MOBILE PHONE-BASED HEALTHCARE DELIVERY IN A SAMI AREA: REFLECTIONS ON TECHNOLOGY AND CULTURE

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Abstract. This paper analyses the redesign of psychiatric services for children and adolescents in a Sami area in the county of Finnmark in Norway. The project included the introduction of a new technology in support of a decentralized model for healthcare service delivery. We focus specifically on the role of culture in the development and implementation of a mobile phone application during the pilot phase of the project. In our analysis we draw on information infrastructure theory. We are in particular interested in the concept of generativity and critically assess its role of in the analysis of technology in a culturally diverse context.

1. Introduction

User-driven innovation has been playing a significant role in many sectors (von Hippel, 2005). An important factor for this shift is the increased demand for personalized products, reflecting more heterogeneous needs. So called user innovation communities are often formed on the basis of users who share similar needs and interests. Members of these communities present their innovations and assist one another with the innovation development (Hienerth, 2006; Tietz et al., 2005). In the health care sector there is a growing interest in user-centered innovations, which can replace manufacturer-centered innovations. Many health care workers wish to understand the user's needs accurately and in detail. Von Hippel (2001) claims that this results in outsourcing important needs-related innovation tasks to the users, after equipping them with appropriate "user toolkits for innovation" (p. 247). Users are perceived to hold better knowledge about their own contexts, needs and wishes. Although this knowledge is 'sticky' and costly to transfer – it results in a more active role of patients, as they take more responsibility their own treatment and decisions.

This paper reports from a reorganization within in psychiatric health care for children and youth in Norway. In this pilot project the users formed a rather diverse group, with different roles and responsibilities and from different cultural backgrounds: Sami and Norwegian. Some of the users were significantly involved in developing a web-based solution, based on mobile phones, which would support the work of the

health care providers as a well as support the patients in their communication and information handling routines in support of the treatment.

To secure access to new technology is of a great significance for participation in society, as well as for the development of culture and language. With this contribution, we wish to amplify what happens during the development of a mobile application when cultural aspects are not taken into consideration. Among the participants in the pilot project we discuss, was a group of families with Sami background. We have problematized the use of technology in the context of these Sami families.

The aim of this paper is to contribute to the understanding the role of culture in a project in which technology plays a central role. By 'following' culture, in this case in a particular language, we can see how culture is both visible and invisible in the pilot project. The project will be continued, this time with user interfaces in both the Norwegian and Sami language. This is an important development in the project, but we argue that the effects of the particular configurations of technology and culture found in the pilot project may only become visible in the next iteration of the technology design.

2. Health Service Context

Finnmark County lies in the extreme northeast of Norway[1]. The county has two official names: Finnmark (Norwegian) and Finnmárku (Sami language) and is the largest county of Norway. With its 73,000 inhabitants it is a very sparsely populated area. Approximately 20,000 persons are under the age of 20, and in 2007, there were 950 children under the age of 18 receiving daily treatment in clinics for Children- and Youth Psychiatry (CYP). Approximately 40% of the inhabitants in the county are Sami people[2]. There are long distances between the different communities and most inhabitants need to travel long distances to the nearest hospital or medical expert. The provision of health care services in rural, sparsely populated, and culturally diverse area raises a number of challenges.

In the last 15-20 years, substantial efforts have been implemented to build an information, communication and technology (ICT) infrastructure for telemedicine in the north of Norway. The infrastructure is to a large extent based on broadband networks, and are mainly used for traditional computer applications, which not necessarily support all type of decentralized health services. The broadband and mobile infrastructure in Finnmark county is unevenly distributed: some areas well covered by both broadband networks and telephone networks, other areas are almost without any coverage at all.

