

Competitive Health Services in Sparsely Populated Areas – eHealth Applications across the Urban-Rural Dimension



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1. Introduction

The Competitive health project is a three year (2008-2010) EU-funded project within the Northern Periphery Program with partners from Finland, Ireland¹, Norway, Scotland and Sweden. The aim of the project, according to the application, “is to enhance the provision and accessibility of health services in the sparsely populated areas (SPAs) of Europe”. The Northern Periphery Program covers parts of Finland, Ireland, Norway, Sweden and UK (Northern Ireland and Scotland). A common feature about sparsely populated areas is a lower accessibility to vital services compared to the more central areas, and this means that the people who live in remote areas have to travel long distances to obtain the services when needed. An aging population in the western will put pressure on the health and social care services, especially as the number of people over 85 is growing. The impact of an aging population is felt more acutely in the rural/sparsely populated areas as the portion of older people is higher than in urban areas. eHealth has been seen as tool that can increase the capacity to provide health care services and give people living in the periphery the possibility to obtain health care services in their local community.

The idea behind the Competitive Health Project was to transfer best practices in eHealth from one country to another. In order to make a documentation of the best practices of eHealth solutions in the northern periphery area it was necessary to identify and map the solutions². Representatives from each country would identify eHealth solutions in their own country and put together a description of the individual services. To make the description of the services comparable, the international project team made two lists of variables that the services could be classified by. One list was focusing on a limited number of variables meant to describe all of the eHealth solutions: 1) What was the main purpose of the solution, 2) what kind of technology was applied, 3) how was the services organized and 4) what kind of values did the services bring to the patients and the health care organizations. The services were also evaluated on the basis of SWOT analysis. The SWOT analysis promote an evaluation of the services based on 4 factors: 1) what strengths do the services have, 2) what can be considered to be the weaknesses of the services, 3) what kind of opportunities are there, and 4) what kind

¹ The Irish partner was providing the framework for the analysis of pilot site and service readiness, and wasn't going to implement any eHealth solution.

² The list of eHealth solutions is published in “A portfolio of e-Health Applications in European Sparsely Populated Areas. Competitive Health Services in Sparsely Populated Areas – e-Health Applications across the Urban-Rural Dimension.

of threats do the services face. These factors must be assessed and balanced on the background of a specific context of technological, cultural, administrative, economical and legislative factors.

Based on an analysis of the list of services each country chose to make a list of three services that were meant to be evaluated and described in a more detailed form. The three services were chosen on the basis of an anticipated readiness for transferring to and implementation in another country. In order to get a deeper insight into the services we made an interview guide. The interview guide consisted of a number of open ended questions; some of them were followed up by triggers. The questions were meant to describe both the system and the outcome of the use as well as the process of implementing the system. The interviews were performed with people who have excellent knowledge regarding the relevant eHealth systems.

Based on the description of the services and the SWOT analysis the local project members tried to single out some projects that potentially could be implemented. Each project team would examine at least three solutions from each of the three other countries, a total number of 9 solutions or more. During the assessment of the services the project teams had to pay attention to what kind of health care organization(s) could be suitable to invite to act as pilot site(s). The assessment of the services and the potential pilot site was done in close cooperation with the local expert groups.

In order to assess the services and the potential pilot sites we applied a questionnaire called the eHIT³. The eHIT let us focus on the strengths and weaknesses of the services and organizations, and the obstacles and pitfalls the project may encounter. The eHIT can be used for interviews with a variety of health care professionals, administrators and technical personnel, and interviews can be performed individually or as group interview. The interviewed give score, from 0-10, to a set of statements regarding the services, human and organizational factors. The eHIT is a sensitizing tool, not a simple decision making tool, as it makes the decision makers aware of some important factors that may enhance or decrease the chance of success for eHealth initiatives.

The data gathered from the interviews, SWOT analysis and eHIT constitute the basis for the decision regarding which services and pilot sites we chose. Each local project team was to

³The result is presented in "Utilization of the eHit-tool eHealth Implementation Toolkit. Identification of pilot services in Finland, Scotland, Sweden and Norway. Competitive Health Services in Sparsely Populated Areas – e-Health Applications across the Urban-Rural Dimensio".

come up with at least one service and a potential site where the service could be implemented. To learn more about the services, representatives from the pilot sites and representatives from the companies were to meet. During this match making session representatives from the companies presented the services and the representatives from the potential pilot sites were invited to ask questions. The decision making process would also be informed by additional data and information.

