit within the organisation where the eHealth service in question was implemented.

This thesis consists of five case studies, focusing on the transfer of five different eHealth services across four countries. Thus, several health care organisations across Finland, Norway, Scotland and Sweden have been involved in transferring eHealth services. Chapters 7-11 in this thesis provide further descriptions of the organisational context where the services have been implemented, and describe the problems organisations have tried to overcome by transferring eHealth services.
5.3 Data collection

Data collection has progressed in two main phases. The first data collection phase was initiated in August 2008, ending in August 2009. During this phase data on organisational readiness to implement eHealth services was collected with the eHealth implementation toolkit and semi-structured interviews were conducted with eHealth service providers. The second phase of the data collection started in September 2009, and lasted to the end of 2010. During this time eHealth services were transferred and implemented across organisational and national boundaries and the focus of the data collection was to collect material related to the implementation processes.

One of the strengths of case studies is that multiple sources of information varying from interviews to questionnaires and review of documents can be utilized. The quality of the case study can be affected negatively if only a single source of information is used. In order to gather strong evidence and to obtain triangulation, the use of several information sources is recommended (Yin, 2009, p.11, 101). Following is a more detailed description of the data collection methods used in this thesis.

Observations

According to Patton (1987, p. 73-75), observation provides the researcher with the opportunity to experience the research context first hand, facilitating an inductive oriented research approach. In addition, the researcher has the possibility to share the experiences of the people being observed, thus making the researcher part of the group, at least to an extent. This description matches well with my experiences of observation. During the Competitive Health Services project I have conducted a total of 80 hours of observations at one of the eHealth implementation sites. I joined the Lycksele ophthalmology staff at the mobile eye unit during both pilot periods, which took place in March 2010 and in June 2010. My participation in the pilot was negotiated with the staff members and management of the ophthalmology unit, leading to an agreement that whereas I would not participate in the treatment of patients, I would participate in the processes surrounding the treatment. This would ensure the privacy of the patients and allow me to focus the research on the use of eHealth, rather than on the medical outcomes of the service.

During the observation periods I had daily informal discussions with the staff members on how they experienced the new way of working with diabetic retinopathy screenings and conducting examinations at the mobile eye unit. The staff members also explained and demonstrated how screening of diabetic retinopathy is organised and conducted in practice both at the mobile eye unit and at Lycksele hospital. I have taken field notes continuously during the observations, and after each day, I have re-written the notes in order to make them more readable. In addition to the observations carried out at the mobile
eye unit, I have had a chance to observe and ask questions on how CheckUp Life and CheckUp Care function when the service concepts have been demonstrated at workshops organised within the Competitive health services project. This has provided me with a more in-depth understanding of how the systems are used, and allowed me to follow how the members of the health care organisations have reasoned regarding the transfer of the services.

Document review

During the course of this research I have gained access to a multitude of documents, for example, local policy documents, care-guidelines and national care recommendations. Analysing these documents has contributed to my understanding of the organisational contexts the eHealth services that were transferred operate in. These documents have also facilitated my understanding on how the organisation of health services varies across Finland, Sweden, Norway and Scotland and how, for example, care guidelines are implemented in practice.

I have also had access to internal documents reporting on the use of CheckUp, teledialysis, remote speech therapy, EyeMo and remote wound therapy in their original context. Access to these documents has contributed to my understanding on how and why the services have been initiated, and what results they have created. This has been valuable background information; for example, I have received documents from Oulu university hospital’s ophthalmology unit, which give a detailed account on how screening processes are organised at the mobile eye unit in Finland and health economical reviews from the County Council of Västerbotten, which describe in detail how the implementation of remote speech therapy service has impacted patients’ travel re-imbursements. Access to these documents has aided me in understanding the complex nature of the problems health care organisations are faced with and how local conditions impact for example the sustainability of eHealth services. As the transfer of eHealth services discussed in this thesis has been carried out within the Competitive Health Services project new documents reporting on the progress of transferring eHealth services have been written and some of them have also been published (see next chapter for detailed overview) throughout the course of the project. The internal reports on how the implementation of the transferred eHealth services progress have given me insight to how local conditions impact the outcomes and facilitated my understanding on how organisations work with implementing eHealth services.

Yin (2009, p. 102-103) points out that it is important to keep in mind while reviewing documents that they do not necessarily give an objective picture of the research subject; the documents may be biased. In addition, it can be challenging to get access to, for example, internal reports. Document reviews can be treated as evidence supporting or contradicting, for example, statements
made during interviews. For this research, document reviews have been especially useful in understanding the problems health care organisations are trying to overcome by transferring eHealth services, and when topics discussed during meetings and interviews have needed clarification. In addition, document review has provided background information on the transferred services and insight on the local conditions impacting the outcomes of eHealth services. As this research has been carried out within the Competitive Health Services project, involving several health care organisations, internal reports on the transferred eHealth services and their implementation have been easily accessible. Document review has clarified questions that I have had and created new ones, which I have discussed with staff members involved in the transfer of eHealth services in Finland, Sweden, Scotland and Norway.

*eHealth implementation toolkit*

One of the research questions this thesis aims to answer is to find out if the eHealth implementation toolkit (eHIT) is a useful instrument for identifying potential problems in the context of transnational eHealth implementation. In order to answer the research question health care professionals have used the eHIT to assess their workplaces’ readiness to implement a specific eHealth service. The management of each implementing health care unit has conducted the selection of respondents, in order to ensure that the staff members who will be involved in using the eHealth service once it has been set up will also carry out the eHIT assessments. In all of the case studies, the respondents have conducted the eHIT assessments prior to the implementation of eHealth services. The decision to use eHIT to assess organisational readiness was taken jointly by the Competitive Health Services project teams in Sweden, Finland, Scotland and Norway. The eHIT was selected as it is based on research focusing on identifying barriers and facilitators of eHealth implementation. Furthermore, the eHIT can be used to assess the organisational readiness to implement different types of eHealth services. This was an important aspect, as the transferred eHealth services cover several medical fields.

A total of 12 eHIT assessments were completed by health care professionals in Sweden, Finland, Norway and Scotland. Five of the eHIT assessments were completed jointly by two or three respondents, the remaining seven were completed by individual respondents. The professional role of each respondent is described in the following chapters in conjunction to the eHIT results. The eHIT assessments generated numeric data, accompanied with free text comments. Health care management and staff members have utilized the results of the eHIT surveys throughout the implementation processes. The surveys have provided practical guidance for the health care organisation on how to avoid problems that may occur during implementation, for example, by highlighting the need to alter division of work among staff members or organisations.
In order to find out if the eHIT assessments identified relevant problems, the eHIT results have been systematically compared with the actual events that took place when CheckUp, EyeMo, remote speech therapy, teledialysis and remote wound therapy services were implemented. The detailed results of the eHIT surveys related to assessing the organisational readiness to implement eHealth services are presented in chapters 7-11.

Qualitative interviews

Patton (1990, p. 288) summarizes the strengths and the weaknesses of qualitative interviews as data collection method. Informal conversational interview has the benefit that the person carrying out the interview is able to adapt the questions according to the situation allowing a high degree of flexibility. In addition, the progress of the interview can be adjusted continuously based on the respondent’s responses. The weakness of the approach is that the informal character of the interview impacts greatly what data is gathered, making it difficult to compare results from different interviews. Using an interview guide facilitates a more systematic approach to collecting data although there is still a risk of unintentionally missing relevant topics.

Both approaches informal conversational interview and semi-structured interview were used to gain understanding on factors that impact the transfer of eHealth services across the Northern Periphery. The project teams in Sweden, Finland, Norway and Scotland developed a semi-structured interview guide that has been used to gather information on eHealth services that could be transferred among the organisations involved in the Competitive Health Services project. The project team in Sweden was responsible for leading the development of the checklist and the interview guide. A first version of the interview guide was drafted by the project team in Sweden and circulated among the project partners in the partnering countries. The guide was tested by using it to interview two health care professionals who use eHealth to provide clinical services. The final version of the interview guide (see appendix 1) was created based on the feedback from project partners and from testing the guide in practice.

All of the respondents received information about the Competitive Health Services project prior to the interview. The respondents also received information on the contents of the interview in order to give them a chance to familiarize themselves with the questions and to collect relevant information on the eHealth service. A joint decision among the project members on not to record or transcribe the interviews was taken. The length of the interviews varied between 60-120 minutes, and on some occasions the service under investigation was also demonstrated in practice. I conducted seven semi-structured interviews with staff members who have been involved in providing and/or initiating the eHealth services that were considered for transnational
implementation. The selection of respondents was based on the interest health care organisation involved in the project had expressed towards eHealth services. Thus, departments involved in providing specific eHealth services were contacted and staff members with in-depth knowledge on eHealth services were interviewed.

In addition to the interviews conducted with health care professionals in Sweden, three interviews were carried out in Finland, one in Norway and five in Scotland by the local project teams. The number of interviews conducted in each country correlates with how many potentially interesting eHealth services for transnational implementation were identified in each country. The same interview guide has been used during all interviews. Some questions were modified depending on the eHealth service in question. Additional questions were also asked based on the respondents’ previous responses. All of the interview results were disseminated among the project partners.

The goal of these interviews was to understand how eHealth services are provided and to understand how the local context impacts the service delivery. As the focus of the interviews has largely been on obtaining descriptions of how the eHealth service is provided and what the outcomes are the interviews have had a summarizing character. The respondents have not always been able to give detailed descriptions of, for example, technical components used to provide the service or estimate the costs the service creates. On some occasions the respondents have e-mailed additional data, that has been added to the notes taken during the interviews. The interview situations have also acted as a way of obtaining additional information on the eHealth service that has been the topic of the interview. In conjunction with the interview I have gained access to, for example, internal documents, statistics, evaluations and reports.

In addition to semi-structured interviews, I have conducted informal conversational interviews with staff members involved in transferring and implementing eHealth services. These interviews have taken place during international workshops organised by the Competitive Health Services project consortium. During these events I have had the opportunity to discuss the progress of the eHealth transfers with health care professionals and management involved in implementing CheckUp, EyeMo, remote speech therapy, teledialysis and remote wound therapy services. These discussions have contributed to my understanding of how local conditions in Finland, Sweden, Norway and Scotland impact the outcomes of transferring eHealth services.

Other sources of data

Other sources of data that I have utilized during the course of this research include taking part in videoconferences, meetings and e-mail discussions. Over 800 e-mails have been sent among project partners and health care
professionals involved in transferring eHealth services. These discussions have focused mainly on the overall progress of the Competitive Health Services project and on the progress of the individual eHealth transfers. In addition, the e-mails often contained requests for clarifications and documentation and discussed current and potential problems regarding the eHealth transfers. The same issues have often been the content of project meetings and other informal meetings that have regularly taken place during this research process. These additional data sources have been valuable for this research, as they have contributed to my understanding of how health care organisations collaborate across organisational and national boundaries when eHealth services are transferred. In addition, being able to take part in meetings and e-mail conversations regarding the transfer of eHealth services have given me insight to how organisations assess local health care needs and how eHealth can be utilized to match those needs.

5.4 The role of the researcher

Walsham (1995) defines the roles of researchers as outside observers and involved researchers. The author points out that the basic assumption of interpretive research does not allow either researcher type to gather objective data. On the contrary, the observations made by the researcher are always coloured by subjectivity.

Interpretive methods of research start from the position that our knowledge of reality, including the domain of human action, is a social construction by human actors and that this applies equally to researches. Thus there is no objective reality which can be discovered by researchers and replicated by others...

(Walsham, 1993, p. 5)

My role in the competitive health services project varied between the roles of an outside observer and involved researcher depending on the phases of the project. I have worked in the project as a project assistant throughout the course of the project. The project teams in each country have consisted of both health care professionals and researchers. The Northern Ostrobothnia Hospital District in Finland led the project. During the first year of the project the work focused mainly on mapping existing eHealth services in the Northern Periphery. The next step of the project was to match existing eHealth services with local health care needs. This work was carried out by local expert groups in Finland, Sweden, Norway and Scotland, consisting of health care professionals with insight in local health care needs. As the matching phase of the project started my role changed from involved researcher to an outside observer.
Once the local expert groups had identified eHealth services that could be implemented transnationally, the potential host organisations' readiness to implement specific eHealth services was assessed. The project teams in each country made a joint decision to use the eHealth implementation toolkit (see section 2.7 for more details) to assess organisational readiness, as the toolkit is research based and generic enough, to be used to assess different types of eHealth services. During this phase project partners in each country disseminated the eHIT to health care professionals likely to be involved in implementing the eHealth services that would be transferred. Once the health care organisations had made the final decision on which eHealth services would be implemented transnationally, plans for how the transfers would take place were drafted by the health care organisations and local project teams. During this stage my role in the project became more of an involved researcher. Once the transfer of eHealth services progressed, the project teams in each country monitored and reported on the progress of the implementations. As previously mentioned, I have observed the ophthalmology staff members in Sweden when they have tested the mobile eye unit. During the observations at EyeMo my role my role can be best described as involved researcher, although I could not to participate in medical processes. My role in relation to the implementation of the remaining four eHealth services; CheckUp, remote speech therapy, teledialysis and remote wound therapy service can be best described as an outside observer. Due to the nature of the work carried out in the project, the possibility I had to influence the outcomes of the project were limited, as I could not influence which eHealth services were transferred or what the implementation sites would be. These decisions were based solely on the needs of the health care organisations and their perception of how local health care problems could be overcome by transferring eHealth services.

Galliers (1992, p. 158) points out that different researchers may interpret data in different ways. How researchers interpret data can, for example, be influenced by researchers' background and past experiences, leading to different research results. Next, I will clarify for my background and its impact on the research process.

In the ten years prior to starting my PhD education I worked and trained in several health care organisations ranging from emergency care, rehabilitation of children and young adults to geriatrics, neonatal care and palliative care. I have had extensive patient contact in various scenarios. During that time I have experienced first hand the impact ICT has on the organisation, patients and the health care professionals ability to deliver health care services. In the best cases ICT has supported the carrying out of clinical work, increasing invaluably the quality of care I have given to patients. In the worst cases, ICT has taken the focus away from the patient and technological failures have led to an inability to access critical patient information when it was needed, with dire consequences for the patient. When working in health care I was struck by the damage that inappropriate ICT systems could do at the point of delivery; reducing the materials available to the professionals and risking the wellbeing
of the patients. During my professional career I have seen many ICT trials take place. Whereas some systems brought a welcome change to the organisation, others were avoided, as we could not see the system benefitting the staff members or the patients. Such systems became an additional laborious step, which took already stretched resources, instead of facilitating care processes.

During my years in health care I have also been struck by health care organisations' limited use of ICT. Throughout the years I have experienced countless situations where eHealth could have been used to solve a number of problems. Many unnecessary transports of terminally ill patients between health care organisations could have been avoided if, for example, remote consultations had been possible. Urgent problems with patients could have been solved immediately, on the spot, if the right ICT innovation had been available. Time critical treatments could have been initiated at an earlier stage, if we just would have had access to the right technology. These experiences have made me realize what a powerful tool ICT is and how easily care processes could be improved with eHealth.

My previous experiences of working in health care might have impacted the research presented in this thesis in different ways, and I have consciously dealt with this possibility throughout the research process. Rather than in retrospect trying to reflect on my own subjectivity and its impact on this research, I have tried to reflect on it continuously during the research process. For me it has been especially important to avoid pre-determining the value of the eHealth services discussed in the case studies based on my previous experience of similar services. Instead, I have tried to have an open mind when I have followed the implementation process. Furthermore, I have tried not to assume that I fully understand the care processes health care professionals carry out, just because I have been part of the process myself. In practice this has materialized as asking questions even when I thought that I already knew the answer, following demonstrations although I was already familiar with how equipment is used and double-checking meanings. This has at times led to the realisation that asking rather than assuming has been absolutely necessary, as even the most familiar care processes can take a different shape in another organisational context.

### 5.5 Data analysis

The empirical material has been analysed with an inductive and a deductive approach, starting with an inductive approach. Inductive approach can be described as a “…systematic procedure for analyzing qualitative data in which the analysis is likely to be guided by specific evaluation objectives” (Thomas, 2006, p. 238). In this thesis the analytical process has been guided by the research questions, which focus on identifying local conditions that impact the transfer of eHealth services and on understanding how these conditions impact the outcomes of eHealth transfer. In addition, finding out if the eHIT facilitates
identifying potential problems standing in the way of eHealth implementation has been examined.

The core of the inductive approach is looking at the data without any pre-defined expectations. In inductive analysis, the researcher starts the process of analysis by approaching the data with an open mind, getting to know the details, and reading the material repeatedly. During that stage, patterns start to emerge from the empirical material. These patterns are then marked in the material, collected and categorised. Once the initial categories have been established, the researcher continues to work with the categories. This work can include collapsing several categories into one; deleting material not related to the research question and re-labelling and refining the categories (Patton, 1987, p. 150-154).

The inductive analysis of the empirical material has been done with the research question at centre. I started the process of analysing data by going through the empirical material several times in order to become familiar with the data. While I familiarized myself with the data, I marked sections in the material that were meaningful in the sense that they had impacted the outcomes of eHealth transfer. I went through all of the empirical material related to CheckUp, EyeMo, remote speech therapy, teledialysis and remote wound therapy systematically, service by service, in order to identify themes related to the research questions.

The collection of empirical material and the analysis have been somewhat overlapping activities. The first patterns in the data started to emerge when the data collection was still on going. For example, the notion how infrastructure limits and facilitates the possibilities health care organisations have to utilize eHealth became evident at an early stage of eHealth transfer. I have tried not to lock myself too much into the themes that have started to emerge when data collection has still been on-going, to make sure that I stay open for other emerging themes. The formal process of analysis started in 2011, once data collection was completed.

Patton (1987, p. 15-16) notes that analysing qualitative material often leads to using both inductive and deductive approaches. When the process of analysis is beginning it may be easier to stay open to the material, and let the themes emerge. As the analysis process goes on, the analysis may become more deductively oriented, as the researcher becomes increasingly aware of the patterns that have already been identified. This may lead to the nature of the analysis becoming increasingly deductive, as the previously discovered patterns impact the way the researcher sees the remaining data. Thus, maintaining a purely inductive approach throughout the process of analysis the empirical data may become challenging.
These notions apply even to the research presented in this thesis. Whereas in the initial stage of this research the analysis was purely inductive, towards the end of the process my approach to analysis has been informed by the themes that had emerged at earlier stages. This has led to increased iteration, where I have gone over the empirical material several times. Once the first categorisation of the empirical material was completed, I cross-compared the identified local conditions that impacted the outcomes of the transfer of eHealth services, and examined if several commonalities could be found. The analysis has continued with refining and collapsing overlapping categories, which describe the identified local conditions that have impacted the outcomes of eHealth transfer.

According to Patton (1987, p. 152-153) there are two ways to label themes and patterns that emerge from empirical material. The first way is to label categories using the words that can be directly seen in the empirical material. The second way is to create new labels, referred to as “analyst-constructed typologies”. Creating a new category, or a label, is appropriate when the researcher aims to capture underlying meanings that are not explicitly expressed in the empirical material, or when several categories are collapsed into one. During the analysis of the empirical material I have used both ways of labelling patterns. Towards the end of refining the identified categories, analyst-constructed typologies have dominated the process. The following chart exemplifies how data units have been refined and categorised.

**Figure 5.1 Categorisation**

During the first stage of analysis the text unit “Some parents had refused to allow their children to participate due to negative prejudices on therapies by video conferencing” was identified and marked as meaningful. The text unit was then categorised as 1) prejudice towards the service and 2) patient enrolment. These two categories were later on collapsed into a single category “trust in remote speech therapy service” into which several meaningful text units were
addressed. Later on the category was re-labelled into “trust in eHealth services”, as similar patterns were detected in other cases. Even though the category is labelled as “trust in eHealth services”, it contains both trusting in, and not trusting in eHealth services, and the potential implications; decision to enrol or not to enrol to use the eHealth service, as both negative and positive examples were found in the empirical material.

Refining the identified categories has led to the identification of five local conditions that have impacted the outcomes of transferring eHealth services;

1) ICT infrastructure and facilities
2) Patient base and flexible use of technology
3) Organisational structure
4) Stakeholder collaboration and knowledge exchange
5) Trust in eHealth services

The contents of the preceding categories that lay the ground for the final five categories are presented throughout the case studies in chapters 7-11. The final categorisation, 5 local conditions that impact the outcomes of eHealth transfer, is discussed in chapter 12.

Health care professionals in Sweden, Finland, Norway and Scotland used the eHealth implementation toolkit to assess their workplaces' readiness to implement eHealth services. The results highlighted specific problems that could potentially hinder, or have a negative impact on the implementation of CheckUp, EyeMo, remote speech therapy, teledialysis and remote wound care. The potential problems regarding the implementations detected by the respondents during the eHIT assessments were compared with the actual events that took place when the services were transferred, in order to see whether or not the potential problems materialised and to find out how organisations dealt with the identified issues. Here, the data analysis has had more of a deductive character, as the analysis of the implementation processes has been informed by the eHIT results.

The eHIT results are presented in detail for each transferred service in chapters 7-11. In each chapter the central findings of comparing the eHIT results with the actual implementation process are presented in addition to the local conditions that have impacted the transfer of eHealth services across Finland, Norway, Scotland and Sweden. The next chapter describes in more detail the context - the Competitive Health Services project - in which the research discussed in this thesis has been carried out.

Galliers (1992, p. 151) points out that information system case study results are difficult to generalize, as it is challenging to obtain same results from number of cases. According to Patton (1990, p. 54) case studies can however provide rich information and insight that can facilitate learning from the cases.
As Walsham (1993, p. 5) points out, interpretive research can never be objective. Instead the decisions researchers make are coloured by subjectivity throughout the research process. These choices impact how data is collected, how empirical material is interpreted, and what the research results are. Yin (2009, p. 101-103) and Walsham (1995) highlight that no data collection technique is perfect; there is always a risk that relevant information is overlooked as each approach has its strengths and weaknesses. Using multiple sources of information supports the research process as several views on the research object can be obtained. In addition, researchers should also continuously reflect on their own potential research bias. It is possible that a different researcher would have interpreted the empirical material this research is based on differently, or seen different patterns emerge from the data, or made other choices regarding, for example, data collection techniques.

As previously discussed, I have tried to enter the research context with an open mind, rather than judging the relevance or the usefulness of the transferred eHealth services in beforehand. I have also used several data sources in order to get multiple views on the local context eHealth services are operated in. The research results presented in this thesis can be difficult to generalize, they do however, provide rich information to how local conditions impact the outcomes of eHealth transfer and how assessing organisational readiness can facilitate implementation of eHealth services.
Chapter 6: Transferring eHealth services

This chapter provides background information on how the five different eHealth services that have been transferred within the Competitive Health Service were selected, and describes the contexts in which the research presented in this thesis was carried out. Information included in chapter 4 and in chapters 6-11 is based on the reports listed below published by the Competitive Health Services project consortium. All of the reports referred to in this chapter are accessible via the project website\(^5\). Each country’s project team compiled the pilot reports (1-4) describing the implementation processes in the four countries. The project consortium compiled the remaining reports (5-7) jointly.

2. Larsen, F. (2011) Competitive health services in sparsely populated areas- eHealth applications across the urban-rural dimension.

The eHIT results described in chapter 7-11 have been published previously in report number 6, above.

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\(^5\) Project information and reports can be found at www.ehealthservices.eu
6.1 Mapping and assessing eHealth services in the Northern Periphery

During the first phase of the project, where eHealth services were mapped, project partners in Sweden, Finland, Norway and Scotland worked with the local health care organisations in order to gather information on eHealth services used in the region. Results of the mapping can be found in Winblad et al. (2009) and in Roberts et al. (2010b) where the results are summarised by medical speciality. In total 148 eHealth applications were identified: 52 in Finland, 19 in Scotland, 32 in Norway and 45 in Sweden.

In order to support the mapping phase of the project, the project consortium created an eHealth checklist. The eHealth checklist supported the data collection during the mapping phase. The checklist aims at summarizing information on eHealth services used in the Northern Periphery and facilitates the initial evaluation on the eHealth services’ transferability. Detailed information on the contents of the checklist can be found in (Roberts et al., 2010b). The information documented in the checklists is stored in an eHealth database accessible via www.ehealthservices.eu.

Once the eHealth services had been initially assessed by using the eHealth checklist, the results were disseminated and analysed by the local expert groups. The groups then proceeded to draft a shortlist of the most promising services for transfer. The shortlisted eHealth services’ suitability for international transfer was further examined by interviewing service providers and users. Further information on the content of the interview guide used to collect information on the eHealth services can be found in Pesola and Lindh Waterworth (2009c) and in Pesola and Lindh Waterworth (2009b). The complete interview guide can be found in appendix 1.

All information and evaluations gathered on the eHealth services were disseminated and available to project partners and local expert groups via the eHealth database. The local expert groups in each country had an opportunity to go through the services and ask for additional information when necessary. The interview results and interest expressed by partnering health care organisations narrowed down the potential services to be transferred.

6.2 Local health care needs

The local expert groups in Finland, Norway, Scotland and Sweden have, in addition to shortlisting services that could be transferred, identified gaps in local health care provision. The identified gaps have been matched with existing eHealth services, in order to find out if utilizing eHealth could bridge any of the gaps in local health care provision.
In order to provide health care organisations involved in the project with an opportunity to further discuss the possibilities to transnationally implement eHealth services, an international conference was organised in Inverness, Scotland, in February 2009. The conference provided health care organisations with the opportunity to exchange information on eHealth services face-to-face and demonstrate some of the services on the spot. The conference further narrowed down the eHealth services that could be transferred. Following is a summary of the local health care needs identified in each partner country, and a list of the services that were selected for transnational implementation.

**Finland**

In Finland the local expert group identified the need to implement eHealth services that support patient empowerment and self-management of illness. In addition, services that support de-centralisation of specialist health care services were deemed to be of interest. Four eHealth services were identified. The expert group agreed on transferring three out of four potential services, including remote speech therapy via video, CheckUp remote monitoring of physiological parameters and remote wound therapy service. A fourth service, that was excluded, was a PC unit used for capturing and transferring ECG, blood pressure and spirometer readings. The service was excluded due to lacking standardization of ECG bio-signals, which would make it difficult to implement it in the Northern Ostrobothnia Hospital District.