A new trend in the provision of health care is the mobilization of the patients' own resources, as well as family and community resources, as significant contributions to the healing process (Brennan and Safran, 2003; Ball and Lillis, 2001). In particular, patients should be provided with care and support in order to self-manage their health problems as much as possible. Health workers in the county are aware of the challenges in working with both the Norwegian and Sami culture, and try to handle the mobilization

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[1] Finnmark is larger than Denmark. Vardø, the easternmost municipality in Finnmark and Norway as a whole, is located further east than both St. Petersburg and Istanbul.
[2] The Sámi language has official status in the Sami Administrative Areas.

trend by including the Sami language and culture in their daily work. Employees in the health sector speak Norwegian, and some speak both Sami and Norwegian. If some of the Sami speaking health workers and/or patients specifically ask for an interpreter, the regional Health Services Provider will provide this. In their daily work, health care workers now use video conferencing, personal computers, and mobile phones. Video conferencing is generally used between health workers to arrange meetings, give counseling, and receive training. Norwegian is the language used in video conferencing.

All employees in the child- and youth psychiatry have access to computers, stationary and/or portable. The system used is called Clinic for Children and Youth Data. This system is only available in Norwegian. All information about the patients is stored electronically in this system and can be accessed by those who are authorized. Data from video conferencing and medical data from the Children and Youth Psychiatry (CYP) is archived and communicated within the Norwegian Healthnet[3]. Healthnet is a platform for electronic interaction and contains a communication network and services for electronic interaction in the Norwegian health care sector. Through secure information processing, health workers are able to exchange important patient information, while requirements for confidentiality, integrity and accessibility are secured. Use of the home telephone and mobile phone takes place over the ordinary telecommunication network, and is not considered secure. Health workers use telephone between each other, but also as a communication channel with the patients. To a large degree, telephone communication deals with the agreement of time of meetings for treatment, as well as the cancellation of these meetings or treatments.

This paper reports on the introduction of one health program in Finnmark called Kom hIT[4] Ambulant Teams and Technology (Kom hIT). The new program is a project of the 'Clinic for Psychiatric Health Care and Intoxication'[5], and was approved as a result of the shut down of Seidajok Child Psychiatric Home. The project involves the introduction of mobile teams, who use and adapt acknowledged treatment methods, including new methods of treatment that include technology. Children will get the help they need, as early as possible and as close to their families and home community as possible. The target group is the 6-12 years age group. This paper reports on the development and implementation of a pilot project that ran from January 1, 2006 to December 31, 2008. This pilot project had the following objectives:

- Establish methods for interaction to quality assure the kinds of treatment within psychiatric health care for children, independent of language, culture, patterns of settlement and geography.
- Strengthen the interdisciplinary cooperation between the support services in the municipalities and the specialist health service, between different levels, agencies and organizations through documentation and altered working methods.
- Increase the efficiency with the help of technology.

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[3] The enterprise Norwegian Healthnet AS (Norsk Helsenett AS) was established in the fall of 2004, with the foundation in national health authorities' aim for a secured network for electronic interaction in the health- and caresector in Norway, with appurtenant relevant services (http://www.norsk-helsenett.no/om-oss).
[4] The Norwegian title: "Kom hIT – ambulante team og teknologi" includes a pun thorugh capitalising IT in "hit" (meaning "here").
[5] http://www.helse-finnmark.no/klinikk-psykisk-helsevern-og-rus/category923.html

The performance measurement goals in project were as follows:

- The mobile teams will make sure that the child is getting help where he/she lives.
- The mobile teams will make sure that the child and its family/relative get satisfactory qualitative and testable treatment methods.
- The mobile teams will contribute to strengthen the cooperation and interaction between children, their family/relative, the school, and the health – and social services in their home community, which consolidates good quality on the overall offer.

With the help of the mobile teams, technology, interaction and client participation, children- and youth psychiatric policlinics will give professionally coordinated, continuous, and decentralized forms of treatment within psychiatric health care for children and their family/caretakers. The treatment method used in the project Kom hIT is based on a variant of the Parent Management Training-Oregon (PMT-O), which is a treatment and prevention program for families with children with antisocial behavior.[6] Another important part of this project was the development and implementation of appropriate technical solution, based on mobile phones, that can help the health care providers as a well as the patients in their communication and information handling routines supporting the treatment. This innovation process is described more detailed in Andersen and Jansen (2009).

