To use, or not to use, that is the question

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Preface

It has been my privilege to write this thesis as a part of my ordinary work at Norwegian Centre for Integrated Care and Telemedicine (NST). I have used 20% of my work at NST over two years for data collection, analyzing and writing. The process has been interesting and challenging, very much like a hermeneutic process, focusing on details in one moment and the whole in the next.

It is a trough privilege to have the extremely positive environment at NST around me in my daily work. A part of my interpretation is discussing the content in my findings with highly skilled people from NST. I am sorry for ruining your lunch with empirical and theoretical questions connected to interesting theories and concept discussions. At least these discussions gave me a lot. Especially I will thank Frank, Aksel, Anne Gerd, Lars and Rune. You were all pushing me further with challenging questions and alternative perspectives.

A thank to my supervisor Gunnar Ellingsen for giving me inspiration and evenings in reflection.

I will thank the nurses and physicians at Longyearbyen Hospital and at the Health Care Centers in Finnsnes and Vadsø for their participation and insightful contribution. On the other side of the organization thanks to the open and participating crew at The Dispatch Centre at UNN.

Finally thanks to my wife and boys for comfort and encouragement in the late evenings.

Tromsø, May 2010

Oddvar Hagen

Wovon man nicht sprechen kann, darüber muß man schweigen.

Die Grenzen der Sprache sind die Grenzen der Welt.

Ludwig Wittgenstein: Tractus Logico-Philosophicus

German

List of illustrations

Abbrivations and concepts

Case or **emergency case**: patient case in general, any emergency case treated and taken care of in the institutions

Asynchronous- and **synchronous** collaboration. Synchronous is often named real-time, the communication happens at the same time.

VEMI – Video based Emergency Medical Interaction is the concept of using videoconferencing as communication tool in emergencies.

VEMI equipment is the videoconferencing (VC) equipment developed, implemented and used in the emergency settings.

VC is used on videoconferencing systems in general. In this thesis **the VC** system, refers to VC systems in general and the VEMI system particular.

Clinical video conferencing is defined in this thesis as: video conferencing used for transmission of real-time clinical patient data.

Professionals; is physicians, nurses and other health care professionals. This concept is uses on all physicians and nurses at the at the minor institutions when the patient is at their institution even if they are formal clinic specialists.

Specialist; is the clinical specialist in the emergency field at the Specialist health service level (Hospitals) used as consulted partners.

The virtual team: consists of two teams, the local team and the team of specialists. The term team is used both about the team in one place, and the team composed of the two teams.

Telemedicine; derives from the Greek 'tele' meaning *'at a distance'* and 'medicine' derived from the Latin 'mederi' meaning *'healing'*.(from Wikipedia) Telemedicine in some definitions are different from telehealtcare and e-health, limited diagnose and therapy in distance. In this thesis I look at telemedicine in a wider perspective including the concepts of telehealthcare and e-health

UH: University Hospital. The highest specialized level of hospital service in Norway. In this case used as the specialist service. UH is tertiary health care for the region, but also local hospital for the nearest municipalities.

Local Hospital: Institution in specialist service, also named secondary health care

Health care centre: the rural centre for the primary health care, often organized in a DMS

DMS: District Medical Centre, a local health centre with several collaborative municipalities.

Nursing Home, the General Practitioner(s) (GP) service and the preventive health care at the same or close by location

Implementation: the process of installing the technical equipment and clarify the basic organizational and competence needs.

ATLS: Advanced Trauma Life Support. An emergency training program.

BEST: Bedre og mer Effektiv Traume Behandling- translated " Better and more Efficient Trauma Therapy".

List of informants:

(N= nurse, D=Physician or doctor)

Longyearbyen: N1, N2, N3 and D1

Finnsnes: N5, D3

Vadsø: N4, D2

1 Introduction

1.1 Introduction

Modern health services are facing new challenges. In this thesis I will use the Norwegian public health service as an example. The main challenges expressed in Norway are within patient care and social economics (HOD, 2009), similar to most Western countries. The main challenge ahead is the demographic fact that we are on average getting older. The number of citizens aged over 67 will increase by 100% by the year 2050 (HOD, 2009:43). The costs of health care will increase dramatically. One of the main ways of improving health services is treating more patients on a lower health care level, and enabling more efficient transfer between the levels. There is no doubt that information and communication technology (ICT) is an important part of this planning.

The number of emergency situations will increase, and more patients will need to be triaged and referred to the right institution giving the right treatment. The health care system has to handle these cases efficiently, and with increasing expectations in terms of public opinion. Emergency care entails services where the limits are pushed, and the time margins are narrow (Røyse et al, 2007). The possibilities for improving the service are limited with traditional technology. Road and air ambulances will in the future be marginally faster, but distances and narrow time windows for treatment will remain a challenge. The health service is in need of quick and efficient care, and telemedicine is ready to offer new solutions. The thesis is based on a project initiated at the Norwegian Centre for Integrated Care and Telemedicine (NST). The motivation of the centre is to find ICT solutions suitable for solving problems in health care. The centre is owned by the Norwegian specialist health care. This kind of national center has the possibility to use Norwegian or international health services as a test-bed for new health care concepts, and to carry out projects crossing the boundaries between primary care and secondary/tertiary care. In this case, the project initiated testing of video conferencing (VC) in emergencies. VC in emergencies was at that time known from one single project in Australia (Wilson et al, 2010), but none in Europe. Finding a communication solution in emergency telemedicine is an exciting task. The solution had to be useful in the Norwegian setting with long distances and sparsely populated areas. The hospitals are scattered, and the smaller local health institutions in primary health care are often far from the nearest hospital.

Our first smaller institution is the world's northernmost hospital, in Longyearbyen, with 19 employees and a flight time of 1.5-2 hours (one way) from the University Hospital in Tromsø. The site was the first choice for testing telemedicine at a distance, with dramatic cases and a long hospital stay before further transport. The University Hospital in Tromsø had a well run Dispatch Centre, and this was a natural communication centre in the Northern region. Expanding the VC service in the county of Finnmark gave the opportunity to look at the functioning of the service. This involved the daily use of VC in emergencies, and developed differently between apparently similar places. My focus in this thesis will be on this development, where some professionals find the service useful and others reject the service as not useful.

1.2 Research objectives

This thesis intends to seek answers related to the following research questions:

What factors influence professionals' choice in accepting or rejecting a new video communication system for emergencies?

Is the professionals' reasoning for their choice the deciding factor for whether the VC concept is successful or not?

Is the professionals' choice an indication of a telemedicine success?

1.3 The structure of the thesis

What is the professionals' reason to choose or reject an implemented telemedicine solution? The reason why a solution becomes an important clinical tool or a useless "dust collector" in the corner has not been clarified. Many views on telemedicine offer declarations, methods and theories to explain why implementations end so differently, and how they should be done. Chapter two presents the organizations and the challenges for emergency medicine in Norway. This was followed by the idea of using videoconferencing as a communication tool in emergency medicine, and ended in the development and implementation of the VEMI concept

The theory section presents the theory used for understanding and analysis. The general content in the concept of telemedicine is assumed to visualize the complexity of the topic. Concepts like success and bootstrapping offer an explanation. A successful implementation is

probably a part of the professionals' reasoning, without being the whole explanation. I will use the concept of success and bootstrapping in the discussion of the professionals' choice. The lack of opportunities to observe these situations makes it necessary to use contextual, experienced knowledge about the emergency situation, as an element in the interpretation. Chapter four explains the methodology for data collection and analyses. The professionals' choices are explored through interviewing the nurses and physicians, combined with literature and reports on the project work. This empiricism will be analyzed through hermeneutics and principles from ethnography. Chapter five presents the case, and contains the development of the VEMI concept after the implementation. The institutions' experiences and their work to develop the concept as a tool in emergency care are the focus. The research question is derived from these experiences, and the events experienced in the institutions are important for the understanding of the professionals' user choice. Chapter six contains the findings and the initial analysis, sorting and grouping of the respondents' statements. This presentation is intended to be a transition to the discussion part. The discussion in chapter seven involves sorting the findings according to the importance expressed by the respondents choosing and using the VEMI system. Every telemedicine implementation is intended to be a user success. But a successful implementation on a small scale is no guarantee for further use. The users' reasoning is compared with that of the non-users, and discussed according to "success" and "bootstrapping" concepts. Hopefully I can use some of the main findings to arrive at a conclusion.

The interviews / results are analyzed and discussed using elements from ANT, showing the changes between the old and new communication system. The discussion shows the health workers preferences both when choosing the new system over the old one, and when choosing not to use it. The discussion explains what professionals get out of the system, and if the system satisfies their expectations and demands.

2 The emergency care organization

2.1 The brief history of the emergency care organization

Emergency care is about medical situations threatening life and health. These are all accidents and serious illnesses were the life and health is dependent on quick response and qualified help. In emergency there are a concept called “the golden hour”, indicating a time window limiting possible treatment. Many conditions have such time window differing between case, condition and diagnose. These cases differ, but to simplify the picture we divide the emergency cases in two. First; one group is the typical medical condition with “time windows”, like heart infarction and stroke. These need a certain diagnose and therapy prescribed by a specialist within a certain amount of time. Otherwise the therapy is contraindicated. Second; there are high energy traumas like accidents by falling and traffic accidents. These are often a variety of injuries included internal bleedings, which are life threatening lasting over time. The time before getting critical is unpredictable. Severe internal bleedings need define surgical therapy, but can win time trough stabilizing therapy, securing circulation and airway. A goal in emergency medicine has always been initiating therapy as quick as possible.

But the method initiating emergent life saving therapy has changed. Prior to the 1980 the therapy was initiated at the hospital, and the ambulance just carried out the transport. The modern thinking is initiating the therapy at the accidental scene, in patient’s home, in the roadside or in the ambulance. It saves time for initiation by bringing along the health personal to the patient, not the patient to the health personal. The way of improving the service today is not only initiating the therapy faster, but increasing the quality of this therapy as early as possible. For sure the development of medicine and health service has made these changes possible. In addition, the methods and new organizing has improved the time from accident to define therapy. The logistics with wide use of governmental helicopter and planes (fixed-wing) has for sure made it quicker and easier to reach define treatment in time. A lot of other different factors are influencing the outcome of accidents; differ from safer car fleet to centralization in settlement pattern in Norway. But still there are a considerable population living in rural areas with a travel time making it hard to reach the therapy window limitations.

The local health centre in rural areas is small institutions containing all professional health service at the place. Health centers handle all kind of cases in first line, with general

practitioner (GP), preventive health measures, and nursing homes. Health centers are characterized by a great variety in cases, but with totally few cases in each category. The volume is related to elderly people. There are always a number of emergency cases including accidents, emergency medical disease and conical cases getting worse. A model taking care of the emergency cases is nursing homes having some few, one to four, beds for observation and emergency cases, a kind of hospital function in the nursing home. Normally the GP and nurses at the nursing home, sometimes with the ambulance personal, are taking care of the local emergency cases. For this patient changing status and degree of seriousness there is always a negotiation between local GP and hospital doctor where and how to take care of the patient.

The system for warning and handling patients to hospital is perused the last decades. There are both an alarm call service for the public, (113) to the dispatch centre, and a professional systems like the ambulance system, built as a response to this emergency treat. Focusing on the Norwegian professional system and rural areas, there will be an organizational divide in the institutions between "First line" the primary health service and the "second line" the minor hospitals. The University Hospitals (UH) are the third line (specialized functions) organized with the minor hospitals in Health Enterprises. Within our Region health enterprise (Helse-Nord), there are two Health enterprises (Helse Finnmark HF and UNN HF).

The transport system, car- and boat ambulances are public, driven in different ways, in UH area owned by the UH. The fixed wing fleet is governmental, and the helicopter service is public driven private companies on contract. The dispatch centers are the control section for the fleet of ambulance cars and boats, the UH dispatch centre also for the planes and Helicopters. The priority of transport is combined with a degree of centralization in emergency competence. There are emergency competences in all hospitals in the region but the quality of emergency competence differs a lot, and the most critical and special cases must be treated at UH.

The difference in emergency competence between second and third line is mainly the ability to handle multi trauma cases, the most demanding cases and the cases needing caretaking from specialists only present at the UH. The minor hospitals also have problems keeping continuity 24/7 with their needed specialists, which give a better stability in specialist access in UH. To secure the right patient come to the right place in time it has to be a cooperation

between the first and second line and levels in hospital in every case when doubt. This organization is often called the emergency medical chain. This means several links are following each other taking care and delivering patient and information from one link to the next.

When emergencies appear in rural areas the response is dependent on the case and the resources. Worst case demands quick response directly to hospital, sometimes further transport to the UH. Other cases might go to the Health centre for observation or stabilization. Sometimes the distances or problems according transport makes it impossible to move the patient, either in air or at all. In these cases the first line has to take an expanded responsibility for the patient keeping him for a prolonged period or do the total therapy locally.

2.2 The electronic communication in emergency care

The communication in health care is mostly a voice telephone communication. In field there are an emergency voice communication based on a closed health network and analog technology (OLT) (HOD, 1999-2000). The network is old, the security is not sufficiently ensured and there are problems according stability and coverage (KOKOM, 2009:77) The GP's on duty often do not use the old network. In practice this means GSM mobile phone is used instead, even the GSM system is encumbered with limited coverage. The health workers are not satisfied with the existing voice communication systems. The open GSM system is not sufficiently secure for the sensitive health information, and the closed emergency health network is not good enough. There are plans for improvement. Norway are these days planning and testing a new closed emergency network, the TETRA (Terrestrial Trunked Radio). TETRA is a vendor independent standard using GSM to one-to one communication and TETRA to group oriented professional communication. TETRA net is primarily for voice communication (HOD, 1999-2000). TETRA is now implemented in the first municipalities in the central eastern part of Norway, but is not yet expected in Northern Norway. TETRA will probably cover the need for emergency communication between the emergency services when completed over the country.

The data and videoconference (VC) network is taken care of by another system. This is the responsibility for the Norwegian Health Network (Norsk Helsenett, NHN). Norwegian Health Network is today an independent enterprise owned by the four regional enterprises in Norway.

Norwegian Health Network (NHN) offers a closed network on secure lines both for data and VC traffic. These are two networks. NHN intends to offer network to all health services in Norway, from primary to secondary services. The physical network is present and no hindrance for cooperation in the health service (NHN, 2009).

Electronic communication is a big issue in health service today (Brustad, 2008). This means communication in written text and to some extend text is supported by still pictures, sound files and video files. The exchange of written data is the basic and missed by the professionals. Document exchange following the patient is the normal communication between levels in health care. Today there are legal obstacles in exchanging information over the health level and geographical boundaries. This means there is no right to open a health record for access from another level or administrative unit than where the patient is at time. There is possible to ask for certain information related to the actual situation from the responsible doctor, but no admittance for general access to the health record, in spite of possible health profits for the patient. In an emergency setting there are more legal possibilities, but the access needed is still not possible in lack of practical solutions for access. Within the same Health care enterprise there is no hindrance for document exchange. Document exchange is essential, and simple and safe exchange of documents is the number one e-health priority among health care professionals.

Videoconferencing is a useful communication tool, presenting real time sound and picture. Videoconferencing is the closest meeting another without being at the same place physically. An important part of VC is the point of real time presence, and the communication possibilities in questions and answers. The quality of communication is also regarded as more reliable, of two reasons. Seeing is the same object at the same time is a confirmation of the observation or description being correct. In addition, a person's communication is regarded as more reliable of words and body language correlate, which is possible to control by watching the other during a conversation. The last point is only possible by seeing the person, or watching him in on a quality screen.

First two telemedicine projects in Norway in 1986 were VC projects. The first one was a dermatology project, using much of the same principles as the ongoing VC services. The patient was visiting his GP in Kirkenes, talking to the dermatologist in Tromsø , 1000 km away. (Børresen, 1995) VC was the communication tool, and the tool to show the patient's body surface. Documents (papers) were shown with a specific document camera. The service

was resource demanding, especially regarded the most critical resource, the specialist. A VC was normally taking one hour of a specialist's working day, and this was too much time for organizing according to a busy specialist day. The early VC projects demonstrated collaborative real time management, even this was not the most interesting aspect of the projects and maybe not necessary. The main idea was using VC as a simple decision making aid (Randall et al, 1998). A simple store and forward still-picture in e-mail communication can do the job in most cases, and have to a degree replaced VC (Pak, 2008).

2.3 Collaborative real time management projects

The aspect of using the potential of real time in VC was clearer in some following projects. One project clearly using the real time advisory aspect was the project "gastro surgical counseling" (Norwegian: Gastrokirurgisk veiledning). This project was initiated in the nineties and used the gastro surgeon in the UH as mentor to the inexperienced surgeon in the minor hospital. The project used VC technology, and one of the partners in the project, the company Telenor, produced the software for the purpose. The experienced surgeon watched the pictures from the endoscopic procedure, also called peephole-surgery. The normal operation procedure is watching the picture on a screen bedside and moving the instrument guided by the picture. The same picture was sent to the senior surgeon, which real time could guide and give advice in distance. This was a project with focus on collaborative real time management. The "telementoring" projects are in small scale ongoing VC services between UH's like St Olaf UH in Trondheim, and minor hospitals in their region. In many ways the telementoring projects are the technological and organizational beginning of the collaborative real time management projects in Norway

Figure1. The local team at Longyearbyen Hospital in training

Figure 2. The specialists in the Dispatch Centre, UH Tromsø.