**Norway**

In Norway the local expert group recognized the need to support patients with chronic conditions and patients with multiple conditions as the main areas where eHealth could be utilized. The need to monitor patients who have been released from the hospital was also identified as well as the need to develop service models related to palliative care. The Norwegian expert group identified three eHealth solutions that could be suitable for transfer. The services include a palliative care service that provides home monitoring of pain and other symptoms, CheckUp Care, a platform that allows remote monitoring of physiological parameters, and EyeMo, a mobile unit for screening of diabetic retinopathy and glaucoma follow-ups. The Norwegian expert group decided later on not to pilot EyeMo due to logistical problems; transporting the mobile eye unit from Finland to Norway would have been too costly. The palliative care service was ruled out, as it was uncertain if the service concept could be integrated with the electronic patient record system. The expert group decided to focus on transferring CheckUp Care that matched the local priorities of supporting patients with chronic conditions and patients with more than one condition in need of active monitoring.
Scotland

In Scotland several clinical areas were designated as high priority areas. Coronary heart disease, cancer and mental health problems were considered to be priorities, in addition to stroke and diabetes care. Other services of equal importance that were identified in Scotland included renal and genito-urinary medicine, paediatrics, maternity services, community dentistry and pharmacy, as well as endoscopy services. The local expert group in Scotland identified three potential services for transfer within the high-priority areas. Two of the services target stroke patients. The first service utilizes videogames in stroke rehabilitation, while the second service focuses on providing speech therapy via video to patients with aphasia or dysarthria following a stroke. The third service considered for implementation focuses on providing dialysis for renal patients. The expert group also identified another area that could benefit from eHealth in addition to the high priority areas identified in Scotland. The fourth considered service was a video-based remote consultation service for patients with a leg/ulcer wound. Further analysis of the potential services led to the exclusion of video-game facilitated stroke rehabilitation due to costs related to the service. The leg/ulcer wound clinic was excluded due to software problems and difficulties in engaging the potential users. The Scottish health care organisations therefore chose to transfer the teledialysis service and the remote speech therapy via video service.

Sweden

The local expert group in Sweden identified the need to provide cognitive behavioural therapy, physiotherapy, general group therapy and treatment as main areas where eHealth services could be utilized to increase access to health care services. The second area identified by the expert group was access in the sparsely populated areas to nutritional advice provided by dieticians. The third area of interest was eHealth services that could be used to counteract social isolation of the elderly living in the sparsely populated areas of Västerbotten. The mapping of eHealth services in the Northern Periphery revealed that there were no transferrable eHealth services that focused on the identified areas of priority.

After some further investigation the local expert group identified a service that could be of interest to pilot in the County Council of Västerbotten. The eHealth service considered suitable for transfer was a mobile eye unit for screening of diabetic retinopathy and follow up of glaucoma (EyeMo) used in the Northern Ostrobothnia Hospital District in Finland. Even though ophthalmology was not initially considered to be an area of priority, the decision to pilot EyeMo was taken by the County Council of Västerbotten In total, five eHealth services were transferred within the Competitive Health Services project;
• CheckUp – system for remote monitoring of physiological parameters
• EyeMo – mobile eye unit for screening of diabetic retinopathy and glaucoma follow-ups
• Remote speech therapy via video
• Teledialysis
• Remote wound therapy

Three of the cases; teledialysis, remote wound therapy and remote speech therapy via video, focus mainly on knowledge transfer rather than the transfer of a product. In these cases an existing health care provision model was duplicated and implemented at a new health care organisation. The implementation processes were supported by the organisations that originally developed the services. In two cases, CheckUp and EyeMo, the transfer process was a material transfer rather than a knowledge-centred one. In the case of CheckUp the implementing health care organisations have purchased or rented the necessary equipment in order to provide the service and have mainly collaborated with the company providing the product. In the case of EyeMo the mobile eye trailer was borrowed from the Northern Ostrobothnia Hospital District in Finland by the County Council of Västerbotten, Sweden on two occasions. In this case the transfer included both a material transfer and a knowledge transfer.

6.3 Assessing the organisational readiness to implement eHealth services

Once the health care organisations involved in the project had identified potential eHealth services that could be implemented, the organisations’ readiness to implement the chosen eHealth services was assessed with the eHealth implementation toolkit (eHIT). The goal of the assessments was to predict potential problems standing in the way of successful implementation, and to use this information during the implementation processes. The eHIT has not been used in an international context prior to the Competitive Health Services project (Macfarlane et al., 2011).

The following case studies in chapters 7-11 show in detail, how the health organisations assessed their organisational readiness to implement eHealth services by using the eHIT, and how the eHIT results matched with the actual implementation processes. In addition, local conditions impacting the outcomes of eHealth transfer are identified and discussed.
Preface to case studies presented in chapters 7-11

This thesis focuses on assessing the value the eHIT can bring to health care organisations in anticipating potential barriers and facilitators that may influence eHealth implementation. The eHIT results presented in chapters 7-11 have been previously published within the Competitive Health Services project as a project report:


In the current presentation, each case study is concluded by contrasting the eHIT results with the actual implementation process, in order to assess whether or not the predictions made with the eHIT were accurate. In addition, the local conditions that have influenced the outcomes of transferring eHealth services across the Northern Periphery are examined and discussed.
CheckUp Care and CheckUp Life systems are used to measure patients’ physiological parameters. The CheckUp concept is provided by a Västerbotten based company, which provides the service to the region’s health care providers, and companies active in the field of wellness and training. CheckUp services have been transferred to the County of Troms, in Northern Norway and to the Technology Health Centre of Kaakkuri in Finland within the Competitive Health Services project.

Controlling the patients’ physiological parameters is one of the routine tasks carried out by health care professionals. Especially people with chronic conditions such as chronic respiratory diseases, stroke, diabetes or heart disease need to be closely monitored in order to detect changes in the their health status. The CheckUp service has been developed to support health care staff’s work and to make measuring physiological parameters more efficient. The CheckUp service enables increased measurement intervals, leading to more accurate data and improved care responses. It also enables remote access of measurement results and supports patients' self-care activities. It can also be used to support the patients’ early release from hospital, for example, within cardiology.

Figure 7.1 The CheckUp service consists of medical equipment packed in a suitcase or a back bag. The measurement results obtained with the equipment
in the bag are automatically transferred to a database. The database can be accessed via a web service by authorized personnel and in some cases by the patient or the customer.

Two versions of the CheckUp service are commercially available, CheckUp Care and CheckUp Life. CheckUp Care is used in healthcare organisations whereas CheckUp Life focuses on health promotion and is used, for example, at sports centres. The contents of the CheckUp Care system can be adjusted depending on the organisations' and patients' needs, it can include a variety of medical instruments to monitor, for example, electrocardiograph (ECG), oxygen saturation (SpO2), blood pressure, pulse, blood glucose levels, Haemoglobin (Hb), C-Reactive Protein (CRP), Forced Expiratory Volume (FEV), Peak Expiratory Flow (PEF) and International Normalized Ratio (INR) levels.

All of the equipment included in CheckUp is standard medical equipment used widely in health care. The instruments have been modified so that all measurement results are sent wirelessly to a web server over General Packet Radio Service (GPRS) and Bluetooth connections (Skönevik et al., 2008). Each patient receives a personal identification card that is inserted in the CheckUp bag, the system identifies the patient and the measurement results are registered in a database. Health care professionals have access to the measurement results in real time through a website and they can thus monitor the patients' condition remotely.

CheckUp Life is built in the same way as CheckUp Care, but its focus is on health promotion. Depending on the customer's needs different measurement equipment can be included in the bag, such as a blood pressure monitor, FEV and PEF equipment, blood glucose measurement equipment and scale with fat percentage and Body Mass Index (BMI) calculator. An exercise bike can also be integrated into the system. The measurement results are available for the customer in real time via a personalised webpage. If CheckUp Life is used, for example, at a gym, it is possible for the health coach or a personal trainer to access the customer's measurement results in real time and offer advice on how to work out in order to improve the level of fitness.

There is a variety of ways the CheckUp Care system can be used. In the County Council of Västerbotten the service has been used, for example, at a health centre. The patients receive training on how to measure physiological parameters using CheckUp Care. They can then use the system when necessary, at a dedicated self-care room located at the health centre. The staff members are able to access the measurement results when necessary via a website, and, for example, adjust the patient's medication based on the measurement results.

The CheckUp Care system can also be used by home care teams and at nursing homes as a way to decrease travel for the patients (Nilsson et al., 2009). Instead of patients traveling to the local health centre to have their physiological
parameters measured, home nursing teams can perform the measurements at the patients’ home by using the remote monitoring system.

Another target group that can benefit from using CheckUp Care are patients on anticoagulation medication. Patients receiving this medication need to be carefully monitored; depending on the patient’s condition, laboratory tests measuring the patient’s INR value are taken weekly, or every few weeks. Furthermore, the course of anticoagulation treatment can last for years. An alternative way of monitoring the INR value is to use CoaguCheck equipment, included in the CheckUp system. Instead of the patient traveling to a health centre for the laboratory test, the patient can have CoaguCheck equipment at home. The device enables measuring the clotting tendency of the blood from capillary blood taken from a finger prick, thus allowing the patients to take the measurements themselves. Health care staff can access the measurement results via an online service, and adjust the patient’s medication accordingly (Boman et al., 2012).

The results gained with CheckUp Care across the County Council of Västerbotten in various contexts, such as monitoring physiological parameters at nursing homes and using CoaguCheck at health centres, have motivated the Finnish and Norwegian partners of the Competitive Health Services project to pilot CheckUp. CheckUp Care has been piloted in the County of Troms in Northern Norway. CheckUp Care and CheckUp Life have been piloted at the Technology Health Centre of Kaakkuri in Northern Finland.

### 7.1 Transferring CheckUp Care and CheckUp Life to Finland

CheckUp Care and CheckUp Life were piloted in the Northern Ostrobothnia Hospital District and in the city of Oulu’s Technology Health Centre of Kaakkuri. The goal of the pilot was to encourage patients to take a more active role in their own care and to promote self-management of illness.

Patient empowerment and preventive health care have for long been a national priority stated by the Ministry of Social Affairs and Health in Finland. One of the main responsibilities the Ministry has, is to oversee health promotion work at a regional level. The Ministry has created a national development programme to promote health and wellbeing. The programme aims at reducing regional differences regarding the quality and access to health care services (Ministry of Social Affairs and Health Finland, 2012). At a regional level, the goals of the national development programme could be further facilitated by the implementation of CheckUp.

The CheckUp systems have been implemented at the Technology Health Centre of Kaakkuri, which is a health centre specialised on piloting ICT-based health services. The health care centre is governed by the City of Oulu. The centre has vast experience of developing and implementing ICT based care concepts that
give the patient an opportunity to become more actively involved in their own care.

Currently the City of Oulu offers an online portal called “Oulun omahoito” – “Oulu self care” for its population. The patients use the portal, for example, to contact health care providers and to schedule appointments, to access laboratory results, and to document measurement results taken by the patients themselves. Implementing CheckUp would be an addition to the self-care related services the city of Oulu provides.

7.2 eHIT results on CheckUp Life and CheckUp Care in Finland

Prior to implementing CheckUp Life and CheckUp Care at the technology health centre of Kaakkuri, the unit’s organisational readiness was evaluated with the eHealth Implementation Toolkit (eHIT). The management of the technology health centre of Kaakkuri considered the health care team in charge of clinical services to be most suitable team for assessing the normalisation potential of the CheckUp services. The clinical services team consists of a general practitioner, two public health nurses and a nurse; the team completed the eHIT jointly.

The eHIT scores and a summary of the free text comments reported by the clinical services team are presented next. First, the eHIT results on the context, the intervention and the workforce are presented, followed by a summary of the total scores of each section.

Table 7.1 eHIT number 1. Results on CheckUp- Context.

**National policy:** compatibility with current and planned national policy scored 9. According to the respondents the concept of CheckUp is supported by Finnish policies. The national policies aim at promoting self-care and care at home by utilizing health care technology thus decreasing demand for health
care services. Enabling the achievement of national priorities and targets scored 7, as CheckUp supports self-care.

**Local policy:** Compatibility with current and planned local policy scored 10 as the city of Oulu where CheckUp would be implemented promotes innovative health care focusing on home- and self-care.

**Local culture:** Welcoming e-Health and embracing change scored 10. According to the respondents the technology health centre of Kaakkuri and the city of Oulu have positive attitude towards implementation of new health care related technologies. Good working relationships scored 9 since the staff members are willing to deal with problems. Supported by a well-respected sponsor scored 4, as finding an adequate number of staff to work with CheckUp might be a problem. The city of Oulu has previously run “Oulu self-care” project focusing on self-management of illness. Financial resources for self-care related activities have been secured within the project, and it may possible to use some of the funds for implementing CheckUp. Initiating new self-care related innovations might be problematic without formal support from the Oulu self-care project. Supported by opinion leaders scored 9, according to the respondents the opinion leaders at the technology health centre of Kaakkuri support ICT based health care related innovations.

**Resources:** the statement well resourced scored 9. According to the respondents access to resources should not be a problem as long as the implementation is carefully planned. Minimal impact on resource allocation scored 8. The respondents do not anticipate any big changes in resource allocation, since current work flow matches with the intended workflow of CheckUp. The respondents point out that the content of work is affected by implementation of CheckUp.

**Risk:** compatibility with existing risk management policies is given the default score of 5. The respondents are unable to evaluate the risks related to CheckUp without more accurate information on reliability and usability aspects of CheckUp, and a detailed plan on how the work processes surrounding CheckUp would be structured.
**Impact on clinical practice:** Facilitation of health professional - patient interactions scored 8. According to the respondents the patients, including the elderly patients would be willing to use CheckUp. The respondents give security, confidentiality and reliability the default score of 5, as they are not able to evaluate confidentiality and reliability based on the information they have received on CheckUp, they do however point out that they do not foresee any problems related to security.

**Ease of use of the system:** scored 6. According to the respondents CheckUp is easy to use and the service concept matches the intended use. Not all potential ways of using CheckUp are included in the information the respondents have received on the service, making it difficult to assess the ease of use.

**Effectiveness and cost effectiveness:** the respondents give the statement effectiveness and cost effectiveness score 0, as they have not seen any scientific evidence that demonstrates CheckUp’s effectiveness and cost effectiveness.
Impact on work and workflow: *not increasing staff workloads* scored 2, as implementation of CheckUp at the technology health centre of Kaakkuri will increase staff workloads. *Increasing efficiency of work patterns* scored 6. According to the respondents it is possible that implementing CheckUp would decrease the number of patient visits at the health centre. The respondents give the statement *compatibility with divisions of labour* score 5, since no changes are anticipated. The respondents do however point out that some changes may take place, as the responsibility of measuring physiological parameters would shift from professionals to patients.

Education and training: scored 4. According to the respondents no extensive training on CheckUp in needed.

Relationships between different professional groups: *compatibility with existing power relationships* scored 10, as the respondents think that the service concept matches with existing power relationships. *Enhancing confidence between groups* scored 5, according to the respondents the staff members already have strong trust in each others professional competence, and it will not be affected by CheckUp. *Alignment of responsibility and accountability* scored 0 as implementation of CheckUp requires a multi-professional approach.

The following table presents a summary of the scored previously reported by the respondents, showing the overall score on the context, the intervention and the workforce.
Context: scored 80%. This section highlights the importance of gaining the support of the management of the "Oulu self care" project. Without the support from the project it will be impossible to obtain the financial resources needed to purchase and run the CheckUp service.

The intervention: has the overall score of 48%. As there is a lack of sufficient evidence on the effectiveness and cost-effectiveness of CheckUp Care, it is difficult to project the outcomes of implementing CheckUp. The overall score on the intervention is lowered further by statement on risk, which is given the default score of 5.

The workforce: Statements regarding impact on work and workflow, as well as relationships between different professional groups negatively influence the overall score of the workforce, 46%. The content of the work the health care team for clinical services does is likely to be affected by CheckUp. The team members anticipate increased workloads as well as shifting some tasks and responsibility from professionals to patients.

7.3 Implementation outcomes - Finland

CheckUp Life

CheckUp Life has been piloted at the technology health centre of Kaakkuri. A weight management group tested the service in order to find out if the service would be feasible to use in weight management context.

The weight management group participated in a 14-week program led by a specialist nurse. A total of seven people joined the group. Each participant attended the meetings 3 to 5 times. Several meetings were scheduled, but they had to be cancelled due to the H1N1 virus outbreak in Finland. The programme
consisted of group meetings where the participants discussed weight management and received guidance and feedback on their progress from a specialist nurse. The patients also registered their food intake as well as any exercise they took during the programme. In addition to group counselling, the participants’ BMI, weight, waistline, blood pressure, serum cholesterol and plasma glucose were measured after each group meeting by using the equipment included in CheckUp Life. Two group members received personal CheckUp Life systems to be used at home.

The participants found CheckUp Life to be easy and motivational to use. However, none of the participants achieved significant weight loss during the program. Four of the participants managed to lose between 0.4 to 1.8 kg, and three of the participants increased in weight from 0.3 to 0.9 kg during the 14-week programme. Further, no significant differences were detected regarding the participants’ BMI, fat percentage or waistline.

**CheckUp Care**

The CheckUp Care system has also been piloted at the technology health care centre of Kaakkuri. The aim of the pilot was to test if it would be feasible to use CheckUp Care to monitor cardiac patients.

The contents of CheckUp care were adjusted to match the needs of cardiac patients. The patients who used the service measured their blood pressure, blood glucose and cholesterol levels and took daily ECG’s. Health care professionals have been able to see the patients’ measurement results in real time via the web service included in the service concept.

Three cardiac patients participated in the pilot. All of the patients received training in how to correctly perform the measurements. All three patients used CheckUp Care at their home. Two of the patients experienced no technical problems with CheckUp Care. The third patient was not able to take measurements due to problems with the Bluetooth connection. According to the staff members CheckUp Care is suitable for diagnosing cardiac arrhythmia. One of three patients who were monitored remotely got a revised care plan and updated medication based on the measurement results obtained with CheckUp Care.

According to the health care staff members involved in the implementation, CheckUp Care needs further localisation to fully meet the needs of Finnish health care organisations. When the service was taken into use problem with the results obtained with the laboratory equipment was detected. Although the use of the laboratory equipment was free of problems, difficulties emerged when the staff members analysed the laboratory results. The analysis revealed that different measurement units are used in Finland and in Sweden. This made some of the laboratory results unusable in the Finnish context. In addition
problems were detected with the ECG equipment. The staff members had difficulties analysing the ECG results due to lack of grid lines in the ECGs. The localisation needs of the service were not addressed when the staff members conducted the eHIT on CheckUp services.

As the CheckUp Care service was implemented in an urban area, no substantial benefits regarding access to care were achieved. The staff members feel that the service would be suitable, and more beneficial in rural settings. As the technology health centre of Kaakkuri is able to provide extensive laboratory services, the implementation has not affected the patient base’s access to laboratory services. According to the professionals involved in the implementation, laboratory equipment included in CheckUp Care services should preferably be placed, for example, at a remote health centre that is not able to deliver laboratory services. It would also be suitable to use for remote monitoring of cardiac patients without nearby access to health care services.

Contrasting the eHIT results with the process of implementing CheckUp services, shows that several of the issues detected with the toolkit did materialise. The eHIT results showed that support from local sponsor was required in order to free staff members to work with the implementation. Local sponsors decided to support the implementation, and the necessary resources for acquiring equipment were obtained, staff members were allocated to work with the implementation and training for staff and patients was organised.

The eHIT results showed low scores on the service’s effectiveness and cost-effectiveness. As the service was implemented in a small scale, and in an urban area, the potential cost-effectiveness of the service could not be demonstrated at the health centre. As anticipated the workload did initially increase for the staff members as they had to learn to use the system, and teach the patients to use the service. As the patients conducted measurements themselves, some of the work usually carried out by professionals was shifted to the patients. The health care team of clinical services who completed the eHIT did not foresee any problems related to enrolling patients to use the service. This did however become a problem regarding recruiting cardiac patients to use CheckUp Care.

Overall, the eHIT results obtained from Kaakkuri technology health centre matched fairly well with the actual implementation. However, a critical issue not discussed within the eHIT was the need to localise the equipment to meet the Finnish standards. Overlooking this issue has limited the use of the equipment and the potential benefits the system could create.

Local conditions impacting the outcomes of transferring CheckUp

Looking at the process of implementing the CheckUp services at the technology health centre of Kaakkuri three local conditions impacting the outcomes of transferring the service can be identified; 1) trust, training and usability
testing, 2) ICT infrastructure and physical space, 3) host organisation’s goals and policies.

1) Trust, training and usability testing

Prior to implementing the CheckUp systems at Kaakkuri technology health centre, the centre’s health care product-testing unit conducted extensive usability tests on the medical equipment and the communication platform included in the CheckUp service. During the usability testing both patients and health care professionals tested the service. The CheckUp usability testing report states that:

“Generally, the users had very positive image of the bag and web-pages. They did not find any particularly difficult or challenging characteristics that might impede operating the device.”

The feedback and experiences gained from patients and professionals was utilized when the CheckUp services were implemented and training was organised. The usability test results demonstrated that patients are able to use the service and that training patients would not be a problem. In addition, the usability testing ensured that the system works correctly. Despite these positive results, enrolling cardiac patients to use the CheckUp Care turned out to be challenging. Only three cardiology patients were willing to use the service. Recruitment process was easier regarding the CheckUp Life system, as a weight loss group organised by the health care centre started using the system. However, difficulties in recruiting cardiac patients have consequently limited the number of users.

2) ICT infrastructure and physical space

The ICT infrastructure at the technology health centre of Kaakkuri is good; in addition, the centre’s product-testing unit has been able to deal with technological issues that have occurred during the implementation without a delay, in-house. The CheckUp service has been an addition to an existing service “Oulu self care”. As a result of the Oulu self care program, the organisation has allocated facilities for the patients, which they can use to, for example, measure physiological parameters. These facilities were utilized when the CheckUp service was implemented, thus ensuring that patients have easy access to the equipment. Furthermore, allocating facilities for the patients demonstrated in practice that the organisation prioritises and supports self-management of illness.

3) Host organisation’s goals and policies

The CheckUp services have been implemented at the technology health centre of Kaakkuri. The organisation specialises in testing technological innovations in
real health care situations; consequently, the staff members have high ICT competence and are experienced in utilizing technology in clinical work. The health care professionals working at the centre are also part of product-testing teams. Therefore piloting new eHealth services is well supported by the organisation’s structure and its’ goals as testing protocols and IT support is readily available for the staff members. As testing new ICT innovations is one of the core functions of the centre, the staff members are used to dealing with new service concepts.

As the technology health centre of Kaakkuri prioritises self-management of illness, existing services that focus on self-care activities were in place even before CheckUp was implemented. Thus, CheckUp has been an addition to existing service provision models, and the implementation has been supported by the organisation’s priorities and policies.

7.4 Transferring CheckUp Care to Norway

The CheckUp Care service has also been implemented in Norway, on the island of Senja, in the county of Troms. The island is divided into four administrative regions; Berg, Torsken, Tranøy, and Lenvik. With the exception of Lenvik, the municipalities have struggled with recruiting general practitioners to work on the island. Due to the recruitment problem, the four municipalities of Senja have decided to re-structure the provision of health services on the island. All general practitioners working on the island are now stationed in Lenvik, travelling to the rest of the municipalities three times a week to meet patients.

The CheckUp Care service has been transferred to the island of Senja as an attempt to support the general practitioners work in the remote municipalities. Ideally, the CheckUp service would be available in municipalities without a stationary general practitioner. Health care professionals working in these municipalities, for example, in nursing homes, would measure patients' physiological parameters with CheckUp. The general practitioners working at the Lenvik office could then access the measurement results in real-time, and revise the patients’ treatment accordingly. Alternatively, the general practitioners could take the CheckUp equipment with them, when they conduct their weekly visits to the outlying communities. In addition to supporting general practitioners’ work, the CheckUp Care service could have a positive impact on patients’ access to health care services, and decrease their need to travel.

7.5 eHIT results on CheckUp Care in Norway

Prior to transferring CheckUp Care to the county of Troms, on the island of Senja, the organisational readiness to implement the service was evaluated with the eHealth implementation toolkit (eHIT). A nurse with insight in the re-structuring of health services on the island of Senja completed the eHIT
assessment. Following are the eHIT scores and summaries of the free text comments reported by the respondent. The eHIT results on the context, the intervention and the workforce are presented first, followed by a summary of the total scores reported in each section.

| National policy: compatibility with current and planned national policy scored 7. According to the respondent CheckUp Care is aligned with Norway’s national policies, which focus on decentralization of health care services by utilizing ICT. Enabling the achievement of national priorities or targets scored 7, indicating that implementation of CheckUp Care would support national priorities and targets which highlight the importance of making sure that health care professionals have access to necessary patient data despite their location. |
| Local policy: Compatibility with current and planned and local policy scored 7, as the CheckUp Care concept supports the planned co-operation between primary health care providers in Troms County. |
| Local culture: Welcoming e-health and embracing change, and good working relationships both scored6. According to the respondent the working relationships have so far been good among personnel. The respondent points out that it does not automatically mean that the relationships among personnel will continue to be good As the provision of health services on the island of Senja is under re-structuration, primary health care providers will have to increase their collaboration. It is possible that this will result in conflicts among the staff members, as the organisations have different work cultures and routines. The respondent states that not all of the staff members are positive towards eHealth, nor are they willing to adopt eHealth innovations or electronic co-operation, due to the possibility of increased vulnerability and the possibility of health care personnel focusing on ICT instead of the patients. The statements on supported by a well-respected local sponsor and supported by opinion leaders scored5 respectively 7. The respondent states that there are opinion leaders that support CheckUp Care, but there are also opinion leaders |

Table 7.5 eHIT number2. Results on CheckUp Care- Context.
that are doubtful about connecting the service into the Norwegian Health Net. Furthermore, staff members have expressed concerns regarding the financial investments implementing CheckUp requires.

**Resources:** the statements well-resourced and minimal impact on resource allocation scored 7 respectively 5. According to the respondent the financial situation of the county of Troms is not optimal. Even if the county would have the necessary resources, the implementation of CheckUp has to be financed by the Competitive Health Services project.

**Risk:** Compatibility with existing risk management policies scored 7. According to the respondent CheckUp Care is compatible with the local risk management policy as long as patient data is transferred in the secure Norwegian Health Net. The respondent points out when assessing risks related to CheckUp Care, it is important to consider the nature of the data transferred between organizations, for example, if the health care personnel must have real-time access to the data, a back up system is required.

![Table 7.6 eHIT number 2. Results on CheckUp Care - The intervention.](image)

**Impact on clinical practice:** facilitation of health professional – patient interactions scored 8. According to the respondent CheckUp Care facilitates interaction in health care provision. Security, confidentiality and reliability scored 8. No issues related to the use of CheckUp Care are anticipated as long as the service is run in the secure Norwegian Health Net. The respondent does however raise the question of data access and which parties have the right to access the measurement results obtained with CheckUp. In addition, security, confidentiality and reliability of the system should not just be considered regarding the service's technical characteristics, but also in relation to how the service provision is organized.

**Ease of use of the system:** the respondent scored 9 on the ease of use of the system. According to the respondent health care personnel are used to measuring physiological parameters, but might not be familiar with the specific
equipment included in CheckUp. The staff should not experience problems using CheckUp, if adequate training is provided.

**Effectiveness and cost-effectiveness**: scored 5. According to the respondent there is a lack of evidence regarding the effectiveness and cost-effectiveness of CheckUp. It is however possible that CheckUp Care has a positive effect on patients’ travel reimbursements. It might also support the effectiveness of health care staff by decreasing the time spent on measuring physiological parameters thus allowing more time to be spent on direct patient care.

![Table 7.7 eHIT number 2. Results on CheckUp Care - The workforce.](image)

**Impact on work and workflow**: not increasing staff workloads scored 3. According to the respondent it is likely that the staffs’ workload will initially increase if CheckUp Care is implemented. Increasing efficiency of work patterns scored 8, indicating that the service might make work patterns more efficient. Compatibility with divisions of labour scored 8, indicating that CheckUp Care is compatible with current labour division.