3. Theory and Methodology

In the previous section we sketched some of the complex set of practices, relations, roles, accountabilities in which the Kom hIT project is embedded. We will now present a conceptual framework that we will use to gain better understanding of such complexity. We will begin with a brief discussion of information infrastructure theory, which may offer better understanding of large infrastructures and how they evolve and change (Star and Ruhleder 1996; Hanseth and Monteiro, 1998). Information infrastructure theory can provide us with insights in how we can develop and maintain a new infrastructure (Jansen and Nilsen, 2002), for example, how to successfully create an architecture for electronic coordination, or how to develop a global electronic patient record (Hanseth and Braa, 1998). We will look closer at the concept of *generativity* (Zittrain, 2006), which is gaining interest in information infrastructure research. We have selected generativity as our conceptual lens for the discussion and analysis of the mobile technology underlying the Kom hIT project to analyze whether this enables the users to aqcuire the technology for their own use (Church and Whitten, 2009). A generative technology may have a considerably greater capacity to be adapted and modified by a culturally diverse audience than a non-generative technology.

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[6] PMT-O is based on "social interaction learning theory", developed by Patterson and co-workers at Oregon Social Learning Center. PMT-O is a detailed program designed to improve parenting practices, and indirectly reduce antisocial behaviour in the children

3.1. INFORMATION INFRASTRUCTURES

A variety of concepts and properties can be used to describe information infrastructures (Star and Ruhleder 1996; Hanseth and Monteiro, 1998; Ciborra et al., 2000). Information infrastructures can be conceptualised and understood as formed by independent and interconnected collections of socio-technical components (Hanseth 2000; Hanseth and Monteiro 1998; Hanseth et al. 1996; McGarty 1992; Star and Ruhleder 1996). Together these components form a platform that can offer services and applications for other actors, such as an intranet in a global organisation or the Internet.

Information infrastructures are large, open, and heterogeneous sociotechnical networks of different types of users, stakeholders, application areas, and technological components. The different actors in an information infrastructure have different perspectives and have only partial control over the information infrastructure (Neumann and Star 1996, Star and Ruhleder 1996). An information infrastructure is not just the result of design activities and choices. It grows from the existing installed base of technologies, design practices and use (Hanseth and Monteiro, 1998). Installed base is defined as the already existing infrastructure with its technology and users, and information infrastructures are developed only through the expansion and improvement of such a pre-existing installed base (Ciborra et al., 2000). Information infrastructures are developed over time through gradual expansion, improvement and replacement of its parts. Total control over the information infrastructure is impossible, but the different parts or components will be under the control of specific actors (Ciborra et al. 2000; Lyytinen and Yoo 2002). For example, users are made to use a new information infrastructure through the cultivation and bootstrapping (Hanseth and Aanestad 2003; Rolland and Monteiro 2002), while lock-ins are prevented through flexible standards (Hanseth et al. 1996). There are two basic types of integration or linking of information infrastructures:

- Vertical integration, in which applications are linked to a specific infrastructure; this is typically for telecommunication networks, for example SMS as an integral part of the mobile network.
- Horizontal integration, in which cooperation between networks is established at particular network layers; this is typical for networks such as the Internet, LAN – WLAN communication, etc. Also convergence is partly related to the integration of different levels.

In our case, we want to examine the information infrastructure of the Kom hIT project in order to understand how the users' potential for innovation can be realized through the project. Thus we also draw on literature that analyses how different technologies and different development models facilitate such innovation. Relevant studies in this context are that of Janet Abbate (1994, 1999) who draws parallels between the Internet network model and the common conceptualizations within telecom networks. Her studies showed that different configurations allowed for different usages and different paths of evolution where the Internet turned out to be an outstanding flexible platform for innovation based on its simple network protocols, end-to-end intelligence and open development processes. In describing the unprecedented growth and innovation of the Internet, Jonathan Zittrain (2006) employs the concept of generativity: "Generativity

denotes a technology's overall capacity to produce unprompted change driven by large, varied, and uncoordinated audiences". In the next section we will discuss the suitability of the concept of generativity in our analysis of the mobile technology in the Kom hIT project.