This report describes and analyzes the Norwegian case in Competitive Health project. The Norwegian project has been organized by representatives from the Norwegian Centre for Integrated Care and Telemedicine (NCT). The Norwegian project team chose to implement a Swedish eHealth solution called “the Remote Check-up Bag” or simply “the Bag”. The project has gone through many stages from the start in 2008. The aim of this report is to analyze the process from the point at which the informants from the pilot site evaluated the readiness of the site to the point at which the health care professionals are testing the services. A mapping of the whole process will give us insight into the facilitators and obstacles to the implementation of eHealth system that has been developed in another country.

2. Methods

Different methods can be applied to evaluate new health care services, both quantitative and qualitative. Quantitative methods are focusing on quantitative properties of the phenomena and the relationships between variables. The result can be presented by numbers. Qualitative methods are focusing on the qualitative properties of the phenomena. The result can be based on the qualitative reactions to the system of the health care workers who have been using the services or of the actors who are in a position to decide whether to or not to implement the services.

Quantitative methods often apply logs and/or questionnaires. The answers are normally coded by the researcher and the respondents mark their answers and the results. Qualitative methods often use interviews. Interviews are more resource demanding, but there is possibility to interview a carefully selected sample of key actors. In semi-structured interviews questions are open and the informants are able to talk about issues that are not covered by the interview guide.

This evaluation is based on the use of quantitative and qualitative methods. We used a readymade sheet, called the eHIT, to evaluate the readiness of implementing the solution into the health care organizations. The eHIT was used before the project started and also to be

used during a midterm evaluation. The respondents were all nurses. The eHIT questionnaire was conducted face-to-face or via telephone. eHit is based on statements that the persons have to evaluate and give a score to. The persons were interviewed for 1 to 2 hours. In order to evaluate the uses of “the Bag” we made a log sheet which was to be filled in by the health care professionals whenever “the Bag” or biomedical equipment was used. The sheet covered some basic variables: date, initials, medical equipment, where the measurement was done (home or at an institution), was the communication system used and if it was used, could the clinical parameters be accessed within a reasonable time, and did the patient avoid travelling. Semi structured interviews were used during the whole implementation period. The interviews covered the basic stages of the implementation and the use of the services, and allowed us to invite the informants to comment and elaborate on the data in the log sheet. The main themes covered in the interview were: facilitators and obstacles to the implementation and use of the services, integration with the health care delivery system, usability of the solution and what values can the solution bring to the health care system and the patients. The interviews were normally organized as focus group interviews and were performed during training and testing sessions. Normally these sessions lasted from 2 to 2,5 hours. The last interview was done with the nurse in charge of Sifjord nursing home and an ICT professional in the municipality of Torsken.

3.Implementation

The Competitive Health project is to be considered as an implementation project. The attempts to implement new technology into the health care services have lead to an interest in developing analytical frameworks that can give insight into the process of establishing a new way to deliver health care services. There are many stories about failure in the history of implementation of telemedicine and eHealth. Often the eHealth services fail to sustain as a routinized way of delivering the services after the project period is finished. This has triggered an interest for finding out why some eHealth solutions have been established as routine services while others have not. Many of the perspectives have in common that they are based on the assumption that implementation of new services is dependent on human and organizational factors as well as on technological factors.

Implementation has been called “the critical gateway between decision to adopt the innovation and the routine use of an innovation” (Klein & Sorra, 1996). Cooper & Zmud (1990) have developed and described a process model of implementation focusing on six

stages. The first stage is called initiation and describes the search for organizational problems/opportunities and technological solutions. The process starts when someone takes the initiative, either an actor within the organization who thinks that a new technology may be as solution to a problem, or from pressure from outside, the state authorities demand that the organization start using the new technology. The initiative can be rejected or the organization decides to implement the services. The next phase, adoption, is focusing on the negotiations to get organizational support for the implementation. If the organization decides to allocate resources for the implementation of the solutions, the next phase is the adaptation stage. During this stage the technologies is adapted to the organizational contexts and installed. Work procedures are developed and the potential users are trained to use the technology. The result is that the technology is available and the users are able to use to use the technology. The stage is followed by an acceptance stage where the users are committed to use the technology. A routinization stage then follows where the use of the technology is seen as the normal way of performing the activities and not something extraordinary. The last stage is called infusion and describes a situation where increased organizational effectiveness is realised through the use of the technology in a comprehensive and integrated way in order to support the organization's goals.