Figure 3. The monitor in Dispatch Centre, showing the patient in Longyearbyen and the vital patient data.

3 Theory

3.0 Theory

In this chapter I will review social theory suitable to explain and discuss my scientific question. My scientific question seeks to understand professionals' choices, and through their choices to explore what factors professionals find important in their work. I presume that successful implementation of the video conferencing project is important among the factors identified. Their choice and positive experiences are indicators of a potentially successful implementation. It is likely their choices do not take account of all the factors necessary for a successful telemedicine innovation. My focus is to learn what factors are seen to be important for the professionals through their choice, and to discuss their choices in relation to factors seen as important for a telemedicine success.

The concept of success is not clearly defined. Two review articles will be used as the sources for describing the concept of success (Obstfelder, 2007. Broens, 2007). I will primarily use the structure developed by Broens et al., 2007, as they define the common findings in telemedicine successes, expressed through their category mapping (Broens et al., 2007:304). They identify five characteristics that are important for the successful implementation of a telemedicine project. I will refer to these characteristics in the discussion of the empirical findings of this study. The reason for defining the characteristics of a successful project implementation is to find some characteristics that might be useful in improving the conception of a subsequent project. A concept used in the discussion of the evolution of Information and Communication Technology (ICT) networks in health care is that of "bootstrapping" (Hansethand Aanestad, 2003). The main features of the categories characterizing a successful project, together with the concept of bootstrapping, will be used in the analysis of the empirical findings.

3.1 Expectations and results associated with telemedicine

There is widespread expectation that telemedicine will contribute to the solving of problems in health care (Tracy, 2008:990). This optimism is also common in political documents.

"*I utviklingen av IKT politikken er det en målsetting at elektronisk kommunikasjon sak være den normale måten å kommunisere på. Dette innebærer bl.a. , online- konsultasjoner..*" (My translation: "*In the development of ICT policy, one of the goals is that electronic communication will become the normal way to communicate. This entails, among other things, online consultations..*") (HOD, 2009:35)

Providers of telemedicine services also share this optimism:

"*Optimizing information delivery and clinical processes can have the same impact as discovering a new treatment drug.*" (Michael Hogarth, UC Davis Health System, USA)

Involvement and participation by investors from the health care industry in the development of telemedicine have been rare until recently. The substantial investment by serious private companies with ambitions of profit was initially absent, but recently major players such as Cisco and Microsoft have begun to focus on telemedicine. The interest from private players is an indication that they see a profitable future in telemedicine and e-health.

In spite of the optimism from external actors, there is still a way to go before telemedicine can offer the optimal service to health care. In fact, ICT in telemedicine is still in an early stage of development. Up to now, the solutions offered for the health care sector have usually been general solutions transferred to a health care setting. The adaptation to make the systems useful for health services has so far been done by scientists and research institutions. Most initiatives have been only minor projects and pilot schemes.

"*Telehealthcare is characterized by frequently experimental developments that seem seldom to last beyond the trial stage.*" (May, 2003)

To develop useful telemedicine solutions, lasting beyond the trial stage, we need a different kind of contribution. Knowledge from the different fields of telemedicine is expected to contribute to the development of useful telemedicine.

3.2 What is a successfully implemented telemedicine service?

What does it take to develop a good telemedicine service? This question is important because we are still searching for examples of successful telemedicine services. Some attempts have been made to describe what is important to make a telemedicine solution last. I will discuss two review studies of the determinants and the characteristics of a successful telemedicine implementation. These are by Broens et al (2007) and Obstfelder et al (2007).

The question of the determinants of telemedicine success is so important that it could be called "the big question" in telemedicine. This question is about how to scale up pilots to become part of daily practice, or how to build and maintaining large scale telemedicine services.

Richard Wootton, head of research at the Norwegian Centre for Integrated Care and Telemedicine (NST), asks:

"*Why haven't we succeeded in building and maintaining large-scale telemedicine services? That is the main research issue…" (NST and Richard Wootton*, http://www.telemed.no/new-nst-research-leader-wants-to-solve-the-big-question.4665040-4259.html , 2010-04-17)

This is at least an answer about what we should reach towards. There are different ways of describing the route to the large scale implementation of telemedicine. Network building is a way of scaling up complex networks, and is the perspective used in the bootstrap concept. (Hanseth and Aanestad, 2003)

3.3 Normalization process model: NPT

The normalization process is an attempt to make success a normal state in telemedicine. In that connection NPT describe premises for a success. NPT focus on how the technological aspect becomes a part of the social context. NPT has got some of the main concepts from Actor Network Theory (Latour) and has similarities with other implementation theories like Cooper and Zmud (Cooper and Zmud, 1990). Normalization Process Theory is developed of Carl R May and his partners' trough the period 2000-2009. (May, 2009) They are presenting a series of articles on their way to a theory.

The theory is today a sociological tool to explain how the combination of technologies and ways of acting and working becomes routines embedded in everyday clinical practice.

"The model is defined by four constructs: interactional workability; relational integration; skill set workability and contextual integration. This model can be used to understand the normalization potential of new techniques and technologies in healthcare settings" (May, 2003).

"..these constructs can be expressed as a set of propositions:

- *P_1: Implementation* of telemedicine services depends on a positive link with a (local or national) policy level sponsor, so that telemedicine is defined as an appropriate means of delivering care, and appropriate infrastructures are developed. (May, 2003)

The plan, forming a project ending in an implementation is dependent on funding. The funding comes from someone believing in the results from the project. This link must be founded in the political and health political environment, staking on the idea. The concept of implementation normally describing a process ending with the presence of a telemedicine solution, but the NPT concept of implementation content of the premises and the consequence of the foundation. This is the early stage of a telemedicine concept, including the basic premises for the implementation.

- *P_2: Adoption* of telemedicine systems in service depends on successful integration at the level of structural legitimation so that it is supported as, and thus practically incorporated into, health care delivery through the development of organizational structures. (May, 2003)

The NPT concept of adoption is pointing at organizational challenges in adapting and improving an existing health service integrated with the new telemedicine concept. This is still basic premises, but now brought into a certain setting and seen as support for existing services.

- *P_3: Translation* of telemedicine technologies into clinical practice depends on the enrollment of heterogeneous actors into relatively cohesive, cooperative groups, in which functional identities are negotiated and established *a priori* and powers relatively well defined. (May, 2003)

Concept of translation is operasionized i NPT as the process of technical solutions contribute enrollment of cohesive cooperative groups. The concept is focusing on the demand for cooperation, and establishing a cooperative organization trough the telemedicine solution. The concept is now brought into the clinical practice to the health worker, and given as a possibility to translate into a useful tool by the professionals.

- *P_4: Stabilization* of telemedicine systems in practice depends on integration at the level of professional knowledge and practice, where clinicians are able to

accommodate telemedicine in their clinical activities through the development of new procedures and protocols. (May, 2003)

Using the concept stabilization in NPT, the focus in on how telemedicine should be used in the clinical activities. The systems usually imply several possibilities to clinical use, and it is the clinicians matter to find the use suitable for their clinical challenges. The concept is made a tool in use trough procedures and protocols in negotiation with cooperating organization. This is the state when the telemedicine concept is a tool used of different professionals according their work tasks.

P_5*:* The *normalization* of telemedicine as a means of health care delivery (in whatever setting and at whatever level of health care provision) is conditional on $P_1 + P_2 + P_3 + P_4$." (May, 2003)

The normalization is the sum of the implementation-, adoption-, translation- and stabilization process. Are the single parts and processes successful, there is chance having a successful total concept.

"The normalization process model has face validity in (i) assessing the potential for complex interventions to become routinely embedded in everyday clinical work, and (ii) evaluating the factors that promote or inhibit their success and failure in practice".(May, 2006)

By using normalization process theory (NPT) I will point at what parts of the empirical findings are supporting the basic demands to a successful implementation. A successful implementation put some leads to the post-implementation user phase. Taken the implementation success for granted having a good technical solution, is a mistake done. May's Normalization Process Theory (NPT) deliver a method for evaluating a successful implementation (May, 2003 and 2006. May et al 2007 and 2009). I find aspects of NPT as useful in the description of a telemedicine success, in spite the focus in the implementation.

3.4 The concept of bootstrapping

Hanseth and Aanestad have a background in informatics, and they present the concept of bootstrapping. Bootstrapping is focused on the design and construction of networks, and as such may be classified as a constructivist approach (Hanseth and Aanestad, 2003)

A key element in electronic communication building is an understanding of how the technology and society build communities, networks, and infrastructure. Bootstrapping is a concept relating to this topic. Bootstrapping is in fact a concept with different meanings in different specialized fields, but I will apply it in this thesis as it has been determined by Hanseth and Aanestad:

" ..the process of making a tool by means of the tool itself". (Hanseth and Aanestad, 2003:)

To put this into the context of telemedicine and health services:

"Telemedicine may potentially be used within any discipline and between all kinds of organizational units in health care. This implies that the technological solutions used by one group will have to be linked to and integrated with solutions used by others. Together this makes up a multiplicity of overlapping and interconnecting networks.. The various technological solutions will be integrated into one common network, a (in principle) global infrastructure."(Hanseth and Aanestad, 2003:)

It is essential to build up a network, and a network of users. The concept of "critical mass" focuses on the importance of the number of users. Growth in numbers is the essential factor when building networks. A key point is that the value of the network increases when the total number of users is increasing. When it begins reaching a certain scale of use, the technology starts growing by a self-reinforcing process. The number of users is the force driving forward the network building process (Hughes, 1983). Bootstrapping takes another view: the size of the network is not the only factor of importance. Instead, there is heterogeneity of elements along several dimensions of importance. Designing networks and making use of concepts such as bootstrapping means using user preferences to develop and construct the network. The users' preferences are complex. They comprise personal preferences, as well as tasks of interest to the users and their professional working context.

In the VEMI case, we have a limited, but complex, organization. This organization is, by means of its own resources, building a structure useful to the members. The presence of the nearest one or two communication links is of vital interest to the remote users, but the rest of the organization has limited value when seen from the perspective of the user (smaller institutions).

The concept of bootstrapping focuses on four important and different aspects:

User motivation; user areas and situations; aspects of technology (including availability, simplicity, costs, "future-oriented"); and coordinating institutions.

The concept of bootstrapping is a way of looking at the telemedicine tool in the organization. Successful implementation is a way of building a smaller network. The empirical findings discussed in this study will describe the beginning of the network building. Through the discussion of their choices, the professionals interviewed give some indications of what is necessary to build a large-scale network. An open telemedicine tool, like the communication concept VEMI, can be used in different ways. The open system has so many possibilities for the user that it is up to the professionals to find a way of fitting the system to their need. This is the users' opportunity to develop the system so that it becomes an increasingly useful tool for their tasks.

3.5 The micro level of success

However, there are alternative ways looking at the concept of success. The big complex network does not always work best. There are examples of small, limited services functioning well over time. This shows that there are alternative models for a well functioning service, and one that is a success.

"., the question whether an implementation has been a success or not is socially negotiated" (Berg, 2001:144)

At an organization level, the question of what might be a success is not always obvious, Rather, it is a question of what the organization needs, decides and negotiates in the relevant situation. According to Berg, success can be seen not only from an organizational perspective, but also from micro perspectives, from the viewpoint of the professional or patient.

Successful implementation and successful services can be seen in the meso and micro level, and a successful telemedicine service may be defined as a service contributing to a positive patient outcome.

"*Success, in short, has many dimensions: effectiveness, efficiency, organizational attitudes and commitment, worker satisfaction and patient satisfaction – and not all parties in and outside of the implementation organization may agree about which dimension should be the most relevant*" (Berg, 2001:145)

Seen from the single user viewpoint, the goal for any telemedicine intervention is that it should be a useful clinical tool for the health professionals. Healthcare professionals are normally not interested in how a solution is developed. The development of the growing user network is also of limited interest. Their focus is on how the solution is functioning in a medical setting and how it affects their work. In the view of the individual health professional, a key aspect of telemedicine success is getting the help needed with your clinical case, when you need it. This is another aspect of success: in health care on the micro level. The empirical findings in this study come from asking the users at the micro level in the organization, which affects the meso and macro level. This means that among the characteristics of success one must also include the "micro level of success".

In the evaluations of long established VC telemedicine services, the concept of "unsuccessful" implementation has been used by Krupinski and her colleagues (Krupinski 2004 and Krupinski et al 2004). "Unsuccessful" services would appear to be the opposite of "micro level success". In the settings reviewed by Krupinski, the service has already been established and is regarded as existing. The term "unsuccessful" is applied in cases when the use of VC is associated with financial loss to the institution, normally due to factors associated with the external collaborator: "unsuccessful" cases that can be identified and compared with the successful cases.

There are different measures of success, and a set of success criteria will always be only a guide or a relative measure. In my research question, I seek to understand the motivation of the individual health professional choosing to use VC. The reasons might include a successfully implemented and useful solution, but also the presence of human, individual preferences; intentions and volition.

In a search for examples of success in telemedicine, there is a focus on the successful implementation and understanding of the complex interventions in health care (May et al, 2007). This is a fundamental demand for a successful telemedicine project.

"..the relatively poor implementation record for telemedicine may be primarily due to a naïve model of development that assumes a linear, rational process in which high-quality research will readily lead to the acceptance of an innovation and its integration into practice." (May, 2003)

May realized that there was a need to focus on the implementation process. It is a mistake to take it for granted that the implementation process will be successful if the technical solution is good. May's Normalization Process Theory (NPT) offers a method for evaluating a successful implementation (May, 2003 and 2006. May et al 2007 and 2009). I find aspects of NPT useful in the description of a telemedicine success, even though May's focus is on the implementation.

Scientists engaged in telemedicine, from a variety of different standpoints, emphasize how complex the situation is when an organization is to get a telemedicine solution to work. Many of these earlier studies contribute a set of rules, or challenges to overcome.

Berg has this perspective on success: *"Another caveat that should be addressed is that it is not possible to list a definite set of 'success' and/or 'failure' factors that will provide a certain recipe towards implementation success (or failure)*" (Berg, 2001:146)

"Today you can get hold of more or less any technology you want to. But getting that technology into routine use is an organizational and human challenge". (NST and Wootton, 2010)

The focus on implementation is understandable, but this is not necessarily sufficient for success in the development of a lasting service. A telemedicine project that is lasting as an ongoing service is not only well implemented, but has been found to be preferable in clinical use. The successful implementation gives the professional a well functioning tool, but this must support the professional's content. To develop from a successful implementation to a large-scale service, the telemedicine solution must continue to be a useful way of solving health care problems. At the level of health care politics, it must be a part of an official strategy and there should be a diffusion plan for building networks (HOD, 2009). At the micro level it must be adopted by individual professional users for their tasks and should be a preferred feature of their toolbox for service improvement.

This thesis will not focus on health care politics; this aspect is only mentioned to make it clear that the successful building and maintenance of a large-scale service is dependent on a coordinated superior organizational strategy. Network building, like the bootstrap concept, can be seen as a way of building bridges from macro to micro level in telemedicine.

3.6 The individual choice

When two organizations have similar characteristics of locality, tasks and staff skills, they may look similar from the outside. When these two organizations are implementing the same tool in the same way, one might expect that the assumptions associated with that use would be similar. So it is difficult to understand how it is that two apparently similar organizations might choose completely different ways of using the tool. This is hard to understand in terms of the theory used at the organizational level. There is surely another factor, beneath the organizational level, perhaps an individual component. This component is the conclusive factor when professionals in similar institutions make very different decisions under what appear to be similar circumstances. This is about personal choice and individual preferences, and is within the psychological theory.

In conclusion, telemedicine implementation is a function of many different aspects, such as individual motivation, medical benefits, technological usefulness and organizational efficiency. These factors should be adequately represented in any telemedicine solution if it is to be a success.

In a discussion of the micro level and the role of personal choice, there may be a need for a new understanding of some empirical findings. Concepts that are helpful for understanding personal motivation include concepts with psychological features, such as the concept of "user acceptance" (Davis, 1989), and the motivation concept of "self-efficacy" (Bandura, 1997) (Espenes, 2001). The analysis and discussion regarding personal motivation is not intended to be used as an explanation of the individual respondent's personal motivation. Rather, the focus of interest is in the discussion of motivation factors in general and the reasoning according to the motivation in the user group. The most central aspect in the concept of the Technology Acceptance Model (TAM) is the concept of "perceived usefulness". Perceived usefulness may be defined as *"the degree to which a person believes that using a particular system enhances his or her job performance*" (Davis, 1989). TAM as a model is used as a standard in measuring the success of technological implementation, by measuring the actual use of the technology. Measuring the use is not part of this thesis, but I find the concept particularly useful because perceived usefulness affects a relevant aspect that is not addressed adequately by the concepts of success and bootstrapping.

A central question in my thesis asks: Is the professionals' choice an indication of a telemedicine success or a successful implementation?

"should at the very least open our eyes for the fundamentally multidimensional and contested nature of the concept of success and failure" (Berg, 2001:145)

A single qualitative study is not equipped to answer that question. The perspective used is that the reasons for choices found are indicators of factors being important to the professionals in the specific setting. In addition, the professionals are expected to give examples of the success of the intervention at micro level. Users' motivation is to be regarded as a necessary feature in any telemedicine success.