3.2. GENERATIVITY

Jonathan Zittrain (2006) argues that instead of using the terms *open* versus *proprietary* technologies, one should use the terms *generative* versus *closed* configurations of technologies. The Internet is an example of the type of technologies that are open to third-party (user) innovations and are therefore classified as generative technologies. Zittrain (2006) defines generativity in the form of four criteria, which are described as follows:

- *Leverage* describes the extent to which a technology has the capacity to do tasks. Leverage provides generative technologies with the capacity for change: the more leverage, the more it can produce change.
- *Adaptability* is associated with the ease with the technology can be modified to broaden its range of uses and tasks.
- *Accessability* refers to how quickly people can use and control a technology, including access to the tools and information required to master the technology for greater accessibility.
- *Ease of mastery* describes how a technology can be mastered without difficulty, or rather how easy a technology is to master. Zittrain (2006) argues that this criterion is related to the accessibility and adaptability criteria, because it reflects on the ease of adapting and accessing a technology.

Inspired by Zittrain (2006), we will use the concept of generativity and investigate, on the basis of its four criteria, if the mobile technology under investigation encourages generativity, enabling users to appropriate the technology for their own use (Church and Whitten, 2009). As our project is implemented in a culturally diverse population, a generative technology, we speculate, may have a greater capacity to be adapted and to produce change by a culturally diverse audience than a non-generative technology.

3.3. METHODS AND DATA COLLECTION

Our study of the mobile technology used in the Kom hIT project follows the interpretative and qualitative tradition in information systems research (Myers, 1997: Myers and Avison, 2002; Walsham, 1993). The empirical data were collected in the form of interviews with employees in the ambulant teams working with Children and Youth Psychiatry, interviews with user representatives, and through written feedback from various stakeholders in the project. All interviews are transcribed.

The first author was the project manager for the project from the start in 2006. The researcher was directly involved in project development and implementation, which enabled data collection throughout the project's lifetime. This involvement included participating observation as well as active participation, with a relatively high degree of engagement. This dual role challenged the balance between research interests and

practical needs in the project. It was important to be transparent towards the other stakeholders concerning the two related roles of the researcher and the project manager.

It can be difficult to be analytical and critical, when one plays a central role in one's case study. There may be diverging interests between the role as researcher and project manager. Walsham (2006) mentions that there may be a risk when the researcher is becoming "socialized to the views of the people in the field and thus loose the benefit of a fresh outlook on the situation" (op. cit., p. 322). As the project manager, the first author did not met de families participating in the project: all contact with the families has therefore been through therapists in the ambulant teams. This means that this research is based observation and interviews with the CYP employees and ambulant team members and thus focuses on their challenges related to the use of mobile technologies in child and youth psychiatry (CYP) in the Sami language area.

4. Generative technology?

In our analysis of the mobile phone application will we draw on information infrastructure theory and use the concept of generativity as our analytical lens. We begin with examining the use of the mobile technology in the Sami area, followed by a discussion of the generative aspects of this technology.

4.1. USE OF MOBILE TECHNOLOGY IN THE "SAMI AREA"

The area in which one of the participating communities is located is a Sami Administrative Area. This means that both the Sami and Norwegian language have official status as an administrative language. The Sami pilot community with its 9704 km^2 is the largest community in Norway in terms of its areal. There are 0,3 inhabitant pr. km^2, and there are ca. 3000 inhabitants in the community. Approximately 85-90% of the inhabitants in the community speak Sami. A Sami-speaking therapist would be available if one of the children or their families asked for one. The administrative health care workers in the community experienced the use of Sami language and mobile phone as necessary to get the job done, and one of them describes this as follows:

> For the most part, we speak and carry out our administrative work in Sami. Most of the health employees are either Sami or can speak Sami. We use mobile phones on a daily basis for SMS and other messages, and all of the messages are written in Sami language. I think mobile phones have been used in Sámi areas since the mobile was introduced. It is natural to use it as a tool because of the long distances. A lot of the citizens in the community are spread all over the large community area, in the mountains, in the small villages. We must therefore organize for our citizens! We always use mobile phones to confirm the appointment. We do this even if there is an appointment in the office or clinic, because we have experienced that there is often need for a new appointment concerning time and date. The most important is to be available, and this is necessary because of both long distances and weather. The mobile is both a tool, and a resource in our work.