The critique of the Cooper & Zmuud model is that it's linear and rationalistic. Implementation goes through a set of planned stages, one after the other. Cooper & Zmuud have been responding to this critique by pointing out that the stages don't have to be sequential but can take place more or less in parallel. In this report I will think of the stages as critical passages that process have to go through before the services are a part of the normal organizational activities.

The process of routinization or normalization has been discussed by May et al. (2003) in relation to telemedicine. To them the use formative qualitative evaluations will get insight into how the outcome of implementation are achieved by identifying and analyzing the "the professional and organizational negotiations, networks and practices on which they are they are founded". They identify four conditions that dispose a telemedicine system to fail to normalize as a stable way of delivering health care services or be successful. Rather than focus on the technology they focus on the social process as key factor to understand success and failure. 1) Telehealht systems fail to normalize when there is no link with sponsors who will promote energy to support the implementation effectively. 2) Telehealht systems fail to normalize when they are not fully integrated into the health care delivery system. 3)

Telehealth systems fail to normalize when the people needed to make them work in practice are not enrolled into cooperative functional groups. 4) Telehealth systems fail to normalize when the model of working in telemedicine is difficult to integrate into existing ways of working.

The use of telemedicine means that two or more actors have to perform specific tasks. The tasks sometimes have to be done simultaneously, e.g. telephone or video conference, or the activities of one actor are based on the activities of another actor in a sequence. It may be more challenging to implement a solution when two or more organizations or departments than it is in just one organization or department. In order to make a service all the involved actors have to integrate the services into their organizational structure and ongoing work processes. All the organizations have to perform the planned tasks and this has to be done according to a schedule.

The concept described above will be used in this report as sensitizing concepts. It is not considered to be a model that is to be tested. They have been used to guide the attention to specific phases in the implementation of "the Bag". During these phases different actors, solutions and problems comes and goes.

4. Identifying potential eHealth solution and pilot site

The process of identifying potential eHealth solution and pilot sites was done in 2008 and 2009. The aim was to come up with one pilot site and one eHealth solution that could be matched. The eHealth solution would then be implemented in the chosen pilot site.

The list of eHealth projects from the three other countries was to be the basis for the decision regarding which eHealth services the Norwegian partner were to implement. The project members made a short list of all the services from Sweden, Finland and Scotland. The list was presented and discussed with the local expert group at a meeting. During the discussion some services were excluded due to technical complexity, organization of the services, costs, problems of integration into local information systems or simply because the services already had been implemented in Norway. The expert group identified two services and three pilot sites that could potentially be matched.

Representatives from the potential pilot sites were invited to come to Scotland for a match making session. The aim was to learn more about the solution and to assess the appropriateness of the services in a local context. During the session the solution was

demonstrated and the representatives from the sites asked questions regarding the functionalities of the system.

After an examination of the services and potential pilot sites, the local expert group chose to implement the Swedish solution called “the Bag” in an organization called “Senjalegen”. There are four municipalities located at the Island of Senja. Lenvik is the biggest of the municipalities, with 11 000 inhabitants and where a big proportion of the population is living on the main land. The three other municipalities, Berg, Torsken and Tranøy, are relatively small, from 1000 to 1500 inhabitants. The three smaller municipalities have had trouble in recruiting GPs, or more precise the GPs don’t stay there for a long period of time. Due to the problems of getting general practitioners to stay for a longer period the 4 neighbouring municipalities started to cooperate. The GPs would have their office in Lenvik, the biggest municipality, and travel to the other municipalities three days a week.