3.7 The pillars of telemedicine

The term *'telemedicine'* derives from the Greek *'tele'* meaning *'at a distance'* and the word *'medicine'*, which itself derives from the Latin *'mederi' meaning 'healing'*.

Telemedicine is a multifaceted concept. This implies that research and viewpoints in telemedicine are multidisciplinary or interdisciplinary. Telemedicine is multidisciplinary in the sense of existing as a part of different disciplines and interdisciplinary in the sense of being developed with contributions from the different disciplines.

"*Telemedicine is the investigation, monitoring and management of patients and the education of patients and staff using systems which allow ready access to expert advice and patient information no matter where the patient or relevant information is located*" (European Health Telematics Research Program Advanced Informatics in Medicine, 1991)

The theoretical method in telemedicine has developed from different fields. A telemedicine service is defined by the Norwegian Centre for Integrated Care and Telemedicine (NST) as a service containing three main disciplines or "pillars":

- the healthcare aspect in medical and medical informatics science
- the technological aspect in information science
- the organizational aspect from social science

In their basis and methodology, these three fields are located in different scientific traditions. These aspects might differ in theoretical nature as well as in methodology. What clearly

unifies them is the focus on how technology and organizational settings can improve health services (Brustad, 2008)(HOD, 2008).

Information science is an interdisciplinary science primarily concerned with the analysis collection, classification, manipulation, storage, retrieval and dissemination of information. Information science focuses on understanding problems from the perspective of stakeholders involved and then on applying information and other technologies as needed (Wikipedia). Using this picture, we will be especially concerned with the part of IS that is concerned with the interaction between the people (the professionals) and the machine – the human-computer interaction (HCI). A widespread focus on using technology in a social setting has developed through theoretical fields such as Human Computer Interaction (HCI) and Computer Supported Cooperative Work (CSCW). The focus in CSCW has been on the characteristics and requirements of human cooperative work (Aanestad, 2003:2) (Berg, 1999). CSCW uses health care as one of its scientific fields, developing telemedicine solutions. The concept of bootstrapping belong to the CSCW tradition (Hanseth and Aanestad, 2003)

Social science may regard telemedicine from very different perspectives, such as functionalism, social constructivism and the ethnographic method (Tjora, 2002:4). The different perspectives are useful for explaining different aspects of the concept of telemedicine. The constructivist approach tends to 'do' science, showing the development of technology. The functionalistic approach focuses on the use of the technology, and how it functions in a (health care) social setting. To describe the differences in sociological focus I will focus on the concepts of determinism and potentiality. Determinism in the concept of technology determinism means "decision" and indicates two conditions: the technological development moves in a particular direction, and the technological development influences a certain direction of change in society. (Tjora, 2002:7).
Potentiality on the other hand means that a technical resource can be configured in many different ways. One configuration realizes an aspect of the well-being potentially present at the actual level of technicality (Tjora, 2002:9). It is not possible to develop the role of technology in service delivery solely from the technology itself. The technological system development is influenced by cultural and professional factors as well as by guidance from senior authorities (Tjora, 2002:4).

There is both a technical and a functionalist focus derived from social science in this instance. The technical focus has emerged from the possibilities for more effective solutions associated

with technological change. The functionalist approach focuses on the effects the technical system has on the user. A researcher following the functionalist approach might make use of the ethnographic method.
Social science has a clear focus on organization (macro level), the individual in the organization (micro level), and the function of the cooperative action. In telemedicine settings the social science approach has delivered a clearer look at the organizational use of the systems than on the technical development (Tjora, 2002).

Health care science or medicine is about people's health. The main goal is good health (ref WHO), and health care uses the tools that are suitable and accessible to improve patient health. Telemedicine is one of these tools. Optimal health care is dependent on storing and access to the information about the patient, generally that which is contained in the patient's HR/HER.

The interrelationship between health science and information systems is commonly described as medical informatics.

"Medical informatics is the study of how medical knowledge is created, shaped, shared and applied" (Coiera, 1997).

From a health science perspective, telemedicine is a tool for attaining improved health or patient outcome. Coiera lists five important skills from the informatics field that are important in a healthcare setting: communicating, structuring, questioning, searching and making decisions. (Coiera, 2003:xxiii). Health science clearly offers an analytic tool as to how health personnel choose and act in interaction with medical and communication solutions in medical settings. Even though medical informatics at its inception focused surprisingly little on the social systems in which it was used and on co-operation between users (Coiera, 2003), later literature has increased the focus on social consequences and social interaction (Coira, 2004).

The complex content of telemedicine relates to all three main theoretical fields; I will expect the empirical findings in my investigation to be influenced by each of the fields. That is why I will supplement my theoretical understanding with some other basic concepts when explaining and discussing my findings. Even though there are different definitions of telemedicine, they all focus on the clinical work related to health care. While the main goal in telemedicine is health, the development of the field demands technological and organizational understanding. This is observed in different ways.

Because telemedicine is such a complex field, it is useful to develop an understanding of the complexity of the motivation of the users of this technology. Searching for the broad user motivation challenges the understanding from different aspects of this broad field. Using knowledge from the whole field of telemedicine is untraditional, but I would suggest that it is necessary for developing an understanding of the complexity of the users' motivation

4 Method

This chapter will describe how data has been collected and interpreted in this thesis. It also explains why the particular theoretical tools used in the data collection and interpretation process were chosen.

4.1 Research design

This is a case study in the field of telemedicine. It has been inspired by ethnographic studies, but lacks some important methodological aspects normally used in an ethnographic study. In particular, data was not collected over a longitudinal observation period.

"*..case studies are a form of enquiry that does not depend solely on ethnographic or participant-observer data."* (Yin, 1994:10-11)

This case study will nevertheless use methods seen in ethnographic and other qualitative case studies. The perspective of the study is an ethnographic one.. The reason for choosing an ethnographic approach is described by Harper (2000):

"*Underscoring ethnography is one basic assumption: it is a method for understanding what activities mean to people who do them.*" (Harper, 2000:244)

This understanding of ethnographic purpose has informed the decision to use ethnographic methods in this dissertation to shed light on the question of the professionals' reasons for making a particular choice in a specific professional setting.

There are similarities between the ethnographic and other case studies.

"There is no hard and fast distinction between the two, their principle differences are the length of time that the investigator is required to spend in the field and the extent to which the researcher immerses himself or herself in the life of the social group under study."(Klein and Myers, 1999:69)

"Case study is well suited when you want to investigate contemporary phenomena within its real –life context, especially where the boundaries between phenomena and context are not clearly evidenced" (Yin, 1994:13)

The setting is the virtual emergency team. The case study approach has been chosen because of the research question and the complex nature of the work situation in emergency care. The research question seeks to identify those factors influencing professionals' choices in their work situation. Many factors might influence their choice, and different persons and organizations might be influenced in different ways. It is not a part of my research to quantify the choices, determining what factors are the most important, or how many persons make one specific choice. I am exploring the reasons for their choice, as presented in my meetings with the professionals. The variety in reasoning is my topic. The method must uncover the variety of arguments in the professional's choice, and the variety in the reasons that are found important for using video conferencing (VC) in their job.

The choice of method must be made in response to the research question. The method must uncover the complexity of reasoning, and the complexity of awareness in the professional's choice (Tjora, 2005). The professionals' reasoning is compound and complex. This complexity includes factors such as giving optimal medical care, the connection within a profession, the individual's function in work groups, the resources available, the culture of cooperation, and the alternative tools available for problem solving. There are personal factors, organizational factors, factors within the emergency medical service system and factors relating to the perceived benefit of the technology.

The complexity and qualitative nature of the research question require a qualitative approach. The complexity of possible factors affecting a choice requires consideration of different views, and a philosophic approach taking account of phenomenology and hermeneutics. An understanding of the connections is important. A quantification of the numbers in each category is not the topic under investigation. The need for interpretation, and the complex nature of the data, calls for an interpretive method. The interpretive method is not a result of the case study (Klein and Meyers, 1999:69); rather, it is a choice based on the scientific question and the ontological stance.

The theoretical input to the interpretive method comes from the field of all theoretical foundations in telemedicine. The fields supported by interpretive method are: the socio-technical aspect, particularly from information systems (IS) and computer-supported cooperative work (CSCW) (Walsham, 1995 and 2004) (Klein and Meyers, 1999), the sociological aspect (Tjora and Scambler, 2009), and the medical informatics aspect (Coira, 2003) The interpretive method is used in all theoretical fields of telemedicine and can be

defended in relation to all the data discussed. The interpretive method is not exclusively confined to qualitative studies, but in this case it is used for qualitative purposes.

IS research can be classified as interpretive if it is assumed that our knowledge of reality is gained only through social construction, such as language, consciousness, shared meanings, documents tools and other artifacts. (Klein and Myers, 1999: 69)

The choice of interpretive method expresses the researcher's ontological stance: that social entities are the construction of the perceptions and actions of social actors (Berger and Luckmann, 1966).

Setting up and carrying out the study

"The setting up and carrying out of fieldwork is the fundamental basis of any interpretive study" (Walsham, 2006:321)

The study has four key phases, with different methodological tasks in each phase:

- Description of the expectations regarding the newly implemented VC solution at the time of implementation
- The data collection phase, consisting of interviews and transcription of written material
- An informal analysis phase reflecting on the findings
- Analyzing and discussing the findings in relation to the research question

The process prior to the VC implementation

The aim of this thesis is to describe the use of a telemedicine solution after the implementation of the new system. To describe this process, it is of interest to begin with some knowledge about the situation at the starting point of the new intervention. Therefore I will include a discussion of the process prior to the implementation, even though this study relates only to the period beginning with the implementation of the new solution. The health personnel had participated in a development process, culminating in the implementation of the new system, which reflects their institution's expectations and needs. Their expectations have been formed through a process in which the concept has been presented to the medical and

nursing staff. Through their participation, they helped to form a solution related to their institution and to the anticipated needs of their organization. So the starting point is before the equipment is available for use in clinical situations, but after a process of discussion which shaped the expectations of the clinical participants. The clinical users were interviewed during the implementation and asked about their expectations. These interviews, not being a part of the thesis, were analyzed and sorted into key points and categories in terms of users' expectations.

The users' expectations are the starting point of the thesis, and used for two purposes.

- To construct a guide for the interviews about professionals' experiences
- As background knowledge in the discussion phase. The experience may be understood in the light of the expectations.

The project period and the development of Video- based Emergency Medical Interaction (VEMI)

The findings of this study are likely to be of interest both to the institutions and to the clinical staff. They have invested time and resources in meetings relating to the project. The project ended with the implementation of equipment and the staff training process. During the process the participants have expressed their opinion about the project, and the needs that they hope will be resolved in their institutions. The documentation from the preparatory process is held in minutes and reports of meetings and in project documents that are only accessible by participants who are employed at NST. This material is used to only a limited extent in this study, due to the closed access and the consequent lack of transparency in the process. The conclusions from the project period are accessible in the NST reports, and therefore used as a source (Hagen, 2006. Larsen, 2007 and Sjaaeng, 2007)

4.1.1 Simulated emergencies as a source of understanding

Arranging clinical exercises as simulated emergencies showed the teams in a work situation. Such exercises were undertaken at every new site in the implementation of the VC system (VEMI). The clinical training was a prerequisite for the professional staff, before they treated their first patient using the new system. The staff experienced the system in action, and learned how to use the technology. The training in the management of simulated emergencies was especially important, both as clinical training in the use of the equipment and for training

in the functioning of the local emergency team. It was a new experience for the local team to be communicating in real time with the specialist hospital. This was a situation that the professionals had never previously experienced. A member of the local team said that this was a kind of experience hard to imagine without having previously tried it. It was fairly commonly expressed that this was a scenario which gave a different perspective on the cooperation within the local emergency team, as well as in the virtual team. The simulated emergencies contributed to the content in the VC communication, providing the professionals' perspective on the possibilities associated with the use of VC as a tool in the management of emergencies.

The simulated emergency becomes an important context for understanding the reasoning associated with the respondents' choices. As a part of the study methodology, the discussion of simulated emergencies is intended to provide insight about the professionals' perceptions. The simulated emergencies provided observations of the local internal team working as well as the virtual teamwork. This impression was important as a basic understanding of the professionals' roles and potentials in team cooperation. The simulated emergencies are represented in the data collection as compensation for participant observation as part of the ethnographic method. The situation under examination is a simulated emergency, differing from the real emergency, but still containing much of the tension and the stress typical of the real emergency situation. The training situation provides valuable observations of the virtual team, especially in the use of team communication. Virtual team communication is a new experience for the professionals, and as such it reveals their real reaction to the new experience, and to the content in VC communication. These observations are experienced as "real", and provide valuable insight in the subsequent interpretation of the data gathered in interviews. In many ways this must be seen as the most important background material for case interpretations, together with the background knowledge associated with my own professional background.

An awareness of the team members' experiences is important in developing an understanding about the potential uses of VC communication in emergency care management. The understanding of the dimensions of VC communication seen from the participants' points of view will be useful in the interpretation of the findings.

Lack of access to the real-life clinical emergency situation and to those opportunities of observation forced me to choose an indirect method of observation. The indirect method

consists of interviewing professionals present in the emergency situation. But the interpretation of their information is based on my understanding of the situations, and in this context the simulated emergencies combined with clinical experience are important.

The users expectations

Prior to the study, the project development phase drew upon on participation from the author and the respondents in this study. This phase revealed several interesting problems and choices, which were material in the eventual implementation of the system. Out of these problems and choices, there were some lessons used in the development of the interview schedule relating to the users' expectations at the starting point of the technical implementation. The interviews undertaken before the main study affected the method in two different ways:

- Knowledge about the users' expectations was used in the development of the interview guide used in the case interviews. The user expectations were collected and grouped as a set of key points. The key points derived from the early interviews were used in the preparation of the interview guide (Attachment 1) in the review of user experiences.

- The key expectations from the preliminary discussions also formed a point of departure for the professionals starting to use the new system, and they provided a reference point for the discussions. This makes it possible to comment on divergence between expectations and experiences.

Competence in emergency field as a method factor

The methodology in interpretive studies is dependent on the understanding of the person executing the study. The author's role in the project influences the work done in this study, and also provides for an understanding of the scientific data.

There are specific aspects of insight and understanding that are impossible for someone outside the emergency health care area of practice. My way of observing the professionals can be characterized as "the competent eye": The sociologist Kari Wærnes used various concepts to express the understanding of a person watching a social situation: "The dead eye" (in Norwegian: Det døde blikk)- "The untrained eye" (in Norwegian: det ukyndige blikk) and "the competent eye" (in Norwegian: det kyndige blikk). The competent eye knows the rules of the game and understands the connections and reasons. Because one is familiar with the context, it is possible to understand what is really going on, and to obtain a deeper

understanding of the social connections in the study context. However, the existence of a competent eye does not in itself guarantee that the real content in the respondent's information will be adequately interpreted.

My own professional understanding of the clinical emergency situation is a key research tool. The understanding is a product of experience and practice in a variety of clinical settings. On the quantitative side this means seven years of formal education and 25 years of emergency-related practice. My background as a nurse anesthetist is my main access to the clinical emergency situations. The nurse anesthetist is a permanent member of the various emergency teams. In my own working experience I have participated and contributed directly to the management of a large number of emergency cases. These have included emergencies of many different kinds and intensity, in a variety of settings. My experience of emergency care has been gained in several different countries and therapeutic traditions. I have had particularly intense experiences in emergency rooms; many cases have been unlike other situations in life and have not been easy to forget. My interpretation of the professionals' experience and behavior during the simulated emergencies is of a situation seen through my "competent eyes", developed from emergency medical education and experience.

4.2. Data collection

Data collection has consisted of written material and undertaking and transcribing interviews.

4.2.1 Written material

The intended use of the written material is expressed by Silverman:

". . .documents are to be used as a resource for social scientists in order to get a better overall picture of how a social institution operate". (Silverman, 2008:154)

The written material mainly consists of three official project reports from (NST) relating to VC projects:

- NST Report 8-2006: Project report "Video-based Emergency Medicine Conferencing (VEMI) Report": (Norwegian: Prosjektrapport "Videobasert Akuttmedisinsk Konferanse (VAKe)" []). (Hagen,Sjaaeng,Bolle, 2007)
- NST Report 14-2007: Telemedicine as a coordination tool between nursing homes and hospitals in Finmark – an evaluation: (Norwegian: Prosjektrapport "Telemedisin som

samhandlingsredskap mellom sykestuer og sykehus i Finmark- en evaluering") (Larsen, 2007)

- NST Report 13-2007: Technological challenges associated with the introduction of videoconference as a tool for cooperation. "Teknologiske utfordringer ved å innføre videokonferanse som samhandlingsverktøy" (Sjaaeng, Karoliussen, Øvernes, 2007)
-

(The reports are written in Norwegian, and all translation to English is mine)

- In addition, Bolle et al (2009) investigated the experiences associated with the simulated emergencies enacted at Longyearbyen hospital. That paper provides important background information about user expectations and about the initial experiences of the virtual team using the new system.