**Education and training**: scored 2 indicating that staff members would need extensive training in order to be able to use CheckUp.

**Relationships between different professional groups**: compatibility with existing power relationships scored 10, indicating no problems regarding power relationships. Enhancing confidence between groups receives the default scored of 5. According to the respondent CheckUp Care will not have an impact on confidence between groups, since patients’ physiological parameters will be measured whether or not the service is taken into use. Alignment of
responsibility and accountability scored 5. According to the respondent responsibility and accountability will not be affected by the service, as long as health care professionals are in charge of measuring the patients’ physiological parameters. However, if the patients are in charge of taking the measurements by using CheckUp Care, the aspects of accountability and responsibility are influenced. If the patients take the measurements themselves, it is the health care organizations’ responsibility to make sure that the patients are familiar with the equipment and know how to use it correctly.

Following is a summary of the scores previously reported by the respondent. The table shows the overall score on the context, the intervention and the workforce.

Table 7.8 eHIT number 2. Results on CheckUp Care- Summary of topic scores.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Score (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context</td>
<td>64%</td>
</tr>
<tr>
<td>The intervention</td>
<td>75%</td>
</tr>
<tr>
<td>The workforce</td>
<td>59%</td>
</tr>
</tbody>
</table>

**Context:** Statements on local culture have negatively influenced the overall score of 64% on context. The health care staff members’ attitudes towards change and eHealth are divided. While some staff members are willing to try new e-health innovations, others are not. Some of the opinion leaders in the organization have negative attitude towards implementing CheckUp Care, whereas others are more positive towards the implementation. Re-structuring the provision of primary care in the county of Troms might have a negative impact on piloting CheckUp Care, as some staff members feel that resources should not be invested in piloting the service. Further, the planned co-operation between the four municipalities on the island enja might not be problem-free, as different work cultures and routines are likely to collide. The CheckUp Care pilot might not be supported by the health care staff members due to negative attitude towards electronic co-operation among the four municipalities of the island of Senja.

**Intervention:** obtained the overall score of 75%. The score was negatively influenced, as there evidence on the effectiveness and the cost-effectiveness of
CheckUp Care are lacking, making it more difficult to justify the pilot from health-economical point of view.

**The workforce:** scored 59%. In order to ensure smooth implementation of CheckUp Care, necessary resources should be made available for training, to ensure that the staff members know how to use the system. Staff workload is also likely to increase during the implementation phase, and should be taken into consideration when resources are divided.

### 7.6 Implementation outcomes - Norway

The CheckUp Care system has been implemented at Sifjord nursing home in the municipality of Torsken. The professionals working at Sifjord nursing home used CheckUp Care to measure the nursing home residents’ physiological parameters. In addition, home care staff members used the system during home visits. Staff members involved in the patients care, including a general practitioner located at Lenvik have utilized the measurement results.

The implementation of CheckUp Care in Norway has been challenging due to technical problems, which has made using the service difficult for the staff members, as it has not been possible to make the measurement available via the online service within a reasonable time. Problems with the data transmission have made the CheckUp service unreliable, and the staff members have not been able to trust that the measurement results will really be automatically transferred. Consequently, the staff members became reluctant to use on the service. Rather than relying on the online service, the staff members decided to register the measurement results manually, thus avoiding problems related to data transfer.

Problems with automatic transfer of measurement results to the online service have complicated the collaboration between the general practitioner and the staff at the nursing home. As the professionals involved in patients’ care have not been able to trust that the results become automatically available for all parties that need to have access to them, the goal of supporting general practitioners work by utilizing CheckUp has not been fulfilled.

The staff members at Sifjord nursing home tried to adapt the use of CheckUp Care to better match the needs of the municipalities and to support the work of the general practitioner at Lenvik. An initiative was taken by the Sifjord nursing home staff to perform INR measurements during summer holidays when Sifjord was not serviced by the general practitioner from Lenvik. The measurement results would be sent via secure e-mail to the general practitioner in Lenvik. This initiative did not happen; instead, the INR testing was conducted at the general practitioners office at Lenvik.
In addition to problems with data transfer, the lack of integration between CheckUp and the electronic patient record system became a problem. The general practitioner responsible for assessing the measurement results wanted the data to be accessible via the electronic patient record system, and was not willing to receive the data via any other channel. As utilization of CheckUp Care depends on co-operation between nursing staff members and the general practitioner, running the CheckUp Care service became impossible, and the service was terminated.

The results of the pilot are divided. One of the goals of implementing CheckUp Care was to support the electronic exchange of data between the four municipalities of the island of Senja. Due to lack of local support and problems with data exchange this goal has not been accomplished. Despite these problems, the nursing home patients have benefitted from the implementation. 15 measurement sessions at Sifjord have been documented, in 13 cases the patient did not have to travel over 80 km in return to get the laboratory tests done.

Though the CheckUp Care pilot in Norway was discontinued prematurely due to technical problems and the lack of co-operation between stakeholders, one of the components included in the service has managed to become a permanent part of health services provided at the island of Senja. INR monitoring equipment included in the CheckUp Care system has been purchased and stationed at the nursing home, enabling remote monitoring of patients receiving anticoagulation treatment.

The eHIT results showed that the local culture could be a problem during the implementation. Potential issues were detected regarding cross-organisational collaboration and work processes. In addition, the respondent assessed that some opinion leaders might be negative towards eHealth and electronic collaboration. These issues became apparent during the implementation and were at least a partial reason for terminating the service.

The eHIT results also highlighted the importance of transferring patient data in the Norwegian Healthnet. During the implementation it became evident that measurement results would have to be stored on a server located in Sweden. This problem was later on solved, as the data stored in Sweden consisted only of RFID code and numeric measurement data. The measurement data could only be connected to a specific patient inside the Norwegian Health Net.

As predicted in the eHIT the implementation of CheckUp did create training needs and increased workload as staff members had to adjust to a new way of working. Although training was provided, it did not encourage the use of the service, as the training sessions only highlighted the problems with accessing the measurement results. Whether or not the implementation would have led to permanently increased workload and if it would have had a positive impact
on the cost-effectiveness and effectiveness of the organisation cannot be determined as the service was terminated after three months.

The eHIT results showed that there were no resources available for purchasing the equipment, the organisation was able to solve the problem by renting the equipment for a limited period of time. Issues related to shift in alignment of responsibility and outcome of the intervention did not materialise, as patients did not conduct measuring of physiological parameters.

Overall the eHIT results on implementing CheckUp in the Norwegian context identified several problems related to the organisational culture as well as problems related to cross-organisational collaboration. These predictions did materialise during the implementation. The implementing organisation was however not able to change the situation for the better prior to initiating the implementation.

Local conditions impacting the outcomes of transferring CheckUp

Looking at the CheckUp Care implementation process, several local conditions impacting the outcomes of the transfer can be identified; 1) training and the reliability of the service 2) collaboration, 3) responsibility for the service.

1) Training and the reliability of the service

In order to demonstrate for the staff members how the service works, and to motivate them to use the service, several training sessions were organised by a training team consisting of a data engineer, project manager and a biomedical engineer. The Norwegian pilot report states that:

“The training sessions was organized as hands-on training where the health care professionals tested the equipment under guidance of the biomedical engineer. The tests revealed that they were not able to access the data via the patient administrative system.”

As the training team was repeatedly unable to get the system to work properly during training sessions, the events only highlighted the problems with system, making staff members hesitant to use the it in clinical context, further decreasing their trust in the service.

2) Collaboration

The utilisation of the CheckUp service required collaboration between the nursing home staff and the general practitioner’s office. According to the implementation report this collaboration was problematic:
“The nurses at Sifjord nursing home accepted to use the eHealth services, while the GP, who were to receive the clinical parameters, was not committed to use the services.”

The report states further that:

“The clinical parameters were to be transferred to one GP, a GP who was negative, and then the project was stillborn.”

As the service provision relies on the collaboration of several professional groups, it could not be successfully provided, as one of the parties was not committed to using the service.

3) Responsibility for the service

The implementation of CheckUp took place at a time, when the municipalities of Senja involved were undergoing a re-structuring of health services. The ongoing changes made it difficult for the nursing home staff and the general practitioner’s office to determine which organisation was responsible for the service; the Norwegian report on implementing CheckUp states the following:

“But still it was not clarified who was to have the responsibility for the system: The municipality of Lenvik, the organization for reorganization of the GP services, the GP office in Lenvik or the municipality of Torsken where “the Bag” was to be located. “

The re-structuring of health services on the island of Senja took place during the implementation. The changes in the organisational structure made it unclear how work would be divided in the future and how collaboration between different health care providers would be organised. The implication was that the CheckUp service concept could not be anchored in the organisational structure.
The Northern Ostrobothnia Hospital District in Finland (NOHD) has developed the mobile eye unit (EyeMo) for screening of diabetic retinopathy. The service has been piloted in the County Council of Västerbotten (CCV), Sweden, within the Competitive Health Services project.

The mobile eye unit (EyeMo) is a mobile, fully equipped trailer that functions as a mobile clinic. Ophthalmology nurses and an imaging technician meet patients at the mobile unit and screen them for diabetic retinopathy. EyeMo has been operated as a part of standard ophthalmology services provided by the ophthalmology unit at Oulu University Hospital since 2006. The Northern Ostrobothnia Hospital District conducts approximately 5030 screenings of diabetic retinopathy annually, of which 2700 are conducted at EyeMo (Aikkila, 2009, p. 47).

Instead of travelling to the ophthalmology unit located at Oulu University Hospital, the patients can take part in the screenings locally by visiting the mobile eye clinic that circulates through the sparsely populated areas of Northern Finland. The NOHD consists of 34 municipalities, of which EyeMo covers 30. The remaining four municipalities purchase the screening services from private ophthalmologists or have acquired their own screening equipment.

The ophthalmology unit at Oulu University Hospital is in regular contact with the municipalities located in the NOHD. Each municipality has a health center with nurses specialised in diabetes care. The specialist nurses provide lists of patients currently in need of diabetic retinopathy screenings to the staff working at EyeMo. The lists are used to schedule the individual appointments at EyeMo. The mobile clinic stays in the same location from a few days up to a week and all listed patients living in the area are called to the screening.

Once patients arrive at EyeMo, they are pre-medicated\(^6\) and interviewed by an ophthalmology nurse. The imaging technician photographs the patient’s eyes and stores the images of the optic disc and the macula in a database. The ophthalmology nurses at EyeMo examine the images and the results of the screening are sent to the local health center’s diabetes nurse, who will inform the patients of the results. If the images reveal abnormalities staff members at EyeMo forward the pictures to the ophthalmology unit at Oulu University Hospital where an ophthalmologist examines them. If necessary, the patient is called for further examination or treatment to Oulu University Hospital.

\(^6\) Pre-medication: the patient usually needs eye drops to make the pupils large enough to photograph. The ophthalmology nurses working at EyeMo give the patients the eye drops on arrival.
Figure 8.1 The mobile eye unit "EyeMo" measures 2,5m*10,5m. The staff members working at the mobile unit have remote access to the electronic patient record system where patient data is stored, as well as access to image server to store the retinal images taken at EyeMo. Photo by Sylvi Savolainen.

Figure 8.2 EyeMo has a waiting room for patients, and two examination rooms where patients can be treated. Photo by Sylvi Savolainen.
The Northern Ostrobothnia Hospital District decided to develop EyeMo as a response to a growing need to perform high-quality diabetic screenings and glaucoma follow-ups. Using EyeMo, it is possible to have a high volume of screenings locally, close to the patients, ensuring an equal access to specialist services despite the patients’ geographical location. The municipalities that are covered by EyeMo have also gained financial benefits, due to decreased screening costs. Overall, the care processes have become more efficient and straightforward, as the Oulu University Hospital’s ophthalmology unit is responsible for the whole care process (Hautala et al., 2009). The overall patient flow has improved in the 30 municipalities that are serviced by EyeMo. The response time for screenings has improved, as well as the response time for treatment of diabetic retinopathy (Aikkila, 2009, p. 55-56). In addition, patients are satisfied with the services provided at EyeMo, 96% of the patients wish to have their next screening at the mobile eye unit. EyeMo has reduced the travel time for the patients from 8 hours to 2.5 hours, including the screening time.

8.1 Transferring EyeMo to Sweden

The County Council of Västerbotten has three ophthalmology units, located in the cities of Umeå, Skellefteå and Lycksele. The ophthalmology units’ management considered Lycksele hospital to be most suitable to pilot EyeMo due to remote, but geographically central location within the county. Lycksele ophthalmology unit covers a vast geographical area and its’ staff is experienced in travelling to remote health centres with portable equipment to perform diabetic retinopathy screenings. The equipment is difficult to move due to its large and heavy size; in addition, it is very fragile. The equipment is sent from Lycksele hospital to the screening location by bus. The screenings take place at health centres located in the inland of Västerbotten, under the perquisite that there are suitable facilities available for the screenings. In addition to finding suitable screening facilities the ophthalmology staff members must make sure that someone at the screening location will collect the equipment from the local bus station when it arrives, and sends the equipment back to Lycksele once the screenings have been concluded. According to the ophthalmology staff members there has been occasions when the equipment has not arrived on time, it has not been collected or it has been sent to wrong health centre. Furthermore, the risk of the equipment being damaged during transport is high.

The National Board of Health and Welfare’s guidelines for diabetes care in Sweden recommend screening of diabetic retinopathy to take place every 2 to 3 years depending on the patients’ condition and diagnosis (Socialstyrelsen, 2010). In addition to screening guidelines there are also guidelines regarding referral times. The national health care guarantee stipulates that all patients requesting first appointment at specialist clinics must be cared for within 90 days from the first point of contact (Landgren, 2012). Ensuring regular and timely access to diabetic retinopathy screenings is of high priority, as up to
80% of people who have suffered from diabetes for at least ten years will develop diabetic retinopathy (Joy and Rajasekhar, 2011).

Lycksele hospital’s ophthalmology unit has experienced problems coping with the number of referrals they receive. In order to fulfil the national care guarantee patients with diabetes referred to the unit must be screened within three months. The unit has not been able to provide screenings within this period. In addition to long waiting times, the patients in need of diabetic retinopathy screening, living in the remote rural areas of Västerbotten struggle to have equal access to specialist ophthalmology care as the patients living in urban areas. Long geographical distances to screening locations can be an insurmountable obstacle for some of the patients living in the remote areas of Västerbotten. Especially the elderly patients can find traveling long distances to participate in the screenings to be physically too demanding, leading to missed appointments. The clinical need for increasing ophthalmology screening volumes in the County Council of Västerbotten is high. Due to increased number of people who have been diagnosed with Diabetes Mellitus, the need for screening diabetic retinopathy continues to increase.

The Lycksele ophthalmology unit expressed interest in hosting a pilot where the EyeMo would be tested in order to find out the service could be a potential solution to problems related to referral times and unequal access to specialist services.

8.2 eHIT results on EyeMo

In order to assess the ophthalmology unit’s organisational readiness to pilot EyeMo, two eHIT evaluations were carried out. The eHealth implementation toolkits were used by an ophthalmologist and by an ophthalmology nurse who would be involved in piloting EyeMo. Following are the eHIT results reported by the ophthalmologist. First, the scores and the free text comments on the context, the intervention and the workforce are presented, followed by a summary of the total scores reported on the three sections.
Table 8.1 eHIT number 3. Results on EyeMo- Context.

**National policy:** *Compatibility with current and planned national policy* scored 7. According to the respondent EyeMo supports patients’ equal access to health care services despite their geographical location, which is of national priority. *Enabling the achievement of national priorities or targets* scored 7, indicating that EyeMo service can have a positive impact regarding achievement of national priorities and targets related to ophthalmology.

**Local Policy:** *compatibility with current and planned local policy* scored 8. According to the respondent the ophthalmology unit aims at increasing screening volumes in order to comply with the 90-day guideline on patient referrals.

**Local culture:** according to the respondent organisational culture is generally positive towards eHealth and supports piloting EyeMo, therefore the statement *welcoming e-health and embracing change* scored 9. Furthermore, the staff members are used to adapting to change. *Good working relationships* scored 9, indicating no major problems regarding working relationships if EyeMo is implemented. The respondent could not answer the statement *Supported by a well-respected local sponsor*, leaving the score on the statement at default 5. *Supported by opinion leaders* scored 8, indicating that local opinion leaders are supportive of EyeMo.

**Resources:** the respondent replies with 1 to the statement *well resourced*, as the ophthalmology unit does not have the necessary resources to finance the pilot, or to purchase and equip a similar mobile eye unit that could be used in the County Council of Västerbotten after the pilot period. *Minimal impact on resource allocation* scored 7. According to the respondent no major impact on resource allocation is expected if EyeMo is implemented.

**Risk:** the respondent could not answer the statement of *compatibility with existing risk management policies* leaving the score to default 5.
Impact on clinical practice: facilitation of health professional-patient interactions scored 8, indicating that EyeMo would support the relationships between patients and professionals. Security, confidentiality and reliability scored 10. The respondent does not anticipate any problems related to security, confidentiality and reliability if EyeMo is implemented. The respondent does however raise the question of EyeMo’s imaging equipment’s compatibility with the electronic patient record system used at the ophthalmology unit in the County Council of Västerbotten.

Ease of use of the system: scored 9 out of 10. The service should be easy to provide, if the staff members working at the ophthalmology unit are able to use the same imaging equipment at EyeMo as the do at the ophthalmology unit.

Effectiveness and cost-effectiveness: scored 10 out of 10. According to the respondent there is adequate amount of proof on EyeMo’s effectiveness and cost-effectiveness.
Impact on work and workflow: Not increasing staff workloads scored 8, the respondent states that it is unlikely that piloting EyeMo would increase staff workloads. Increasing efficiency of work patterns scored 8, as EyeMo is likely to increase the efficiency of current work patterns. Compatibility with current divisions of labour scored 8, indicating that the labour division at EyeMo is aligned with current situation.

Education and training: scored 8 out of 10, only a minimal amount of training is estimated to be necessary.

Relationships between different professional groups: compatibility with existing power relationships scored 10 out of 10, the ophthalmology unit is small, and characterised by informal communication. According to the respondent the staff has high confidence in each other’s expertise, leading to score 8 on enhancing confidence between groups. The final statement on alignment of responsibility and accountability scored 7 out of 10, indicating no major issues related to the topic.

Following is a summary of the scores previously reported by the respondent, showing the overall score on the context, the intervention and the workforce.
Context: the overall score is 66%. The main issue standing in the way of piloting EyeMo is the lack of resources, as Lycksele ophthalmology unit cannot participate in the funding of the pilot. Further, the unit does not have funds to build and equip a Swedish version of the mobile eye unit once EyeMo is returned to Finland. The respondent could not answer the statements on supported by a well-respected sponsor and compatibility with existing risk management policies.

The intervention: scores high overall, leading to total score of 93%. The only issue identified in this section is related to the imaging equipment used in EyeMo, and whether or not it is compatible with the electronic patient record system used in the County Council of Västerbotten.

The workforce: scored 81%. No potential problems were detected at this stage.

The second respondent who assessed the Lycksele ophthalmology unit’s organisational readiness to pilot EyeMo, is an ophthalmology nurse who is likely to be working at the mobile unit during the pilot, should the organisation decide to proceed with it. Following are the eHIT results reported by the ophthalmology nurse.
Table 8.5 eHIT number 4. Results on EyeMo- context.

**National policy:** compatibility with current and planned national policy scored 8, indicating that the EyeMo service would be compatible with the national policies in Sweden. *Enabling the achievement of national priorities or targets* scored 8, indicating that EyeMo would have a positive impact on reaching the national targets and priorities in ophthalmology.

**Local policy:** compatibility with current and planned local policy scored 8, indicating that EyeMo is compatible with local policies.

**Local culture:** *welcoming e-health and change* scored 9. The respondent states that the local culture supports eHealth initiatives as long as sufficient proof of services usefulness can be demonstrated. *Good working relationships* scored 10. According to the respondent the staff have been working together for over a decade. *Supported by a well-respected local sponsor* scored 8, indicating that local sponsors who support the implementation of EyeMo exist. *Supported by opinion leaders* scored 9, indicating that EyeMo has the support of the organisations opinion leaders.

**Resources:** on the statement *well resourced* the respondent replies with 2, with reference to the unit not being able to carry any costs related to piloting EyeMo. Minimal impact on resource allocation scored 7. According to the respondent, EyeMo will not have any major effect on allocation of resources.

**Risk:** the respondent cannot answer the statement, giving it the default score of 5.
Impact on clinical practice: Facilitation of health professional – patient interactions scored 8. According to the respondent piloting EyeMo would increase patients’ access to health care services. EyeMo scored 9 out of 10 on security, confidentiality and reliability, indicating no problems related to the topics.

Ease of use of the system: according to the respondent the staff has the necessary skills to carry out the screenings at EyeMo, giving a score of 8 on the statement.

Effectiveness and cost-effectiveness: scored 8. According to the respondent there is adequate evidence on the cost-effectiveness and effectiveness of EyeMo.

Table 8.7 eHIT number 4. Results on EyeMo - The workforce.
**Impact on work and workflow:** Not increasing staff workloads scored 7. According to the respondent it is not likely that EyeMo would increase staff workloads. Increasing efficiency of work patterns scored 8. According to the respondent EyeMo is likely to have a positive effect on the efficiency of work patterns by shortening referral times. Compatibility with divisions of labour scored 8, indicating that EyeMo is aligned with current division of labour.

**Education and training:** scored 8, on the prerequisite that the imaging software used at the mobile unit is one that the staff members working at ophthalmology unit in Lycksele are familiar with. If different equipment is used image comparison may not be possible.

**Relationships between different professional groups:** The respondent gave a score of 8 on the statement compatibility with existing power relationships, indicating that the EyeMo service model is compatible with the current power relationships. Enhancing confidence between groups scored 7. According to the respondent the different professional groups working at the ophthalmology unit already have confidence on each other’s expertise, so no major changes related to confidence can be expected if EyeMo is implemented. Alignment of responsibility and accountability will remain the same if EyeMo is implemented, leading to a score of 7.

The following table shows a summary of the scores previously reported by the respondent, showing the overall score on the context, the intervention and the workforce.

<table>
<thead>
<tr>
<th>Summary of Topic Scores</th>
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</thead>
<tbody>
<tr>
<td><strong>Context</strong></td>
</tr>
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</table>

Table 8.8 eHIT number 4. Results on EyeMo- Summary of Topic Scores.

**Context:** has the overall score of 74%. The score is negatively influenced by access to resources. The ophthalmology unit cannot invest any financial resources on piloting EyeMo. The County Council of Västerbotten must carry the costs in order for the pilot to proceed. The overall score on context was
further negatively influenced by statement on risks, which was left unanswered and given the score of 5.

**Intervention:** scored 83%. No potential problems were detected at this stage.

**Workforce:** The overall score on the section is 76%. The potential pitfall revealed in this section is related to integrating the retinal imaging software used at EyeMo to the electronic patient record systems and the image database used to store the images. In order for the ophthalmology staff perform a reliable comparison of the patients` retinal images it is preferable that all images are taken using the same type of equipment. Otherwise image comparing could be very time consuming.

### 8.3 Piloting EyeMo in Sweden

Two staff members working at the department of ophthalmology used the eHIT to assess the unit’s organisational readiness to pilot the mobile eye unit. Both of the eHITs highlighted problems related to resources and imaging equipment installed at the mobile unit. The County Council of Västerbotten allocated the necessary financial resources for the ophthalmology unit so that the EyeMo could be piloted in the inland of Västerbotten. The ophthalmology nurses decided to use their own unit’s imaging equipment at EyeMo during the pilot, to ensure that the pilot would not affect the quality of care patients receive. As the ophthalmology nurses used familiar equipment during the pilot, no training was needed.

Once the problems related to the imaging equipment and resources were solved, the Lycksele ophthalmology unit proceeded with the pilot. The Northern Ostrobothnia Hospital District in Finland lent the mobile eye unit to the County Council of Västerbotten twice within the scope of the Competitive Health services project. Due to the mobile eye unit being heavily used in the Finland, it was not possible to borrow the trailer for more than two weeks at the time.

The first pilot period started in March 2010. The mobile eye unit was transported from Oulu, Finland to the Storuman municipality located in the inland of Västerbotten, approximately 110 kilometres from Lycksele hospital. The Lycksele ophthalmology unit had prepared lists of patients in need of retinopathy screening living in Storuman municipality, and called the patients for the examination by letter. The screening invitation contained pre-medication\(^7\) that the patients were to take before their appointment. Once the patients arrived to the EyeMo, they were interviewed and screened. If the

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\(^7\) Pre-medication: the patients received eyedrops by post, and were advised to take the eyedrops an hour before their appointment. Sending the medication to the patients in advance shortens the patients’ treatment time.
ophthalmology nurse detected no abnormalities during the examination, the patients received the screening results straight away. If abnormalities were detected the images were forwarded to an ophthalmologist for further examinations and Lycksele ophthalmology unit would later on contact the patient regarding the screening results.

A total of 80 patients were screened for diabetic retinopathy at EyeMo when the unit was located at Storuman municipality. The mobile eye unit was also scheduled to be at the Soršek municipality during the second week of the first pilot period. Due to problems transporting the mobile eye unit from Storuman to Soršek the appointments had to be rescheduled to take place at Soršek health center. The second pilot period took place at Vilhelmina municipality, located approximately 120 kilometers from Lycksele hospital. A total of 80 patients were called to the examinations in June 2010. The screening processes were the same during both pilot periods. In total, 160 patients visited EyeMo during the pilot periods.

Local conditions impacting the outcomes of transferring EyeMo

Looking at the process of piloting EyeMo, several local conditions impacting the outcomes of the pilot can be identified; 1) ICT infrastructure and physical space, 2) staff members’ confidence in EyeMo, 3) collaboration, and 4) organisational structure and patient base.

1) ICT infrastructure and physical space

Before the mobile unit was piloted several preparatory meetings where the pilot was planned were organised at Lycksele ophthalmology unit. During one of the pre-pilot meetings we discussed problems that might occur during the pilot. The staff members were concerned with how to access the hospital network from the mobile unit. If the electronic patient record system and the image database, where screening images are stored, would not be accessible from the mobile unit, it could make carrying out the screenings impossible. In addition, the staff members were concerned that the EyeMo’s delivery to Storuman could be delayed as the transport schedule was tight and the weather and road conditions were challenging.

The staff members’ concerns proved to be justified as they were not able to connect wirelessly to the secure hospital network from the mobile unit and the transport of EyeMo proved to be problematic. When we arrived to the screening location at Storuman municipality to set up the mobile eye unit and to prepare for the patients arrival we noticed several problems. The mobile eye unit had been damaged during the transport from Finland to Sweden. The damage was extensive, thus moving the mobile unit from Storuman municipality would be impossible without extensive repairs. The staff members would be able to carry out the screenings scheduled to take place at Storuman municipality, but the
examinations scheduled to take place the following week at Sorsele municipality would have to be changed to take place at the local health center instead of the mobile unit. This was not a problem, as during one of the preparatory meetings we discussed how screenings would be conducted if something went wrong when EyeMo was transported from Finland to Sweden. The staff members had made sure in advance that examination rooms at local health centres would be available at all municipalities where screenings were scheduled to take place. In case the mobile unit would not be available the screenings would be conducted at the health centre facilities.