4.4 The “Bag”

The idea behind the check-up bag is to bring the health care services to where the patients live instead of having the patient to travel long distances to the primary health care centre or GP office. The check-up bag is a mobile solution that can be stationed in a patient’s home or at a local health care centre. The service consists of standard medical equipment, most of them well known to the health care professionals, but they are supplied with Bluetooth technology. The medical equipment can be used by the health care workers and some of them can be used by the patients. Every patient has their own identity card which is attached to “the Bag” prior to the measurements. When the patients or the health care professionals use the medical equipment to measure clinical parameters, the data is sent to “the Bag” via Bluetooth. The data is then transferred to a server via the mobile net and can then be accessed by authorized health care personnel via the patient administrative system.

The RFID card will enable the clinical parameters to be associated with the patient. To be able to register the clinical the data in the data base every single patient has his or her card. The card is made while registering patient data in the patient administrative system. There are no data registered on the card and no information stored in “the Bag”.

5. Implementing “The Bag”

An interdisciplinary project team was established at NCT. The team consisted of people with different professional background: 1) a biomedical engineer, 2) a data engineer, and 3) a project manager. The biomedical engineer was to verify the medical equipment and

communications tool in "the Bag", while the data engineer was to verify the connection via the net and that the clinical data could be accessed via the patient administrative system. The project manager was responsible for organizing and seeing to that the project evolved as planned.

"The Bag" can include a variety of medical equipment. In order to decide which medical equipment should be included and tested during the pilot period, the project team organized a teleconference meeting with the leader of the reorganization process of "Senjalegen" in April 2009. During the meeting the leader came up with a list of medical equipment they wanted to test; 8 clinical parameters, including 4 points ECG, BP, SPO2, Pef, Hb, GI, INR and CRP.

The list of medical equipment was communicated to the manufacturer of "The Bag" in May 2009. We came to learn that not all the equipment was ready for "the Bag". Several months followed with development and adaptation of the technology. It took seven months before the equipment arrived in the municipality of Lenvik. "The Bag" arrived at the GP office in Lenvik November 5. Due to extra medical equipment "the Bag" was longer a bag but a suitcase. Including all the equipment the weight of the suitcase was 15 kg. The suitcase had wheels so the carers could easily move it around in a nursing home. The suitcase included a lot of technological components. Some of them were the health care workers familiar with, like the biomedical equipment. But the idea about a suitcase and the communication between the medical equipment and the modem via Bluetooth technology was novel to the healthcare professionals.

In mid November 2009 a biomedical engineer travelled to the GP office in Lenvik to test "the Bag". Local ICT personnel had already installed the patient administrative system on a server. But tests revealed that they were not able to access the clinical parameters via the patient administrative system. The clinical parameters were not sent from the biomedical equipment to "the Bag" or not transferred to Sweden via GPRS. Ten days later a representative from the company sent a mail to tell us that they had been testing "the Bag" together with ICT personnel in Lenvik. During the tests the representative from the company in Sweden was able to get in contact with "the Bag". He was not able to see any clinical parameters which meant that the clinical parameters ought to be accessed from the database in Lenvik.

In Norway all medical data run through a secure health network while "the Bag" runs through the mobile net. The project encountered some problems with opening the right gateways in the Norwegian Health Net so that data (clinical parameters and patient ID) could be

transferred from Sweden. In the beginning of December the representatives from the company and local ICT staff managed to establish secure contact by running the data through a proxy. The steering group made some comments regarding the transferring of data to Sweden. They asked about the legality of sending clinical parameters and patient ID to Sweden. The representatives from the company responded to the question and pointed to the fact that it's only a RFID code and the clinical parameters that are transferred to Sweden. The linkage between RFID code and patient is to be located in a secure database at Senjalegen.

In the beginning of February 2010 the project team arranged a meeting at the GP office in the municipality of Lenvik to discuss how "the Bag" could be used and where it could be located. During the meeting it was decided that there would be a demonstration of the "the Bag" at the GP office in Lenvik on February 23. Members of the staff brought "the Bag" with them to NCT for demonstration and further testing.

On February 22 the biomedical engineer went to Lenvik to test "the Bag". She noticed that "the Bag" was unstable. Sometimes "the Bag" didn't send the clinical parameters and sometimes, even though the modem signaled that the parameters were sent, she was not able to locate the clinical parameters in the patient administrative system. The rest of the project team arrived in Lenvik February 23. The aim of the meeting was to give a presentation of "the Bag", including the communication tools, website and the medical equipment. The biomedical engineer demonstrated the medical equipment, "the Bag" and the RFID card. The training session was organized as a hand on demonstration. A "patient" identity card was made and the health carers tested some of the biomedical equipments under guidance of the biomedical engineer. The data engineer demonstrated the patient administrative system on a PC at the office; how to log in to the patient administrative system and how to find and display the clinical parameters. The training session took 2 hours.