These documents are useful for obtaining the official views of the projects and their outcomes, and some of the information which they contain is both relevant and useful. However, I find that these reports do not completely address the issues raised in my research question, so they are mainly useful in providing supplementary information and a background to the context of my own research.. Written material, especially written reports, may lack the convincing content needed to answer research questions which are searching for a totality and a more holistic understanding of the issues. (Golden-Biddle and Locke, 1993:595) The reports listed above help to illuminate the context and the intentions associated with the introduction of VC for clinical purposes.

Further, the discussion in this report will present results and stories from other projects.

4.2.2 The interviews

The interviews are seen to be the main source of information in this study, for two reasons. Interviews are an expression of the informants' experiences in the actual situations. Though they may provide only indirect answers to my question, this is the most relevant source giving access to the information sought about the experience and management of the emergency situation. When it is not possible to be present in the real situations, the most directly accessible source of information about what the experience was like is obtained from the stories of those who were present. This is also a situation which the researcher does not influence in any way; the story is drawn from the professionals' world.

When the interview has been completed, the record of the interview text creates the world, giving the word its situated meaningfulness (Denzin, 2007:25)

"Interviews are a part of most interpretive studies as a key way of accessing the interpretation of informants in the field." (Walsham, 2006: 323)

In interpretive connections, interviews are regarded as eliciting the opinion of an individual informant, and as such they provide indirect information for the researcher. This is in contrast to information the researcher obtains directly through their own observations. Indirect information is usually seen to be more scientific, compared with direct information. In the present study the situation is slightly different, as I am primarily interested in the professionals' opinion regarding their motivation and choice. The respondents' opinion is not indirect information but direct. The case primarily focuses onthe professionals' choice, not the outcome of their choice.

Plan for the interviews

The intention of the interviews was to find what experiences occurred when the VEMI system was used in emergency situations. I assumed that the use of VC differs from institution to institution and from case to case. The reason for its use might even be different for the individual user on different occasions. This means there is a variety in reasoning from case to case, and the same professional might have experienced differences in the cases and the motivations for using VC. An institution's motivation and decision might even differ according to who is on duty.

The interviews are expected to reveal the complexity and total content of the motivation for use of VC by the professionals participating in the interviews. The interview should provide the respondent with an opportunity to reflect about the clinical situations and to follow their processes of association and the different viewpoints for answering the questions.

The interview method chosen is that of in-depth interview, with open or semi-structured questions. A template of questions was prepared, in the expectation that it would be used mainly as a backup if the open form did not work adequately. Semi-structured questions were prepared, mainly to cover topics which had been previously identified as likely to be of interest. The main idea was to let the associations of the respondents take the lead in the

process, and for the interviewer to follow that lead on every association indicated by the respondents. This kind of interview can be demanding and requires the interviewer to be watchful.

The respondents' decisions and choices are described in their own words, as they responded to mainly open questions. The interview content is derived from the researcher's knowledge of the research area, both the clinical emergency medical field and knowledge relating to the development of the VEMI system and organization..

The study population – the informants

The population of the study is drawn from the three VEMI projects, following projects in emergency telemedicine from 2004 to 2008. The study population consists of the health professionals, both doctors and nurses, with or without specialist education. Their workplaces include a range of local institutions, mainly nursing homes and small local hospitals, in Northern Norway.

Most of the sites are nursing homes, part of the municipal first-line services. These institutions are mainly in small rural locations, sparsely populated and usually far from the nearest hospital. The municipal health service includes a medical emergency service, normally staffed by general practitioners. These facilities usually comprise a nursing home, a home for elderly and disabled people, and between one and six beds for urgent consultations and emergency cases. Such institutions deal with a wide range of diagnoses and medical problems, and health workers have to cover a great variety of roles. Normally there are no emergency specialists among either the doctors or the nurses attached to these local municipal health facilities. The VEMI system is normally placed in the emergency room in these institutions. It is designed for use in other circumstances as well, for instance in non-emergency clinical care, organizational meetings and competence development. The health workers in these settings care for a wide spectrum of patients.

The other kind of facility from which the study population is drawn is the local hospital. Local hospitals normally have emergency functions; they undertake some kinds of surgery, and provide anesthetic services. Anesthetic services are normally provided 24/7, but it is unlikely that a full range of other specialty staff will be available. As in the nursing homes, the clinical staff is responsible for a variety of patients, though they do practice a greater degree of specialization.

The study respondents are drawn from the clinical staff who meet the emergency patients and who make the hard choices. The person with lead responsibility will in all cases be the doctor on duty locally, but the patient care is provided by an emergency team, each member of which in most cases will affect the ways things are done, through their common skills and knowledge. In many small communities, the clinical team includes doctors, nurses and also paramedics. At those sites where only doctors and nurses were interviewed, this is because the team at that institution contains only these two groups. Paramedics are normally only intermittent members of the team; their participation may be confined to the transportation of the patient to the facility. In small health facilities, the nursing team may be the most stable factor in the group, and the nurses may be important bearers of the local therapeutic tradition and of medical and problem-solving skills.

Criteria for inclusion of informants

The inclusion criteria covered medical personnel, mainly doctors and nurses, engaged in clinical work and in the direct provision of emergency patient care, including out-of-hours care. The respondents are all members of the emergency team at their facility, , with responsibilities for direct patient care. These individuals are expected to have the highest clinical skills regarded emergency cases, and are likely to be among those influencing the way the institution will manage their emergency cases.

All of the respondents are drawn from institutions where the VEMI solution had been in place for at least a year. In the time since implementation, individual staff members and the different facilities had different experiences of using the VEMI solution, with greater or lesser frequency of use. Some facilities had fully implemented the system for daily use, others were using it occasionally and unsystematically, and some were not using it at all in emergency cases. Most of the facilities were in the middle group, and they used it, but not regularly. Because of the qualitative approach, the numerical distribution of respondents between these groups is not important. It is possible to divide the population into only two relevant groups: those who have experienced using the system, “the users”, and those who do not have any experience, ”the non-users”.

The first group of respondents is drawn from facilities which are active users and the partial users of the VEMI system.

The active users are the facilities using the VEMI system as an active part of the organization's problem solving; that is, as an relevant choice when there is a potential for use. There will be a discussion about whether a medical case can be better solved by using the communication equipment or not. This does not mean that every emergency case will be handled by the VEMI system, rather that there will be an assessment of whether it might be useful in the specific clinical situation.
The partial users are the institutions using the system irregularly. This group has used the system in at least one or two situations, and has undertaken appraisals leading to use in some cases, but not in others.

The second group of facilities is the non-users, the facilities which after more than a whole year have still not used the system. The organization does not use the system as a part of their emergency clinical problem-solving strategy, and consequently do not use it in specific emergency situations.

The study population in this case consists of the professionals participating in the facilities' management of emergency cases. All of the respondents are professionals who have been participating in handling emergency cases, and who have experienced the need to communicate with professionals with greater expertise ate specialist level. In these situations they have either chosen to use or not to use the VEMI system. The key criterion for inclusion is that of having being in the situation of having the choice at least once, not the result of that choice. In the partial-user facility there were respondents who had both chosen and not chosen to use the VC system in particular situations. The extent or frequency of that experience was not a relevant criterion for inclusion.

The single exclusion criterion is simply failure to satisfy the inclusion criteria.

Among the total set of facilities where staff were potentially eligible to participate in this study, four smaller hospitals and seven nursing homes, the most established user and the non-user institutions were clearly identified. The other facilities were all partial users, and the choice of employees to include among the interviewees was random. The choice was made for practical reasons.

Access to the informants

Once the eligible facilities had been identified, the researcher telephoned the institution and asked for volunteers among the doctors and nurses who had experienced the use of VEMI in

an emergency setting. I presented myself as calling from NST, working with the VEMI system. Participation was not expected as a matter of course, but all responded positively. Who you are and your intentions may affect the respondent's choice about whether to participate in a study. To refer to the work done in the implementation process is perhaps presenting the interviews in a more serious light than if I had presented myself as a master's student. The ethical aspect of this may be discussed, and I clearly would not have used that approach if it was not true. It is important to use communication skills to get access, but it is unacceptable to lie.

"…the most important attributes they need for this [access to informants] are social skills,…" (Welsham, 2006:322)

I asked at the same time about their experience with the videoconferencing situations, and would have excluded those without any personal experience. We then made an appointment for the interview.

Ethical considerations

The interviews are describing a situation in which the professionals are working with patients. These patients are in a vulnerable state and information from these situations is regarded as sensitive patient data. It is not permissible for sensitive patient data to be made accessible to outsiders Personal Data Act (Personopplysningsloven). In this case no outsiders have been given direct permission from the patient to access sensitive data. This means the thesis and the data collection process should not make sensitive data accessible. This means the professionals should not present sensitive personal data to me as the interviewer, and I should use only general, not sensitive personal information in the thesis. The examples used in this thesis are regarded as general and without any likelihood that a particular patient might be recognized. Because the data collection method was regarded as entirely secure in this respect, it was not necessary to obtain approval for the study from the Committee for Ethics Research (Norwegian: Faglig etisk komite).

The focus of this study is the health worker and the health worker's choices. The clinical situation is the setting. It is necessary to describe the patient situation without using patient sensitive data. The task is to balance the information given in the interviews without risking patient sensitive data. The descriptions of the situations should not make it possible to

recognize any patients described in the case. This is an absolute requirement, and is the reason why both the institutions and the situations are anonymous.

It is incumbent on the researcher to avoid eliciting patient sensitive data in the interview setting, by focusing on the content in the situation, not sensitive details in the case.

Secondly, further filtering took place in the transcription process, by focusing on the content and meaning, and disregarding any recognizable details.

Thirdly, I do not make it clear which institutions were represented in the different cases.

Conducting the interviews

The interviews were conducted with individual respondents, without influence from their colleagues, focusing on their own experiences and thoughts. Interviews were conducted in two ways: either face to face at their workplace, or as telephone interviews.
The informant was met at their office or called by telephone to their office. Appointments were made, so the interview could happen with as few breaks as possible. In instances where the professionals had to suspend the interview to do clinical work, the interview resumed without any kind of problem. All interviews were given the time needed to finish the communication.
The time used on the interviews was between 18 and 27 minutes (breaks not included). Most interviews lasted approximately 20 minutes. This was long enough to get the feeling that the work had been done. There were no significant differences in the length of the face to face interviews and the telephone interviews, except that there was more small talk in the face to face situation.
The interviews were all recorded on an MP3 player, before being transferred to a computer..

The interviews all started in much the same way. The users described their experiences. In most cases the interview just followed the story, and felt very natural. This means that most of the interviews were quite open ended. In some cases I went back to the prepared questions in the semi-structured plan, and the interview was partly semi-structured. Passivity was no problem; neither was over-direction in the communication (Welsham, 1995)

In all cases permission was given for the use of the MP3 player. None of the informants had any objection to its use.

At the same time, I also took notes during the interview, partly because the respondent's answers provided new directions for the questioning, and the writing helped me to focus on the points of the responses.

In two instances, the written notes were at variance to the taped speech, indicating that the interviewer and respondent had been talking at cross purposes to some extent. After I had listened to the tape several times, the notes were corrected. The tape was assumed to be the more reliable and trustworthy record of the conversations in these cases.

The transcription of the interviews

The raw material of interviews is mainly from the MP3 player, augmented by the written notes. The MP3 files were copied into the computer and given a code.
As far as possible, normally immediately after returning to my workplace, and always within a week of the interview, the transcription process started. This is a time consuming process

The transcription to paper starts with writing down the conversation, word for word. The interviews were given and transcribed in Norwegian.

Edit the data – preparation for analysis

This is the process after the transcription, of sorting the findings to be used in the discussion.

The first step was for the researcher to translate the interviews into English. That is both a question of finding the correct expression in English, and also of taking care of the shades of meanings and complexity in the respondent's response. This is about interpretive validity.

"*Interpretive validity – interpretive accounts are grounded in the language of people studied and rely, as much as possible, on their own words and concepts"* (Mørk, lecture note 24.11.08)

4.3 Reflections on the accomplishment

4.3.1. Method for investigation and interpretation

Basically, this investigation rests on the ontological stance of constructivism. The social connections, the entities, are seen as constructions of the actions and perceptions of social actors. The reality derives from the reality of the society (Berger/Luckmann, 1979)

Finding an answer to my research question demands an exploratory attitude. The method must reflect both the answer to be explored, and the nature of the topic itself. As this study shows, telemedicine is a complex field, and permits a great variety in the methods by which it is studied. The limitations to the choice of methodology associated with the field itself are therefore not particularly strong. Rather, the choice of methodology is more likely in this field to be influenced by the research question to be answered,

In this instance, the research question demands an exploration of the professionals' motivation and choices, within the context of a deeper understanding of the professionals' field.

There were three sources of information about the professionals' understanding. First, their opinion was obtained through interviews. The second source was general communication with doctors and nurses in the project setting, and my own experience of clinical training and clinical practice. The third source was the written material from the relevant project and related projects at NST in which health professionals have participated.

The ethnographic inspiration in method is used to obtain an understanding of the health professional's choices. It includes elements of psychology; my reasoning is that the ethnographic method takes account of the psychological (micro level), aspects in an inter- and intra professional (meso-level) setting and the organizational (macro) level. (Tjora, 1997) The ethnographic method is relevant to understand people's choices, and the reasons for their choice.

Ideally, one would choose to apply the ethnographic method through the use of participant or non-participant observation in the emergency situation. However, there is one problem; the clinical emergency situation is difficult to access for observation. The participants are limited to those who have primary duties to perform relating to the emergency. Often, because of other demands, the number of staff members available to deal with an emergency is actually smaller than the situation really needs. There is little scope for attendance by staff or

researchers not actively involved in managing the emergency, . This limitation can affect students needing this kind of experience, so they are excluded from the situation.

From the perspective of the smaller institutions, the emergency situations are extremely rare and impossible to predict, which makes it hard to arrange to be present in the few moments when it may be possible to observe something of interest. Ethnographic studies are normally characterized by observation over a long period. The limited duration of this thesis limits the time available for data collection. These practical obstacles rule out the possibility of undertaking observations as a part of the study, despite the basic wish to undertake a high quality ethnographic study. But ethnographic study is not narrowly defined and limited to the use of observation as a study the tool.

"...ethnography...It is a toolbox – an artifact that can be used alongside other tools" (Harper, 2000:240)

One of the most important tools in ethnographic studies is observation. Ethnographic studies can be done without observations and a protracted period of fieldwork.The concept of focused ethnography can provide access to the ethnographic tools.

"...it refers to an often practiced and respected form of short-term ethnographies by which information relevant to the development or change of technological systems is collected in an intensive and rapid way. (Which is, one should stress again, not possible without prior familiarity with the setting.)" (Knoblauch, 2005)

Focused ethnography limits the time needed for the study, and is often used as a way of limiting and defining of the topic studied.

Observation: the understanding of the field is not from fieldwork directly, but indirectly through the emergencies related to the professionals trained to implement the new VC system, and through personal experience of previous emergency situations. These do not provide an equivalent understanding to that provided in observation studies, but they do provide a far better understanding of the respondents' information and perceptions, and the interpretation of these. I see this is a contribution to the task of delving into the work field in more detail, which is an important part of the quality aspect of my study. The deep knowledge of the work field is probably one of the most important factors in understanding the complex cooperation in work practices (Berg,1999) (Tjora, 2008)(Klein and Myers 1999).

"There is a consensus in the research field (CSCW) that work practice needs to be studied in detail and that these studies are prerequisite for effective system changes" (Tjora , 2009)

In this setting the concept of "contextual attention" is important. It is defined as;

"An actor's active interpretation of, and engagement in, colleagues' ongoing activities". (Tjora, 2009)

The understanding of the activities to be described will differ according to the interpreter's own background. Findings will be interpreted in a context, where the contextual attention is itself a tool. In the interpretation I will use the hermeneutic method. Within the study of telemedicine, or originally in field studies relating to information systems, Klein and Myers (1999) identified a set of principles for interpretation , the first and most fundamental of which was the hermeneutic circle.

These principles for the analysis of interpretive field studies include some of the points already mentioned, such as the "principle of contextualization", and "relation between researcher and subject", and the "principle of multiple interpretations", all of which are important for the further analysis of the topic. (Klein & Meyer, 1999)

Hermeneutics in this connection is mainly a method, the hermeneutic circle. The hermeneutic circle is the iteration between understanding of the parts and the whole they are a part of. This will be a basic tool for understanding the data. Hermeneutics is actively used in the phase after data collection and transcription, before the analysis is finalized; it is an informal analytic phase of reflecting upon and discussing the interim findings. More concretely, there are two concepts from grounded theory which are also suitable for use in this study. Once one has a set of findings, they need to be interpreted, sorted and systemized. The interviews have an inner, implied structure, containing an initial set of assumed categories. As an early part of the analysis of the data from the interviews, there will be a process of looking for the content in the respondents' stories. This process is reading, re-reading and interpreting the content and codes in the text. This is the process of selective coding. This process clarifies the understanding of the material. The concept of theoretical sampling can help in sorting the new understanding, the new categories and the new whole (Tjora, 2002). The theoretical sampling is the process of data collection for generating a whole, or a theory identified in the language of grounded theory. To conceptualize and formulate the theory there are some demands on the scientist, who needs to be theoretically sensitive. (Glaser & Strauss, 1995)

"The sociologist should also be theoretically sensitive so that he can conceptualize a theory as it emerges from the data" (Glaser & Strauss, 1995:45-46)

Even though my goal is not to develop a theory, the methods used in the concept of grounded theory are a useful way of doing the analyzing process. (Glaser Strauss, 2009)

4.3.2 How can data be edited to enable meaningful findings?

When translating the text, I also read it several times, and looked for the content in the sentence. A control function for content is one's own memory of the interview, and reference to the original notes and tapes if in doubt. In this study only two statements were not understandable and therefore were not included in the analysis.