The staff members at Lycksele ophthalmology unit had also prepared for eventual problems with accessing the electronic patient record system by printing the patient records so that they would have access to necessary information during the pilot. As the lack of network access also meant that there was no access to the image database, the staff members saved the screening images locally and uploaded the images to the database later. As the mobile eye unit was parked next to the local health center the staff members working at the health center assisted the staff at EyeMo by installing a temporary cable from the health center to the mobile unit, thus connecting EyeMo to the hospital network. However, the first two days of the pilot went on without the staff members working at EyeMo being able to access the electronic patient record system or the image database. As the ophthalmology staff had taken network problems into consideration they were able to carry out examinations as planned. The problems did however raise discussion among the staff members; they could not see how EyeMo could become a permanent part of ophthalmology services when there are persistent problems with the wireless access to the hospital network in the inland of Västerbotten.

As I was present at the EyeMo throughout the pilots I had the chance to discuss the use of the mobile eye unit with the staff members daily. During the pilot the staff members emphasized the importance of the screening facilities and how carrying out screenings at the mobile unit impacts the screening process. The ophthalmology nurses explained that some patients do not feel comfortable or are unable to take the pre-medication before arriving at the screening location. This causes a problem, as the pre-medication is necessary in order for the staff members to be able to carry out the screening. When a patient has not taken the pre-medication the ophthalmology staff helps the patient with it. This has, however, a knock-on effect on the schedule as the patient’s examination needs to be postponed with at least half-an hour in order for the medication to have time to work. Meanwhile, the next scheduled patient might not have arrived yet, causing a backlog of patients especially if several patients need assistance with medication.

As the screenings are usually conducted at the hospital or at a health center the staff members might not be able to locate the patient in the facilities to check, whether or not they have arrived and taken the pre-medication. At the mobile eye unit the staff members have had a better control of the situation as all
patients that are going to be screened wait for their turn at the waiting room of EyeMo. As the screenings are relatively short, several patients have been waiting for their turn at the same time. Therefore, the ophthalmology nurses have been able to check between each screening if new patients have arrived to the waiting room and whether or not they have been adequately pre-medicated. They have also been able to select the patient with the most optimal eye-status for the screening, making the examination easier. This has made it possible to conduct screenings continuously, although sometimes in different order than intended. In the case of EyeMo facilities where the screenings have been conducted at has impacted the screening process so that the staff members have been able to make the most of their time by continuously screening patients, and select the best time to screen the patients.

The location did however not only create benefits; some patients with limited mobility had difficulties accessing the mobile eye unit. This problem was experienced due to the mobile unit breaking during the transport; a mechanism enabling handicap access broke, making it impossible to lower the mobile unit in order to make it easy to access by people in a wheelchair. In addition to the issues with accessing the facilities, the staff members pointed out that the sound isolation at the mobile eye unit was poor, affecting the privacy of the examinations negatively. Patients located in the waiting room could sometimes hear what was said in the examination room.

2) Staff members confidence in EyeMo

As the staff members were able to use the unit’s own imaging equipment during the pilot periods no training regarding the technology used at the mobile unit was necessary. In addition, the staff members were able to carry out the screenings the same way as during traditional screening situations, the only difference being the screening facilities. The staff members commented during the preparatory meetings on how positive it was that they would be able to use their own imaging equipment, and how that made them feel comfortable about participating in the pilot.

During one of the pre-pilot meetings at the ophthalmology department the staff members analyzed potential problems that might occur at the mobile eye unit and drafted back-up plans for coping with these problems. Once the back-up plans for network problems and transport problems were drafted the staff members expressed that they were well prepared to deal with any problems that might occur during the pilot and could not think of anything else that could go wrong. In the case of transferring EyeMo to the County Council of Västerbotten, the preparations carried out before piloting the service increased the staff members trust in their own capabilities to carry out the service and deal with problems related to the pilot.
3) Collaboration

The staff members working at Lycksele ophthalmology unit involved in piloting EyeMo have had the opportunity to visit the Northern Ostrobothnia Hospital District and meet the professionals who work permanently at EyeMo. The visit was valuable as staff members had the opportunity to see the mobile unit in real-life which supported planning for the pilot. It also allowed the staff members to assess whether or not the facilities matched their needs. During the visit it became apparent that direct communication between the staff members at Lycksele and the staff members working at EyeMo would not be possible due to language problems. This has challenged the collaboration between the organisations, as staff members have not been able to communicate directly with each other.

4) Organisational structure and patient base

The sustainability of a service like EyeMo was the subject of reoccurring discussions among the ophthalmology staff members during both pilot periods. Whereas the staff members involved in the implementation felt that the mobile eye unit matched the organisations’ clinical needs, they estimated that the patient base in Västerbotten is too small in order for the mobile eye unit to be used all year. The staff members calculated that the patient base in the Västerbotten’s inland would keep the mobile eye unit busy for only 8 weeks annually. Therefore, the investments permanent use of EyeMo in Västerbotten would require would not be justifiable. In order for the mobile eye unit to become sustainable in the Swedish context the service concept would have to be expanded.

The mobile eye unit has been used in the Northern Ostrobothnia Hospital District since 2006 and over 18 000 examinations have been carried out at EyeMo. The financial benefits of EyeMo have been well documented, as well as how patients experience their visit at the mobile unit. The professionals at Lycksele ophthalmology unit have acknowledged the results obtained with EyeMo in Finland but noted, that similar benefits are difficult to obtain in the Swedish context, due to differences in the underpinning structure of how screening services are organised and funded in Finland and in Sweden. In addition, the patient base in Västerbotten, Sweden, is barely a third of the patient base of Northern Ostrobothnia Hospital District, limiting the number of days the service would be used in Västerbotten.
Chapter 9: Case study 3 - Remote speech therapy via video

The County Council of Västerbotten, Sweden has since 2005 provided remote speech therapy via video. The service concept has been transferred to the National Health Service in Scotland, and to the Northern Ostrobothnia Hospital District and the Oulunkaari Joint Municipal Board (OJMB) in Finland, within the Competitive Health Services project.

Remote speech therapy via video is an eHealth service developed in the CCV as a response to a growing need to provide speech therapy in the sparsely populated rural areas of Northern Sweden. Patients in need of speech and language therapy have traditionally attended therapy by visiting one of the three hospitals located in Västerbotten. Since the implementation of remote speech therapy via video, the patients have been able to receive speech therapy remotely. During the remote therapy sessions the main focus lies on training, discussing the patient’s situation and on assessing the patient’s status. The remote speech therapy service covers multiple diagnostic groups, including functional and organic voice disorders in adults, Parkinson disease, aphasia and dysarthria following a stroke, dyslexia and children with abnormal development of speech or language (Alrutz, 2012).

Access to speech and language therapy has not been adequate for these patient groups. One of the reasons behind The County Council of Västerbotten not being able to provide therapy for patients is the problem of recruiting speech and language therapists willing to work in the rural areas of Västerbotten. Prior to developing the remote speech therapy service, therapy was only provided on daily basis in Umeå and Skellefteå hospitals, and twice a week at Lycksle hospital. In addition to recruitment problems long geographical distances to the hospitals made it difficult for the patients to attend speech therapy. In the County Council of Västerbotten elderly patients of 80 years or older, suffering from aphasia/dysarthria and living in the remote rural areas had difficulties attending speech therapy sessions. In average this patient group received speech and language therapy twice. The number of speech therapy sessions for patients aged 80 years or older, suffering from aphasia/dysarthria and living in urban areas was on average 4.6.

When the speech and language therapists schedule a training session with the patient, the patient arrives at his or her local health centre and meets the therapist via video. The speech and language therapy unit can also provide therapy sessions via video directly to the patients’ home. Portable home equipment has been developed in order to provide intensive therapy periods
lasting 2 to 3 weeks. This part of the service is aimed for patients unable to travel to their local health centre.

Providing speech and language therapy via video has posed some new challenges to the therapists in charge of the therapy sessions. The staff members have adjusted their work processes to match the new means of communication. Tools and materials used in therapy sessions have been adjusted and new documentation routines have been developed. Providing remote speech therapy has affected the organisation of administrative routines as well. The staff members need to book the video conferencing facilities at health centres, make sure that the patients receive the training material in advance and contact the patients escorts to schedule the appointment (e.g., when treating children).

All newly appointed speech therapists receive training in providing remote speech therapy. The training includes technology oriented training as well as training related to methods used in providing speech and language therapy via video. All of the health centres located in the Västerbotten region are equipped with videoconferencing rooms, suitable for conducting remote speech and language therapy sessions.

Figure 9.1 Delivering a remote speech therapy session to a child. During the therapy sessions the therapists controls the cameras and the videoconferencing system. The patients do not need to manage any of the equipment during the therapy sessions. This is to avoid them becoming distracted during the session.
Since the implementation of the remote speech therapy service, access to speech and language therapy has improved in the area. The prior unjust situation for patients aged 80 or more, suffering from aphasia/dysarthria no longer exists. This patient group has now equal access to speech therapy despite their geographical location; the average number of visits is currently 4.2. In addition to increased and more equal access to speech and language therapy other benefits have been documented. The number of cancelled therapy sessions has decreased, the amount of travel the patients need to do in order to attend the therapy has decreased and the treatment response to speech and language therapy has improved.

According to the speech and language therapy department at Norrland university hospital evaluations done on the remote speech therapy show that 97% of the patients are satisfied with the remote speech therapy service. The technology used to provide the service has worked very well, evaluation among speech and language therapist providing remote therapy shows that 93% of the remote visits have been successful.

The results gained by implementing remote speech therapy in the County Council of Västerbotten have driven the Northern Ostrobothnia Hospital District in Finland, and the National Health Services, Caithness and Sutherland area in Scotland to duplicate and transfer the service concept to their respective regions.

9.1 Transferring remote speech therapy to Scotland

The remote speech therapy service was implemented in NHS Highland, Caithness and Sutherland area, in order to increase the volume and the frequency of speech therapy sessions available for the patients.

The population in Caithness and Sutherland area is small, approximately 38 000, and scattered through a large (7700km2) geographic area that is difficult to access due to sometimes-extreme weather conditions, single-track roads and mountainous areas. The speech and language therapists responsible for the Highland area are located on the east coast, in Golspie, Wick, Thurso and Dornoch, leaving the west coast of Highland uncovered.

The speech therapists working in the NHS’s Highland, Caithness and Sutherland area spend a big portion of their time travelling to visit patients living in the remote areas of Scotland. Child patients usually receive speech therapy at school, in order to minimize travel time for the speech therapist. When it comes to adult patients the therapists usually travel to the patients’ homes to provide therapy. Depending on the travel distance, the therapist sees 1 to 3 patients a day. The sessions are often long, as the therapists have limited opportunities to visit the patients. According to the therapists working at NHS Highland, the therapy sessions provided at patients’ homes would ideally be
shorter and more frequent, to avoid patients with neurological impairment being exhausted by the lengthy sessions. Shorter therapy sessions would enable the patients to stay more focused during the therapy, maximizing the benefits of the therapy for the patient.

In addition to increasing the volume of speech and language therapy, NHS Highland has the need to shorten the waiting period for assessing new patients. Releasing time for the speech therapist by reducing the time spent on traveling would enable faster response times and it would be possible to increase treatment volume.

9.2 eHIT results on remote speech therapy in Scotland

In order to evaluate the NHS Highland – Caithness and Sutherland area’s organisational readiness to implement remote speech therapy service, an eHIT evaluation was conducted. A senior speech therapist working in the area completed the toolkit; following are the results with the comments made by the therapist. First, the scores and the free text comments on context, the intervention and the workforce are presented, followed by the summary of scores.

Table 9.1 eHIT number 5. Results on remote speech therapy- Context.

<table>
<thead>
<tr>
<th>Context</th>
<th>Score</th>
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<tbody>
<tr>
<td>National policy</td>
<td>10</td>
</tr>
<tr>
<td>Local policy</td>
<td>9</td>
</tr>
<tr>
<td>Enabling the achievement of national priorities or targets</td>
<td>8</td>
</tr>
<tr>
<td>Welcoming e-health/embracing change</td>
<td>5</td>
</tr>
<tr>
<td>Good working relationships</td>
<td>9</td>
</tr>
<tr>
<td>Supported by a well-respected local sponsor</td>
<td>9</td>
</tr>
<tr>
<td>Well resourced</td>
<td>5</td>
</tr>
<tr>
<td>Minimal impact on resource allocation</td>
<td>0</td>
</tr>
<tr>
<td>Compatibility with existing risk management policies</td>
<td>5</td>
</tr>
<tr>
<td>Risk</td>
<td>9</td>
</tr>
</tbody>
</table>

National policy: compatibility with current and planned national policy and enabling the achievement of national priorities or targets both scored 10, as the remote speech therapy service is compatible with the national policies, targets and priorities, which focus, for example, on providing health care services locally, using ICT to deliver health care services and reducing carbon emissions by decreasing travel. The remote speech therapy is also aligned with the Scottish government’s “early years”- framework.

Local policy: Compatibility with current and planned local policy scored 9, indicating high compatibility. According to the respondent the Community
Health Partnership is interested in eHealth, and there is a local increase in using teleconferencing between health care professionals.

**Local culture:** *welcoming e-health and embracing change* scored 8, indicating that NHS Highland-Caithness and Sutherland area would welcome e-Health innovations and is able to cope with changes implementing the service might bring. *Good working relationships* scored 5 due to the working relationships between speech therapists working in Caithness and Sutherland area and the educational system not being so developed. *Supported by a well-respected local sponsor* and *supported by opinion leaders* both scored 9, indicating that both groups of stakeholders are supportive of remote speech therapy.

**Resources:** the statement *well resourced* scored 0. The respondent points out that when it comes to ICT the Speech and Language Therapy Services are under resourced. *Minimal impact on resource allocation* scored 5, indicating that resource allocation might have to be reconsidered if remote speech therapy service is implemented.

**Risk:** *compatibility with existing risk management policies* scored 9, indicating no issues related to risk management in relation to implementing remote speech therapy.

![Table 9.2 eHIT number 5. Results on remote speech therapy- The intervention.](image)

**Impact on clinical practice:** *facilitation of health professional – patient interactions* scored 10, indicating that remote speech therapy supports interaction between health care staff members and patients. The respondent points out that these estimates are based on the results obtained in the County Council of Västerbotten, Sweden. *Security, confidentiality and reliability* scored 10. The respondent states that this statement can be seen as a pre-requisite, which must be met in order for the remote speech therapy pilot to take place.

**Ease of use of the system:** scored 9, indicating that the remote speech therapy service should be easy to use.
Effectiveness and cost-effectiveness: scored 10, indicating that the effectiveness and cost-effectiveness of remote speech therapy service is estimated to be high.

Table 9.3 eHIT number 5. Results on remote speech therapy - The workforce.

Impact on work and workflow: not increasing staff workloads scored 6, indicating that staff workload might increase if the remote speech therapy service is implemented. Increasing efficiency of work patterns scored 10, indicating that the speech therapists’ work patterns will become more efficient. Compatibility with divisions of labour scored 10, indicating that the current division of work is aligned with the proposed division of work implementation of remote speech therapy would entail.

Education and training: scored 5. The respondent estimates that some of the speech therapists will need training in order to run the remote speech therapy service. The respondent does not think that extensive training will be necessary.

Relationships between different professional groups: compatibility with existing power relationships scored 10, indicating that remote speech therapy service is aligned with the existing power relationships. Enhancing confidence between groups scored 9, indicating that the implementation would have a positive effect on enhancing confidence between speech therapists. Alignment of responsibility and accountability scored 5, according to the respondent the alignment of responsibility and accountability would not be affected by the implementation.
Following is a summary of the scores previously reported by the respondent, showing the overall score on the context, the intervention and the workforce.

Table 9.4 eHIT number 5. Results on remote speech therapy - Summary of topic scores.

**Context**: scored 74%. The unit of speech and language therapy services do not have the necessary resources to implement remote speech therapy. Resources must be procured elsewhere in order to purchase the equipment and set up the service. The context section also highlights that working relationships are not well developed between the different parties that would be involved in piloting remote speech therapy. This could hinder implementing the service, since cooperation between staff members working in education and speech therapists is necessary. The overall score is further lowered by remote speech therapy service’s potential impact on resource allocation.

**The intervention**: scored 98%. No potential problems were detected at this stage.

**The workforce**: has the overall score of 79%. This section highlights the need to provide training for the staff members, in order for them to successfully operate the service.

**9.3 Implementation outcomes - Scotland**

The eHIT analysis on implementing remote speech therapy revealed four main concerns related to collaboration, resources, workload, and training needs.

According to the eHIT results the collaboration between the educational system and the speech therapists could turn out to be problematic, if remote therapy would be provided to children. During the implementation phase, the patient base was limited to adults, based on the advice received from the
Swedish speech and language therapy unit. By focusing on adult patients, potential problems with collaborating with the educational system were also avoided.

The eHIT results highlighted that the speech and language therapy services did not have adequate resources to purchase videoconferencing equipment necessary to run the service. The videoconferencing systems available at NHS Highland were dated, and not suitable for providing remote speech therapy. This turned out to be one of the major problems experienced during the implementation, and the organisation struggled with the funding.

As estimated in the eHIT, the implementation of remote speech therapy service led to increased workload and created training needs. As providing remote therapy involved implementing a new way of working the staff members had to develop their work methods and familiarize themselves with new technology.

One of the biggest problems encountered by the implementing organisation was a lack of adequate ICT infrastructure. Problems with broadband access in the remote areas of Scotland led to changing the sites where the service was implemented. Issues related to ICT infrastructure were not addressed by the eHIT.

Local conditions impacting the outcomes of transferring remote speech therapy

Looking at the transfer of remote speech therapy service to Scotland, three local conditions impacting the outcomes of the eHealth transfer can be identified; 1) ICT infrastructure 2) training, and 3) collaboration.

1) ICT infrastructure

One of the reasons for transferring remote speech therapy service to NHS Highland was to increase access to speech therapy services on the Northwest coast of Sutherland that did not have any stationed speech therapists. A closer evaluation on the regions infrastructure revealed however, that the region did not have adequate videoconferencing facilities or adequate access to broadband.

The final report on implementing remote speech therapy in Scotland highlights the importance of having adequate ICT infrastructure, and how inadequate infrastructure can limit where eHealth services can be used thus limiting patients’ access to health care services. The Scotland report on implementing remote speech therapy states that:

“The initial scope of the pilot was to explore the potential for remote speech therapy via video conferencing between NW Sutherland and
the east coast. It was envisaged that this could take place from schools, health centres and, if possible, patients’ homes.”

As problems with ICT infrastructure became evident, the implementation sites had to be changed, leaving the areas that were prioritized to receive remote speech therapy without it. The Scotland report on implementing remote speech therapy states further:

“It became apparent that videoconferencing facilities in the NW Sutherland area were severely limited, both in NHS premises and in schools. Patchy and low speed broadband connections across the region (one of the least well-connected in the UK) would further hamper the use of mobile units in patients’ homes.”

Once it was clear that problems with inadequate broadband access and dated video conferencing equipment could not be solved, new implementation site had to be found. Speech and language therapy service has an office in Wick, which was selected as the new implementation site due to the location having adequate ICT infrastructure and equipment.

2) Training

Once a new implementation site was found, the implementation was initiated. The first phase was to train staff members in how to handle the video conferencing equipment and how to plan and execute a remote speech therapy session. The staff members organised remote speech therapy simulations among personnel, where they practiced providing speech therapy remotely. The Scotland report on implementing remote speech therapy states the following:

“Mock practice sessions were set up between therapists to explore potential difficulties of delivering therapy remotely, and to seek solutions. It was found necessary to change some of the customary ways of planning therapy, as some methods would not work well over VC. On a practical level, two identical sets of materials were needed, one for each end.”

As experienced in Sweden, the Scottish speech therapists concluded that not all traditional techniques used to provide speech therapy were suitable when providing therapy remotely. Some of the techniques and routines had to be adjusted to suit the new way of working.
3) Collaboration

The speech therapists working in Scotland have been in regular contact with speech therapists and the IT-department in the County Council of Västerbotten, Sweden, during the implementation and beyond. As an outcome of the collaboration the speech therapists working at NHS Highland have received guidance and support in how to set up and work with remote speech therapy service. The report on implementing the service in Scotland states that:

“The lead therapist in North Highland has maintained close communication with her counterpart in the Västerbotten speech and language therapy service throughout the pilot, by email, teleconference and VC. In September 2010 the lead therapist paid a three day visit to colleagues in Umeå together with the newly appointed adult therapist from Wick. This visit was an invaluable opportunity to see the remote service in action and to learn from Swedish professional and technical experience.”

Collaboration between the two organisations has also led to some tangible results; for example, guidelines for conducting clinical video consultations in speech therapy context have been created by the County Council of Västerbotten. The guidelines include a variety of hands-on information on how to set up and conduct remote speech therapy. These guidelines have been translated into English and adapted to suit the needs of NHS.

Difficulties with infrastructure and video conferencing equipment, as well as small patient base on the east coast of Caithness and Sutherland have limited the scope of the pilot. During the Competitive Health Services project four adult patients have received remote speech therapy. NHS Highland has invested in new videoconferencing equipment to be used to provide remote speech therapy services at Golspie community hospital, thus supporting the use of eHealth within the organisation. The lead therapist in the Caithness and Sutherland area plans to utilize the new equipment and to extend the service to include Lochinver located on the west coast of Highland. The aim is to further expand the used of remote speech therapy by circulating a portable videoconferencing system at the remote health centres in Caithness and Sutherland area enabling intensive therapy periods in locations previously uncovered by speech therapists.

9.4 Transferring remote speech therapy to Finland

The remote speech therapy service has also been transferred to the Northern Ostrobothnia Hospital District (NOHD) and to the Oulunkaari Joint Municipal Board’s (OJMB) Pudasjärvi health centre in Finland. The health centre has provided speech therapy to pupils at the remote schools of Aittojärvi and Kipinä.
The remote speech therapy service was implemented at Pudasjärvi health centre. The aim of the implementation was to increase access to speech therapy and to decrease travel for the patients. There is a strong clinical need for increasing the volume of providing speech and language therapy in the Pudasjärvi area.

In relation to speech therapy, the main role of specialist health care in Finland is to assess the patients’ therapy needs, designing individual care plans and to diagnose patients. The NOHD provides these services to the population of Northern Finland. The actual provision of speech and language therapy sessions defined in the care plan is the responsibility of primary care organisations such as Joint Municipal Boards or individual municipalities. In some cases The Social Insurance Institution of Finland takes over the speech and language therapy of individual patients. The municipalities and Joint Municipal Boards can choose to purchase speech and language therapy services from private sector or they can organise it within the municipality or the Joint Municipal Board, for example, by employing speech and language therapists to work at local health centres.

The pupils of Aittojärvi and Kipinä schools travel to Pudasjärvi health centre to meet the speech and language therapist. The travel distance is approximately 60km from Kipinä, and 40 km from Aittojärvi to Pudasjärvi in return. There is no organised transportation for the children instead the parents drive the children to the health centre, leading to parents having to take time off from work. The time spent on travelling adds to the school hours children miss due to attending speech therapy. In addition to the practical problems related to travel, the Pudasjärvi area has a clinical need for speech and language therapy and the speech therapist working at Pudasjärvi health centre had expressed interest in piloting remote speech therapy.

9.5 eHIT results on remote speech therapy in Finland

Department of phoniatics

The first set of eHIT results were collected at the Oulu University Hospital at the department of phoniatics in order to evaluate the organisational readiness to implement remote speech therapy. The respondents are a phoniatician and two speech therapists working at the department, they completed the eHIT jointly. First, the results on context, the intervention and the workforce are presented, followed by a summary of the total score on the three areas.
Table 9.5 eHIT number 6. Results on remote speech therapy - Context.

**National policy:** the respondents gave *compatibility with current and planned national policy* the default score 5. The respondents point out that depending on the viewpoint the score on the statement varies. In relation to the overall Finnish policies remote speech therapy is well aligned and would score 9. On the other hand, in terms of the organisational structures and services provided by specialised health care, the remote speech therapy service is not compatible with national policy, and would score 2. Due to the difference in the scores the respondents chose to use the default score to respond to the first statement. *Enabling the achievement of national priorities or targets* scored 9. According to the respondents implementing remote speech therapy service enables reaching the national targets and priorities, as long as the user groups are carefully selected.

**Local policy:** scored 5. The respondents point out that remote speech therapy should target adult patients with specific phonetic problems such as stuttering in order for the service to be aligned with local policies.

**Local culture:** *welcoming e-health and embracing change* scored 5. The attitude towards new innovations at the department of phoniatrics is generally positive. *Good working relationships* scored 9. According to the respondents the personnel at the department of phoniatrics have good working relationships, which can be described as mature, democratic and social with a high degree of togetherness. *Supported by a well respected local sponsor* scored 8. The Oulu University Hospital is not able to hire new employees to run the remote speech therapy service. The department of phoniatrics might however be able to re-allocate some resources for the team that would work with the remote speech therapy service hence supporting the implementation of the service. *Supported by opinion leaders* scored 7. The respondents point out that some members of the staff might feel that providing speech therapy via video is not suitable form of interaction. On the other hand, remote speech therapy might decrease travel.
Resources: well resourced scored 9. According to the respondents the department of phoniatrics and Oulu University Hospital have the necessary resources, skills and suitable environment to implement remote speech therapy. The respondents also point out that videoconferencing is a familiar tool for many of the employees. Minimal impact on resource allocation scored 7. According to the respondents the degree in which resource allocation will be impacted depends on how the remote speech therapy service will be organised. If the department of phoniatrics would provide consultation support to remote health centres, communication would increase, leading to increased need for resource allocation. The respondents point out that the main responsibility of the department of phoniatrics would be to provide consultation support to the professionals working at remote health centres, since providing speech therapy is not part of the services offered by specialised health care in Finland.

Risk: the remote speech therapy service’s compatibility with existing risk management policies scored 8. According to the respondents it could make speech therapy services more accessible. The respondents point out that providing speech therapy via videoconferencing might lead to transmitting false phoniatrics information leading to inaccurate diagnostics.

Impact on clinical practice: facilitation of health professional – patient interactions scored 9. Implementing remote speech therapy can have a positive effect on the interaction between staff members and patients, as long as the patient base is carefully selected. Security, confidentiality and reliability scored 9, indicating no major concerns regarding implementation. The respondents point out that special attention should be given to identifying suitable patient groups, and creating a work situation where the speech therapy sessions are based on mutual confidentiality.

Ease of use of the system: scored 7. According to the respondents it is possible that the staff members have difficulties in adjusting to the new way of working and interacting with the patients via videoconferencing. They do not anticipate any problems related to the actual use of technology.

Table 9.6 eHIT number 6. Results on remote speech therapy. The intervention.

![Table 9.6](image-url)
Effectiveness and cost-effectiveness: is given the default score of 5 since the respondents cannot answer questions related to the effectiveness and cost-effectiveness of remote speech therapy.