The average distance between a Children and Youth Psychiatry clinic and the families in this pilot community is about 670 kilometers. The ambulant team experienced also the necessariness to contact the families by mobile phone before they visit. One therapist describes this as follows:

If the family is not able to meet us as planned, they will have to give us feedback on this, and in this way make themselves responsible. However, we do make exceptions. If we have to travel for 3- 6 hour to visit one family, we contact the family in advance to make sure that they remember the appointment and are able to meet us. It is sad to spend one whole day travelling without getting to do our job.

The team meets the children and families in their own home. One of the therapists describes a home visit as follows:

We have experienced that there may be other relatives in the home, like grandparents, uncles, aunts etc. The families live in small communities where everybody knows everybody. We especially meet more than just the family if the families are related to the primary industries like reindeering, fishing, and agriculture. Maybe these families are able to be more flexible in their use of time? Or know how important it is to participate? But we also meet neighbours who want to meet us, because they are curious to know who we are.

The goals to be reached with the treatment are discussed and prioritized during meetings between the child / youth, parents, family and the ambulant team in the initial phase of treatment. The team talks with the family and takes into account the wishes, individual differences and any needs the family has, as this is the premise for the families to take part in their treatment and receive treatment where they live. Behavior to be corrected or changed by the treatment (such as change of behavior in relation to meals) need to clarified. The child receives rewards associated with a change in behavior. As one of the therapists explained:

The demand towards the child, in relation to the points that can be earned, must be realistic and achievable. This is very important. The child shall have a reward when it has achieved 70% of the total possible score. For example, if the total score is 5 points - then the child must have achieved 70% of this in order to earn a reward.

A form is filled out on the mobile phone based on this information. The parents work together with the child/youth in filling out the form by linking behavior to points, providing the number of gained points (usually between zero and five). These forms form the basis for interaction between the families and the ambulant team. Between each home visit by the ambulant team, the parents must register the child's/youth's behavior. The introduction of the mobile technology and the new mobile application allowed the parents to send the forms immediately, so that the ambulant team can respond when necessary to this ongoing treatment process. The ambulant team emphasizes that this process of discussing behavior and linking it to points written down on a form on the mobile phone is more important than the points itself. The therapists also mention that they have the impression that the child/youth and parents participate actively in the treatment and that everyone seems happy with the

arrangements. The Kom hIT project resulted in daily contact with families, but that the mobile solution has not resulted in less travel for the ambulant teams:

> *You have to spend time getting to know them, to establish a good contact between the family and team. Once this is in place, we will be able to use the mobile phone much. In the long run this will result in less travel where there are families who will need guidance for a long time.*

Before this decentralized management model of the Kom hIT project was introduced to the families, they would either send the forms by mail or fax to the ambulant team - or keep the forms for the next time the team came on home visits. Users in the Kom hIT project felt that it was now easier to cooperate because of ease of reporting and more regular interaction. Several representatives in the teams have expressed that user focus has been important in the engagement, interaction and participation. It resulted in early help and treatment for the families in their own community, and at the same time the families had the possibility to participate and cooperate with the ambulant team in their own treatment.

4.2. GENERATIVE TECHNOLOGY?

The users of the mobile phone technology, the members of the ambulant teams as well as the participating families, were very positive about using the mobile phone for reporting on behavior and for communication in general. In this section we will analyse the technology through the lens of generativity (Zittrain, 2006), which focuses on possible future adaptation and use. The concept of generativity provides us with four characteristics, analysing how ordinary users have the opportunity to appropriate and use technology for their own use. Zittrain (2006) claims that a generative technology increases the possibility that users can generate new and valuable usage patterns that become sources for further innovations (p.6). We will present each of the four characteristics of generativity in a discussion of the Kom-hIT project. We are especially interested in the relationship between culture and the generativity of technology. We will begin to address this topic in this section, but the main discussion can be found in section five.

Accessibility refers to how quickly people are able to use and control a technology and here we see a high level of generativity for the Kom hIT technology. The teams report that all families were quickly able to use the Kom hIT application, because everyone was already familiar with using a mobile phone. Secondly, the mobile phone technology is easily for families are active in the primary industries, such as in fishing, reindeering, and agriculture. They can bring the mobile phone to places and situations in which there is no access to other information and communication technologies.