The text consists of quotations from the interviews, and the quotations are required to be organized in an understandable context.

To start the process of organizing the text I used open coding. This entails reading through the transcribed material, looking for significant and important topics, themes, subjects and phenomena (Tjora 2002:22). The primary sorting of topics follows the open questioning undertaken in the interviews. The first sorting generates a somewhat random sequence of grouped responses.

Further structuring sorts the themes into categories and these categories are used to structure the material from the interviews. This sorting is done in several steps, and includes trying to arrange related groups in an understandable, natural sequence. The groups are sorted in categories, giving a clearer structure. These categories are presented in the findings (see chapter 5). The categories are further used in the discussion, both as structure and discussion points (see chapter 6).

The editing process gives a set of findings, with categories of statements covering common topics.

There will be some limited scope for generalization according to method and number of participants. What might be generalized is the concepts, themes and categories; these are the findings of the thesis.

4.3.3 Critique of the Methodology

There is a danger of familiarity associated with choosing a case in an area with which I am familiar, simply because I know it. In this instance I am not afraid that I have chosen a problematic case. I am more afraid that by choosing a topic in an area where I might think that I know the answers, it is possible that I might reject findings which do not fit with my own opinion. The only course is to be aware of this potential problem, and to invoke the principle of contextualization as far as possible.

"The contextual principle requires than the subject matter be set in its social and historical context so that the intended audience can see how the current situation under investigation emerged." (Klein and Myers, 1999:73).

Contextualization is not always easy, and the danger of taking shortcuts is present. In this case the presentation of findings is easier to address than the interpretations. The interpretation has its background in my own experiences and understanding in the situation. This may vary according the nature of the findings. Some of the professionals' choices are easy to realize. Others demand a deep understanding of the highly specialized field, and the interpretation is both complex and sometimes hard to explain. Such problems will test the application of the principle of contextualization.

There is also the danger that I, the researcher might select a case which is likely to support my arguments (Silverman, 2006:309). This possibility is present, and is only rejected through contextual awareness and a transparent method.

Interpretive method

There are alternative possibilities within the interpretive method. A deeper exploration of the topic would have demanded participation in the situations, or analysis of some kind of stored data (such as videoconferencing recordings). These options are all studded with problems regarding the protection of confidentiality.

If one is seeking an alternative method of data collection, the main problem in any alternative to interviews is in obtaining access to the data. There is no way for a researcher to obtain access to the live situations, for two reasons: you never know when the emergency situation will arise, so it is not possible to arrange to be present and ready to do the data collection, especially as the incidents may occur at any time of day or night, not just in office hours.

Further, there is no way of interacting with the professionals in real time, as all their attention is reserved for the patient focus, not the data collection focus.

The situation in the emergency care room itself is not accessible to anyone except the clinical staff needed to improve the patients' outcome. Other persons are not welcome in this situation, because the risk of interfering, disturbing and making the situation messier than is necessary. Unnecessary disturbance in the emergency situation is viewed as a risk.

A third reason is the stringent requirement for both patient and data security in such situations, which means that anyone who does not have a defined health care role in the situation is not wanted. This applies to all other activities not directly defined as "patient care", such as science and scientific data collection [The Health Personnel Act] (Norwegian: Lov om helsepersonell)

This means that all kinds of active and passive participant observation would be hard to perform in an emergency care situation. The only possible way of obtaining permission to be present during the management of emergency cases would be by applying to the Research Ethics Committee, (Norwegian: Faglig etisk komite), which was not done in this instance because of the time limitations and also because of the constraints associated with individual hospital practice in trauma situations. It is my clear opinion that participatory observation in real emergency situations would be the optimal method for studying this research problem, combined with interviews and written data. The observation method would have supplemented the interview data, and would have excluded some of the weaknesses associated with the interview method. For practical reasons I chose the second best option.

One potential bias in qualitative analysis is to put too much weight on that part of the material which supports the scientist's theories and assumptions.

Weaknesses in the interview method

What is said in an interview is not necessarily the truth, the whole truth and nothing but the truth.

"Interviews do not appear to give us direct access to 'facts'or to events". - Interviews do not tell us directly about peoples' "experiences" but instead offer indirect "representation" of those experiences" (Silverman, 2008:177).

Several aspects are said to weaken the credibility of interview data. These include the informant's memory, the connection between the interviewer and the informant, and the setting of the interview. There are others. I find it hard to give an account of all potential problem areas; I will concentrate on those considered as the most important.

How trustworthy is memory? The time from the professional's experience to the time that the question is asked about it varied widely. In the worst case, the gap might be more than three years, in other instances only a few days. As time passes we forget, and memories are weakened. The questions have been constructed to remind the professionals. For the professionals, some questions relate to situations which they will remember for a long time. Others relate to aspects which were not important at the time, and which are only dwelt on as a reflection in the interview moment. There are strengths and weaknesses, but I conclude that I mainly trust the interview data. Many of the points noted were made by more than one respondent, which strengthens the credibility. It is important also that the respondent's answers are not forced into a category during the interview session. I had never thought of it before, but I see this point as an argument in favor of the qualitative method.

Open or semi-structured interviews may yield more information than that which is obtained from the respondents' direct answers. Some of the content may be indirect, obtained by reading between the lines, so to speak. To derive this content it is first necessary to interpret the answers and supplement this with other accessible material, such as written reports. Talking about experiences probably will elicit a richer material than talking about lack of experiences.

Conducting the interviews

Interviews are regarded as a time-consuming research method. I experienced this, even though the preparation time and the process of setting up interviews and obtaining access to informants were the most time-consuming parts of the study. In general the interview method is time consuming and demanding. Time and effort were spent in preparing the interview guide, which covered the main points from the reports about three VEMI project periods and from a set of interviews undertaken before the current study. In one way, once the interviews were over, the time spent preparing the interview guide felt as if it had been wasted, as most of the interviews had been open-ended, On the other hand, the interview guide had been useful during the interviews, as it did provide useful prompts for the interviewer, especially after a digression. Although the interviews were "open ended", the respondents did mainly

follow the general outline of the structured questions, even if they were not asked to cover every specific point. Individual questions from the guide were sometimes asked, but by no means systematically.

Some aspects of the analysis of the interview material should not be regarded as weaknesses; rather, some issues were deliberately left out of the investigation. I have not sought any quantification of the distribution of the most or least important reasons given by respondents for the decision to use or not to use the VC system during an incident. Nor have I compared the responses from the different health professions at each institution.

The written material

The written material has not in itself been the subject of systematic analysis. Rather, it has been used to shed light on the content of the interview findings. I am familiar with much of the written material, and have used it as support intermittently during my writing.

The documentary material is only in Norwegian. This is a potential problem for the transparency and control of my sources and of my translation. Translation potentially changes the content in the text. I would suggest that the limitations associated with translation are more important in the translation of the interviews than in the written material, which has been quality assured regarding language and understandability.

"Where texts are analyzed, they are often presented as 'official' or 'common sense' versions of social phenomena… (Silverman, 2008: 154).

I will be very careful doing so; rather I regard this as something of a trap. I will explain why. It is quite common for authors to refer to their own work. In my case I think it is important to mention having different roles and contributions. In a way this is both a weakness and a strength. By contributing as a researcher with my clinical training and working experience, delivering reports to NST, contributing to scientific projects relating to this topic, being project manager in the three VC projects described, and doing the data collection and analysis in this study, I am heavily involved. A term describing this is "to wear many hats". It is obviously possible that this extensive involvement might mean that I am too much involved in the chain of activity and that I might therefore be blinded to important aspects of this case study.

On the positive side, the researcher has insight into the various aspects of a complex topic. This insight is used with consciousness. This informed awareness is essential and will color

my interpretation. Every step in analyzing the results draws on the understanding of the topic. In fact this is using the written documentation more as study content rather than as resources (Silverman, 2008). It is entirely my own responsibility to remain steady and avoid the traps.

The researcher's roles and their potential effect on the study outcome.

"We are all biased by our own background, knowledge and prejudices to see things in certain ways and not others" (Walsham, 2006:321)

We are all biased, and I am absolutely in danger of being biased. My roles in the different parts of the broader VC project might influence the result of the current study. My two main tools for fighting bias—being conscious and aware, and accounting for how I am managing the data—are both easy to say but difficult to prove.

I would like to discuss two ways in which my own background might influence the findings of the study. There may be others, but these are considered to be the aspects of key importance for the outcome of the study.

First, the influence of expectations at the starting point of this project.

Second, prior to the starting point, I, the researcher, have several roles, including that of project manager for the implementation of VEMI (Hagen, 2006).

For these reasons, it is relevant to give an account of the background and perspective derived from my qualifications and experience. My background as professional in emergency care has already been mentioned. I have also had other roles which have more directly influenced the context of this study. My roles as a participant in developing the VEMI solution and also as project manager in three VEMI projects are both of importance. At the point of preparation for this study, I might be seen as a complete participant. A complete participant is someone who is a full member of the social setting. From a research perspective the complete participant, in addition to the known role, also has an unknown identity as researcher. In this situation that is not the case because the prospect of this study was known during the earlier projects. The participant's awareness and consciousness of my double role seemed to be less clear before the study began. During the implementation it was clear enough, and not likely to influence the participants' expectations in any degree.

Prior to the study but also subsequently, I have a direct interest in making the system a success. The wish to make my object of study a success is an obvious trap. This might make

me and my perspectives far too positive both at the inception of the study and also later during its execution. This involvement is indeed a threat to the researcher having a neutral stance.

One criticism of social science has been that authors do not sufficiently account for their methodological stand (Walsham, 2005).

It has been clearly stated that I need to be careful in this study, especially with relation to the transparency of the role of the researcher (Clarce, 2003: 219-35). The method should in this instance be transparent and reflect caution about any tendencies to taking an exaggeratedly positive perspective on the findings and the discussion.

There is also the issue of influence on the execution of the interviews.

"., it is somewhat naïve to assume that open-ended or non-directive interviewing is not in itself a form of social control which shapes what people say." (Silverman, 2006:125)

The interview process is the part of the study that is most vulnerable to an exaggeratedly positive perspective on the part of the researcher about the VEMI project and its usefulness. During the interview this issue had to be constantly kept in mind. Probably the most difficult aspect to control is the unconscious attitude of the researcher, and potential hidden tendencies to emphasize the positive findings. In spite of efforts to avoid such bias, there are no guarantees that this has been accomplished.

There are quality aspects regarding the performance of the interviews, which may be possible weaknesses. As the protagonist, I am not able to evaluate the extent to which of these weaknesses were present, but I j mention them as potential weaknesses:

- It is possible that I have not exposed all of the reasons for the professionals' choices.
- Many of the respondents are colleagues and participants in the VEMI projects. This might affect their answers.
- In conducting the interviews, I might over-direct the answers given.
- The recording of the interview might inhibit the informants and make them less open.
- It is not possible to observe the informant's body language during telephone interviews.
- The body language of participants in face-to-face interviews is also not part of the recording of the interviews. (Walsham, 1999:323)

4.3.4 Practical application of the research method in the discussion

The discussion section of this research report is mainly based on findings from the interviews, presented as statements by the respondents. The statements have been sorted into categories, and have emerged as the research findings. This has been done by sorting the interview data into specific topics and into more general categories. The discussion of these categories is supported by reference to the written material, and application of background knowledge.

The statements are be interpreted, and the content is discussed in the light of its meaning as a reason for the respondents' choice to use or not to use the VEMI application. The statements will in this way contribute to the understanding of the whole. The whole, as the professional's conclusions, is then used to understand the elements. This is the hermeneutic circle used in the interpretation of the data.

The process of interpretation moves from a precursory understanding of the parts to the whole and the global understanding of the whole context back to an improved understanding of each part, i.e., the meaning of the words. (Klein and Myers, 1999:71)

5 The Study - Videoconferencing in an emergency setting

This chapter will describe the telemedicine concept as the object of the study. First, I will tell a story and give a background and description of the VEMI project. VEMI is both a clinical concept and a technical solution. I will describe the projects involving implementation of VEMI in smaller health care institutions and hospitals. The implementation phase consists of clinical training and organization building, and will be described. There will also be some brief examples of the system used in clinical emergency situations. The local institutions implementing VC face different challenges. These challenges, according to the implementation and the technology put into clinical practice, are the background for the research question. VEMI is an open system with multiple possibilities for use. How was the system used, and what was the framework around the professionals' experience?

5.1 What is VEMI?

VEMI is an intention. The intention is to create a possibility to carry out actions possible through specialists who are not physically present. VEMI is an acronym to describe a virtual team, designed to produce an optimal outcome in a time-critical medical emergency situation.

VEMI is a service, not a technical concept. The technical concept is a necessary part of the service, but the main idea is to perform a service through action. This action is made possible through a heterogeneous network of professional and skilled health workers, a technical concept designed for the use, and an organizational way of allowing this cooperation.

5.2 A true story prior to the creation of VEMI

A patient arrived at a smaller institution in Norway presenting with symptoms of possible gastrointestinal or cardiac disease. This patient was mainly taken care of by an experienced GP, and admitted for observation in the institution's observation bed. The symptoms were not obvious, but were diffuse and hard to interpret. The patient stayed in the institution for several days and slowly became increasingly ill. The GP made a preliminary diagnosis, and tried to prove this was right. But after some hours, the patient went from bad to worse, and the hospital was contacted. The GP consulted an experienced locum physician, an anesthesiologist from another Scandinavian country. The GP got no clear evidence of his preliminary diagnosis. On the contrary, these two doctors had different opinions, as far as they understood. The anesthesiologist found the communication of diagnosis vague, and the GP's conclusions unlikely. Meanwhile the patient got worse and the GP wanted to send the patient

to the hospital. The ambulance aircraft arrived, but the patient died on the way to the hospital. A day of reckoning came, with fingers pointed at the different sides. Insignificant things done during the progression of the illness were claimed to be reasons for the patient's death, and none of the parties accepted any liability for the outcome. On the other hand, communication between the parties was highlighted as not adequate for solving the problem. The GP's diagnosis was wrong, and he was communicating his mistaken diagnosis as the answer. The anesthesiologist had no possibility to access the patient's symptoms, and received a basis for decision making that was far from correct. One conclusion was confirmed; the course of events was a result of inadequate communication and of misunderstanding.

5.3 Definition of the concept of "clinical videoconferencing"

The concept of clinical VC has up to now not been clearly defined. Normally, use of VC in a clinical setting is a part of concepts like "video telemedicine" (Randall, 1998:2), "collaborative video management" (Randall, 1998) or "teleconsultation" (Lundvoll Nilsen, 2008). Clinical VC is technically close to VC equipment used for conferences, meetings and teaching. VC for educational purposes, equipped with a document camera, is much the same technology. The main difference is the presence of the patient and the considerations regarding patient safety. I will operationalize the concept and explicitly define the concept as:

Clinical video conferencing is video conferencing used for transmission of real-time clinical patient data.

The difference from the concept of "teleconsultation" is the focus on the direct transmission of the clinical data. Teleconsultation focuses on the consultation, which may rely on direct transmission of patient data, but may also be limited to the conversation between professionals. The main goal of clinical VC is to collect and present data and, in a virtual team, to provide collaborative real-time patient management (Randall et al, 1998:1). The reason why the teleconsultation covers a different perspective is the need for a focus on the use of clinical data as decision-making collaborative data. The presentation of patients and symptoms is transferred to the competence side of the virtual team, participating in the treatment process at a distance. The real-time data transmission has a purpose: to produce optimal data for clinical decisions. By using the concept of clinical VC, I will point out that the conversation and consultation in the VEMI concept always contains the real-time clinical data.