Impact on work and workflow: not increasing staff workloads scored 2, as implementing remote speech therapy includes a new way of working that the health care personnel has to learn in order to provide the service. Increasing efficiency of work patterns scored 5, according to the respondents efficiency of work patterns is likely to remain unchanged at the department of phoniatrics. Remote speech therapy service’s compatibility with divisions of labour scored 10, on the perquisite that technical assistance is provided from outside the department.

Education and training: minimal training needed scored 8. According to the respondents some training is needed regarding the new way of working. Oulu University Hospital would be able to provide technology related training for staff members involved in the pilot. However, if equipment is placed at the patients home the education and training needs are different.

Relationships between different professional groups: compatibility with existing power relationships scored 10, indicating high compatibility between remote speech therapy and power relationships at the department of phoniatrics. Enhancing confidence between groups scored 5, as no change is anticipated. Alignment of responsibility and accountability scored 0. The respondents state that providing remote speech therapy is a matter of multidisciplinary teamwork.
Following is a summary of the scores previously reported by the respondents, showing the overall score on the context, the intervention and the workforce.

Table 9.8 eHIT number 6. Results on remote speech therapy- Summary of topic scores.

**Context:** scored 72%. This section reveals a conflict between the planned implementation of remote speech therapy and the responsibilities specialised health care has; providing speech therapy sessions is not the responsibility of the department of phoniatrics. Therefore the remote speech therapy is not aligned with the organisational structures even though the service is supported by national policies. The role of the NOHD in piloting remote speech therapy should be reconsidered, a more suitable role for specialised health care would be to provide language and speech related consultation services to health centres. The overall score is further lowered by factors related to the suitability of the service. Some of the staff members may feel that speech and language therapy should be provided by traditional means and that remote therapy may increase the risk of incorrect diagnosis due to false phoniatrics being transmitted via ICT.

**The intervention:** section scored 75%. The statements included in this part show that some staff members may find adapting a new way of working and communicating with patients challenging. Furthermore, the patient base that would use the remote service must be carefully selected.

**The workforce:** scored 57%. The section brings out the implications implementing remote speech therapy would have on alignment between division of work and responsibility. As NOHD’s responsibilities do not include providing therapy the organisation’s role in piloting remote speech therapy must be re-considered. If the service is implemented the staff members workload is likely to increase as the personnel needs to learn a new way of working.
The second set of eHIT results were collected at Pudasjärvi health centre, which would be the organisation that provides the speech therapy sessions. The respondents are the chief physician and a speech therapist working at the health centre. First, the scores and the comments on context, the intervention and the workforce are given, followed by a summary of the total scores.

Table 9.9 eHIT number 7. Results on remote speech therapy - Context.

**National policy:** compatibility with current and planned national policy scored 7. According to the respondents concept of remote speech therapy is compatible with national policies. The implementation would increase access to speech therapy in remote areas in Northern Finland, and it would enable earlier access to treatment and specialist consultations. Enabling the achievement of national priorities or targets scored 9, as the planned service is aligned with the Finnish targets and priorities.

**Local policy:** scored 9, indicating that remote speech therapy is in compatible with current and planned local policies. The respondents state that the service is aligned with the organisational culture to implement new innovations.

**Local culture:** welcoming e-Health and change scored 8. According to the respondents Pudasjärvi health centre welcomes e-Health and change, the health centre has been a pioneer when it comes to implementing new innovations, for example the health centre has used electronic patient records since 1993. Good working relationships scored 8, indicating good working relationships and collaboration skills. Supported by a well respected local sponsor scored 9. According to the respondents implementing remote speech therapy would increase the versatility of speech therapy services. Support towards the implementation from a local sponsor is demonstrated by the willingness to employ a trainee to work with the service. Supported by opinion leaders scored 9, the respondents state that the health care personnel working at Pudasjärvi health centre have positive attitude towards ICT.
**Resources:** *well resourced* scored 8. The respondents point out that resources are needed especially in the initiation phase of the service. *Minimal impact on resource allocation* scored 8. Implementation may cause some changes in resource allocation although the respondents do not expect any major impacts.

**Risk:** *compatibility with existing risk management policies* scored 9, according to the respondents implementing remote speech therapy does not threaten service production and no major issues related to risks are anticipated.

The intervention.

<table>
<thead>
<tr>
<th>Facilitation of health professional - patient interactions</th>
<th>Security, confidentiality and reliability</th>
<th>Ease of use of the system</th>
<th>Effectiveness and cost-effectiveness</th>
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<tr>
<td>Facilitation of health professional - patient interactions</td>
<td>Security, confidentiality and reliability</td>
<td>Ease of use of the system</td>
<td>Effectiveness and cost-effectiveness</td>
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Table 9.10 eHIT number 7. Results on remote speech therapy- The intervention.

**Impact on clinical practice:** *facilitation of health professional – patient interactions* scored 9 indicating that the remote speech therapy service supports interaction between health professionals and patients. The respondents state that the service scores high in relation to providing therapy to adults and when it comes to consultations between professionals. The respondents find providing remote speech therapy to children more challenging, due to session management. *Security, confidentiality and reliability* scored 9, indicating no major issues regarding these topics in relation to initiating remote speech therapy service.

**Ease of use of the system:** scored 8, indicating that the service would be fairly easy to use.

**Effectiveness and cost-effectiveness:** scored 7. The respondents’ state that they do not have knowledge on the cost-effectiveness or the effectiveness of services such as remote speech therapy. They do however point out that, in general, using videoconferencing in health care works well.
Impact on work and workflow: not increasing staff workloads scored 6, as the respondents’ estimate that the workload for those involved in the pilot will increase initially. Increasing efficiency of work patterns scored 8, according to the respondents the efficiency of treating adult patients is likely to increase, due to the possibility of treating patients remotely. Compatibility with divisions of labour scored 8, indicating that the remote speech therapy service is compatible with division of labour between the speech therapist, doctors and nurses.

Education and training: scored 6, the respondents’ estimate that the technical equipment is quite easy to use. They do not anticipate any major issues related to education and training.

Relationships between different professional groups: compatibility with existing power relationships scored 10. The respondents point out that overall, the health care staff working at Pudasjärvi health centre collaborates well, and there is only one speech therapist working at the centre. Enhancing confidence between groups scored 7, according to the respondents implementing remote speech therapy will have a positive effect on confidence between groups as the speech therapist’s competence will increase. Alignment of responsibility and accountability scored 9 indicating no major issues related to the topic.

Following is a summary of the scores previously reported by the respondents, showing the overall score on the context, the intervention and the workforce.

Table 9.11 eHIT number 7. Results on remote speech therapy - The workforce.
Table 9.12 eHIT number 7. Results on remote speech therapy - Summary of topic scores.

**Context:** the overall score is 84%. The responses on this section highlight issues related to resources. Some resource re-allocation might be necessary if remote speech therapy service is implemented. Allocating additional resources for the service may also be necessary.

**The intervention:** scored 83%. No potential problems were detected at this stage.

**The workforce:** scored 77%. The section highlights that the workload for staff members involved in the implementation might initially increase.

### 9.6 Implementation outcomes - Finland

Children with linguistic and pronunciation problems attending the remote elementary schools of Kipinä and Aittojärvi usually receive speech therapy at the Pudasjärvi health centre. The implementation of the remote speech therapy service has provided the children with the possibility to receive speech therapy remotely thus decreasing the need for travel. In addition to remote speech therapy sessions, the speech therapist in charge of the service has been able to consult specialists working at Oulu University Hospital regarding speech and language problems.

The eHIT results obtained from Oulu University Hospital highlighted national and local policies, resources, support from opinion leaders, and resource allocation as potential problems that could impact the implementation negatively. The respondents also pointed out that there is a risk that communication between the remote site and the department of phoniatrics would increase, if the remote site would be able to request consultations freely. Increase in consultation requests could ultimately lead to the need to re-allocate resources to deal with the requests. Even though the implementation
of remote speech therapy included the phoniatrics department of Oulu University Hospital, no consultations have taken place between the remote health centre and the hospital, as no patients in need of the service have been identified at the remote site. As a result, the identified issue of having to re-allocate resources to cover for the potentially increased consultation requests has not materialized. Consequently, the risk of false phoniatrics when diagnosing patients during a videoconference has not occurred.

Another potential problem according to the eHIT results was that some staff members could have difficulties adapting to the new way of interacting with the remote site and the patients. As no consultations have taken place, the staff members have not communicated with patients or with the remote site via videoconference. In addition to issues described earlier, a more profound problem was detected regarding national and local policies rendering the department of phoniatrics unsuitable for providing speech therapy sessions due to the collision of organisational responsibilities and the content of the remote service. In Sweden one organisation is responsible for patients with speech and language related problems. In Finland the responsibility is divided between two organisations, each with strictly defined tasks. Therefore, the Swedish model of providing speech therapy was not directly applicable in the Finnish context.

The eHIT results from the Pudasjärvi health centre show that the implementation was expected to lead to initially increased workload and training needs. These expectations did materialize during the implementation. In addition, the respondents estimated that if the service is directed to children, the sessions might be difficult to manage. Contrary to the expectations session management was successful, as special education teacher accompanied the children receiving remote therapy. In addition, once the children got used to the technology, their concentration was better during remote sessions that during traditional speech therapy. The problem of transmitting false phoniatrics was addressed in the eHIT results from Oulu University Hospital, but not by the Pudasjärvi health centre. The speech therapist at the health centre did experience problems with false phoniatrics as it was difficult to hear the distinction between certain letters during the remote sessions.

To summarize, the eHIT results obtained from Pudasjärvi health centre matched well with the actual implementation. As no consultations took place between the health centre and the department of phoniatrics at Oulu University Hospital the accuracy of the Oulu University Hospital’s eHIT results cannot be determined.

*Local conditions impacting the outcomes of transferring remote speech therapy*

Looking at the process of implementing remote speech therapy in Finland four local conditions impacting the outcomes of the transfer can be identified; 1) ICT
infrastructure, equipment and location, 2) collaboration 3) trust in the remote speech therapy service, and 4) organisational structure and distribution of benefits.

1) ICT infrastructure, equipment and location

The technological readiness to implement remote speech therapy at Pudasjärvi Health centre was good, with secure networks and adequate bandwidth available. Occasional problems with the local network did appear, impacting the video and audio quality negatively. The speech therapist was however satisfied with the overall quality of the service and with the results of the therapy. According to Finland report on implementing remote speech therapy access to equipment at the schools turned out to be a problem:

“There was only one equipment at the peripheral site and for this reason the special education teacher had to carry it from one place to another.”

Problems occurred also in relation to the locations where the children received the speech therapy:

“Arrangements in the room at the remote school were not good, as there were too much environmental disturbances.”

A dedicated room for receiving remote therapy was deemed to be essential for continued provision of the service. As the speech therapist no longer shared the physical space with the children receiving speech therapy, the process of providing therapy changed. Work material had to be delivered to the schools in advance; some material also needs to be transferred to electronic form and other methods, such as playing with the children could not be used during the remote sessions.

2) Collaboration

The implementation of remote speech therapy led to the initiation of collaboration between the speech therapist and the special education teachers. The Finland report on report on implementing remote speech therapy states:

“The children, the special education teacher, and the therapist were present at the same virtual room, which is an indisputable benefit of this video conferencing setting compared to a conventional session.”

The speech therapist was able to discuss the progress of the therapy and the individual needs of the children with the special needs teacher after the therapy session. This collaboration did not exist prior to the implementation of
remote speech therapy service, thus the implementation opened up for multi-professional collaboration and added value for the service users.

3) Trust in the remote speech therapy service

The importance of gaining patients’ and family members’ trust in remote services became apparent once the service was offered to patients. Although the staff members involved in the implementation were positive towards the service, not all of the children’s guardians were convinced of the remote service’s benefits. This problem became apparent when children were enrolled to use the service. The Finland report on implementing remote speech therapy states:

"Some parents had refused to allow their children to participate due to negative prejudices on therapies by video conferencing."

A total of 9 children suitable to receive remote speech therapy were identified, only three were consented to do so by their guardians. Each child received face-to-face therapy in addition to remote therapy in order to establish a good care relationship. In total the three children received 33 speech and language therapy sessions, of which 26 sessions were conducted remotely. The parents who allowed their children to participate in the trial were satisfied with the service. According to the therapist the treatment results achieved with remote speech therapy were good; the therapy was effective and care targets were met. According to the implementers of the service the low participation rate could be the result of underestimating the need to inform the parents on the content of the service.

4) Organisational structure and distribution of benefits

In the County Council of Västerbotten, Sweden, the implementation of remote speech therapy has led to considerable savings regarding travel reimbursements. These cost-savings have benefitted the implementing organisation directly. Similar benefits can be obtained in Finland; however, the potential savings would not directly benefit the Northern Ostrobothnia hospital district or the Ojankaari Joint Municipal Board, as a third organisation - the Social Insurance Institution of Finland deals with patients’ travel costs, hence the reduction in patients travel re-imbursement does not benefit the implementing organisations. In the Finnish case, the organisational structure has made it impossible for the implementing organisations to directly duplicate or widely implement the service, or to reap the same benefits as in Sweden.
Chapter 10: Case study 4 – Teledialysis

The Norwegian Centre for Telemedicine has developed a distance spanning haemodialysis service for renal patients in need of regular dialysis. The patients can undergo dialysis at one of the satellite renal units located in North Norway, instead of traveling to the University Hospital, located in Troms. The teledialysis service model has been transferred from Norway to Scotland NHS Highland & Western Isles renal services within the Competitive Health Services project.

The service was created in order to improve the level of care that could be provided at satellite units in addition to decreasing travel, both for patients and professionals. Instead of the nephrologists at the University Hospital of North Norway traveling between 800 and 1900 kilometres (return) to the satellite units, they are able to replace a third of the physical visits by utilizing videoconferencing (Rumpsfeld et al., 2005).

The teledialysis service includes videoconferencing equipment that is used by the satellite units’ staff to consult specialists located at the main hospital, and by the specialist to stay in contact with the patient during the dialysis. It is also used for virtual rounds and training purposes by the renal staff between the satellite units and the main hospital. The adoption of the teledialysis service at the satellite units also provides the units with access to on-call nephrologist at all times. Additional support for teledialysis is provided by online monitoring software that is used to exchange patient data and technical parameters regarding the status of the dialysis process between the satellite units and the main hospital. The service also includes digital ultrasound equipment and an electronic stethoscope for auscultation. The adoption of the teledialysis service model has led to decreased number of emergency admissions and the continuity of care, for example, regarding treatments and check-ups has improved (Rumpsfeld et al., 2005).

The teledialysis service was established by the University Hospital of Northern Norway in 2001 to include two satellite units; the service has since been expanded to include a total of five satellite units in Northern Norway and it is now part of routine renal care delivery.

10.1 Transferring teledialysis to Scotland

The clinical need for transferring teledialysis to NHS Highland renal service was high. The Highland renal services main operational centre is Raigmore hospital, with three satellite units in Wick, Fort William and Stornaway.
Out of the three satellite units Wick has the strongest clinical need to implement teledialysis. The unit has been running on maximum capacity with increasing demands on providing dialysis to the areas patient base. The nephrologists responsible for renal care travel to Wick once a month to hold outpatient clinic and to review all patients receiving haemodialysis. However, the nephrologist has struggled to review all outpatient cases during the visit to Wick, in addition to reviewing patients undergoing haemodialysis. As a solution, an extra nephrologist has occasionally travelled to Wick to help with the outpatient cases. This has led to doubling of travel time and costs for the nephrologists. Renal patients attending the Wick unit have been referred to Inverness unit, due to visiting nephrologists not having time to review all patient cases. The staff members at Wick satellite unit have expressed strong interest in implementing the teledialysis service, with Raigmore hospital being the organisation providing consultations.

The goal of transferring teledialysis to NHS Highland was to increase the quality of care provided at Wick satellite unit, and to decrease the nephrologists’ travel time allowing more time to be spent on direct patient care.

### 10.2 eHIT results on teledialysis

In order to evaluate Raigmore hospitals and Wick satellite units’ readiness to implement teledialysis, and detect potential problems the organisation might run into during implementation, two sets of eHIT were completed. Both Raigmore main hospital and Wick satellite units were evaluated.

The first set of results is collected from Wick satellite unit. The respondent is renal nurse in charge of the renal unit (eHIT number 8).

![Table 10.1 eHIT number 8. Results on Teledialysis - Context.](image-url)

Table 10.1 eHIT number 8. Results on Teledialysis - Context.
National policy: compatibility with current and planned national policy and enabling the achievement of national priorities or targets both score 10. According to the respondent teledialysis service supports reaching national targets and it is also compatible with the Scottish national policies.

Local policy: compatibility with current and planned local policy scored 10. According to the respondent teledialysis is aligned with local policies.

Local culture: welcoming e-health and embracing change scored 10. According to the respondent the organization has already implemented several eHealth initiatives and has a positive attitude towards change. Good working relationships scored 10, indicating that the Wick satellite unit has no problems related to working relationships. On the statements of whether or not the eHealth initiative is supported by a well-respected local sponsor and supported by opinion leaders the respondent gave the score 5 respectively 7, indicating existing support from opinion leaders but lacking support from local sponsors.

Resources: the statement related to whether or not the teledialysis service is well resourced or not the respondent gave the score 3, as NHS Highland is faced with financial challenges. The statement minimal impact on resource allocation was given the default score 5.

Risk: compatibility of existing risk management policies scored 7, according to the respondent teledialysis could have a positive impact on risks, for example, by reducing travel for patients and professionals.

Table 10.2 eHIT number 8. Results on Teledialysis - The intervention.

**Impact on clinical practice:** facilitation of health professional-patient interaction scored 10, according to the respondent the teledialysis service has the potential to improve communication between professionals working at Wick satellite unit and Raigmore hospital. Security, confidentiality and reliability of teledialysis is estimated to be high, giving the score of 8 on the statement.
Ease of use of the system: scored 8. The respondent remarks that it is difficult to estimate ease of use regarding teledialysis prior to piloting the service.

Effectiveness and cost-effectiveness: scored 9. According to the respondent the estimation is based on the positive results obtained on using the teledialysis service in Norway.

Table 10.3 eHIT number 8. Results on Teledialysis - The workforce.

Impact on work and workflow: Not increasing staff workloads scored 4. The respondent points out that there is likely to be somewhat increased workload in the beginning when the staff working at the satellite unit is not familiar with the service provision model. In the long run it is likely that teledialysis will be increasing efficiency of work patterns, giving a score of 7 on the statement. The respondent points out that scheduling regular videoconferencing slots is likely to reduce the number of emails and phone calls, leading to improved efficiency. Compatibility with divisions of labour scored 6, according to the respondent the teledialysis service will support current division of labour.

Education and training: scored 2, indicating high training needs. According to the respondent it is very important to provide thorough training on how to use the equipment included in the teledialysis concept.

Relationships between different professional groups: compatibility with existing power relationships scored 10, indicating that teledialysis is compatible with the current situation at Wick. Enhancing confidence between groups scored 8. According to the respondent implementing teledialysis at Wick satellite unit
will further harmonize working relationships at the unit. The respondent gave the default score of 5 on *alignment of responsibility and accountability*.

Following is a summary of the scores previously reported by the respondent, showing the overall score on the context, the intervention and the workforce.

![Summary of Topic Scores](image)

Table 10.4 eHIT number 8. Results on Teledialysis- Summary of topic scores.

**Context:** the overall score is 77%. Though local and national policies and targets support implementation of teledialysis, the Wick unit lacks support from local sponsors. Cutbacks on NHS funding make it challenging to implement teledialysis. Wick unit does not have resources to implement the service, thus funding for teledialysis must be secured elsewhere. The respondent could not answer the statement on how the implementation would impact resource allocation.

**The intervention:** the statements included in this section receive a high score overall leading to a total score of 88% on the intervention. The respondent does however point out that it is difficult to estimate how easy teledialysis is to run without prior experience.

**The workforce:** the overall score is 60%. As teledialysis introduces a new way of working there is likely to be an increase in staff workload. Further, training should be given high priority to ensure that staff members are able to use the equipment correctly. The respondent could not answer the statement on alignment of responsibility and accountability.

The second set of eHIT results on teledialysis is collected from Raigmore hospital which would provide consultations for the Wick satellite unit. The respondent is a renal physician, who is likely to be the specialist in charge of the consultations.
National policy: according to the respondent implementing teledialysis will ultimately reduce travel time not only for patients, but also for staff, leading to shorter waiting lists for patients, since health care professionals will have more time to see patients. Therefore compatibility with current and planned national policy and enabling the achievement of national priorities or targets scored 8 respectively 9.

Local policy: compatibility with current and planned local policy scored 8, indicating that teledialysis is compatible with local policies.

Local culture: Welcoming e-health and embracing change scored 9 indicating positive attitudes among the staff towards e-health. The respondent does however point out, with specific reference to the teledialysis service, that it is necessary to complete the local implementations of the electronic patient record system in Wick and Raigmore before implementing teledialysis. Good working relationships scored 10, indicating no problems regarding working relationships. The respondent points out that there are routines in place that support work relationship; Raigmore hospital and its satellite units have regular meetings where skills are exchanged potential problems are discussed. According to the respondent teledialysis is supported by a well-respected local sponsor, score 9, and it is supported by opinion leaders, score 10.

Resources: according to the respondent the organization does not have the necessary resources to initiate teledialysis services. They are however going to try to find the necessary funding and try to demonstrate that teledialysis can be cost-effective or cost-neutral. The respondent gave the statement well resourced the default score of 5, as well as on the statement minimal impact on resource allocation.

Risk: according to the respondent teledialysis is compatible with existing risk management policies, scoring 9 on the statement. The respondent states that teledialysis can have a positive effect on risks by reducing patient and staff
travel. Communication included in the teledialysis service will be over a secure link further strengthening the score on risk category.

![Table 10.6 eHIT number 9. Results on Teledialysis - The intervention.](image)

**Impact on clinical practice:** facilitation of health professional-patient interaction scored 6, indicating that implementation of teledialysis will not have a major impact on relationships between patients and professionals. Security, confidentiality and reliability scored 9. The respondent estimates that security risks related to implementing teledialysis are minimal.

**Ease of use of the system:** scored 7 out of 10. No major issues related to how easy it will be to operate the teledialysis service are anticipated.

**Effectiveness and cost-effectiveness:** scored 6, with respondents’ reference to difficulties in estimating effectiveness and cost-effectiveness in advance.
Impact on work and workforce: on the statement not increasing staff workloads, the respondent scored 4, indicating that staff workload will initially increase as a result of implementing teledialysis. The statement increasing efficiency of work patterns scored 6, indicating that implementing teledialysis might have a positive effect on efficiency. Compatibility with divisions of labour scored 4, indicating that teledialysis is not fully compatible with current divisions of labour.

Education and training: on the statement regarding training needs the respondent gave the score of 3, indicating that training is required.

Relationships between different professional groups: compatibility with existing power relationships scored 6, indicating that teledialysis is not completely compatible with the organizations power relationships. Enhancing confidence between groups scored 8, indicating a positive impact on professional confidence between groups if teledialysis is implemented. Alignment of responsibility and accountability scored 7. The result indicates that there are no major issues regarding responsibilities and accountability if teledialysis is implemented.

Following is a summary of the scores previously reported by the renal physician working at Raigmore hospital on context, the intervention and the workforce.
Table 10.8 eHIT number 9. Results on Teledialysis - Summary of topic scores.

**Context:** has the overall score of 82%. Local and national policies and targets support the implementation of teledialysis. The staff members have in general positive attitude towards eHealth. In order for the staff members at Raigmore to be able to focus on implementing teledialysis the implementation of electronic patient record system should be completed prior to setting up teledialysis. Currently, Wick and Raigmore do not have the necessary resources to implement teledialysis, funding has to be secured elsewhere. The respondent could not answer the statement of minimal impact on resource allocation.

**The intervention:** scored 70%. No potential problems were detected at this stage.

**The workforce:** receives the overall score of 54%, several factors influence the score negatively. Implementing teledialysis might increase staff workload. It can also create a need to re-divide tasks among health care staff. Implementing teledialysis will lead to implementing a new way of working; the staff members need training in how to work with the ICT used in the service.

**10.3 Implementation outcomes**

The teledialysis service concept has been transferred to Raigmore hospital and Wick satellite unit. Based on the Norwegian experiences of implementing teledialysis the electronic stethoscope and the digital ultrasound equipment have been excluded from the transfer as they have not been necessary in providing teledialysis. The goals of implementing teledialysis in Scotland were to use the nephrologists’ time more efficiently by decreasing time spent on traveling and to increase the number of patients seen at the outpatient clinics thus avoiding referring patients to other care facilities. According to the Scottish pilot report on teledialysis these goals have been met.
The implementation of teledialysis has enabled increased number of outpatients to be seen by the nephrologists during the monthly outpatient clinic held at Wick. Time has been freed up for the nephrologist as the patients undergoing haemodialysis have been reviewed in advance during virtual rounds. During the virtual rounds the haemodialysis patients have met the nephrologist in a videoconference. In addition to the live video-feed the nephrologist has been able to access the patients’ medical history and laboratory results via the electronic patient record system. As a result of the implementation of teledialysis the need to refer patients to other care facilities has decreased. Prior to implementing teledialysis in 2009, 32 out of 42 outpatients were referred to Inverness unit. In 2010 after implementing teledialysis 2 out of 31 outpatients were referred.

Implementing teledialysis has also impacted how work is divided among the staff members. As nephrologists now review the haemodialysis patients in advance during virtual rounds the renal nurses working at Wick need to prepare the patient and the equipment before the virtual round can take place. As time has been freed up for the nephrologists by decreasing travel time, they are now able to increase the time spent on clinical work. This has led to increased number of patients being treated by the nephrologist during outpatient clinic days at Wick, while haemodialysis patients are seen via videoconference during the office hours at Raigmore hospital.

The implementation of teledialysis has run fairly smoothly, the main problem being how to acquire the videoconferencing equipment needed to provide teledialysis. The eHIT conducted prior to the implementation in order to evaluate the organisational readiness at Wick satellite unit and at Raigmore hospital showed that the representatives of both organisations gave fairly similar responses, highlighting the difficulty of acquiring videoconferencing equipment. In addition, the renal nurse working at the satellite unit questioned...
the local support teledialysis would receive. Both of these issues were overcome when the NHS Highland and its eHealth department decided to formally support the teledialysis service by funding the purchase of necessary equipment and by guaranteeing technical support for the staff members running the service.

The eHIT results show that the consultant renal physician (eHIT nr. 9) stressed the need to complete the on-going implementation of the electronic patient record system prior to initiating the teledialysis service in the renal service. Consequently, the implementation was postponed until the electronic patient record system was fully implemented. As expected based on the eHIT results, the implementation impacted the division of work and workload and created training needs, which were met by the organisation during the implementation process.

To summarize, the eHIT analysis detected potential issues related to resources, local support, training needs, division of work and workload. These predictions did materialize during the implementation process; however, the organisation was able to overcome these obstacles and completed the implementation.