The GP was skeptical to the use of 4 points ECG and the specific spirometric equipment included in "the Bag". And he didn't like that the puls oximetry and ECG didn't have a display. He also commented on the lack of integration with the electronic patient record.

"The Bag" was to be stationed in Sifjord nursing home. The nursing home has 17 beds and 14 employees, including 3 nurses. Sifjord is a small village in the municipality of Torsken. Torsken has a total population of 900, 100 are living in Sifjord. The distance between Sifjord and the GP office in Lenvik is 41 km, one way, meaning that a patient has to travel a distance

of more than 80 kilometers when he or she has to go to the GP office in Lenvik. A GP is visiting Sifjord every Wednesday where the office is located at Sifjord nursing home.

The plan was to arrange another training session with the health carers at Sifjord nursing home in February 2010. Because of some avalanche hazard in the Sifjord area at that that time, the project group from NCT waited until March before they went to Sifjord.

In late march 2010 representatives of NCT, including a medical engineer and a data engineer, went to Sifjord nursing home. The training session was organized much in the same way as the session in Lenvik. Four of the health carers attended the training session. The training session revealed that the data could not be accessed via the patient administrative system, at least not within a reasonable amount of time. It was decided that the health care professionals should start to use the medical equipment without using the communication tools while the project team would try to find a solution to the communication problems. The medical equipment that didn't have a display was not found useful at that moment.

In the middle of June 2010 the project team arranged a telephone conference meeting with the nurse in charge at the nursing home in Sifjord. During the meeting the nurse said that they preferred to have all the manuals in Norwegian. The manuals were in English and Swedish, and under Norwegian regulations that's adequate. We decided that the biomedical engineer would translate all the manuals to Norwegian and send them to Sifjord nursing home via e-mail. The manuals were translated and sent to Sifjord nursing home by the end of June. It was also decided that the project team from NCT should go to Sifjord nursing home for a follow-up training session in the end of June.

The project team went back to the pilot site in the beginning of July 2010. The data engineer was to stay at it-department in Lenvik, while the biomedical engineer went to Sifjord nursing home. The data engineer was to log on to the patient administrative system and check if the clinical measurement could be accessed. The biomedical engineer and the health care workers at Sifjord nursing home were to test the medical equipment and "the Bag". The health carers in Sifjord had been using some of the medical equipment but hadn't been using the communication tools. They had made measurements and just registered the values on a form. However, they had been trying to register the patients on the RFID card but had encountered problems. The system didn't seem to work all the time, sometimes they were able to register the information while other times they were not. A project member from NCT was told to test the RFID card system. He experienced the same kind of problems. We

concluded that the manual regarding the use of the RFID card wasn't complete and that the project team should send an e-mail to the company in Sweden to ask for a complete version.

The tests in July revealed that there were still problems with the data communication. The health care workers were not able to access the clinical data within a reasonable amount of time. Either "the Bag" didn't signal that the data had been received, or the data could not be accessed via the patient administrative system. It was clear that there were some fundamental problems with the implementation of the system in a Norwegian context. It was decided that the modem in "the Bag" had to be changed.

After the health care workers had been testing the different medical equipment it became clear that they wanted use the four blood measurement equipment (CRP, INR, HB and GI) and the blood pressure equipment. The medical equipment was placed in plastic boxes and kept in an office. The health care workers kept the RFID cards in a little book, which was kept in the same office. This made it easy for them to find the equipment whenever it was needed. The PC to access the patient administrative system was stationed in the same office.

During July the project team at NCT worked together with the manufacturer to find a solution to the communication problem. The result was that a new modem was sent from Sweden to Sifjord nursing home where the local ICT personal installed the new modem. The new modem could be used together with a smaller bag. This meant that the health carers could use the system without having to bring the suitcase with them. They could just bring the modem and the medical equipment they needed at the moment with them. This made the system more mobile.