Adaptability applies to the ease with which a technology can be modified to broaden its range of uses. In the Kom hIT project, the mobile technology was easily modified for new purposes. Through the development of the new application for the forms, and the discussions around filling in those forms, the technology played an important role in the treatment. Secondly, the mobile phone enabled daily support for the families receiving treatment through structured and unstructured communication and practical communications between ambulant teams and the families. The ambulant teams were very positive of the user-friendly technology and how the data sent in from

the mobile phone could be represented in web-based applications. They mentioned that the same technologies could be used in other treatments and by other user groups with just little adaptation.

The *ease of mastery* of a technology reflects the amount of skills necessary to use a technology. The ease of use of the mobile phone technology in the project was high. There were no technical problems. All the participating families were able to use the specially design application to fill in the form with the points for behavior.

In terms of l*everage*, the extent to which a technology has the capacity to implement tasks, we can see that the mobile phone technology was used to implement several tasks, communication between teams and families, the filling out of the form, and maybe most importantly, the mobile phone became an object in the treatment as it facilitated discussion on behavior between the child/youth and the parents. From the point of view of the healthcare workers, however, the leverage of the mobile phone technology is limited by the centralised model of HealthNet. The Kom-hIT mobile solution stands outside the existing infrastructure and has worked well during the test period. In terms of leverage, however, the Kom hIT project needs to be integrated in the existing infrastructures, including HealthNet, if healthcare workers and their organisations want to develop and implement new tasks with this technology.

Although the mobile phone and its particular Kom hIT application seem to have all the characteristics of a generative technology, the generativity of a piece of technology depends on the larger infrastructure in which it is embedded. The HealthNet network, the information infrastructure for secure data storage and communication within and between organisations in the health sector, does not accommodate communication between healthcare organisations and private homes. The decentralised treatment model of the Kom hIT project was incompatible with the centralized communication network of HealthNet and was therefore developed and implemented outside HealthNet. This affects the adaptability, accessibility, and leverage of the Kom hIT technology in a major way, as new uses, new tasks, and new purposes can only become possible in new configurations of the Kom hIT technology and the HealthNet infrastructure.

The generativity of the Kom hIT technology may also affected by the fact that the interface was only available in the Norwegian language. One team reported that a Sami family in the Sami community was not able to participate in the project because the interface was not available in the Sami language. Several Sami families did participate using the Norwegian language interface. We have however no data that can give us an indication that the lack of a Sami interface affected the interactions of the Sami families with the mobile phone. The generativity of technology can be analyzed with the use of four characteristics: accessibility, adaptability, ease of mastery, and leverage. The generativity of the Kom hIT technology seems promising, but is very low as it is not connected with the information infrastructure (HealthNet) that is needed to function in a secure and sustainable fashion in a healthcare setting. The four characteristics of a generative technology do not, as we begin to see, ask specific questions about the 'cultural infrastructure' and how this affects the accessibility, adaptability, ease of mastery, and leverage of a technology. We could discuss the generativity of the Kom hIT technology without taking language in consideration. In the next section we will

look closer at this observation by asking how culture can become invisible in a culturally diverse project setting.

5. Technology and Culture

Our analysis of the mobile phone technology in the Kom hIT project illustrates how technology moved to the centre of the project, while culture, once it was decided that the mobile solution would be in the Norwegian language, moved to the background. The concept of generativity seemed to strengthen this process, as it directly linked to the new organizational solution of decentralized healthcare delivery through an alternative technical platform within an existing information infrastructure. In this section we will reflect more on the relationship between technology and culture in the project. We will look at the interactions between technology and culture and discuss what these interactions mean for our understanding of the concept of generativity.

5.1. ROLE OF TECHNOLOGY IN THE PROJECT

The aim of the Kom hIT project was to replace the centralized treatment model by a decentralized model. In the new model children and families would receive support and treatment independent from where they lived or their cultural background. The technological solution was crucial for the implementation of this new decentralized care model. In that sense technology moved to the centre of the project, performing different roles and presenting different aspects in the project.