**Local conditions impacting the outcomes of transferring teledialysis**

Looking at the implementation of teledialysis in Scotland, three local conditions impacting the outcomes of transferring teledialysis can be identified; 1) collaboration and knowledge exchange 2) training and confidence 3) flexible use of ICT.

1) Collaboration and knowledge exchange

Collaboration between the renal staff members in Scotland and the department of nephrology at Troms University Hospital has been beneficial throughout the implementation of teledialysis in NHS Highland. The Wick team has visited Troms University Hospital to see how the service is operated in Norway. They have received support and guidance in how to operate and organise the service during the implementation process from the Norwegian partners and from the NHS. Experiences gained on running the teledialysis service in Norway have also impacted what equipment has been acquired in Scotland. Based on the recommendations the renal staff in Norway have given to the renal staff in Scotland, the monitoring software and the electronic stethoscope have not been acquired by NHS Scotland, as they have proved to be unnecessary in clinical work.

2) Training and confidence

The implementation of teledialysis created training needs which have been met by the organisation. NHS Highland organised training sessions for staff
members who would be involved in providing the service. The Scottish pilot report states that:

"Initial practical training sessions were provided by NHS Highland VC specialists at the Wick and Raigmore units for doctors and nurses who would be among the first users of the new equipment. These were rated highly as generating confidence among staff, along with the assurance that help would be on hand to troubleshoot problems with connection or transmission of video calls."

Thus, the training sessions have not only provided the staff members with the skills necessary to run the service, it has also had a positive impact on the level of confidence. The knowledge of technical supports availability has further increased the sense of security regarding providing teledialysis.

3) Flexible use of ICT

The videoconferencing equipment acquired for providing teledialysis has been used far beyond its original purpose. Staff members at Wick satellite unit have utilized the videoconferencing equipment by participating in the training activities taking place at the main hospital. This has had a positive impact on their professional competence and counteracted professional isolation. The renal nurses have also used the equipment to share nursing updates between Wick and Raigmore regarding renal patients. The nursing updates have led to formalization of communication between the two sites. There are now scheduled weekly nursing updates, which help the staff members to plan, for example, patient discharges, influencing the continuity of renal care in a positive way.

The patients and the staff are satisfied with the quality and the outcomes of the service. The teledialysis pilot has now turned into a part of permanent services provided by the NHS Highland renal service. It has also been expanded to include consultation services provided by dieticians to renal patients. Furthermore, pharmacists and physiotherapists involved in renal care are planning to utilize the equipment to provide remote consultations to Wick unit. In addition to providing teledialysis at the Wick unit, teledialysis is now provided at Belford Hospital in Fort William and the possibilities to expand the service further to include other satellite units are being explored.
Chapter 11: Case study 5 – Remote wound therapy

Remote wound therapy service has been transferred from University Hospital of Troms in Norway to Northern Ostrobothnia Hospital District (NOHD) and to Oulunkaari Joint Municipal Board (OJMB) in Finland. In the NOHD the service has been implemented at Oulu University Hospital’s department of dermatology and the department of surgery. In the OJMB the service has been implemented at Pudasjärvi health centre.

Remote wound therapy is a service established by the University Hospital of Troms in 1989. The goal of establishing the service was to increase patients’ access to dermatology services and to shorten waiting times for the patients, ultimately leading to improved health status.

The remote wound therapy service connects the University Hospital to two remote primary care centres, located in Kirkenes and in Hammerfest. Instead of the patients traveling 1600 km return from Kirkenes, or 900 km return from Hammerfest to visit the dermatology unit located at the University Hospital of Troms, the patients’ status can be followed up via videoconference at the local primary care centre.

Both Kirkenes and Hammerfest primary care centres are equipped with video conferencing equipment and phototherapy machines used to treat dermatology patients. During a remote wound therapy session, the patient and a general practitioner meet with a dermatologist in a videoconference. The general practitioner initiates the meeting by briefing the dermatologist on the patient’s medical history. The dermatologist is then able to see enlarged live images of the skin areas that are affected and interview the patient. Finally, the general practitioner, dermatologist and the patient jointly plan how the patient will be treated. Since care plan and phototherapy machine are available at the primary care centre, the patient is able to receive treatment locally without delay.

Based on the cost-minimization analysis conducted by Bergmo (2000), 79% of dermatology patients living in the area of Kirkenes can be treated remotely. Patients who might suffer from a malignant condition, and patients who have problems in the genital area or who suffer from scalp problems are not suitable recipients of remote therapy and are referred to the University Hospital of Troms. The main beneficiaries of the remote wound therapy service are the patients. Due to the implementation of the remote speech therapy the patients need to travel has decreased and access to treatment has increased. Treatment of dermatological conditions may also include phototherapy sessions. A course of therapy can last from a few days to weeks depending on the patient’s
condition. This service has been traditionally provided at the University Hospital. With remote support from a dermatologist and local access to phototherapy machine the patients are able to avoid lengthy stays at Troms.

11.1 Transferring remote wound therapy to Finland

Patients with complicated skin problems are referred from Pudasjärvi health centre to the department of surgery or the department of dermatology at Oulu University Hospital. Pudasjärvi health centre is located approximately 90 kilometres from the Oulu University Hospital. Traveling to the hospital can be straining, especially for the elderly patients. Implementing the remote wound therapy service in the municipality of Pudasjärvi is expected to increase patients' access to specialist wound care services, and to increase the competence of the staff members working at the remote health centre of Pudasjärvi

11.2 eHIT results on remote wound therapy

In order to evaluate the organisational readiness to implement remote wound therapy service at the Oulu University Hospital and at Pudasjärvi health centre, eHIT assessments were carried out by both organisations. Oulu University Hospital’s department of dermatology and the department of surgery were evaluated as the sites that would provide consultations. Pudasjärvi health centre was evaluated as a satellite unit that would contact Oulu University hospital when in need of consultation regarding wounds.

Department of surgery, Oulu University Hospital

The first set of eHIT results were collected at the department of surgery at Oulu University Hospital. The respondent is a plastic surgeon, likely to be the specialist responding to the consultation requests. First, the results on the context, the intervention and the workforce are presented, followed by a summary of the total scores on each of the sections.
Table 11.1 eHIT number 10. Results on remote wound therapy - Context.

**National policy:** the statements *compatibility with current and planned national policy* and *enabling the achievement of national priorities or targets* score 8 respectively 7. According to the respondent the Finnish national policies support implementation of ICT applications that facilitate achieving national targets.

**Local policy:** *compatibility with current and planned local policy* scored 9. According to the respondent Oulu University Hospital is a pioneer in exploiting ICT innovations.

**Local culture:** *welcoming e-Health and embracing change* scored 8. The respondent points out that the Northern Ostrobothnia Hospital District is currently running several ICT projects. *Good working relationships* scored 8, indicating no major issues related to working relationships. *Supported by a well respected local sponsor* scored 8. According to the respondent the management of the department of surgery are committed to implementing ICT innovations. *Supported by opinion leaders* scored 7, indicating that local opinion leaders are positive to piloting remote wound therapy.

**Resources:** *well resourced* scored 4. According to the respondent the fact that Northern Ostrobothnia Hospital District has several projects running, can make it difficult to obtain the necessary resources. The respondent cannot answer the statement on recourse allocation, thus the statement is given the default score 5.

**Risk:** the respondent cannot answer the statement on *compatibility with existing risk management policies*, giving it the default score of 5.
Table 11.2 eHIT number 10. Results on remote wound therapy - The intervention.

**Impact on clinical practice:** *facilitation of health professional – patient interactions* scored 8. According to the respondent the wound therapy service is well suited to be a remote service, due to the nature of clinical work in wound care, which prioritises visual assessments. Security, confidentiality and reliability scored 8, indicating no major issues related to the topic.

**Ease of use of the system:** scored 8, indicating that the remote wound therapy service will be easy to operate.

**Effectiveness and cost-effectiveness:** scored 5. According to the respondent calculations done on the cost-effectiveness of the remote wound therapy in Norway might not be accurate in Finnish context.

Table 11.3 eHIT number 10. Results on remote wound therapy- The workforce.
**Impact on work and workflow:** Not increasing staff workloads scored 2. The respondent points out that implementation of new ICT systems always leads to initially increased workloads. Increasing efficiency of work patterns scored 8. According to the respondent remote wound therapy will decrease the number of patient visits at the department of surgery, as long as the service is well functioning. It will thereby enable more demanding patient cases to be dealt with at the department of surgery with the time freed up from less demanding cases. Compatibility with divisions of labour scored 5, according to the respondent labour divisions are not likely to be impacted if the remote wound therapy service is implemented.

**Education and training:** The statement minimal training needed scored 2. According to the respondent training is necessary since methods used in the remote wound therapy service are not currently used at the department of surgery.

**Relationships between different professional groups:** compatibility with existing power relationships scored 10, indicating that the remote wound therapy is compatible with existing power relationships. Enhancing confidence between groups scored 8, indicating that implementation of remote wound therapy can enhance confidence between groups. Alignment of responsibility and accountability scored 0. According to the respondent it is necessary to increase multi-professional co-operation if remote wound therapy is implemented.

Following is a summary of the scores previously reported by the respondent, showing the overall score on the context, the intervention and the workforce.

![Summary of Topic Scores](image)

<table>
<thead>
<tr>
<th>Topic Score (%)</th>
<th>Context</th>
<th>The intervention</th>
<th>The workforce</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>69%</td>
<td>73%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Table 11.4 eHIT number 10. Results on remote wound therapy - Summary of topic scores.

**Context:** scored 69%. The statements included in the context section highlight that there are several ICT related projects running in the NOHD. This might
make obtaining the necessary resources to pilot remote wound therapy difficult.

**The intervention:** scored 73%. The section highlights a potential problem related to the cost-effectiveness of remote wound therapy. The cost-effectiveness obtained in the Norwegian context might be difficult to obtain in the Finnish context.

**The workforce:** has the overall score of 50%. Staff member’s workload is likely to increase at least temporarily if remote wound therapy service is implemented. Training is essential, as the department of surgery has not previously provided video consultations. Careful consideration should also be given to the effects implementing the service may have on how responsibility and accountability of providing remote therapy is divided between the department of surgery and Pudasjärvi health centre.

*Department of dermatology, Oulu University Hospital*

The second set of eHIT results are reported by the department of dermatology at Oulu University Hospital. The respondents are the head nurse and a nurse, likely to be involved in producing the service. The respondents completed the eHIT jointly.

Table 11.5 eHIT number 11. Results on remote wound therapy - Context.

**National policy:** compatibility with current and planned national policy scored 8. According to the respondents the concept of remote wound clinic is in line with the Finnish health care policy. Implementing remote wound care lowers patients' threshold to seek care enabling earlier treatment. Enabling the achievement of national priorities or targets scored 8, indicating that the remote wound clinic supports the achievement of targets and priorities.
Local policy: compatibility with current and planned local policy scored 8. According to the respondent remote wound clinic service is compatible with Northern Ostrobothnia Hospital District’s policies.

Local culture: welcoming e-Health and embracing change scored 9. According to the respondents the nursing culture welcomes new innovations. Good working relationships scored 8. The respondents point out that the different staff groups have the necessary skills to jointly solve and discuss problems. Supported by a well respected local sponsor scored 9. According to the respondents their closest management supports the implementation of remote wound therapy. Supported by opinion leaders scored 5, indicating a need to gain the support of local opinion leaders.

Resources: well resourced scored 2. According to the respondents the Northern Ostrobothnia Hospital District is under-resourced, obtaining the necessary resources will be critical in order to proceed with the implementation. Minimal impact on resource allocation scored 5, indicating changes in resource allocation. The respondents point out that currently the specialist nurse treats wounds only twice a week, which may change if remote wound clinic service is implemented.

Risk: compatibility with existing risk management policies scored 2, indicating that the current risk management policies at the department of dermatology might not be aligned with the service model proposed in remote wound clinic. The respondents point out that using videoconferencing might have a negative effect on the quality of care, since some information on the patients status is lost when videoconferencing is used instead of physical meetings. This might challenge the current risk management policies at the department.

Table 11.6 eHIT number 11. Results on remote wound clinic- Intervention.

Impact on clinical practice: facilitation of health professional - patient interactions scored 9. According to the respondents implementing remote wound therapy can have a positive effect on the professional-patient interactions by lowering the patients’ threshold to seek care at an earlier stage.
Security, confidentiality and reliability scored 9, the respondents state that running the service in the secure hospital network should ensure security, confidentiality and reliability of remote wound therapy.

Ease of use of the system: scored 7 indicating that the system would be fairly easy to use. The respondents point out that using videoconferencing eliminates information received during physical examination such as smell and skin temperature and is therefore not suitable for all patient cases.

Effectiveness and cost-effectiveness: is given the default score of 5, the respondents are not able to answer the question regarding remote wound clinics effectiveness and cost-effectiveness due to lack of experience in the subject.

Table 11.7 eHIT number 11. Results on remote wound therapy - The workforce.

Impact on work and workflow: Not increasing staff workloads scored 4. The respondents state that implementing remote wound therapy will lead to initially increased workloads, they do however point out that, in general, the service does not appear to be difficult to use. Increasing efficiency of work patterns scored 7. According to the respondents remote wound clinic can increase efficiency. The staff at Pudasjärvi health centre would prepare the patients for the consultation eliminating certain work processes such as undressing the wound, normally done by the staff working at the department of dermatology, thus freeing up time. Compatibility with divisions of labour scored 2, indicating that remote wound clinic is not compatible with current divisions of labour at the department of dermatology. According to the respondents how labour will be divided depends on the available staff, if there is a staff shortage current division of labour can be affected.
**Education and training:** scored 6. The respondents do not anticipate any major issues related to education and training, some practical training on the technological aspects of remote wound clinic and new work methods are necessary.

**Relationships between different professional groups:** compatibility with existing power relationships scored 5. The respondents do not anticipate any major problems related to power relationships. The implementation of remote wound therapy might cause discussion regarding the division of professional turfs between medical doctors and nurses, the respondents point out that knowhow has to be earned despite medical turfs. Enhancing confidence between groups scored 6. According to the respondents the implementation can provide the nursing staff with the opportunity to demonstrate their skills and knowledge, as long as positive results can be achieved by the implementation. Alignment of responsibility and accountability scored 5. The respondents cannot say how the remote wound therapy service differs from other services provided by the department of dermatology.

Following is a summary of the scores previously reported by the respondents working at the department of dermatology at Oulu University Hospital. The table shows the overall scores on the context, the intervention and the workforce.

<table>
<thead>
<tr>
<th>Topic Score (%)</th>
<th>Context</th>
<th>The intervention</th>
<th>The workforce</th>
</tr>
</thead>
<tbody>
<tr>
<td>64%</td>
<td>75%</td>
<td>50%</td>
<td></td>
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</tbody>
</table>

Table 11.8 eHIT number 11. Results on remote wound therapy - Summary of topic scores.

**Context:** scored 64%. The section highlights the hospital district's lack of resources. This is likely to have a negative impact on the implementation of the remote wound therapy service. In addition to resources, consideration should be given to risk management. Examining a patient remotely might have a negative impact on the quality of care patients receive. As the person conducting the remote examination is not able to physically examine the
patient, some important information might be lost, for example, on skin
temperature and on the odour of wound secretion.

**The intervention:** scored 75%. Apart from the problem related to loss of
information during remote consultation, no potential problems were detected.

**The workforce:** scored 50%. The staff workload is likely to increase, at least
initially, if the service is implemented. Further, the current division of labour
might not be aligned with the division of work that is necessary if the service is
implemented. Remote wound therapy service may have an impact on the
professional roles of nurses. The work nurses do regarding wound care may
become more visible to other professional groups as a result of implementing
remote wound therapy. Further, the implementation may not be fully
compatible with the power relationships between nurses and dermatologists,
and may cause a conflict among the staff members.

**Pudasjärvi health centre**

The third set of eHIT results was collected at Pudasjärvi health centre. The
respondents are the chief physicians and a nurse specialised in wound care.
The respondents are likely to use the service, if it is implemented. The
respondents completed the eHIT jointly. First, the results on context, the
intervention and the workforce are presented, followed a summary on the
topic scores.

Table 11.9 eHIT number 12. Results on remote wound therapy- Context.

**National policy:** *compatibility with current and planned national policy* scored
9. According to the respondents the remote wound clinic is compatible with
Finnish policies, as the implementation would make care more accessible in the
remote areas of Northern Finland. *Enabling the achievement of national policies
and targets* scored 9, indicating that remote wound clinic is aligned with
national targets.
Local policy: compatibility with current and planned local policy scored 9, the respondents point out that implementing remote wound clinic is compatible with Pudasjärvi health centres’ organisational culture of implementing new innovations.

Local culture: welcoming e-Health and embracing change scored 8, as Pudasjärvi health centre is interested in implementing ICT innovations. Good working relationships scored 9, the unit has informal communication channels and there is a tradition of cross-professional consultations and the staff members do not hesitate to ask for help. Supported by a well-respected local sponsor scored 8, as the nursing management at Pudasjärvi health centre is able to allocate resources to be used for running remote wound therapy. Supported by opinion leaders scored 8. The respondents point out that the attitudes of opinion leaders towards the remote wound clinic depend on the support available for the implementation. In general, the attitude towards ICT is positive at Pudasjärvi health centre.

Resources: well resourced scored 7. According to the respondents resources are needed especially in the beginning of the pilot in order for the staff members to learn to use the equipment and to adapt to the new method of working. Minimal impact on resource allocation scored 7, as the implementation can create some changes at the unit.

Risk: compatibility with existing risk management policies scored 9, indicating no major issues related to risks.

<table>
<thead>
<tr>
<th>Impact on clinical practice</th>
<th>Facilitation of health professional – patient interactions</th>
<th>Security, confidentiality and reliability</th>
<th>Ease of use of the system</th>
<th>Effectiveness and cost-effectiveness</th>
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<tr>
<td></td>
<td>8</td>
<td>9</td>
<td>8</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 11.10 eHIT number 12. Results on remote wound therapy - The intervention.

Impact on clinical practice: facilitation of health professional – patient interactions scored 8. The respondents point out that remote wound therapy service is aimed for conducting consultations between health care professionals and will facilitate this type of communication. The service will not be used for communication between professionals and patients. Security,
confidentiality and reliability scored 9, since the service will be running in the secure hospital network.

**Ease of use of the system:** scored 8, indicating no major issues related to the ease of use.

**Effectiveness and cost-effectiveness:** scored 7, the respondents are not familiar with research result that provides evidence on the effectiveness or cost-effectiveness of wound related telemedicine services. They do point out that in their experience videoconferencing generally works well.

![Table 11.11 eHIT number 12. Results on remote wound therapy- The workforce.](image)

**Impact on work and workflow:** *not increasing staff workloads* scored 4, according to the respondents the workload will increase as preparatory work is necessary and new work processes have to be developed. *Increasing efficiency of work patterns* scored 8, implementing remote wound care will provide the patients with the opportunity to receive care at an earlier stage leading to improved efficiency of the health care staff. *Compatibility with divisions of labour* scored 8, indicating high compatibility.

**Education and training:** scored 5, the respondents do not anticipate any major problems related to the service, they estimate that it will be easy to learn how to use the technology.

**Relationships between different professional groups:** *compatibility with existing power relationships* scored 9, according to the respondents
implementing remote wound therapy will have a positive impact on the status of the specialist wound nurse, as remote sessions will have an educational function. Enhancing confidence between groups scored 7; as the nurses’ competence will become more visible to other professionals. Alignment of responsibility and accountability scored 9, indicating that the proposed service is aligned with the organisational structures of Oulunkaari Joint Municipal Board.

Following is a summary of the scores previously reported by the respondent, showing the overall score on the context, the intervention and the workforce.

![Summary of Topic Scores](image)

Table 11.2 eHIT number 12. Results on remote wound therapy - Summary of topic scores.

**The context:** scored 83%. In order for the remote wound therapy service to gain full support from of the local opinion leaders, resources for implementing the service must be available. As the implementation will change the work methods, the staff members must receive support in how to handle the technology and how to use it in a clinical context.

**The intervention:** has the overall score of 80%. No potential problems were detected at this stage.

**The workforce:** scored 71%. Implementing the service will increase staff workloads, as the nursing staff needs to prepare the patients for remote consultation and develop work methods so that they will support the new way of working.

**11.3 Implementation outcomes**

The remote wound therapy service was transferred to Finland in order to increase access to dermatology services and to find out if remote consultation
is a suitable form of collaboration between Pudasjärvi health centre, home nursing teams and Oulu University Hospital.

The remote wound therapy service has been piloted in Finland with two service models. In the first service model home nurses have been able to contact a specialist wound nurse at the Pudasjärvi health centre in order to receive instructions on how to treat a complicated wound. The home care nurses have a portable videoconferencing unit, which they take with them when they visit the patients. The nurses set up a video link at the patient's home thus enabling live-support for wound treatment from the specialist wound nurse working at Pudasjärvi health centre. Two patients receiving home care participated in remote consultation. Both of the patients got a revised treatment plan as a result of the remote therapy. Home nursing staff experienced that the opportunity to consult a specialist wound nurse increased their competence in wound care. The remote consultations functioned as an educational opportunity, as the home care nurses were able to follow the decision process of how to treat complicated wounds and to carry out the instructions.

Figure 11.1 Remote wound consultation between Pudasjärvi health centre and Oulu University Hospital. Photo Yle Akuutti.

In the second service model a video link has been established between Pudasjärvi health centre and the outpatient clinics of dermatology and surgery at the Oulu University Hospital. Specialist wound nurses at Pudasjärvi health centre have been able to consult dermatologists and plastic surgeons located at the main hospital. The specialists have been able to examine the patient remotely and discuss the next steps in the patient's care with the patient and staff members. A total of six consultations were conducted between Pudasjärvi health centre and the department of dermatology. The remote consultations
replaced a visit to the University Hospital in all six cases, and led to a revised course of treatment in five cases. There has been no need for consultations between Pudasjärvi health centre and the department of surgery.

The eHIT results from Oulu University Hospital’s department of surgery and department of dermatology show similar results regarding problems related to resources and the impact the implementation is assessed to have on workload and training needs. These expectations did materialize during the implementation. The organisation was able to organize adequate training for the staff members and acquired the necessary funds to proceed with the implementation. In addition the department of surgery anticipated that the financial impacts gained via remote wound therapy in Norway may be difficult to duplicate in the Finnish context. This estimate was correct, as the limited patient base in Pudasjärvi area impacts the cost-effectiveness negatively.

The department of surgery also expected an increase in multi-professional teamwork as a result of the implementation, potentially impacting the allocation of accountability when patients are treated remotely. As the remote site has not had any patients in need of consultation from the department of surgery, it is impossible to say whether or not this issue would have become reality.

The department of dermatology’s eHIT results highlighted that there was a risk that some conditions could not be treated remotely. This prediction did materialize, when a patient with a scalp problem was examined remotely. Aligned with the Norwegian experiences, scalp wounds could not be diagnosed via videoconference. As predicted in the eHIT, the implementation of remote wound therapy has impacted the division of work. As the remote site prepares the patients’ wounds prior to the consultation, and dresses the wound after the consultation, the work has been shifted from the Oulu University Hospital to the remote site. As a multi-professional team is present at the hospital and at the remote site during consultations, the work different professional groups do has become more visible for all participants.

All of the consultation requests from the remote site to the Oulu University Hospital have been directed to the department of dermatology according to the patients’ needs. The eHIT results from the remote site showed overall high readiness to implement the service, the only predicted problem being lack of human resources to deal with the increasing workload. As extra resources were not allocated, the staff members have had to cope with the existing resources. This has however not hindered the staff members from using the remote service.

To summarize, the eHIT results from the department of dermatology and Pudasjärvi health center were well matched with the actual implementation process, whereas the eHIT results from the department of surgery cannot be
verified, as the department has not received consultation requests due to lack of relevant patients.

*Local conditions impacting the outcomes of transferring remote wound therapy*

Examining the implementation process of the remote wound clinic three local conditions impacting the outcomes of the service transfer can be identified; 1) collaboration and interaction, 2) flexibility of the ICT, and 3) organisational structure and distribution of benefits.

1) Collaboration and interaction

Collaboration between the different health care organisations and the patients during the remote consultation worked well according to the staff members, and has made it possible to treat patients locally. The staff members identified patients with chronic cutaneous wounds as a suitable patient group for remote services. According to the sub-report on implementing remote wound care in Finland, a video feed was seen as a necessity for treating patients remotely:

"A consultation only by phone as a substitute for videoconferencing was seen as insufficient for all of the cases."

The patients who received remote wound therapy were satisfied with the service and wished to use it in the future. According to the sub-report on implementing remote wound therapy the interaction between the staff members and the patients has been good during the consultations:

"They found that they were able to express their problem and it was recognized in the OUH."

The collaboration between the remote health care centre and the Oulu University Hospital has created a new way of interacting between the patient and the staff members. Not all impacts have been positive when remote consultations have been conducted; the sub-report on implementing the service states the following:

"One patient with a wound at his back felt as an outsider because he had difficulties to see the screen."

The position of the videoconferencing equipment and the limitations set by the physical space made it impossible for the patient to see the video screens, challenging the patient's chance to be part of the care situation, as the staff members were literally talking behind the patient’s back. The remote wound therapy service has also reduced the consultation times at the department of dermatology, freeing up time for the staff members to treat complicated patient
cases. The increased efficiency the service implementation led to did however have a downside. A wound consultation at the department of dermatology takes on average 30 minutes, whereas a remote consultation takes 15 minutes. The halving of the consultation time led to less attention being paid to the patient, as the staff members’ focus was mainly on the wound.

According to the feedback from the staff members involved in the implementation of remote wound therapy, it has increased knowledge exchange and co-operation across organisational boundaries and has led to more unified wound treatment praxis. Prior to the implementation patients were referred from Pudasjärvi health centre to the Oulu University Hospital, instead of the two organisations working together to care for the patients.

2) Flexibility of ICT

The staff members involved in the implementation estimate that there are approximately 20 annual patient visits at Pudasjärvi health centre that are suitable for remote wound therapy. In order for the service to be financially sustainable, more consultations are necessary. The Finnish pilot report states that:

“However, if there were altogether about 200 annual outpatient consultations with the departments of the OUH, the mode of action would be cost-effective. On the other hand, if video conferencing equipment were used actively for education of personnel, administrative purposes, etc, considerably lower numbers of consultations with the OUH would be enough in terms of cost-effectiveness.”

Thus, the sustainability of the service depends on the extent the equipment is used. If the videoconferencing system is utilized only in dermatology consultations, the organisations cannot continue to provide the service. If the videoconferencing system can be used beyond dermatology, the service becomes sustainable.

3) Organisational structure and distribution of benefits

Implementation of remote wound therapy has made dermatology services more accessible for patients. This has had a positive impact on the amount of travel patients need to do. Travel-reimbursements are however not the covered by the Northern Ostrobothnia Hospital District or by the Ojankaari Joint Municipality Board, but by the Social Insurance Institution of Finland. Therefore, the patients’ decreased need to travel does not financially benefit either of the implementing organisations. The Finnish report on implementing remote wound clinic states that:
“In terms of economy, the biggest winner of video conferencing is the Social Insurance Institution.”

Pudasjärvi health centre has gone through considerable organisational changes during the implementation of remote wound therapy. It is possible that these changes will influence the future of the remote wound therapy service.