Everything seemed to be ready for some months of using the system in real life situations. The system was tested in August 2010, but the tests showed that the communication system was still unstable. "the Bag" was packed and the project was terminated three months before the official ending of the project. Before the project team from NCT went back to Sifjord we got a mail from the nurse in charge saying that probably one of the medical equipment was missing and we would not be able to locate it. It was the INR equipment. During project period the health care workers discovered that the INR equipment is very useful, and the email was just a funny way of saying that that was the case. They have now bought the same kind of INR equipment as was included in "the Bag". They will use low tech tools for communication, tools that they trust. The measurements will handed over to the GP when he

or she visits the GP office in Sifjord every Wednesday. They had also planned to use secure e-mail to “Senjalegen” when the GP office is closed in Sifjord during summer vacation.

6. The use of the services

Although the project has experienced connection problems, the medical equipment has been used to measure clinical parameters. The equipment has been used for a period of three months, from May to August 2010. 8 patients have been registered in the patient administrative system.

It was important that the equipment should be used by more than one of the health care professionals at Sifjord nursing home. Three of the health care workers at Sifjord nursing home participated during the training sessions and they have all been using the equipment.

During the three months period there have been 15 cases reported in the log sheet. As we remember there were 8 medical equipment included in ”the Bag”, and they have using HB, INR and CRP, while the other equipment have just been tested. The three medical equipment are among the 5 equipment that the health workers thought would be most frequently used during project period. HB has been used 3 times, INR 9 times and CRP 3 times during a relatively short period of time. INR has actually been more widely used than these figures shows as a health care professional has been using the INR at the GP office in Sifjord. These cases were not to be registered in the log sheet as the use of INR was a part of the normal health care services.

“The Bag” is a mobile system that can be used both in care institutions or the health care workers can bring it with them when they are visiting a client. The equipment has been used both in home of the patient and at the nursing home. The carers have used the equipment 4 times at home of the patients and 11 times at the nursing home.

Only two times did they use the RFID card and ”the Bag” to register the clinical parameters. In one of the cases they could access the data within a reasonable period of time. This reflects how many times we were able to access the data in the patient administrative system during testing. Normally the health care workers have only been using the medical equipment and have registered data the manually.

The health care workers registered if the patient avoided travelling. In 14 of the registered cases the patient did not have to travel. In 13 of those cases the patient avoided traveling to

the GP office in the neighboring municipality of Lenvik. That’s a distance of 80 km and we know that the weather conditions can be harsh during the winter.

7. Evaluation of the services

The eHealth services have been evaluated by using the eHiT questionnaire and interviews. Informal interviews have been conducted through the whole project period and a formal interview was conducted after the project was terminated.

7.1 eHit questionnaire

The eHIT has been conducted twice. The first time was in the spring of 2009 when a nurse was asked to give score to the eHIT statements. The nurse had a job as a leader of the reorganization of the primary care in 4 neighboring municipalities, and had been in Scotland for the match making session. The second time the questionnaire was conducted was in the autumn of 2010. The interviewed was a nurse who has been taking part in the implementation of ”the Bag” in Sifjord nursing home in the municipality of Torsken, and the questionnaire was conducted seven months after ”the Bag” arrived in Torsken.

The aim of the first eHIT questionnaire was to identify the ability and readiness of the pilot site to implement ”the Bag”. The interviewed had at that moment no knowledge regarding the use of ”the Bag” in a Norwegian context. The second questionnaire was aimed at learning about how well the eHealth solution fitted into the local organization and work processes.

The eHIT is organized around three main topics: 1) The context of the services, 2) the solution or the intervention and 3) the workforce. The score on these topics is made up by scores given to a number of questions. Table 2 shows the scores from spring 2009 and 2010.

Table 1: Summary of the eHit topic score

	The context	The intervention	The workforce
Spring 2009	64%	75%	59%
Autumn 2010	79%	23%	49%

Both respondents find that ”the Bag” can fit into the context of the national as well as the local system. They both think at the local culture is welcoming eHealth, there are local sponsor or opinion leaders who are supporting changes and there hasn’t been a history of bad

working relationship between the health care personal who are likely to be involved in the implementation and use of the service. The nurse who was interviewed in the autumn 2010 was more positive to the statements regarding the appropriateness of these elements of the local culture for the implementation of the eHealth solution than the nurse that was interviewed in spring 2009. The nurse who was interviewed in 2010 was also more positive to how well the eHealth initiative fitted into the local resource situation and existing risk management policies.