5.1.1. Neutral technology?
When the project started in 2006, two important decisions had to be made. One was about the professional approach (treatment), which resulted in the adoption of the PMT-O model. The other decision was about the choice of technology. At the start of the project, future users participated in the discussion on a technological solution. These users had different cultural backgrounds, which influenced the discussion on the technological solution. For example, some of the Sami families live in small communities with long distances in between. They have to travel many kilometers to reach the nearest school, medical expert, offices, shops etc. The users, both the health care workers and the families, felt there was a need for technology that could use the existing broadband networks and telephone networks. This initial phase is described more detailed by Andersen and Aanestad (2008). The arguments in favor of mobile technologies were multiple:

- A technical solution based on videoconferencing would be expensive.
- The cost of purchasing mobile phones would be moderate as compared to purchase of PCs, web cameras, document cameras and possibly a required upgrading of the different studios of the out-patient clinics.
- The ambulant teams were travelling a lot - mobile phones would therefore be more practical communication equipment than portable PCs.
- The coverage of the mobile network was better than the coverage of the broadband network in the northern part of Norway.

Thus, when a decision was made about the technical solution, the needs of the ambulant teams, the Norwegian families, and the Sami families seemed to align: there was no distinction between Sami and Norwegian people in the selection of a mobile solution. There seemed to be no specific cultural needs, at this stage of the project. The families chose a technological solution they were familiar with. In policy terms, the technical solution seemed to provide universal access in accordance with the government's requirements of universal design[7].

5.1.2. Installed base

After the technological platform was selected, an application that supports the PMT-O model was developed and implemented on the mobile phones. The application is a digital replication of a paper form used to register the results on specific action points regarding the child's problems. This paper form was written in Norwegian.

Around the same time that the decision for a mobile solution was taken, a questionnaire was sent to families in four communities in order to solicit their participation in the pilot project. The questionnaire was in Norwegian only. There had been a discussion in the project group about translating the questionnaire into Sami, but this did not happen because of the lack of budget and capacity. We can see, in hindsight, how the Norwegian paper form, which stood model for the application, in combination with the Norwegian language questionnaire, resulted in a default language for the project. All the families returning the Norwegian questionnaire were perceived as being able to use a Norwegian language application.

At least one Sami family could not participate in the project because the user interface was in Norwegian. They were thus not able to have the same access to healthcare as the Norwegian-speaking participants. The steering group and the project group as well as the different professional users of the ambulant teams were aware that a Norwegian-only pilot project would lead to different health services for the Sami community, which is not allowed under Norwegian law. The national Coordination Reform[8] states that everyone has the right to receive the same health services, independent from where you live in the country. Although aware of this imbalance, the project's steering group and project group argued that given the project constraints, both in time and budget, a Norwegian-only pilot could go ahead.

We see how the installed base, the Norwegian-language paper form, continued to play its role in the mobile solution. . Despite of the explicit demand of addressing both language groups, the decision to use only Norwegian language was made on the backgrounds of translation costs. This discussion will be further explained in the following section. Even though it is technically quite simple to develop a Sami-language interface, the interface is connected with a Norwegian-language installed base in the form of a web-based application for the ambulant team members and all kinds of other practices and forms that were connected with the paper form. Thus, even if it was technically simple to have a Sami interface, on the level of project implementation it was rather complicated. It would require the translation and digitisation of other

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[7] See URL
http://www.regjeringen.no/upload/BLD/Planer/2009/Norge%20universelt%20utformet%202025%20web%20
endelig.pdf
[8] See URL http://www.regjeringen.no/nb/dep/hod/kampanjer/samhandlingsreformen.html?id=524777

applications and forms, as well as the integration of the Kom hIT technology into HealthNet.

5.2. IN/VISIBLE CULTURE?

The Kom hIT project was based on the perspective that a healing process can be advanced by mobilizing the patients' own resources, as well as those of the family and community (Brennan and Safran, 2003; Ball and Lillis, 2001). The aim of the project was to provide both Sami and Norwegian patients with care and support in order to self-manage their health problems as much as possible. The health care workers were aware of the challenges posed by the Norwegian and Sami culture. As the majority of the health workers have a Norwegian cultural background, they tried to include the Sami language and culture in their daily work.