“Pudasjärvi now belongs to a larger health centre unit, the Oulu Arc health care centre. The decisions on service delivery are no longer local and therefore continuing this remote service might be questionable.”

It is unclear how this will impact the division of work regarding wound care, as well as the collaboration between Pudasjärvi health centre and Oulu University Hospital. The new organisation might not be willing to invest in the remote wound therapy service considering how the financial benefits the service brings are distributed.
Chapter 12: Discussion

The purpose of this thesis was to examine what local conditions affect the outcomes of eHealth transfer and to gain an understanding of how exactly do these conditions impact the implementation results. In addition, the eHIT’s usefulness in the context of transnational eHealth implementation has been examined. The research of this thesis consists of five case studies that show in detail how health care organisations evaluated their organisational readiness to implement eHealth and whether or not the predictions were realised during implementation. The results of the eHIT assessments have been presented in chapters 7-11 with a description of the implementation process. In the following sections, each eHealth transfer process and its outcomes will be examined using the normalisation process model as a starting point. In addition, other relevant theories regarding normalisation and organisational readiness are also discussed.

The following sections (12.1–12.5) examine the transfer of the five eHealth services discussed in this thesis through the normalisation process model. Each service is structured around the four constructs of the normalisation process model: interactional workability, relational integration, skill-set workability and contextual integration, in order to understand the role each of the constructs played in the implementation of the eHealth services. Each section is concluded with remarks on the local conditions that facilitated and hindered the transfer of the services.

Section 12.6 discusses the local conditions that impacted the transfer of eHealth services. The final section, 12.7 discusses the usefulness of the eHIT in assessing organisational readiness to implement eHealth services.

12.1 Implementing CheckUp

*Implementation of CheckUp Care and CheckUp Life in Finland*

**Interactional workability:** The motivation for implementing CheckUp in Finland was to encourage patients to participate actively in their own care. Currently, there is limited evidence related to the cost-effectiveness of the service, this was however not an issue that would impact the implementation of the service. The projected benefits of the implementation could not be measured in monetary value; instead the focus was on patient empowerment and on promoting wellbeing and health. The interactional workability was good, as the CheckUp concept supported the goals set for interaction between staff members and patients.
**Relational integration:** Implementation of CheckUp impacted the allocation of responsibility regarding measuring physiological parameters. The patients took over tasks previously carried out by health care professionals. This was however part of a larger health care strategy the organisation has, namely increasing patients' feeling of empowerment and supporting self-management of illness. Therefore, the relational integration of the service was good. CheckUp supported the goals the organisation had regarding the patients' roles, even though the implementation re-allocated responsibility and altered the power-relationships between patients and professionals.

**Skill-set workability:** Implementing CheckUp led to changes in staff work load, division of work and the content of work; firstly, the staff performed less measurements leading to temporarily decreased workload, this was however balanced off by the demand to train patients in how to use the CheckUp system. According to the normalisation process model, the better an intervention matches with existing work roles and with the division of work, the more likely it is to normalise (May, 2006). Based on this definition, the skill-set workability of CheckUp would be low. However, considering the nature of the implementation and the related goals, the mismatch between the implementation and the skill-set workability were desired consequences of implementing CheckUp and supported achieving the goal of changing the process of measuring physiological parameters.

**Contextual integration:** The contextual integration of CheckUp was good. The system was integrated with an existing service platform and it became embedded in relevant care processes. The organisational structures and policies supported the use of CheckUp and the organisation was able to secure resources to implement the service.

The CheckUp services were implemented at the Technology Health Care Centre of Kaakkuri. The unit opened in 2008 and in addition to providing traditional health services it also focuses on providing ICT based health services and testing new health care innovations in clinical contexts. The staff members are therefore familiar with a variety of ICT solutions, and trying out new ICT solutions is one of the organisations core tasks. Weiner (2009) points out that organisational history may play a significant role in implementation of change. In this case study, the organisational history, as well as the organisation's formal position influenced the organisation's interest in implementing the service positively. In addition, the formal support received from the management and the regional authorities further legitimized the implementation. According to Klein and Knight (2005), staff members are influenced by the management's and the organisation's attitudes towards implementation of change; if the implementation is a priority and commitment is shown in practice, the staff members are more receptive for change. As implementing and testing ICT based health services is of high priority and recognized on an individual, managerial and organisational level at the Kaakkuri unit, the organisational readiness and capability to implement ICT
was high. In addition, facilities where self-management activities could be carried out by the patients were allocated for the patients, demonstrating on a practical level the importance of the service.

The implementing organisation was experienced in piloting eHealth services and well equipped for dealing with changes that come with it. The patient base was however less prepared for the change CheckUp Care entailed. This materialised as problems with recruiting cardiac patients to use the service to monitor heart rhythm disturbances. Three patients were willing to try the service, out of which two managed to successfully measure their physiological parameters. The usefulness of the service was lowered due to lack of localisation. As the measurement scale used to present laboratory results differs between Finland and Sweden, some of the measurement results obtained with CheckUp Care were not transferable to the Finnish context. As no staff members from the laboratory unit of the technology health care centre of Kaakku were involved in the implementation of CheckUp Care, the error went undetected and the service was implemented. Even though issues related to security, confidentiality and reliability were discussed during implementation, the organisation underestimated the localisation needs of the service, which had the potential to impact patient safety negatively.

**Implementation of CheckUp Care in Norway**

**Interactional workability:** The interactional workability of CheckUp in Norway was low, and this was manifested in several ways. The staff members’ attitude towards the use of ICT in health care was in general negative. In addition, staff members were afraid that implementing CheckUp would shift the focus of the work they carry out from the patient to technology. The goal of remote monitoring of physiological parameters was not facilitated by the technology, as data transmission proved repeatedly to be unreliable; thus, it did not support interaction between professional groups. During the implementation of CheckUp several mock-up sessions were organised, in order to give the health care professionals the opportunity to learn to use the system and to develop work processes surrounding the system. However, the mock-up sessions failed to meet their purpose, as technological problems with data transmission occurred, and the staff members were unable to get the service working properly, shifting the focus from the potential benefits of the system to technological failure.

In order to improve the functionality of the CheckUp system, the INR equipment was extracted from the system. This allowed the staff members to bypass the problem of unreliable data transfer, as they were able manually to register the measurement results, thus making the INR component of the system usable. The benefits obtained with using the INR equipment at the nursing home were clear; when the equipment was at the nursing home, the patients did not have to travel. Even though the CheckUp service has been
discontinued, the organisation has acquired the INR measurement equipment, which has become a permanent part of the services provided at the nursing home.

**Relational integration:** The problems related to the use of technology and the low interactional workability of CheckUp in the Norwegian context influenced the relational integration of the service. CheckUp did not fit into nor facilitate the existing work relationships between the different groups of health care professionals. Several health care professionals were involved in the use of CheckUp Care, but the interpretation of the measurement results depended on the collaboration of one medical professional. As the key staff member refused to collaborate, the impact on the service provision was immediate, and the service was discontinued. This decision was further supported by a low degree of interactional workability.

**Skill-set workability:** In order to make sure that the staff members had the necessary skills to use the CheckUp system, several training sessions were organised. As the nursing home staff members frequently measure patients’ physiological parameters the equipment included in CheckUp was familiar to them. However, the overall concept of how data is transferred from the equipment to the database, how the service is set up and how it is accessed via the online platform was the subject of further learning. In addition, although the technique for using the INR equipment included in CheckUp was familiar, controlling this specific value at the nursing home had not been part of the staff members’ tasks. This in its turn increased staff workload.

**Contextual integration:** Implementation of CheckUp required investments in staff training and equipment, without projections of the potential cost-benefits created by the service. This raised questions among the staff members about whether or not resources should be spent on the implementation when it was unclear what the financial benefits were. The contextual integration of CheckUp was further hindered by the re-organisation of health care services on the Island of Senja. The re-structuration was anticipated to lead to conflicts among staff members due to collision of work cultures and new routines, influencing the position and future use of CheckUp in the organisation. The implementation was not adequately integrated to the organisational context and there were continuous technological problems which had a knock-on effect on the interactional workability and relational integration of the service.

Looking at the case of implementing CheckUp in Norway through the normalisation process model, it is clear that technological problems have impacted the outcomes of the implementation. The collaboration between the staff members across the two organisations has not been facilitated by the implementation of CheckUp, as the users have not been able to trust that the system does what it is supposed to do. The attempts to increase the staff members’ trust in the system by organising training and demonstration sessions failed, reinforcing the staff members negative attitudes towards the
implementation and further decreasing their motivation to use it. Klein and Knight (2005) highlight the importance of staff training in order to create an organisational environment where the staff members feel safe about trying out new things. Training sessions can increase the staff members’ motivation to actively participate in implementing organisation change. This seems to be no less true in the case of CheckUp, though the outcomes of the training session were the opposite due to technological failure.

In the case of using INR equipment the staff members working at Sifjord nursing home were able to see the benefits of the system and utilize the CheckUp system’s technological flexibility, which increased their motivation to use that specific part of the service. May and Finch (2009) use the term “coherence” to describe how much sense implementing a material practice makes to the members of organisation. In the case of CheckUp, the level of coherence was questionable. The staff members questioned the implementation as no evidence of the benefits the system creates could be provided. In addition, as the implementation proceeded technological problems further lowered the coherence.

The implementation of CheckUp was not anchored in the organisational context and it was unclear what the potential benefits of implementing the service would be. Weiner (2009) and Armenakis et al. (1993) highlight the need for the implementing organisation to clearly justify the implementation to the members of the organisation. Ideally, the members of the organisation should experience that the change is necessary and will lead to positive impacts on the individual and/or organisational levels. This will lead to increased motivation regarding implementing the change. Implementation of CheckUp was not justified for the staff members, as no evidence on the potential benefits was presented, making it difficult to “buy into” the service. In addition, no organisation accepted responsibility for the whole service, making it difficult to anchor the service in the organisational context.

Finally, the two cases of CheckUp implementations in Norway and in Finland differ regarding the goal of the implementation as well as the outcomes of the implementation. In the Norwegian case the purpose of the implementation was not to increase patient empowerment as it was in Finland. Instead, the aim was to change work processes with an impact on the professional roles. Due to negative attitudes towards ICT and eHealth among the personnel and inadequate justifications for implementing CheckUp the initiative was not welcome. As the transfer of CheckUp mainly consisted of transferring a product rather than a process, the implementing organisation was not able to utilize health care staff members’ previous experiences of implementing CheckUp. The staff members in Norway were not able to relate to how the service was used in Sweden, as there was no direct collaboration between health care professionals in Sweden and Norway. Rather, the collaboration took place with the company providing the service in Sweden, and focused on the technical aspects of the service. In Finland the CheckUp services were integrated with an
existing service, Oulu Self Care. The CheckUp service was seen as another ICT component that would further support the health care processes related to self-care, and the promotion of wellbeing and health instead of being seen as an independent service.

The implementation of CheckUp in Finland and in Norway reflects different organisational climates regarding eHealth. In Finland, the implementing organisation had a strong organisational interest and experience in implementing ICT innovations, and piloting eHealth services was one of the core tasks of the organisation. In Norway, the staff members had a negative attitude towards ICT based collaboration and they were concerned that implementing ICT based services shifts the focus from clinical work to technology.

To summarize, the outcomes of transferring CheckUp to Norway were largely negatively influenced by technological failures leading to poor relational and contextual integration, whereas in Finland, the main problems were related to enrolling patients to use the service and failure to adapt the service components to match the local standards. The implementation of CheckUp services highlights the need to localise the services prior to the implementation in order to ensure that the service can be utilized as planned.

12.2 Implementing EyeMo

**Interactional workability:** The interactional workability of EyeMo was good, as the interaction between the professionals and the patients remained the same during the pilot. The staff members were able to maintain their work processes and follow the routines that were already in place. The patients were screened in a somewhat more efficient way, as the staff members were able to optimise the timing of each screening. Interactional workability was however lowered, as EyeMo did not support the confidential nature of the interaction between patients and staff members; patients sitting in EyeMo's waiting room could overhear the discussions taking place in the examination room.

**Relational integration:** The mobile eye unit had good relational integration, as the service concept facilitated working relationships and matched the traditional division of accountability and responsibilities between ophthalmologists and ophthalmology nurses.

**Skill-set workability:** The skill-set workability regarding EyeMo was good. The staff members were able to use familiar equipment at the mobile eye unit. The staff members had the necessary skills to carry out the diabetic retinopathy screenings at EyeMo. They did however feel insecure about having the necessary skills to set up and operate the trailer.
**Contextual integration:** The contextual integration of EyeMo was good in the sense that the service concept matched the local needs of increasing patients’ access to screening services by providing specialist services locally and shortening referral times. However, the organisation was not able to allocate resources that would fund the service beyond the pilot period. In all, despite the service concept matching well with the organisational needs, the lack of resources has made it impossible to sustain the service.

The idea of solving the organisational problems related to referral times and screening capacity by duplicating the EyeMo service concept is not possible as funds are not available. In addition, the limited patient base in the County Council of Västerbotten requires extending the original service concept in order for the mobile eye unit to be a justifiable investment. Even though the interactional workability and relational integration of EyeMo were good, the problems related to contextual integration, more specifically lack of financial resources, made it impossible to continue providing the service. The constructed normalisation process model highlighted several important factors that impacted the outcomes of the implementation. However, the model failed to recognise some critical factors, such as the size of the patient base which impacts the sustainability of the service, consequently impacting the normalisation of the service.

In addition, piloting EyeMo revealed problems in the ICT infrastructure. The implementing organisation misjudged the technological readiness to pilot EyeMo in the inland area of Västerbotten. In the context of a short-term pilot, the problems related to accessing the hospital network were surmountable, but in order to fully utilize the mobility of EyeMo or to sustain a similar service concept, wireless access to the hospital network is necessity. Weiner (2009) discusses the risks related to incorrectly assessing the organisational potential to implement change and how inaccurate assessments can lead to false projected implementation outcomes. In the case of EyeMo, the technological readiness was incorrectly assessed, impacting the organisations ability to utilize the service.

### 12.3 Implementing remote speech therapy via video

*Implementing remote speech therapy via video in Scotland*

**Interactional workability:** The implementation of the remote speech therapy service has led to deliberate changes in the communication patterns between speech therapists and patients. Prior to the implementation speech therapists spent a big portion of their working day traveling to meet patients in the remote areas. As travel was time consuming, the speech therapists were forced to deliver long speech therapy sessions once they met with the patients. The implementation changed this situation allowing more frequent and shorter therapy sessions to take place. This ensured that the patients were able to
concentrate on the therapy and did not get too exhausted during the session. Overall, this led to the service having a good interational workability.

**Relational integration:** The remote speech therapy concept matched the existing working relationships and the division of accountability and responsibility among the speech therapists, thus facilitating the implementation.

**Skill-set workability:** Implementing remote speech therapy required adjustments in the way speech therapy was delivered to the patients. The changes in the work process increased staff workload regarding preparation time and the volume of speech therapy sessions. However, the increase in staff workload was balanced by the decreased need for the staff members to travel to provide speech therapy. Thus, the time freed up due to decreased need to travel was spent in providing speech therapy. The implementation had good skill-set workability, as the service concept supported the staff members work roles and the goals of their work. The implementation of the service created the need to develop and adapt the traditional methods of providing speech therapy. The organisation was able to match these needs by allocating resources for the speech therapists, so that they could work with the issues. The lead therapist organised mock-up sessions for staff members involved in providing remote speech therapy, creating the opportunity to try out and practice delivering speech therapy in a safe context, prior to involving patients in the process. The staff members were able to run through the entire process of delivering remote speech therapy, from setting up the videoconferencing system to trying out the work material. Providing the staff members with the chance to familiarize themselves with not just the technology but also the entire process of delivering the remote service has ensured that the staff members have the necessary skills to cope with the new way of working.

**Contextual integration:** The contextual integration of the service was good, as it supported solving some of the organisational problems experienced by the speech therapists. The organisational capacity to implement the service varied during the course of the implementation. Initially, no financial resources were available that could be used to purchase videoconferencing systems. As the NHS Highland re-evaluated the potential benefits remote speech therapy could bring to organisation and the patients, a strategic decision was taken by the NHS Highland to invest in the necessary equipment. This decision formally supported the use of ICT and eHealth services within the organisation strengthening the services contextual integration.

NHS Scotland has struggled with the standard of local infrastructure. The lack of adequate Internet connection in some of the rural areas of Scotland led to abandoning the plan to implement the service on the northwest coast of Sutherland, which was the area most in need of speech therapy services. Due to the limitations set by the available infrastructure, the remote speech therapy was implemented on the east coast of Caithness and Sutherland. In other
words, the varying standard of ICT infrastructure has greatly impacted the location where the service could be implemented as well as the options for how the service could be expanded. The organisational readiness to implement remote speech therapy was inaccurately assessed, in relation to the available ICT infrastructure, as well as access to equipment necessary for providing the service. As Weiner (2009) points out, organisations can base their assessment of the organisational readiness on inaccurate calculations, and false information can greatly impact the outcomes of the implementation. In this case study, the implementing organisation was able to work around the issue to a degree by changing the implementation site. This did not, however, solve one of the most central problems the organisation faces; inadequate provision of speech therapy on the northwest coast of Sutherland. Despite the remote speech therapy service having good contextual and relational integration, the staff members having the necessary skill-sets to run the service, and the service concept having a good interactional workability, the existing ICT infrastructure limits where the service can be used.

Implementation of remote speech therapy increased staff workload and training needs. These issues have been overcome to a large extent by close collaboration between NHS Scotland and the County Council of Västerbotten, Sweden. The collaboration has resulted in tangible knowledge transfers where, for example, work material related to providing speech therapy via videoconference was translated and adapted to fit the NHS context. Access to these materials enabled the Scottish speech therapists to avoid some of the problems experienced in clinical work and provided detailed practical support for the speech therapists in detailing how to initiate a remote speech therapy session and how to adapt training material used during traditional speech therapy session so that it would work in the remote therapy context. Klein and Knight (2005) name several strategies that can be utilized in order to increase organisational readiness to implement change. One of the highlighted strategies is that the organisation invests in providing learning opportunities for the staff members. Armenakis et al. (1993) points out that the staff members should feel included when it comes to implementing change, and they should actively take part in the change in order for the change to happen. In this case study, the NHS has formally supported the knowledge transfer between the Swedish and the Scottish speech therapists by ensuring funds were available for study visits and for active collaboration between the two countries. This has led to concrete knowledge transfer regarding the process of providing remote services, and the staff members have been actively involved in shaping the praxis of remote speech therapy.

The implementation of a change in an organisation depends to a large degree on the individual’s willingness to carry out the change. When the staff members feel that the proposed change will solve or improve existing organisational issues they are likely to support and actively participate in creating the change (Armenakis et al., 1993; Weiner, 2009). The concept of remote speech therapy is well matched with the organisational problems NHS Scotland experienced.
According to the speech therapists, the main needs the organisation had were to increase the volume and frequency of speech therapy sessions, shorten referral times and decrease the time speech therapists spend on traveling in order to treat patients. The implementation of remote speech therapy has facilitated reaching these goals and has therefore been supported by the members of the organisation.

Implementing remote speech therapy via video in Finland.

**Interactional workability:** The implementation of remote speech therapy changed the way professionals and patients interacted with each other. Overall, the speech therapist was satisfied with the outcomes of the remote sessions, although some important elements of interacting with children were not possible to carry out as the patients and the professionals no longer share a physical space.

**Relational integration:** Implementation of remote speech therapy led to changes in how the importance of speech therapy was perceived at schools. Special education teachers were present during the remote therapy sessions; this made the work speech therapists do more visible to other professionals, thereby facilitating professional relationships between special education teachers and speech therapists. Even though the speech therapist at Pudasjärvi health centre was satisfied with the outcomes obtained with remote speech therapy service, some of the speech therapists in the surrounding municipalities questioned the suitability of providing remote speech therapy, influencing the relationships among speech therapists across organisational boundaries.

**Skill-set workability:** The speech therapists’ workload increased when the service was implemented as work processes had to be re-structured and it was necessary to develop alternative methods and materials for carrying out speech therapy sessions. The speech therapists did however have the necessary skills to cope with these challenges.

**Contextual integration:** The remote speech therapy service was implemented in order to make speech therapy services more accessible and to decrease travel for the patients. The service concept has facilitated reaching the organisational goals. However, the service does not create any financial benefits for the involved organisations impacting the sustainability of the service negatively.

The transfer of the remote speech therapy concept from Sweden to Finland was complicated due to differences in how speech and language services are organised in the respective countries. In Sweden speech therapy is mainly provided within one organisation but in Finland several organisations are involved in producing speech therapy services. In addition, the underlying
organisational structures limited what organisational benefits the implementation can create in the Finnish context. The financial benefits regarding patients’ travel re-imbursement do not materialize in Finland in the same way that they do in Sweden, where the cost-savings are directed to the implementing organisation. In order to fully duplicate the Swedish concept of providing remote speech therapy several health care organisations need to collaborate across organisational boundaries. This is, however, challenging, as the organisations struggle to justify the financial costs a large-scale implementation would bring. The underlying organisational structures limit the possibilities of the service to become financially beneficial or neutral, consequently influencing the sustainability of the service.

The two cases of implementing remote speech therapy are in stark contrast with each other. In Scotland the main obstacle for implementation was the lack of ICT infrastructure, whereas in Finland the obstacles were largely related to distribution of costs and benefits and enrolling users. The normalisation process model is limited to assessing the organisational readiness to implement eHealth and it does not include elements that assess the patient’s willingness or readiness to use the eHealth service.

Research on the facilitators and barriers influencing the patients’ willingness to use eHealth services is limited. Eikelboom and Atlas (2005) have studied factors related to audiology patients’ willingness to use telemedicine services. The main barrier for use was that patients preferred traditional face-to-face visits and the main motivation for using telemedicine services was reduced response-times and decreased costs. Subramanian et al. (2004) studied challenges related to recruiting patients to use home-care telemedicine solutions. The study concluded that the most common reason for the patients’ unwillingness to use telemedicine in a home-care context were that the added value the use of telemedicine would bring was unclear for the patients and that the patients experienced traditional health care services as sufficient. Palmas et al. (2006) conducted a study focusing on enrolling patients to use telemedicine in the context of diabetes care. According to the study the main reasons for refusing participation included discomfort with technology, lack of time and interest in participating in trials, and not believing telemedicine could benefit them. In the case of implementing remote speech therapy in Finland, nine potential patients suitable for remote speech therapy were identified, but only three patients enrolled to use the service. As the service targeted children, parental consent was mandatory. In six cases the parents did not consent to their children receiving remote speech therapy. The reasons for declining participation were distrust in the quality of remote speech therapy and the parents being satisfied with the traditional forms of speech therapy.
12.4 Implementing teledialysis

**Interactional workability:** The implementation of teledialysis has facilitated the work renal specialists do and changed the communication patterns between nephrologists and patients. The implementation has led to dialysis patients and nephrologists communicating via videoconference rather than sharing a physical space. The nephrologists have appreciated this mode of communication as it has allowed them to focus increasingly on outpatients thus making their work at the satellite unit easier.

**Relational integration:** Although the teledialysis service has altered the communication patterns between staff members and patients, the alignment between division of work and accountability has not been impacted. However, preparing the patient for meeting the nephrologist in a videoconference was done by the staff members working at the satellite unit, thus the professionals at the satellite unit and the hospital had to work together in a structured manner to make sure that patients could undergo dialysis.

**Skill-set workability:** The implementation of teledialysis increased the nephrologists’ workload and affected the content of their work by increasing the number of outpatient consultations. The nephrologists’ increased workload was balanced by a decrease in time spent traveling. The teledialysis concept was aligned with the nephrologists’ professional roles and matched the existing content of work, though the proportion of work regarding outpatients changed. Whereas the staff members had the necessary skills to provide dialysis services, they did not have the necessary skills to do it remotely, as they were not used to providing remote services. Several steps were taken by the NHS to train the staff sufficiently. The renal staff members collaborated actively with their Norwegian counterparts throughout the implementation process. The Scottish staff members also had the opportunity to observe how the service was used in clinical contexts in Norway. Several mock-up sessions were organised in Scotland in order to provide the staff with the opportunity to practice running the service and to learn to use the technology the service is based on. The training sessions increased the staff members’ confidence in their own capabilities and in the service in general.

**Contextual integration:** Teledialysis was well integrated into the organisational context as it provided solutions to problems related to increased need to provide dialysis, need to decrease referrals and to utilize nephrologists’ time more efficiently. The Highland renal services did not have the necessary funds to implement teledialysis when the implementation was first considered. The necessary funding was later on provided by NHS Scotland, and the service was implemented and its position in the organisation was formally supported.

Looking at the implementation of teledialysis through the normalisation process model, it is clear that the service was well integrated to the
organisational context and the staff members were able to use the service to solve existing organisational problems using the professional skills they possess. Delone and Mclean (2003) IS success model highlights the impact service quality has on user satisfaction, intention to use a system and the actual use of system. The NHS Highland’s videoconferencing specialists have been involved in the implementation of teledialysis from the start. Their participation reassured the health care professionals that potential technology related problems would be solved, and support would be available when needed. This has had a positive impact on the use of the system and on how comfortable the renal staff members feel about using the system in renal care. Frequent use of the system has consequently impacted the net benefits created by the system.

According to Denis et al. (2002) the distribution of benefits and risks among the members of the organisation influences their decision to support and engage with the service. In the case of teledialysis the organisation had clearly defined needs, which could be met by the implementation of teledialysis. In addition, the created benefits would be distributed among the professionals providing the service. This led to high motivation among the staff to engage in the implementation. The service freed up nephrologists’ time from traveling to conducting clinical work, and increased the quality of renal care. The technology obtained for the teledialysis service has also been utilized far beyond its original purpose of carrying out teledialysis. For example, dieticians use the equipment to conduct consultations regarding nutrition of renal patients and renal staff members are able to take part in training sessions organised elsewhere in Scotland by using the videoconferencing system. The implementation has led to improved continuity of care and formalized cross-organisational communication among renal staff members scattered around Scotland. These organisational changes have been received positively by the renal staff members, although the added value brought by the implementation of teledialysis was not anticipated when the service was initiated. In addition, teledialysis has increased the multidisciplinary teamwork carried out at NHS Scotland, thereby strengthening eHealth’s position within the organisation.

12.5 Implementing remote wound therapy

**Interactional workability:** The interactional workability of remote wound therapy was good. The technology supported remote consultations regarding chronic skin problems, with the exception of head wounds, where the details of the lesion were unclear when transmitted via video. The implementation changed the communication patterns between the specialists and the patients, and initiated direct communication between staff members at the remote health centre and the hospital. The changes in communication patterns have been welcomed by the staff members and the patients, as the service has made specialist services more available for the patients.
Relational integration: Prior to the implementation of the remote wound therapy service patients in need of specialist care, visiting primary care, were referred to a specialist. As a result of the implementation the patients are treated locally. This has led to changes in how responsibility and accountability are allocated. The staff members at the remote site are now responsible for preparing and dressing the patients’ wounds. However, the overall responsibility for the diagnostic procedure is still with the university hospital. Despite this change the staff members found that the service facilitated working relationships and unified care processes across organisational boundaries.