The opinions regarding the ehealth intervention diverge between the two respondents. The nurse who was interviewed in 2009 was more positive about the functionality of the service than the nurse who was interviewed in 2010. The nurse who was interviewed in 2009 based her scores on the idea behind the intervention and demonstration of the system. The system was perceived to facilitate health professional – patient interaction, credible in terms of security and easy to use. The nurse who was interviewed in 2010 have been testing and using the system for almost half a year. During this period she didn't consider the system to be a facilitator of health professional – patient interactions, nor did she consider the system to be reliable, but she found the usability of the system to be fairly good. The scores in the autumn 2010 can be explained by the fact that “the Bag” had not been up and running.

The nurse who was interviewed in 2009 was a little bit positive with the respect to the topic concerning the fit between the intervention and the work force while the nurse who was interviewed was neutral. There are some differences between the respondents regarding specific issues. The nurse who was interviewed in 2009 thought that the use of the system would increase the staff workloads while increasing the efficiency of the work patterns. The nurse who was interviewed in 2010 thought it was the other way around. The use of the solution didn't increase the workload; neither did the solution increase the efficiency of the work patterns.

7.2 The interviews

Interviews were conducted with a nurse at Sifjord nursing home, both informal and formal interviews, during the whole project period.

The informant was asked about how she assessed the project process. She found that the implementation process had been taking a very long time. The process started in May 2009. The informant thought that the project should have been better anchored in the “Senjalegen” organization. From 1.1.2010 the nursing home in Sifjord was responsible for the

implementation locally. 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. She said it was still unclear if the partners have signed a data processing agreement.

The system was installed on a server. The clinical parameters were to be transferred to one GP, a GP who was negative, and then the project was stillborn. Half of the doctors in the municipality of Torsken are medical interns and they are a little bit curious and could have found some spare time. But they were not a part in the project. If they had been recruited, then the clinical measurements made the day before could have been used during the doctor's visit; "Yes, I (the medical intern) need these results. Can you (the nurse) use "the Bag" and I can find the results." When that was not an option, the health care professionals didn't have those results to discuss during the visits. The informant had made an initiative concerning the possibility of nurses measuring INR during summer vacation when the GP office in Sifjord was closed. The nurses would send data via a secure e-mail to the GPs. This was not done. Instead, the measuring of INR was organized by the GP office in Lenvik.

The informant found it quite easy to make contact with the project members at NCT. If there were any questions she would get an answer, but not necessarily the right ones. She thought that the information process had not been functioning optimal. People should have been better informed about what was decided and what was planned, and a copy of the mail should have been sent to relevant partners.

On the question on how she assessed the technology, she said that the system was too fancy. There were too many links in a chain, from the measurements of clinical parameters to the patient administrative system. During the whole trial period the system was unstable. Some of the medical equipment didn't have a display so the only way to get access to the values was to log on to the patient administrative system. And if it takes 5 minutes to wait for "the Bag" to signal that the clinical parameters is registered, then the health care professionals have to wait 5 minutes before they can insert the next RFID card if they are going to make a measurement on another patient.

On a follow-up question regarding the usability of the services, the informant said that the suitcase was heavy. In the situation where the suitcase was stationed at the nursing home it was a lesser problem as the suitcase had built-in small wheels. The weight of "the Bag" made it awkward to bring along when the health care workers were going to visit the patients in their

homes. During the summer 2010 a new modem was delivered from the Swedish company. The health care professionals could just bring the modem and the relevant medical equipment with them.

Although the communication tools were wireless there were a lot of wires. Not all the equipment got Bluetooth technology, the suitcase needed to be connected to electricity and also some of the equipment had to be connected to electricity. The equipment which was not connected to electricity used batteries and the different equipment didn't necessarily use the same type of battery.

The interviewed thought that training sessions was a little bit abrupt. The system had not been tested well enough before the project team from NCT came to Sifjord nursing home. This meant that the project team was not able to demonstrate all the functionalities of the system and the health carers were not able to test them. But still the interviewed felt they were optimistic in March regarding the possibilities of testing the system as they didn't have encountered problems with the medical equipment, except that some specific type of equipment were novel to the health carers.