There was a long discussion in both the steering and the project group about the fact that the pilot project would only be implemented in Norwegian. In that sense the issue of culture was very visible in the development part of the project. It was clear that the new project was embedded in already established practices and technologies, which were all in Norwegian. Changing the language of one aspect of the project, the mobile phone application, would result in expensive translation work. At the same time we can see how the focus on technology, the mobile solution which was selected as the most practical, both by the Sami as non-Sami families, directed the project. Even though there are laws and regulations in place that argue that everyone in Norway has the right to access to health care services, they were ignored in favor of the implementation of the pilot project.

The important role of technology as a facilitator of decentralised healthcare delivery in the Kom hIT project did not only resulted in a project in which only a Norwegian interface was available. The marginalization of the Sami language had consequences, which may affect the overall success of the project in the future. There are important differences between the Norwegian and Sami population when it comes to the understanding, experience, and treatment of mental health issues. Language plays a central role in expressing ourselves. Our emotional language – how and in what language we express our feelings and personal experiences - is of crucial importance in mental healthcare (Sørlie and Nerdgård, 2005). However, Sami-speaking families, even though they were competent in the Norwegian language and participating in the pilot project, were not given the opportunity to express themselves in Sami, if Sami was their emotional language. Secondly, the lack of experience in using the Sami language in the pilot project resulted in the lack of data on text-based mobile phone use. For example, the average word length in Sami is 7,68 characters, while the average word length in Norwegian is 4,9 characters. Does this difference affect the way Sami speakers can express themselves using a text-based application on a mobile phone? In October 2009, the Health Services Provider decided to continue to project, with the mobile phone application and the web-based solution in both the Norwegian and Sami language. The experiences from the pilot will inform the new Kom hIT project. Since there are no experiences with the Sami-language in the pilot, the continuation of the project is now based on project results in the Norwegian language only.

5.3. THE CULTURE OF NO CULTURE

When we revisit Zittrain's definition of generativity, as expressed in the characteristics accessibility, adaptability, ease of mastery, and leverage, we can now see how this concept may contribute to keeping culture invisible. It became clear in the beginning of the pilot project that there was no difference between the Sami and Norwegian families when we looked at the acceptance and use of the mobile phone. Even though the issue of culture, in the form of language, was discussed at the beginning of the project, it became invisible in the implementation of the pilot. The cross-cultural acceptance of the mobile phone solution became a kind of cultural standard, a kind of "culture of no culture" (Traweek, 1992; Haraway, 1994), in which other concerns, such as the role of language in communication and in technology use, moved to the background. Once culture becomes more or less invisible, we can continue analysing the generativity of a technology without mentioning culture (see e.g. Andersen and Aanestad, 2008).

If our aim is to contribute to the understanding of the role culture played in this project, we need to keep culture visible even if there are seemingly no cultural differences in the acceptance of a technology. Analyzing the accessibility, adaptability, ease of mastery, and leverage of the Kom hIT technology, without embedding this analysis in both the culture of the technology design and the culture of the users, results in strengthening the 'culture of no culture' perspective on technology. When we do keep culture visible, we can include culture in the analyzis of the generativity of a technology.

6. Conclusion

In this paper we described an alternative platform for health care delivery in a culturally diverse population. We used the concept of generativity as our analytical lens, as generative technology has a greater capacity to produce change by varied audiences. Innovations in health care delivery, we argue, are enabled or constrained by the generativity of the new technology.

Our analysis illustrates that the generative capacity of the mobile phone technology was limited by the project's installed base, the existing HealthNet infrastructure and the existing forms and practices. Secondly, we described how culture, in the form of language, moved to the background, after both Norwegian as Sami families had identified the mobile phone as their preferred technology in the project.

The generativity of the mobile technology, we argue, is not only affected by the invisibility of culture in the current technology design. The effects of that invisibility continue in the new iteration of the technology design. In the case of the Kom hIT project, we observed how particular choices, in this case the lack of Sami language interface, may have effects that will continue to influence the generativity of the new version of the mobile technology, even when the interface will now be available in both Norwegian and Sami.

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