Skill-set workability: The implementing organisations were able to deal with the changes in workload and content of work by providing training to the staff members involved in producing the service. The changes in the content of work mainly addressed staff members working at Pudasjärvi health centre, and as with the remote wound therapy they become responsible for preparing the patients for consultations. The implementation also affected the professional roles of wound nurses, making their work more visible to other members of the organisation and by increasing their professional competence.

Contextual integration: The goal of the implementation was to increase access to dermatology services and to decrease the need for patients to travel to receive wound care. These goals were realized as a result of the implementation. When the service was initiated, extensive organisational restructuring was planned. During the implementation the organisations involved in providing the service were not able to make a long-term plan for how the remote wound therapy service would be produced once the organisational restructuring took place. This led to the good contextual integration of the service being a temporary state.

Looking at the implementation of remote wound therapy through the normalisation process model, it is evident that the skill-set workability, relational integration and interactional workability of the service were good. However, no long term planning for the service could be done, lowering the service’s integration into the organisational context. When the implementation of the service was initiated, it matched the prevailing organisational goals and structures. The organisation failed to plan for the upcoming restructuring of health care services which may therefore have a knock-on effect on how the remote wound therapy stands in relation to skill-set workability and relational integration. Although the normalisation process model takes into consideration some of the central factors forming the outcomes of the implementation, it does not account for factors that impact the sustainability of the service.

In the Norwegian context the remote wound therapy service has created financial benefits for the organisations that provide the service, as patients' travel expenses have decreased. Travel expenses have also decreased as a result of implementing the service in Finland. This has not benefitted the
implementing organisations, as patients travel expenses are paid by another organisation not involved in providing the service. This has had a negative impact on the service's sustainability. The service has also created other benefits in addition to decreasing travel expenses. The competence among staff members has increased and wound care processes have been unified across organisational boundaries. These benefits can however not be measured in monetary terms.

The annual number of patients visiting the remote health centre in Norway is estimated to be 20, leaving the yearly use of the video conferencing equipment to approximately 5 hours. From the organisation’s point of view, the degree of use is not sufficient for sustaining the service. In order to keep the service running, the patient base needs to increase, or the equipment has to be used more flexibly, to ensure a higher degree of use.

12.6 Local conditions that influenced the outcomes of eHealth transfer

Looking at the five case studies of transferring eHealth services across the Northern Periphery reveals several local conditions that have either facilitated or hindered the transfer of eHealth services. The identified conditions are; 1) ICT infrastructure and facilities, 2) patient base and flexible use of technology, 3) organisational structure, 4) stakeholder collaboration and knowledge exchange, and 5) trust in eHealth services. Following is a more detailed discussion of each of the factors.

ICT infrastructure and facilities

The level of ICT infrastructure varies between Finland, Norway, Scotland and Sweden. The situation is most challenging in Scotland, where the lack of ICT infrastructure greatly limits the degree to which eHealth services can be utilized (Roberts et al., 2010b). In the case studies presented in this thesis the implications of lacking ICT infrastructure have mainly been demonstrated in the cases of implementing remote speech therapy in Scotland and implementing EyeMo in Sweden. In the case of remote speech therapy the lack of broadband access greatly influenced the implementation of remote speech therapy in Scotland, as adequate broadband access was not available. Therefore, the implementation location was changed. The problems with ICT infrastructure in Scotland continue to limit the possibilities to utilize ICT in order to increase access to health services in the most remote areas of the Scottish Highlands. In the case of EyeMo the problems with ICT infrastructure were manifested in a different way. The staff members working at the mobile eye unit were not able to access the secure hospital network wirelessly, causing problems with accessing the electronic patient record system and image database. The problems with network access also limit how the mobile unit, or other similar services can be utilized in the region.
Access to appropriate facilities where eHealth services can be provided is another central circumstance which impacts the possibilities to use the service. The lack of, for example, dedicated videoconference facilities can make using the eHealth service difficult, as was seen in the case of implementing remote speech therapy in Finland. When implementation of eHealth changes the physical space or the proximity between professionals and patients, it also changes the care process. In the case of piloting EyeMo, the change in screening location impacted the order in which patients were screened, incidentally impacting the quality of care and the efficiency of the staff members. In the case of remote wound therapy, the placement of equipment and limitations set by the physical space where consultations were carried out impacted patients' chances of participating in the care situation.

Whereas it may not be surprising that inadequate infrastructure or lack of physical space limits the implementation of eHealth services, it is surprising to see the stage the transfer of eHealth services can get to before these issues are detected. In the case of remote speech therapy in Scotland, the decision to transfer the service was already made, and preparations were well on their way, when the problem of inadequate ICT infrastructure was detected. In the case of EyeMo, the mobile unit had already been transported from Finland to Sweden, and patients were literally on their way to the mobile eye unit, when the problems with wireless access to the hospital network were detected. It seems likely that these problems could have been tackled in a more efficient manner, if the level of ICT infrastructure had been assessed prior to deciding to transfer the service.

Patient base and flexible use of technology

The cases of implementing remote wound therapy and piloting EyeMo highlighted the problem of small patient bases. In order for the services to become justifiable and sustainable the service concepts need either to be expanded, or the technology involved needs to be utilized on a wider scale.

The fact that health care organisations are able to utilize the implemented ICT in a larger context than originally intended can be important in order to justify acquiring the technology, at least from a financial perspective. In the case of remote wound therapy the implementing organisation stated that although the staff members and the patients were satisfied with the service, it would not be enough to turn the service into a permanent part of the organisation. The only way to keep the service running would be to increase the use of the equipment so that more benefits, e.g. increased staff competence by enabling remote education, could be derived from it.

Same reasoning can be seen in the case of EyeMo. If the patient base that uses EyeMo is limited to screening of diabetic retinopathy in Västerbotten, it is not large enough to utilize the mobile eye unit for more than a few months per
year. Therefore, in order to justify the investments in building a mobile eye unit and to make the service sustainable, the service concept needs to be expanded or the patient base needs to grow, for example, by using the mobile unit in other County Councils in addition to Västerbotten.

The implementation of EyeMo, remote speech therapy and remote wound care demonstrate how sustainability of eHealth services can greatly depend on the size of the available patient base. Whereas densely populated urban areas may have a high volume of patients enabling a full-time use of equipment, this may not be the case in sparsely populated rural areas where health care organisations treat a limited number of patients. The health care organisations involved in implementing the eHealth services discussed in this thesis have aimed at establishing sustainable services in the rural areas of the Northern Periphery. The size of the patient bases and possibilities to expand the service to, for example, include other patient bases or utilizing the acquired technology for other purposes, have greatly influenced the outcomes and the sustainability of the transferred services, and consequently the normalisation potential of the services.

Organisational structure

The transnational implementation of eHealth services across the Northern Periphery has revealed several factors that influence the outcomes of eHealth transfer. One of the identified factors is the way health care organisations are structured in Finland, Norway, Scotland and Sweden. Health care legislation, care recommendations, and national and local policies act as the cornerstone of conducting clinical work. They also set the frames in which health care processes are carried out and how ICT can be utilized.

The underlying organisational structures can limit and regulate the use of eHealth in health care organisations. Different models regarding patients’ travel re-imbursement and division of work between primary and specialist care in respective countries impact the way services can be transferred and implemented, what the potential benefits are, and who the main beneficiaries are. The division of tasks between health care organisations can vary across the countries of the Northern Periphery. As the health care organisations function under different health care legislations and policies, the possibilities to directly transfer health care models can be limited by the organisational structure (see, for example, the case of implementing remote speech therapy in Finland or piloting EyeMo in Sweden).

The organisational structure and how, for example, patients are reimbursed for travel expenses vary, and impact how potential benefits are distributed among the organisations. Consequently, this can have a great impact on the sustainability and normalisation of the service. If, for example, financial benefits created by the eHealth service are not directed to the implementing
organisations, the costs related to running the service may become too much for the organisation to bear. Hence, the distribution of potential benefits among stakeholders has a great impact on the sustainability and the outcomes of eHealth transfer. The distribution of potential benefits was not assessed prior to the implementations, although it has been a central aspect influencing the sustainability of the transferred services and consequently the normalisation potential of eHealth.

**Stakeholder collaboration and knowledge exchange**

The transfer of eHealth services relied to a large extent on collaboration and knowledge transfer among the health care organisations and staff members involved in the implementations. The importance of stakeholder collaboration and knowledge transfer can be illustrated with the case of implementing remote speech therapy in Scotland. The Scottish speech therapists have collaborated closely with the Swedish speech therapists throughout the implementation process. This collaboration resulted in tangible knowledge transfers where, for example, work material was adapted to match the NHS context. The access to these materials enabled the Scottish speech therapists to avoid some of the problems experienced in clinical work and provided detailed practical support for the speech therapists. Similar knowledge transfers among peers have also taken place in the case of implementing teledialysis, where the experiences gained in Norway led to modification of the equipment the renal unit in Scotland acquired. In the case of implementing remote wound therapy in Finland the knowledge transfer led to following the Norwegian recommendations regarding the patient base the service is suitable for.

In the case of implementing CheckUp the transfer of the service was supported by the company involved in producing the system. Therefore there was no collaboration between a health care organisation using the system in Sweden and the Norwegian or Finnish implementation sites. Consequently, the implementation sites were not able to receive the same support from health care professionals as they did in, for example, implementing remote speech therapy. This may have had a negative impact on the outcomes of the transfer, as no peer support was available.

Collaboration has not only been initiated between countries, but also within regions. The provision of eHealth services has brought together organisations and staff groups that had not previously worked together. The involvement of several stakeholders has been both positive and negative. In the case of CheckUp Norway, the implementation was discontinued due to collaboration problems, whereas in the case of remote wound therapy care practices have been unified across organisations as a result of the collaboration the implementation initiated.
One of the strengths of transferring existing health care provision models to new contexts is that health care professionals can learn from their peers’ experiences, and even avoid previously made mistakes. In order to achieve this, both organisations have to be committed to collaborating. The implementation of eHealth services discussed in this thesis has required the collaboration of several health care organisations. When several organisations are involved in implementing a service, mutual commitment to the service is necessary for success. As the eHealth services discussed in this thesis have been transferred within the Competitive Health Services project, the involved health care organisations have been formally committed to exchanging eHealth service provision models, setting a good ground for cross-organisational collaboration. Transfer of eHealth services could be more challenging if no formal commitment to collaboration across organisational and national boundaries exists.

**Trust in eHealth services**

In the cases of CheckUp, teledialysis, remote wound therapy and remote speech therapy there was a clear focus on providing training in how to produce the eHealth service. One of the aims of the training sessions was to provide the staff members with an environment where they could test and practice providing traditional health services remotely under safe circumstances, via ICT. The outcomes of the training sessions varied. In the cases of teledialysis, remote wound therapy and remote speech therapy this goal was fulfilled, as the mock-up sessions provided the staff members with an increased feeling of professional confidence and trust in the service that was implemented. In the case of CheckUp Norway the mock-up sessions had the opposite impact, and as technological problems surfaced the staff members trust in the service was undermined. Despite the outcomes of the mock-up sessions, the case studies highlight the importance of organising mock-up sessions and training, and exemplify how these sessions can either support or discourage the use of eHealth.

No training sessions were arranged for staff members involved in implementing EyeMo in Sweden. They did however take part in a study visit during which they were able to see the service in action and see how the service was set up in Finland. Based on the experiences the ophthalmology staff members gained during the study visit they decided to make back-up plans for how to carry out clinical work in case practical problems surfaced during the pilots. The staff members utilized these plans during the two pilot periods as technical problems surfaced. Although the staff members were not able to organise mock-up sessions due to the limited time periods EyeMo was available for use in Sweden, they were able to plan how to cope with potential problems, based on the experiences gained during the study visit. The careful preparations on how to cope with potential problems influenced the staff members’ perception of their own capacity to carry out clinical work at EyeMo positively and increased their willingness to take part in the pilot.
Whereas staff members involved in the implementations have had the possibility to take part in training sessions, see the service in action, and hear their peers’ experiences of providing the service to the patients before committing to it, the patients have not received the same opportunities. This has materialized as problems enrolling patients to use eHealth services. Problems with recruiting patients were experienced regarding the use of CheckUp Care to monitor cardiac patients and with obtaining parental consent for children to receive remote speech therapy. The patients’ and their family members’ lack of trust in the quality of eHealth services, preferring traditional forms of health services, has limited the service use.

The implementation of remote speech therapy shows, that despite the health care organisation’s best intentions, patients may not be willing to accept the change from face-to-face meetings to virtual ones. If the patients do not think that remote health services are equal to traditional health services, sustaining eHealth services becomes impossible, as there is no demand for them.

12.7 Utilizing the eHIT in the context of transnational eHealth implementation

The eHealth implementation toolkit was used to evaluate health care organisations’ readiness to implement eHealth services throughout the five eHealth transfers presented in this thesis. As the case studies demonstrate, the eHIT has aided identification of potential problems that have impacted the implementation process. The eHIT was used by a variety of health care professionals, including health care managers, general practitioners, medical specialists, nurses and speech therapists in health care organisations across four European countries. The eHIT has not, to the best of my knowledge, been previously used in an international context to measure organisational readiness prior to implementing eHealth services, nor has the match between eHIT results and the actual process of implementation been previously examined.

Contrasting the eHIT results with the actual events that took place during the implementation processes, it can be seen that the toolkit helped in identifying relevant problems that could hinder the implementation process or impact the service outcomes negatively. This gave the implementing organisations the opportunity to try to avoid the detected problems by, for example, modifying the intended target group, or by adjusting the content of the service, or by changing the division of work among the implementing organisations. The implementing organisations identified relevant problems in all of the categories of the toolkit; the context, the intervention and the workforce, making all of the included questions relevant.

The implementing organisations did however experience some additional problems, which were left uncovered by the toolkit. Problems with the level of
ICT infrastructure, difficulties in enrolling patients to use eHealth services, distribution of benefits the eHealth service creates among stakeholders, and problems related to the size of patient bases have played a central role in setting up and running the transferred services. As these factors can impact the sustainability and, consequently, the normalisation of eHealth, they should be considered within the toolkit. But it is understandable that the toolkit does not focus on cross-organisational collaboration in order to produce eHealth services, as it was developed for use by the NHS.

The eHIT does not include statements related to assessing the technical readiness of the organisation to implement eHealth. As the level of ICT infrastructure and access to ICT varies between organisations and countries, these factors limit at least to a degree what kind of services the organisation is able to implement. The case studies demonstrate the importance of available ICT infrastructure and equipment, and how the lack of ICT infrastructure limits the options available for how ICT can be utilized. Therefore, these factors should be taken into consideration when organisational readiness is assessed.

As the case studies on remote speech therapy and CheckUp demonstrate, ultimately the patients' motivation to use eHealth services is central. If patients are not willing to use eHealth services, the service does not stand much chance of becoming normalised. The eHIT and the normalisation process focus only on assessing the organisation's and its members' readiness to implement eHealth services, failing to recognize the importance of finding out whether or not patients are willing to use the service.

To summarize, the biggest weakness of the eHIT in the context of transferring eHealth to sparsely populated, rural areas is the toolkit's lack of estimation of the sustainability of the service, which can be seen as perquisite for an eHealth service to become normalised. The case studies in this thesis show how the size of the patient base, distribution of benefits, possibilities to utilize the service in a larger scale and available ICT infrastructure impact the organisation's possibilities to sustain the implemented eHealth service. Whereas health care organisations functioning in densely populated urban areas may have adequate patient bases, which justify for the implementation of eHealth services, this may not be the case in sparsely populated areas. Thus, it would be beneficial to include aspects such as the level of ICT infrastructure, the size of the patient base, distribution of benefits among stakeholders and possibilities to expand the service or increase the use of acquired technology, in the eHealth implementation toolkit.

As the toolkit is used by health care organisations prior to implementing eHealth, the results obtained with the eHIT rely heavily on the impressions and information the user of the toolkit has obtained on the service concept that is being considered for implementation. If the information is inaccurate, or the respondent is prejudiced regarding, for example, the usefulness of the service,
the results of the eHIT can be affected and become less reliable. Therefore, it is crucial that the information the eHIT respondents receive is accurate and as detailed as possible. In addition, it can be beneficial to conduct several eHIT assessments to obtain a more nuanced picture of the organisational readiness to implement eHealth. This becomes increasingly important when several professional groups and organisations with varying priorities and roles need to collaborate in order to produce the service. The eHIT results presented in chapters 7-11 show that several opinions of the organisation’s readiness to implement eHealth may be necessary, as one respondent may not be able to answer all statements included in the toolkit, due to lack of experience for example.

The use of eHIT prior to implementing eHealth has aided the detection of potential problems that may hamper the implementation process. Simply being aware of the problems does not guarantee coping with them, as the case of implementing CheckUp Care in Norway demonstrated. Instead, the organisation needs to actively seek solutions in order to overcome possible problems. Furthermore, the fact that a problem detected with eHIT does not materialize during implementation does not mean that the toolkit result was not important. It is possible that, due to early detection, the implementers were able to adapt the service concept to match the needs of the organisation better and thus preventing the problem from surfacing.

The numeric results obtained with eHIT should be critically assessed and used with caution. When the toolkit is used the respondent answers the statements included in the toolkit by giving a score between 0 and 10. The scores are automatically turned into graphs, which present in percentages what the organisational readiness to implement eHealth is regarding the context, workforce and intervention. Looking at the numeric summaries the toolkit generates, without comments from the respondent, it can be difficult to understand what kind of problems might stand in the way of implementation. For example, the overall score on readiness to implement remote speech therapy at the department of phoniatrics in Finland (see eHIT results of group 6) was 72% on context, 75% on the intervention and 57% on the workforce. These numeric responses provide a poor understanding of what are the exact challenges the organisation faces, without the accompanied explanations of why these grades were given. In addition, no scales are given in the toolkit manual for what classifies as good organisational readiness, nor for what is the lowest acceptable score for the service to have good normalisation potential. This makes the numeric results difficult to utilize and interpret in isolation.

Depending on the organisational goals and policies, the statements included in the eHIT can be of varying importance. For example, the organisation may feel that security and confidentiality perquisites for implementing eHealth, rather than negotiable aspects for which low scores are acceptable. Further, a low score on, for example, education and training indicating high training needs is not necessarily a problem, if the organisation has the necessary strategies and
resources to provide training for the staff members. In that case, the overall score on workforce would be negatively influenced even though the organisational readiness to carry out extensive training would be good. Such aspects should be taken into consideration when the scores generated by the eHIT are interpreted and utilized.

One of the goals of the eHIT is to summarize current research on the factors influencing the normalisation of eHealth, and to disseminate and make this research easily approachable for implementers of eHealth services. A study carried out within the Competitive Health Services project shows that the professionals whose eHIT results are reported in this thesis found the toolkit to be valuable, as it aided critical thinking and discussions regarding the implementation among the staff members. The respondents found the toolkit easy to use and would like to use it again if involved in implementing eHealth services (Macfarlane et al., 2011).

The statements included in the eHIT have been derived from the four constructs of the normalisation process model: interactional workability, relational integration, skill-set workability and contextual integration. As the model does not take sustainability into consideration as one of the factors that influence normalisation of eHealth services, it is natural that the toolkit does not do so either. The case studies discussed in this thesis do however demonstrate that sustainability is a critical factor that impacts the normalisation of eHealth services.

As the eHIT was developed for the UK NHS context, it is natural that the toolkit does not largely focus on issues related to localisation needs, or assess collaboration readiness across several health care organisations. It does however support organisations in evaluating the chance an eHealth service has of becoming normalised. As the statements included in the eHIT are of a general nature, the toolkit can be used to evaluate the normalisation potential of a variety of eHealth services, also outside the NHS context, as cases discussed in this thesis have demonstrated.

Despite the problems related to the scoring system and the complexity of interpreting the overall scores the eHIT generates, the toolkit supports implementation processes and fulfils its aim of aiding critical thinking and assessing organisational readiness to implement eHealth services.
Chapter 13: Conclusions, study limitations and future research

As health care organisations’ resources are often limited, the possibilities to develop, test and implement eHealth services can be restricted. Transferring existing eHealth services across organisations can be useful, as the services have already been tested in practice. Taking advantage of the knowledge health care organisations in different countries have can support organisations in their drive to develop service provision models that reach out to the population of the Northern Periphery. This thesis contributes to an understanding of how local conditions impact the outcomes of eHealth transfer, incidentally facilitating the transfer of eHealth services across national boundaries. Bates and Wright (2009) point out that without increased international collaboration it is impossible to understand the outcomes of eHealth services in different countries, as organisations have different clinical processes, different structures and different cultures.

The focus of this thesis was to gain an understanding of how local conditions impact the outcomes of transferring eHealth services internationally. The case studies presented led to the identification of five local conditions that have either facilitated or inhibited the outcomes of transferring eHealth services, namely 1) ICT infrastructure and facilities, 2) patient base and flexible use of technology, 3) organisational structure, 4) stakeholder collaboration and knowledge exchange, and 5) trust in eHealth services.

The identified local conditions contribute to research on why eHealth services rarely become widely implemented across national boundaries. The case studies exemplify how differences in organisational structure, level of ICT infrastructure, and the size of the patient base impact health care organisations’ possibility to utilize eHealth services. In addition, this research offers rich insight into how these factors impact the sustainability of eHealth services. The case studies also illustrate how stakeholder collaboration and knowledge exchange impact the process of transferring eHealth services, and how patients’ and professionals’ levels of trust in eHealth services can materialize in practice. The identified local conditions have also relevance for professionals involved in eHealth implementation.

As May et al. (2003) point out, the majority of eHealth services fail to become widely implemented. Instead, eHealth services tend to be localized, small-scale services providing health care services for a limited patient base. This research contributes to the understanding, why eHealth services struggle becoming widely used and what factors impact the sustainability of a service. The research included in this thesis provides rich insight on the localisation needs
that surface when eHealth services are transferred internationally. In addition, this thesis exemplifies why the benefits obtained with a specific eHealth service may not be duplicable in another organisational context.

Previous research has identified several factors that facilitate and inhibit the implementation of an eHealth service. This knowledge is utilized in several toolkits that focus on facilitating the implementation of eHealth services. However, assessments on the value these toolkits generate in practice remain largely unreported. The case studies included in this thesis show how the eHealth implementation toolkit was used, and how the results were utilized during the implementation processes. The results show that the eHIT is a useful instrument, which facilitates the identification of problems that may hinder the implementation. Thus, assessing organisational readiness to implement eHealth prior to implementation is useful and can facilitate the implementation process. This confirms previous research results reported by Jennett et al. (2005), who point out the necessity of assessing readiness to implement ICT in health care, in order to avoid costly implementations that cannot be followed through.

The health care organisations in the Northern periphery share the same demographic and geographic challenges. Transferring eHealth services across organisational boundaries and increasing international collaboration can contribute to increased access to health services in the underserviced areas. This thesis shows that eHealth services can be transferred. Transferring eHealth services does however not automatically lead to transferring benefits, as local conditions vary and impact the outcomes of eHealth implementation.

The research results discussed in this thesis are limited in different ways and for various reasons. All of the case studies included in this thesis have been conducted in the area of Northern Periphery. The identified local conditions related to the transfer of eHealth services could be different: if the implementations were carried out outside the Northern Periphery; if different types of eHealth services would have been implemented; or if different health care organisations would have been involved in the implementations. The obtained research results are therefore highly contextual.

In addition, all of the services have been transferred within the Competitive Health Services project. This meant that the health care organisations involved in the project were committed to collaborating with each other for the purpose of transferring eHealth services across organisations. The transfer of these eHealth services may have had different outcomes if the implementations were carried out without formal commitment from the organisations involved.

Furthermore, the fact that the health care organisations involved in the project were committed to transferring best practices across the partnering regions has ensured a certain amount of resources and provided structured
opportunities for collaboration across organisational and national boundaries. In practice, this has meant that the implementing units at each health care organisation have had support from the management level throughout the implementation; this has even facilitated obtaining the necessary resources to follow through with the implementations. The local conditions impacting the transfer of eHealth services may have had a different focus if this support had not been available.

The choices regarding the theoretical frameworks used to assess organisational readiness to transfer eHealth have limited the factors that have been in focus. If other frameworks or different toolkits had been used to evaluate organisational readiness and to guide the implementation processes, the results of the evaluations as well as the outcomes of the implementation might have been different. This might have further impacted both the research process and the results. Therefore the results presented in this thesis should be applied and generalized with caution.

The body of knowledge on the barriers and facilitators that impact the implementation of eHealth services continues to grow, but utilizing these results in practice remains challenging. Creating evidence-based toolkits can be one of the ways to overcome this problem. Several toolkits that aim at facilitating eHealth implementation have been created; however, reports on how these toolkits work in practice are rare. Thus, more research that focuses on assessing the practical value of toolkits is needed.

We also need to gain understanding of the factors that influence patients’ decisions to enroll to use eHealth services, and how they experience ICT supported self-management of illness. There is also a need to understand the challenges health care professionals and patients face when health services are provided remotely. How this impacts the relationship between professionals and patients is not yet fully understood.

Finally, this thesis focuses largely on the organisational aspects of eHealth, rather than on the medical or health-economical impacts eHealth services create. In order to assess all of the impacts eHealth has, a multi-disciplinary research approach is necessary. In addition, there is a need to develop frameworks, and international standards in this area. This would support national and international comparison of eHealth, and facilitate the development of services, consequently improving the quality of care.
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Appendix 1

Interview guide

This interview guide was created within the Competitive Health Services project. Some of the questions were removed or changed depending on the type of eHealth service that was assessed.

- Describe the service?
- What is the purpose of the service?
- How long has the service been in use?
- What led to the decision of taking the service into use?
- Is this a new service or an alternative to traditional services?
- Medical outcomes?
- What have the implications of implementing the eHealth service been for professionals/patients?
- Technical details of equipment used to provide the service?
- Reliability of technology?
- Back-up in case of technical problems?
- Situational failures?
- How is technical support organised?
- Professionals involved in producing the service?
- Division of responsibility among staff members regarding the eHealth service?
- Who is responsible for the whole service?
- How are unplanned/acute situations handled?
- How are confidentiality and security ensured?
- How did the implementation affect work processes?
- Was it necessary to restructure work?
- How does the eHealth service affect the professionals’ work schedule?
- Offline / online services, is it necessary to have staff members / patients using the system simultaneously at each site?
- Scheduling?
- Care documentation?
- Does the organisational policy support the use of eHealth? How?
- Do you think the technology used to provide the service is easy to use?
- Resources needed for training staff members / patients?
- How is training organised?
- Lessons learned during the implementation of the eHealth service?
- Should any of the service components or processes be changed? Why?
- Is staff continuity necessary for providing the service?
- Are the users: patients / staff members satisfied with the service?
- Costs and savings related to the service?
- How has the eHealth service affected
- Access to health care?
- Response time?
- Education / competence?
- Need to travel?
- How has the health care professionals workload been affected by the service?
- Has the professional – patient relationship changed due to the implementation of the eHealth service?
- Obstacles in wide scale adoption of the eHealth service?
- Laws and regulations influencing the eHealth service?
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