5.4 Development of the VEMI concept

Until the last five years, videoconferencing has had no clearly defined role in clinical emergency care. In 2004 the only profiled project going on in the world was the ViCCU (Virtual Critical Care Unit) project between Nepean (University) Hospital and Blue Mountain Hospital in New South Wales, Australia (Brear et al, 2006). This project demonstrated the advantages of access to trauma specialists at the University Hospital. Through contact with participants in ViCCU, the main ideas from the project were used as the basis for VEMI. VEMI wanted a different kind of organization, and developed a technological solution based on these organizational needs. The main differences between ViCCU and VEMI are:

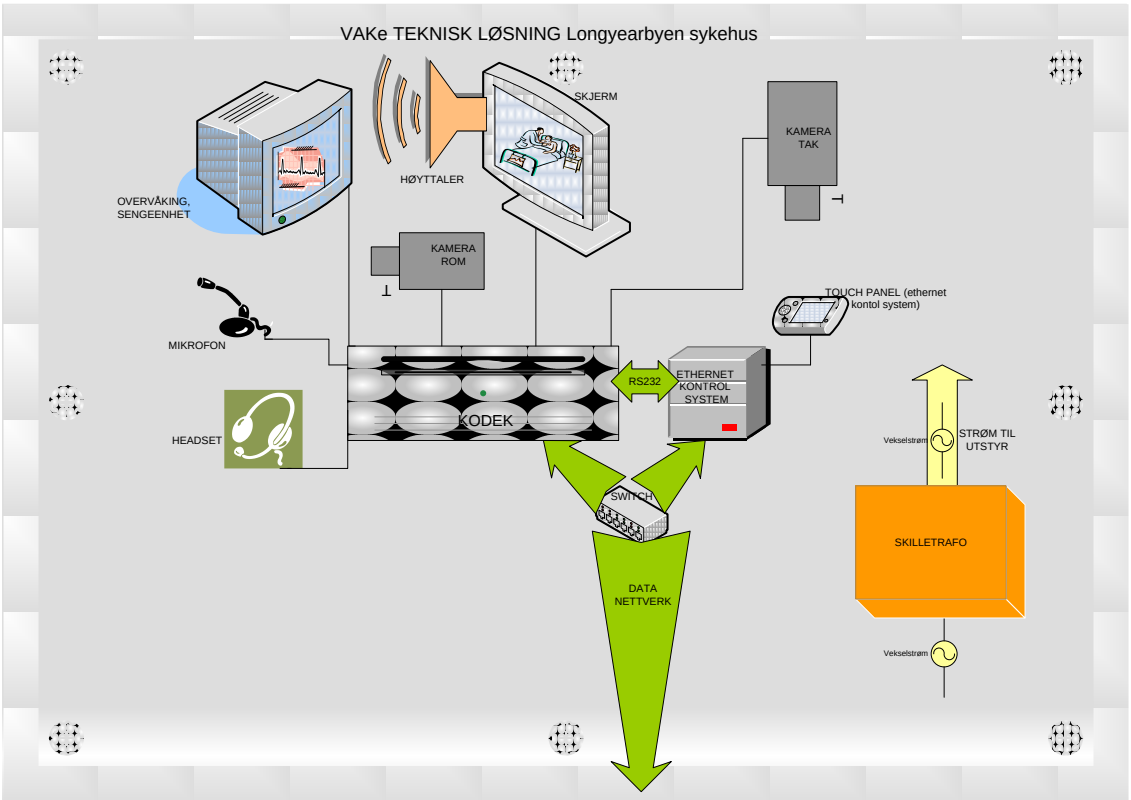
- ViCCU uses a person dedicated to presenting data from the local hospital. VEMI wanted no hands-on equipment from the "patient side", and made the specialist side do all steering of cameras and sources. They used the "far-end" principle.
- ViCCU uses a trauma expert on the specialist side – VEMI composes a tailored virtual team for each case, and has normalized many-to-many (NtoN) communication
- ViCCU made the project a technological test of high-end products in a gigabit-line – VEMI uses high video quality, but with adaptations to the existing lines, sometimes less than 1 Mbps (Liu et al, 2006) , (Cregan et al, 2006) (Wilson et al, 2010) (Hagen, 2006).

5.5 The technical solution

To form a virtual team, you need two distant partners cooperating. Meetings are between partners communicating symmetrically. VEMI is not. VEMI has one side with the patient, one side without. The patient side is more demanding in terms of displaying images from different activities. Some of these activities need high quality to satisfy the professionals' requirements for quality. The project developed the technical concept from an unmodified VC unit. There is dual video transmission to lines from the patient side. There are normally three picture sources. One standard camera is mounted on the codec, showing the activity in the room. In addition, all units have a high-class camera, normally ceiling-mounted, dedicated to taking pictures of the patient. One of these lines is available at times and chosen according to need. The second line was always the patient monitor, showing the patient's real time vital data. This was input into one of the lines as standard, and showed the patient's BP (blood pressure), pulse, ECG (electrocardiogram or heart rhythm), SpO2 (oxygen content in peripheral blood) and Tp (temperature).

The sound is also demanding in the sense that the sound is from different sources at different distances and of varying quality. But the sound requirement was solved by one high-quality ceiling- or wall-mounted microphone.

The other end, the resource centre, was given the best possibilities to receive information. The VC basic unit was the same, but without any extra camera. The screens were two high quality monitors, 42 inches, intended to present a natural picture for interpretation of patient data. The Crestron© steering system was made to control the cameras and microphone in the patient room (far-end). The idea is to let the personnel who are not present in the patient's room do the steering of the equipment. The specialists are the ones who need to watch the patient on the screen; the others are present in the patient's room. Professionals, occupied with the patient, should avoid spending time on managing equipment in a time-critical period.



Picture 4. The original VEMI (VAKe in Norwegian) solution implemented in Longyearbyen Hospital. The picture shows the microphone, cameras and vital data units connected to the codec (Coding-Decoding unit). The green arrow shows the connection to the closed Local Area Network (Sjaaeng, in Hagen, 2006:8)

The steering system from Crestron© with a touch screen was designed to be very simple, controlled from the specialist's side. On the patient's side there was a "one-button principle": just touch the screen to accept the opening of communication.

Picture 5: The first design of the Crestron© screen. Contact was established by pressing the answer button (in Norwegian: "Svar").

The patient was protected from electricity accidents by a separating transformer. The technical solution has been chosen for its high quality sound and picture connection, without any disturbing delays. The connection should be secure. Data security has been taken care of on the basis of the risk analysis performed, using a (secured) closed network, VC protocols and encrypted communication.

VEMI is a service offered to the responsible physician and his/her team in the emergency situation. The technical concept is made simple, related to the workflow in emergencies. On the other side, at the Dispatch Centre at the university hospital, the specialists obtain access to most of the data available in relation to the patient. Their mission is to be a resource for the local team. The specialists need the information received from Longyearbyen as a basis for decision making. The specialists ask questions and give advice to the team. The quality of their advice and decisions is dependent on the information available from technology sources, patients and professionals at Longyearbyen.

5.6 The VEMI projects

The first VEMI project was initiated in 2004 between the University Hospital in Tromsø (RiTø) and the local hospital in Longyearbyen (Longyearbyen Sykehus), Spitsbergen. NST,

Longyearbyen Hospital and RiTø, Department for Emergency Medicine were the project owners, with financing by Helse-Nord RHF (the owner of the specialist service in the region) (Hagen, 2006:11). In the initial project in Longyearbyen, the training in the virtual team was followed by a research study, published by Stein Roald Bolle & al (Bolle, 2009).

The initial VEMI project was followed by two implementation projects called "VEMI Finmark" (Styrking av den akuttmedisinsk beredskapen ved lokalsykehusene i Finnmark) 2005-2007 (Sjaaeng & al, 2007), and "VEMI FiNa" (VAKe Finnsnes- Narvik) in 2007-2008. The first of these was a collaborative project with the project "Nursing Homes in Finnmark" (Telemedisin som samhandlingsredskap mellom sykestuer og sykehus i Finnmark); the second collaborated with the project "New Nursing Homes in Finmark". Financing of these projects came from governmental sources, "Revidert nasjonalbudsjett" (the Revised National Budget), in the two following years, and was offered through the regional health trust Helse-Nord RHF.

The latest project implemented VEMI as a part of the services in the Nursing Home total concept. The cooperation of the projects is important, according to the needs of the smaller institutions. The smaller institutions represent a general health service, characterized by few patients in total, and few patients with each diagnosis. On the other hand, these patients represent a great variety of diagnoses, presenting the smaller institutions with major challenges. The physicians and nurses are generalists, GPs and generalist nurses. This makes the professionals responsible for a variety of challenges. On the other hand, being a generalist is not the same as being able to master any challenge. Many patients with emergency diagnoses will be transferred to hospital as quickly as possible. The two cooperating VC projects were designed to be a tool for a variety of challenges in the smaller institutions, with VEMI as the tool for emergency situations (Sjaaeng et al, 2007).

When the last VEMI implementation project was concluded in December 2008, a total of seven nursing homes/health centers and three local hospitals had implemented the VEMI solution in their emergency rooms. Three hospitals had implemented VC to receive communication from the local institutions to their specialist service. The project was basically financed externally, but the participating institutions financed their own participation (Larsen, 2007).

The users were important contributors in planning and developing the system. The smaller institutions and the hospitals were represented in the project group. The roles of the

institutions were different and representatives from both were needed in the group to take care of the different user perspectives. At the same time, representatives were necessary to take care of both institutions' issues and responsibilities, and to plan a solution tailored to the institutions' needs. The requirements for the representatives from the clinical field were both working as clinical professionals in the institution and in management positions. This meant in all cases using administrative nurses as project assistants, and physicians participating through e-mail and sporadic participation in project meetings. The representation from the field provides quality assurance, enabling better requirement specifications based on clinical use. But there is also another perspective on the user participation. When the participants in the user organization influence the telemedicine solution, it is more likely they will adopt the result (Aas, 2007) (Berg, 1999)

5.7 Training for clinical communication

The implementation was followed by clinical training with simulated emergency situations and the process of building an organization for the service.

To prepare the team for the possibilities of using VC in real emergencies, a training program was prepared. The program included familiarization with the VC equipment and the vital data monitoring. But the most important part of this was communication training between the local hospital handling a case and the specialists present at the university hospital's dispatch centre. This was the initial training and experience in communicating in a virtual team. This was also the preparation for the virtual team doing collaborative real time patient management. The case was simulated emergencies with the use of human "patients" marked with greasepaint, who were instructed to display realistic symptoms. In a realistic setting the professionals were playing their own role in the emergency organization. The teams were solving the case through the participation of the geographically separated parts of the virtual team (Hagen, 2006). In Longyearbyen this exercise was followed up with an examination of communication in the teams (Bolle, 2009).

Figure 3. Simulated emergency training at Finnsnes

5.8 The development of a system in use – a stable service

The VEMI system that was implemented is hardly the ideal tool in every emergency situation. But, depending on the professionals' experience, this tool could be developed and adapted to the institutions' needs. The organizations cooperating could adapt their communication to the expanded possibilities, creating a more streamlined emergency organization. To understand the possibilities and the ways of optimizing the tool is a demanding exercise, where the clinical team is an important participant. One challenging aspect is that in every telemedicine or communication situation there are two partners. These two partners are different, sometimes belonging to different systems, having different goals and work tasks and different patient groups. These differences do not necessarily involve antagonism, but are rather premises for how cooperation should be planned and carried out. User experiences reveal the premises for cooperation, important areas of focus, in the building of the intra-institutional network.

The organizational structure had to take care of the potentials of the new communication, and optimize these possibilities in a set of negotiated rules. These rules, building on the existing trauma organization in the UH, were built to give access to the UH's trauma organization in an emergency case at the local hospital. The rules were negotiated by the local hospital and the emergency medical department and by agreements with the most important emergency departments in UH, like the neurosurgical department. This was not a complete and finished agreement, but a temporary set of rules that was revised after an initial period of harvesting experience with the communication.

5.9 The experience from the study

The intentions expressed according to the implementation are a kind of plan for how to put the VC tool into production. Plans are not always followed. The plans and the intentions differ between the participant institutions. The differences are seen in terms of internal differences, but also the differences in relation to their cooperating hospitals. This phase is the focus of the study. At least two different approaches are of interest. The first is the quantitative study on what kind and numbers of patients are taken care of through VEMI communication. The second, which I will focus on, is the professionals' experience of clinical situations and requirements leading to the use or rejection of the clinical VC communication system in the long term. These experiences of the factors that affect the decision to choose or reject the system are useful to contribute an understanding of how such a system should be optimized in daily use, and optimized as a tool for the emergency situation.

5.10 The virtual team

The concept of the virtual team is essential to the VEMI concept. The virtual organization is a different kind of organization.

"*The telemedicine virtual organization is classified as a type of network organization*" (Aas, 2007:99).

The organization is dependent on the technology, making the organization possible. When the parts of the organization are separated, the ideas, tasks and work processes are separated (Aas, 2007:97). The virtual organization is dynamic, more like a process, being constructed in the moment. The organization exists even if it is not regularly in use, mainly as an "organizational framework", existing as a plan. The real virtual team construction is made in the moment according to the tasks to be solved, the personnel who are present, and the evaluations made according to the needs in the situation.

A goal in the virtual team setting is to facilitate a high level of collaboration, without compromising the smaller institution's autonomy (Wilson et al, 2010). The VEMI concept has expressed clear goals of supporting the smaller institution. The smaller institutions and their needs are the reason that VEMI was developed.

The lack of a formal hierarchical organization is important. VEMI is adapted to the existing emergency medical organization. In a normal case, the patient in the smaller hospital is the responsibility of the local GP. He/she is the head in the local team and has to be responsible for the case as long as the patient is in the institution. In communication with the hospital and the specialists, this is a different organization, not putting the most skilled in the situation at the top of the hierarchy. When the patient is discharged from the local institution, the responsibility is taken over by the emergency specialists at the hospital.

The virtual organization is not self-preserving. The costs of maintaining a virtual organization are regarded as high (Aas, 2007:99). This means the maintenance should be a part of the organization's plans and budget, and is regarded as important to avoid an organizational breakdown.

6 The case

The professionals are to some degree using the VC tool in clinical emergencies. The use is different from the professionals expectations expressed in the implementation phase. All institutions had expectations from the implementation phase, with focus on the major emergency events. In the following period the institutions experienced clinical use, sometimes different from their expectations. This chapter will present the use of VEMI.

The first part (6.1) is illustrating the development of the organization, and examples of clinical use. The examples are collected from user interviews supported with stories presented in media, mainly from local newspapers. All stories are discussed with health workers in general terms, and within the patients personal protection participating. The stories are realistic examples from the smaller institutions involved.

The second part (6.2) of this chapter is the empirical findings expressed through the interviews.

6.1 The emergency organizations in the case

6.1.1 The role of VC in daily use

With a newly implemented system, the institutions had already made significant investments. The investment of the institutions was in an unproven concept. In addition, it was a fact that important aspects of the organization building were undone. The first project harvested some experiences according the administration in the dispatch centre. They initiated some minor changes like the change in the warning procedure. The principle pushing “one button” to answer was changed to “no button” to push. The VC was initiated from the specialist side, but demands an enquiry from the smaller institution. The warning procedure was made, and made a proposal according indications for contact from the institutions side. This indication procedure for establishing contact was unfinished and not adapted to every single user in the system. The local institutions invested time in the organization building. The institutions also spent time to maintain the equipment and technical user competence. The institutions had “super-users”, particularly skilled health care workers taking care of daily problem solving. They normally had to take care of themselves, without any support but a telephone number to a VC technical competent. The institutions are still responsible for all costs. The expenses are running, but the organization building was not completed. Still, when cases were initiated they were mainly running sufficiently, but are impossible to estimate what the lack of organization means the VEMI concept is not chosen.

The training in virtual communication is not followed up after the implementation. This is more critical the less the institution use the VC, as the clinical use is their main training. The lack of communication training has consequences for the users. Users expressed decreasing trust and acceptance to the system. For single smaller institutions this is also expressed to affect the trust in the system in real emergencies. The communication training trough simulated emergencies, are missed from all institutions. From the perspective of the smaller institutions, this kind of training is the responsibility of the hospitals. The arrangement of simulated emergencies is demanding according technical resources and medical skill. This task can be done only by support from institutions with considerable emergency medical resources.

6.1.2 The institutions

The three emergency organizations in the case have some similarities. They are all institutions with a central health responsibility in their municipality. They all are sited in relatively big municipalities, with >2000 inhabitants as their responsibility. In that case they all have more patients and emergencies than the average Northern-Norwegian municipality. They all have the function of emergency beds, mainly made for observations, investigation and light "hospital therapy". These beds are in a sense "hospital beds" in the municipal health service (Helse Nord. 2006).

Professionals working in the municipal organization do not normally have any special education for emergencies. On the other hand, the organizations normally are very serious about emergencies, training their personal in emergencies trough courses, emergency training programs like ATLS (Advanced Trauma Life Support) and local group training in BEST (Bedre & Systematisk traumebehandling, Norwegian: Better & Systematically trauma therapy) (Røyse, 2007:43). These are helpful system preparing professionals, but without making them to experts in a great variety of possible emergencies. They still are not prepared for a lot of traumas demanding surgical final therapy, and numerous other emergencies. But courses and exercise in addition to a strong basic professional education prepare them doing a good job in prolonging the patient's survival by doing life saving actions and prepare for transport. There is no doubt these personal are skilled and an important part of the emergency chain, being an early link in the emergency chain.

The three institutions in the case have similarities and they have implemented the same VC equipment. There are differences in the time experiencing the VC solution, from two to five

years. They are linked as a part of the same network, but cooperating with different hospitals. One is primary liked to a local Hospital, the two others to the University Hospital (UH). They are meeting much of the same patient groups, but there are local differences.

Longyearbyen Sykehus (Hospital): The institution who has made VEMI to a tool considered in every emergency case. The VC is so consequent in use when emergencies, that they are defined as users.

DMS Finnsnes (District Health Centre): Except the two other participants in this investigation all smaller institutions implemented VEMI has used it in clinical situations. Finnsnes represent all the others in a group of partial users. The solution is used now and then, but not in every case possible. For some of the institutions this means just a few times. The use is related to the clinical situations, but also to weather conditions, especially the flight weather for ambulance helicopters and planes.

Vadsø Helsesenter (Health Care Centre): Vadsø is one of the major places in Finmark County. In VEMI connection they are the non user. The equipment was implemented three years before the investigation, but was not used in emergency cases. The VC equipment is still in the institution because used in planned clinical meetings and, and the vital monitor used in local clinical emergency monitoring.