8. Summing up and lessons learned

The initiative to implement "the Bag" in Senjalegen, the organized cooperation between four neighboring municipalities regarding the use of GP resources, came from outside the pilot organization. The project team at NCT had decided that they wanted have a closer look at a Swedish solution called "the Bag". Representatives from the project team contacted the leader of "Senjalegen", an organization for cooperation of GP services in four neighboring municipalities, and introduced her to idea behind the solution. This is an example of a solution searching for a problem to solve (Cyert and March, 1963), rather than the other way around, where the organization has identified a problem and is searching for a solution.

After the initiative was made there was a phase of finding out whether there was a satisfying match between the solution and a problem. The existence of new solution may provide the background for identifying something as a problem. Three small municipalities on the Island Senja have for years had problems in recruiting GPs. "The Bag" could be located in one of the small villages on Senja, in a nursing home and could also be brought home to the patient. The clinical parameters could be accessed by a GP stationed in Levik, the biggest municipality. To get the organizational support for the implementation of the solution the project team at NCT invited the leader of the reorganization process to Scotland for a matchmaking session. A

representative from the company demonstrated "the Bag" and the leader could ask questions regarding the functionalities. In order to assess the solution and the readiness of the organization we used eHit which uses a set of sensitizing questions regarding the context, the intervention and the workforce. The result from the eHIT in 2009 showed that the score for the intervention was high and positive score for the context and workforce.

In a telephone conference meeting with project team at NCT the leader of the reorganization process came up with a list of medical equipment that was to be included in "the Bag". The list was sent to the company in Sweden. It took seven months before "the Bag" arrived at Lenvik GP office.

The local adaptation process started in November 2009 when "the Bag" arrived at the GP office. After the first testing of the medical equipment the biomedical engineer learned that "the Bag" was unstable. Not all the clinical parameters could be accessed via the patient administrative system. During a meeting at the GP office in February 2010 the GP was skeptical to the use of some of the equipment and the lack integration with the electronic record. During the next meeting at the GP office in late February it was decided that "the Bag" should be located at Sifjord nursing home in the municipality of Torsken.

"The Bag" was sent to Sifjord nursing home with a plan for further testing. In March 2010 the project team from NCT went to Sifjord to arrange training sessions and test the equipment. 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. It was decided that the health care professionals should start to use the medical equipment without using "the Bag". The team came back in July for a follow-up training session. Still the tests revealed that they were not able to get a stable contact with "the Bag". The solution to the connection problem was to get a new modem from Sweden. In august 2010 the new modem was tested, but the tests revealed that there still were connection problems. The project was then ended.

We sometimes hear researchers say that implementing eHealth and telemedicine services are for the most part is about humans and organizational factors. That maybe true when we have a reliable eHealth technology. But eHealth is also about technology. The medical equipment used in this project was standard medical equipment. We managed to find a secure solution to the problem concerning the fact that "the Bag" run via the mobile net while clinical data in

Norway run through a secure health net. But we were not able integrate the Swedish eHealth solution into a Norwegian context.

Health care workers need a system that is reliable, a system that they can trust. The test revealed that the communications tools never functioned properly. The fact that they have to wait for the signal to tell that clinical parameters have been transferred is also time consuming as a nurses could have made another measurement during the period they was waiting for the signal. In order to make a workable eHealth system the system has to function in ways that are in accordance with the ways health care professionals are working with their patients.

Empirical findings tell us that the existence of a local sponsor who will devote time and energy to promote the solutions is of importance in generating acceptance and support for the eHealth initiative. During the project period the eHealth initiative have been supported by the health care professionals at Sifjord nursing home. Although they became more skeptical about the technology and the benefits that the services could bring as time went on, they always found time for meetings, tests and training sessions. The ICT personal in the municipalities of Lenvik and Torsken were very helpful during the project period.

This project is also about communication between health care professionals and health care organizations. 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 GP was reluctant to use the services for several reasons. The data was not integrated with electronic patient record, and some of the medical equipment was not adequate.

Although the eHealth solution failed to normalize as a routine way of delivering health care services, we learned that a functional system can bring values to the patients. eHealth services provided to the patients near his or her home means that the patients can avoid tiresome travelling.

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