6.1.3 The experienced emergencies - VEMI in clinical emergency use

The VEMI experiences are both minor and major events in the institutions. The minor is everyday medical cases affecting one single patient, normally experience a worsening in state of health. These stories are rarely told in media. The major situations are events for the news , and some aspects of the story are normally presented in media. The detailed courses of events are not accessible trough media, just the frame round the complex cooperation and communication situation taken place. The participants in the situations are the only primary source to these situations. The professional have secrecy according the patient information, and present the general story.

I will describe two typical situations, one minor the other major and their initial outcome.

The minor situation is a person with convulsions (cramps), arrived the smaller institution. The local doctor gives the recommended dose of anticonvulsive therapy for such cases. The patient does not respond adequate on the therapy, and the local doctor is uncertain on next step. Using VEMI the neurologist, the specialist on convulsions, are looking at and examining

the patient with the local GP. They agree medical therapy, and the possibility to transport the patient if necessary. They do a control of the patient the same day. Patient is observed locally with the specialist as back up if needed. The local institution can handle the patient with that deal, and the ambulance transport to hospital is cancelled.

Some of the professionals' experiences are episodes from the public press, like this experience with emergency episodes and VEMI. In a serious traffic accident two persons were badly injured. The weather conditions were extreme, and the ambulance helicopter where put to the ground. The two injured was a major challenge to the smaller hospital. Taken to the intensive care unit, VEMI was used to confirm initial therapy, and come up with a plan for further therapy and logistics.

The professionals involved in the clinical episodes are experiencing positive and negative aspects of VEMI in use. Professionals compare their experiences according problem solving trough VC with the traditional emergency communication they know.

The concept has also been experienced different at the same local institution. One of the health centers started out practicing VC on three emergency cases during 6 month, solving their problems according therapy, cooperation and transport with success. Their experiences gave the institution a positive knowledge and belief of VEMI as a useful concept. The following two requests were rejected from their partner at the local hospital because lack of specialists on duty. Their lacking ability to answer the request, put the smaller institution in a difficulty, forcing them to solve the problems internally, or alternatively using the UH. In this situation the use of UH seems an overkill, because the patients natural trajectory was between local institution and local hospital. The lack of offer from the local hospital might affect the communication pattern and the threshold of use between the institutions. There have been incidents showing weakness in the system, where cooperation did not function. Even if there are god intentions, cooperation sometimes might be put to a test, when resources are marginal. The most marginal resources in the specialist health service are medical specialists, and the local hospitals use much resource on the daily preparedness for specialists. The specialist resource is dimensioned to solve a basic service, without much redundancy. Sometimes a new, additional demand can be an extra load, and what makes the local institutions request too much. On the other hand, the rejection and lack of a guarantee is important for the smaller institution in next case choosing their tools.

The experiences, negative and positive, are for the smaller institutions collected trough relative few cases divided into the personal group. This means each nurse and physician has a slowly growing experience. This is one of the factors important for the observation of things take time. There is one institution where the use is consequent, another where there are no use, but the rest of the institutions are partly using the VC system. It is important to find both the reasons for use and no use, and how the emergency care organization could optimize the system and communication for their use. This is the kind of experience this thesis deals with, and the background for the experienced differences in approach.

6.2 The findings in the examination

In the following part of this chapter I will present my empirical findings. It is the professionals expressed opinion, collected trough the interviews, supported with findings in written project material.

The results from the interviews are the professionals' experiences according VEMI. By using interpretive method I have put the findings in categories. My method is not suitable for arranging the findings related to their importance. On the other hand- during the interviews the respondents put different weight on the importance of their statements. Some stories and statements were given from more than one informant. Some statements are repeated from most informants. This gave me a hint of what topics were important for the professional respondents.

Then there are some factors of more vague motivation value for the professionals. These factors can in fact appear as both positive and negative according to how the aspects are worked out, and experiences done. To turn these experiences positive, they make some additional factors of importance. Often this factor experienced negative can turn particularly negative for further use. Experienced positive they may be taken as granted and considered natural. Therefore they are rarely mentioned as motivation factors, rather premises for use.

The non-users made their choice. Their reasons are based on optimizing the patient trajectory related to their available resources, modern therapeutic principles and traditional well known communication. I will present the difference in choice according to the groups of professionals.

6.2.1 Motivation factors for use of video conference

Access to the specialist service is the most important reason to use VC. To improve the access to the specialists in emergency cases is the most important factor. Respondents are not asked to number the importance of the findings, but all underscore the access to specialist is important. The ideal situation wanted is access to the right specialist when needed.

Getting help when needed is important. Emergencies are rear in the smaller institutions. Emergencies when need of external help, even more rare. Getting help when you need it is a premise for developing a gratifying cooperation. When experienced as a stabile service the access in the critical moments is a new and better problem solving. This is highly appreciated by the professionals in smaller institutions. The timing, help being accessible at the right moment, is one of the main indications of a quality service.

Support doing examination procedures when in lack of local competence is experienced, and appreciated. An example of the contribution of the specialist access is a situation expanding examination possibilities. The performance of examine procedures is essential to diagnose. This procedure can be performed exclusively by specialists, or by other physicians guided by specialist. To be able to do a procedure guided by a specialist, otherwise not possible, can make the difference. It can find the correct diagnose or the contrary. This support from the specialist is more than expected. The examination is done, and the result interpreted, all at a distance. This is highly appreciated by the local team. Access to specialist is experienced in different situations. All professions have their worst case scenario and their fear of not mastering the case. A qualified back up from specialist seems important for all groups of professionals.

Sharing and understanding the complex emergency situation improved trough VC

Common understanding of the emergency situation is important for an optimal problem solving. Sharing and understanding the situation is a main advantage with VC communication. It is taken as a matter of cause that those who are in the same room share a common understanding. There is a different situation according the specialists, the distant partner of the virtual team. The distance means potential for misunderstanding between the parts in the virtual team. Informants are aware of this potential communication problem and will quality assures uncertainties. Online communication gives the possibility to make the content clear, and thereby achieve to optimize the communication.

To understand the real content in the patient situation is the topic in all medical reporting. The communication is satisfying when the other side understand the situation. Common understanding of clinical information is important. Further it is the basic for the success of the therapy. To know the situation understood is quality assurance from the local institution.

Problems might appear when professionals have different educational background. When involving different categories professionals and medical specialties they all have different variations in their medical language. The differences in language between the generalist physician and the specialist might be significant as a contextual aspect. This might due to different medical traditions and wording, different understanding of concepts, different native cultures between doctors, and poor spoken language from one part. Other aspects like time pressure in the situation might contribute to misunderstandings.

To see the specialists are updated proves the information is being transferred, securing the quality in the emergency medical chain. This demands the data communicated must be correctly forwarded trough the links in the chain. Observing the correct communication of patient data is satisfying from the smaller institution. Sharing and understanding has a variety of aspects. The possibility is created by VC communication, sharing pictures of patient and the team in work and, patient information and sound from communication and patient. The team communication is real time and it is possible to improve the quality of the information on the way. For the smaller institution this is close to have the specialist resource present.

Improved quality of the communication and information using VC

First hand information is associated with a good understanding. Information being sent from person to person or repeated several times is always in danger of being changed or interpreted differently. Every time the information is passed on, there is a danger for changes in the receivers understanding and interpretation. The normal communication in the emergency medical chain is information passing from link to link. Parts of this information are verbally.

VC is different with participants receiving common information and getting closer to the same understanding. Common understanding received at the same time is a question of both being precise and efficient. Receiving information at the same time has two important advantages. First; the possibility for all participants to discuss and respond real time. Second; potential timesaving by having all team partners present at same time. Avoiding several telephones to

the different participants in the emergency medical chain, one after the other, means total communication time reduced.

The advantage of first hand information, and information passed through few links with low danger of being modified or changed. The information can be trusted and the professionals know it is correct. This is important in a setting where the amounts of information are high, and the speed of the quality passing, also can be demandingly high.

Another aspect is the problem not knowing what information you possibly have lost of information. In this case, one person act as an intermediary presenting a referral to the others from a conversation. The intermediary present what assumed important from his/her view. The rest of the team know that they do not get all information. That is loss of information quality compared with getting information direct into the team.

Face to face communication is different from anything else. The face to face is the optimal human communication, a standard which every communication is measured against. The videoconference communication showing the members of the both local teams are called face to face communication. The respondents compare VC communication with face to face communication.

The professionals have explored new patterns of work in the emergency situations. The work patterns are made to optimize the patient outcome. But our pattern of work is also optimized to utilize the possibilities we have at the time. In fact every case is tried optimized by using available resources in the best way.

In a situation where the outcome of the cooperation in the team is changed, ultrasound is performed in distance under guidance. The specialist is guiding the GP in performing the procedure of ultrasound. The examination is thereby done by sufficient quality and the specialist can real time diagnoses and come up with a therapy proposal. This change the way the situation is handled.

One important matter in the clinical emergency care is to sort out those patients. According to VC this includes what patients can benefit from videoconferencing. For smaller institutions these patients are not the numerous and daily patient. This means few possibilities of training of understanding/ insight in this matter.

Both exploring new possibilities of use, and the positive outcome in a potential critical situation, are motivating factors for users. A reservation in this case is the fact people in general and professionals are different.

Personal experiences with VC

The feeling of improved security is an aspect mentioned from the informants. Feeling confident at work is a goal for the professionals. Not feeling confident means a reason for searching another job. We have all different tolerance to work stress. At least it is an absolute advantage to master the challenges at work. Emergencies are putting all systems to test, most for those with a law number of experienced cases and not used to the challenge.

Emergency demands knowledge to those handling the situation. There is a minimum of knowledge and skills necessary independent of case. This minimum is to initiate life saving procedures and activate the emergency system in the institution. No one not being present on VC can compensate for the lack of minimum knowledge and skills.

6.2.2 Premises for choosing videoconferencing in emergencies

It is a premise for a communication tool to prevent misunderstanding. For the professionals VC communication contributes to being certain about facts according to the case. There are two factors particular of interest in creating a situation when both parts are convinced discussing the same topic. One factor is the picture and an other the real time feed-back. Several aspects in the emergency situation imply the possibility for misunderstanding. Some of these misunderstandings are potentially dangerous according diagnoses and symptoms. To know you are discussing the same matter is essential.

The other aspect the picture is also a security factor giving both sides of the team confidence of seeing the same. The situation also brings the feedback on interpretation of symptoms and signs prior to the decision. Both sides can compare their interpretations with the other side.

To avoid noise in communication is important for experienced communication quality. Technically the microphone is transmitting every sound in the room. The good technical quality might appear to be a workflow problem. Many participants can make the communication arena noisy. There is a need for organizational structure and leadership of the communication, to avoid the noise disturbing the occupied and focused professionals' bedside.

Noise can disturb the communication, and professionals want to control it. The situations are different, and the best solution according to sound is changing. Sharing and hearing sound is essential in the virtual team. The exceptions cause problems and can ruin a good communication.

There are different cathegories of problems according to communication found:

- Too much noise in general is disturbing the concentration in work situations
- Communication affecting two (professions) of limited value in general, are heard by all. The communication is disturbing for others than the interested participants
- Patients are hearing and misunderstanding the communication. The hearing interpretation to a injured or sick patient is traumatic and different from the normal

The importance of a high quality technical solution

The professionals must experience the technical solution as stabile. It is taken as granted from the users; to rely on the equipment it has to be stable. Stability is of vital interest of two reasons. First, as it will be compared with the existing technology, the telephone. We are used to the telephone functioning every time we use it, and we don't tolerate anything else. Second, in the time critic emergency situation all equipment is expected to function, every time. All malfunctions mean time loss and treats of reduced patient outcome.

There is no time to spend on the initiation of a VC connection. Initiation of contact is normally within the first critical time of a patient recipe. The initiation procedure is changed during development of the concept. The procedure must be simple according to the time critical period patients are in. The procedure is regarded as simple. Today the procedure is a "non-touch procedure" of the VC from the peripheral team with the patient.

One of the most absolute demands from professionals is the equipments easy to use. There are two aspects when professionals demand ease to use: First, the equipment should be so easy to use that focus should not be taken from the patient. Time is critical, and all use of time not directly focused on patient use is a waste and a treat. Health care personal spend time on monitoring the patient, using medical technical equipment.VC is different from the well known medical technical equipment. VC is communication equipment, without any tradition

in the emergency situation. But it is another piece of equipment in the same situation, another potential factor occupying precious time.

The sound and the picture quality are regarded as important. It is regarded so important that equipment giving problems will not be considered as actual. The quality is more or less taken as matter of course.The sound is not regarded as a problem, contrary it is not mentioned any problems understanding what is said. There are given examples people hearing comments meant for use internally in one institution. The picture quality is expressed as particularly important. The picture is mentioned as one of the factors supporting the clinical decisions, or being one of the information sources needed for decision making. The demands to picture quality are changing from one situation to another. To cover most situations a high quality picture is to prefer.

The picture and sound communication affects the virtual team and gives an added value in team communication. The common picture is important both as information source by its own, but also in addition to the sound. One nurse in Longyearbyen (N2) said:

"*When we don't share a common picture, the result is deteriorate quality assurance*."

Optimal sound and picture on VC have similarities with normal human understanding, even if health workers are used to voice comprehension. Voice communication is their everyday tool, and considered as the standard.

Examples on increased possibilities of understanding trough the picture, or the picture and sound combination are different. They are pointing at an expanded number of clinical exercises are made possible guided by the picture. A discussion of the added value of the picture should not be based on the value of the picture solely, rather on the combination of the picture and voice communication. An overall understanding of the situation is better, meaning both better in quality and quicker. This indicates coming to a conclusion or diagnose faster, which is one of the core reasons for the virtual team communication.

The findings indicate advantages in mediating the situation trough the picture. The situation with divergent interpretation between members of the tea is difficult and time consuming. When different opinion in the team they first have to agree about the diagnose or the problem.

Different diagnose means different therapy. A discussion without an agreement means time loss. The picture can focus the discussion. The picture is described as a support in perceiving the same, and trough voice communication you can confirm similar understand.

Teaching and competence development

There are two different ways of training. Training is either the short weekly connection or the planned clinical training. Weekly contact is regarded as quick short time training and seem to have several purposes. The first is as a part of the routine, testing the communication, having quality assurance on the technology. It is important to know the system is working next time with real case.

It is also frequent training for the members of the virtual team, initiating contact and getting used to talk into a microphone and camera.

A third aspect, mentioned by most informants, is getting known as persons and members of the team before the real situation take place. A general recommendation according VC meetings is; start with a physical face to face meeting, then follow up and continue on VC. (Aas, 2007:22)

Respondents want planned and intended training focus on handling the clinical situations. This is regarded as valuable, but until now not repeated after the implementation and initial training phase. Those employs experienced this training is remembering it as valuable both as learning and motivation.

The Dispatch Center is expected to have a role as coordinator and initiator. The training is usually not self driven, not even the weekly 5 minutes testing of the system. It has to be planned, regulated by contract and accomplished. The dispatch center is competence center in more than one way. It has the contact against all the smaller institutions and are the more specialiced. According the team training the dispatch centre is expected to initiate new teaching activity.

The value of planned simulated emergency training is expressed to be high.VC in clinical emergency settings offers a new and unaccustomed situation for users. The situation offers communication with new participants, new possibilities and new demands. Clinical VC is different from VC in meetings or planned education. Communication in clinical settings is

different. The sum is a rather special setting with different participant, different requirements, and different time demands. It must be experienced to be understood. All smaller places had initially exercises with their hospitals. This was training, at the time when the concept was implemented. The participants in these exercises explored the concept unknown for those coming later, never had the opportunity to do training. Respondents being a part of this express they know it is an important experience. As such it is wanted to be a part of the training for every professional accessing the tool.

Time has gone since implementation with some turn-over, and today most of the professionals never have trained with the simulated emergencies. Respondents participating in the initial exercises mentioned this as an important experience, and an understanding leading to motivation for use. Some of the respondents never had experienced this training

Competence improvement in real clinical situations is one of the exiting findings, where the professionals expressed different comprehension.

Some respondents expressed the real emergencies an extraordinary valuable way of learning clinical emergency medicine of two reasons. You can never plan an emergency situation and put it into your curriculum on a logical place, neither plan how the special emergency situation should be. They appear and the case in front of you is what you get. It will always be up to you to get the most out of it. Clinical training is different from real cases, even if the intention with the clinical training is to recreate the challenges in the real case.

Respondents not putting weight on the learning aspect of emergencies presented two aspects. The emergency situation is too stressful to learn, and the situations are not presenting more than well known problems.

6.2.3 The main aspects for choosing traditional solution

The partial-users in Finnsnes and non-users in Vadsø have different experiences. The professionals in Finnsnes have sometimes chosen VEMI, other times rejected use of VEMI in situations with both alternatives possible. They pointed at situations where there are no clear benefits from either of the alternatives, or non of the alternative showed clear advances compared with the other. The situations often demand an optimal handling to end positive. If not functioning well, the result ends negative for the situation and the users. There are several

situations showing diffuse advantages. Regardless the result, these situations are an important part of the work context and the users motivation.

Successful cooperation demands being synchronic in time and subject. The virtual team communication is complex, and the communication in the emergency setting is complex and rapidly changing. The UH team of specialists has a need for discussing their aspects of the case. Their need for communication is both external and internal, with the distant members of the virtual team and the local team members.

Discussing topics at the same time is the easiest and the common communication. Being asynchrony is disturbing and negative. For those working directly with the patient it is disturbing to listen to the specialist team when they are asynchrony in time, order and subject.

Even if they are partners in the same team their communication needs may be asynchrony. They will both have the same need according to being updated on the patient's vital condition. In other contexts they might have different focus according questioning, or related to patient's clinical needs and the local competence to meet these needs.

The limited local resources need to be used targeted and rational in the squeezed situation. Controlling vital functions and perform life saving therapy has highest priority. With limited resources life saving action need to be executed concentrated and undisturbed. In such situations the communication to the specialists at UH can be felt disturbing.

Local tem want to use their right and possibility to mute the others, or turn off. The booker is the responsible in the situation and has the right to turn off and steer the use of the UH resource. Generally the smaller institutions has made the rule; when asynchrony with specialists, turn off the sound and let the picture stay.

The professionals in the smaller institutions do not experience themselves as equal partners with the specialists in all means. They are reserved according to bothering the emergency organization unnecessary. What is the indication for taking contact? The initiation of contact with the specialists has experienced boarders, even those boarders are diffuse. The local GP must be careful to exaggerate occupying the limited specialist resource. From some respondents we hear the fear of being judges as a professional weak of knowledge, using the support service without an adequate indication. This indication is not well defined. There is a degree of assessment in every situation with potential VC contact. In addition there the least experienced have most to prove in a professional context. Every situation demands two

positive answers. Will the patient benefit from communication and does the specialist side find this case acceptable for being contacted and bothered.

Challenges and demands in the emergency situation

The emergency situation is normally not well defined. Many cases are diffuse, at least initially. Arriving to the health service the patient often present an uncertain situation. The initial phase, the patient arriving, it is not easy to know the extent of the situation under progress. Professionals express this diffuse initial phase as a reason for specialist support.

To clarify the situation and get overview the registration of findings and diagnose is initially important. This is a situation demanding all local resources focused. To get answers on tests and examinations take its time. This means, when realizing this is a serious case, time has passed. Taking time to admit the need for advice and negotiation is a barrier. For the local team this means involving the specialists on a later stadium, maybe later than the optimal involvement. (Bolle,2009:6)

The clinical outcome of the situation is often hard to predict in an early stage. In most cases the basic medical knowledge and competence is the vital factor. The outcome is in less degree dependent on the communication chosen. Even if the professional in retrospect find the one method better than the chosen, they can conclude it went well or was not determine.

Some clinical situations are changing rapidly to the worse. The case may start normal, apparently uncomplicated. Then suddenly it turns into a real emergency.

It is not easy to reorganize an ongoing plan after initiated. There are no principal contra indications in re-estimate both the situation and the tools to use when the situation is changing. In fact this is a good idea, and sometimes necessary. But turning on the way meets obstacles.

Mentally it is demanding to brake and reorganizing when you are working on a plan. Either is it easy to draw the clear boarders for when use is indicated from when it is overkill. If one person has problems turning, a team needs a good leader to rearrange.

Some of the partial users mean VEMI is a back up in the rare situations. Having a backup solution is a security for both the professionals and the patient. Accidents normally occur when the systems are under pressure, or when several moments develop different from

expected. A backup system could be a security for the users, and save the situation in some cases.

A backup system could in some cases be a problem by being rarely used, not being incorporated as a system everybody knows and can handle.

Potential problems affecting motivation for use, conflicts and different practice

Different potential conflicts affect users' motivation. Some are internal (intra-organizational) differences in practice and conflicts regarding use. In general respondents report the level of conflicts experienced as low or absent. The conflicts are more related to smaller disagreement about the optimal choice in the situation. Differences in practice and skills create minor conflicts. Regarding use of the VC concept might appear different opinion between professions or between members of the same profession. There are differences in experience, skills and user motivation reflected in choice of recommended therapy and use of tool. It is not always obvious what reasoning the professionals have according different choices in a case. The time for negotiation is often limited. Normally the hierarchy in the team is vital, and the responsible physician decides.

Conflicts regarding the cooperation between the institutions within the virtual team (intra-organizational) might appear according to how the system should be used and the ability to deliver the wanted service. The different level and tasks in the institutions make their focus different. The different focus means different ways of solving problems and different way of using resources. The motivation for saving resources is important, and a demand from the owners of the institutions. The institutions have built up the system and the concept together; still they have not finished the job. One of the receiving hospitals has limited its use, but is participating as receiver from its local area. It is obviously easier for the UH with a lot of resources to offer a delivering guaranty for specialist, compared with smaller hospitals struggling to cover their specialists on duty. Still, the local hospital mainly gets their emergency inquiry met.

Confrontations regarding lack of qualified specialists appears from lack of resources, not bad intentions. One important part of the wanted service is quality from specialists. Local institutions sometimes experience lack of clinical quality from the specialist end. The problem is more likely to appear in institutions with law number of specialists; lacking specialists at

time or having inexperienced “specialists” on duty. The apprehension is strongly linked to the quality of the advisory, not getting the qualified advice needed to their case.

An experienced physician was asking and an inexperienced physician on “specialist-duty” answering. The answer and the following situation shows a little lack of respect, noticed from the smaller institution. The episode is put in the category of “general communication failure”, and “need for training”, not as bad intentions from the UH.

There are reported different use within the same organization, related to the users role, background, knowledge and experience. The system is expected to be flexible offering tailored service regarding situation and case. This is the normal state, and expected from the local institutions. There is a standard delivery from the UH; this is what the smaller institution receive until the situation is clarified. Later on the team of specialists are tailored at the UH according to the request from the responsible physician at the smaller institution.

There are reported variations in need for use related to the level of personal knowledge. The professionals in the smaller hospital have different background compared with the Local Health Care institutions. Hospitals normally have personal specialized in fields with some aspects of emergency. Health care institutions mainly have general practitioners (GP’s) and generalist nurses. They have a different set of concepts and different tools used in their daily work compared with the different specialists

The virtual team is an organization made to solve specific problems. It is built with the trauma organization in the specialist service as model. The VEMI organization has similarities to the traditional emergency and trauma care organization, but function in different ways. VC communication is an expansion of the normal communication, resulting in the optimal virtual team function demands more from the specialist side. The smaller institutions feel this is an extra offer from the UH. The respondents see the advantages in the virtual cooperation, and smaller institution wants to invest some extra to be able to use this advantage.

There is an unanswered question whether the specialist institution fulfill their responsibility different belonging to the same organization. One hospital is merged with the UH and a respondent find this a reason for better cooperation. The experiences of not fulfilling agreements are from institutions on different organizational level. An uncertainty in this case is about formal agreements signed. This is an important detail and should be entered into a contract. On the other hand, most of the smaller institutions are not the same organization as

the hospital. It is an unanswered question if belonging to different organizations is an obstacle in the communication.

The communication within the virtual team is not regarded without problems. Several factors are mentioned like appointments, regulations, respect between participants and the comprehension this being a case for discussion. The concept is new; there are still a lot of highly motivated participants involved when cases appear. There is also curiosity about what the concept represent implying willingness to try exiting new tools. If these participants keep on another time is dependent on their usefulness.

The agreement is essential, the peripheral institutions right to access and the specialist side being willing to be there. Experiencing lack of agreement is a reason for reject VC communication as a tool. This is an organizational question, making functional agreements and fulfilling these agreements. There is a work to be done making suitable contracts. Later it is about following up and fulfilling the agreement every time.

Respondents are giving examples on VC communication affects the patient trajectory. New technology and concepts mean new possibilities. The way patients are handled through the emergency medical chain is affected of the possibilities in each link. The chain is complex and the affections not always predictable. The quality of the patient trajectory is tried optimized every time. The outcome is dependent on the different links in the organization. The situations give the professionals an experience regarded to their expectations and professional standards. A good experience gives a positive learning and tendency to repeat the success next time meeting a similar clinical case.

There are respondents expressing need of (negotiated) organization improvements. The VEMI organization is not mature and need further development. In different ways the informants underscore the need for a negotiated and formalized agreement. The clearest expressed need is an agreement of cooperation and a clarified procedure. This agreement shall solve daily clinical confusion like criteria for contact and cooperation, and at least make this an easier decision.

Procedures are regarded as a must in the cooperation. Without procedures the practice will be unpredictable and unstable. Procedures can participate in the process of clarifying what should and what should not be handled in the VC communication. This is important avoiding the important matter of; avoiding use of VC as a time trap. The time trap indicates loosing

time when intended the opposite. If the situation profits on a direct transport it should be, always. Procedures are important to clarify situations. Procedures clarify for the personal, important for the permanent employed and even more important for the temporary employed.

Respondents find there are a need and a possibility to expand specialist services. There are given examples of specialties considered to be important for a high quality offer. The goal is an optimal service, and the optimal service all specialist possibly needed in a clinical emergency situation. There are specialist without any agreement and therefore possibly inaccessible. To reach the optimal service all specialists at UH need to be negotiated into an agreement. The negotiation with department at UH having all specialists on duty available is not finished. The users see the need of having a complete offer of specialists. Some take such offer as granted.

To expand the network of users is not an important task from the smaller institutions, except in one case. Nearby institutions with common kind of problems need to discuss. To expand the network is normally a matter of users, or more precise the number of users.

"*The development of large scale networks requires some kind of coordinating and governance structure including some kind of standardization bodies*." (Hanset/ Aanestad, 1999:391)

There is a basic work done to construct an organization, an offer from the hospitals. Standardization done is both according to technology and organizational procedures. This is a basic work to be done, even for a single distant user. To develop and maintain a service for one user and minimum use seems irrational from the offering specialists point of view. There must be a minimum use to regard the system "value for money ". Best way of doing this is building up and expanding number of users, number of institutions using the concept. This is a topic for the professionals having the double role of clinicians and organizers. They are engaged in the investment done from the smaller institution and the danger of service being ended from lack of demand.

In different ways the professionals express a need to develop an understanding of good practice in communication. Communication is not easy. New ways of communication is not learned automatically. To sharpen their advice the specialists needs to discuss internally the findings and their conclusions. Being a multidisciplinary team their strength is seeing the case with the eyes of the different team members. Their advice will content knowledge from different perspectives and priorities. They need to discuss. The specialists need for discussion

is not equally interesting for the local team. They have another timing, another sequence and priority in work. They are more interesting in the teams' conclusion and advices, than their internal discussion.

This means the clear and correct discussion is free of disturbing elements, and is narrowed down to the wanted content. This has to be learned from the specialist side. The specialists are controlling the microphone and they have to understand when to turn off the sound for internal discussions.

Factors influence negative on user of VC

Not getting help in a critical situation is devastating for the cooperation climate between institutions. This is not experienced by our respondents, but is known experienced of other participants in the network of VEMI users. Therefore it is mentioned from our respondents. Lack of help when needed means an unstable access, and makes it hard to trust the service. Situations when rejected in these critical moments are comprehended as breach of trust, and in worst case the end of cooperation.

The quality of the experience is important. A positive experience is the factor making professionals relaxed according to VC or not. The response from the specialists is crucial, and giving trust should be an element in their training and behavior. A potential negative experience is important to turn, avoiding negative learning.

There are situations experienced were professionals indicating need for improving the concept. Negative experiences can be incriminating and devastating. One of the nurses (N2) describes a situation when a patient accidentally is listening but misinterpreting the conversation heard. The emergency therapy situation might be experienced as incriminating for the patient being conscious. If possible the health personal will avoid this and adapt the therapy situation. Conscious patients are particularly exposed, and professionals are normally aware of that. Patients are inexperienced in such situations. The situations are complex, and it is hard, even for the professionals, to comprehend all aspects in a situation. Subsequently it is legitimate to ask; could it be avoided? What should be done different, according to care, organization or technique?

A change in the technical solution implies a different organization. Aloud one of the actors use a headset instead of speaking out in the room. This would lock the conversation between

two participants for a period, avoiding others listening. If limited it could be done without removing the important effect of real time cooperation.

A minor feared problem was the initial pressure being observed from the specialists? For novices there is an unpleasant feeling of being watched. This feels like fear of not performing well, like the "big brother" watching you. This is truly a barrier for those never used the equipment before. In a situation without participating, the feeling will last. This feeling is reported to disappear quickly during the first experience. Videoconferencing means seen in a way unfamiliar for most professionals. This feeling might affect your level of performance. (Bolle, 2009) A positive experience resulting in a confident VC user could be dependent on a positive experience in the user situation.

It is hard to predict the consequences of negative experiences. They are not necessary opposite and symmetrical compared with the positive experiences.

6.3 Non users perspective on VC

6.3.1 The traditional emergency medicine communication is satisfactory.

The main reason for not choosing VC in emergency situations, are satisfaction with the existing emergency system where contact with second and tertiary care is by telephone.

This is one of the smaller institutions have implemented the VC solution for emergency use. Still the VC system is never used for emergencies in the institution. This means never used to emergency situations after implementation. One nurse and one physician represent the non user institution.

It is in general important for primary care to have a stable and safe access to the specialist resource. Institution B is handling emergency cases like the other smaller institutions. Al users have an offer to the emergency clients based on professional knowledge and organization. The local organization can do the needed stabilization of the patients for transport further in the organization to the hospital for definitive treatment. This is the level one in the emergency medical chain. (Røyse, 2007)

Non-users, choosing not to use VC, need access to the specialist service as well. Their evaluation of the access situation indicates no need for an expansion in offer. They have access to a variety of transport resources. The institution has access to a SAR helicopter manned with an anesthesiologist less than one hour away. The professionals are used to

sorting and stabilizing emergencies. The experience sufficient access to transport by ambulance car, helicopter (Seaking) and fixed wing (air ambulance plane).Besides there is well organized telephone contacts with local Hospital and UH. This is mainly the general offer in the emergency chain, including some local changes in distance and quantity of the offers. (Røyse, 2007)

They are in general satisfied with the offers existing built on use of the traditional emergency tools without VC. The emergencies in institution B are according to the informants more characterized by medical emergencies than traumas. The medical picture, the composition of the total group of patients, is important for the professionals' choice of tools. What you are familiar with is, in general, the safest. If you have a satisfactory functioning solution, there is no reason to change it.

There are emergency situations with a potential for use of real time communication. These are all solved by use of the traditional methods. Two aspects are important in the situation. There are resources in the institution, and there is an upgraded patient transport system available.

Using the traditional solution is familiar and well known. The well known is normally the safest. Because the professionals control the traditional solutions it is the safest. Neither is the emergency situation the time for doing clinical therapy experiments. For consultation and information to the hospital the telephone is used. It is a safe and incorporated part of the cooperation with hospital. Videoconferencing in emergency situations is regarded as a good idea, but not fitting at place B.

The challenging cases are sent to the hospital. The organization has one task regarded emergency and trauma - stabilizes them and prepare for transport. The aspect in VC giving possibilities for alternative solutions included the smaller institutions containing the patient, or temporary containing the patient following the development of a diffuse situation. This possibility mentioned by the users is not wanted from all institutions. Keeping patients for evaluation is time and personal demanding for the smaller institution. Many cases are diffuse, and with different possible ways of solving. The smaller institution sees this possibility as negative for them, according to the risk of higher use of resources. The safest, cheapest and easiest in these situations is sending the patient to hospital. Sending the patient away solves the problem for the smaller institution. This is not the same as a total calculation of what is cost efficient for health care as a whole, but in fact, that is not the responsibility of the smaller

institution. Avoiding VC and sending the patient appears to be way of avoiding the demanding case.

6.3.2 Could VEMI been used in emergencies

There is no interest for rebuilding a video conferencing emergency service. The professionals are not completely closing the possibilities. A use of VC in emergencies is expected not give any extra contribution. The main reasoning is the institutions expected need for service and expected outcome from the specialist participation. Seen from the informant; VC is in fact no alternative before the access to specialist service is prepared for effort.

Does the picture communication give any added valuable in information? In the non-user institution the physician is define about the contribution of the picture. The picture is not needed to clarify the emergency situation.

The professionals in the non-user organization are not trained in using the equipment. This is explained by significant turn-over. There is a clear problem maintaining a competence in an organization with a significant turn-over. Besides, in all institutions professionals need to train regularly, at least if there is no regular use giving them training. To have a system in use, we need competence in the organization. In the non-user organization there are no official policy denying use of VC in emergency cases. In that point there is agreement between the groups of professionals. Their traditional way of solving emergency cases are incorporated and preferred.

7 Discussion

In the discussion, I will interpret and review the empirical findings reported in chapter 6, in the light of the theory described in chapter 3. The discussion will use the empirical findings and the professionals' reasoning for their choice, and compare these findings with the characteristics of a successful implementation and with the content of the bootstrapping concept (Broens, 2007 and Hanseth and Aanestad, 2003). The findings from the informants focus on experiences which they find important in a professional context. The findings will be used as the structure for the discussion. Concerning the professionals' personal choice and the organizational construction of a network, I will support this material with other aspects of telemedicine theory. In relation to network building, the discussion will be based on the concept of bootstrapping (Hanseth and Aanestad, 2003). It would seem that there are some empirical elements showing the professionals' personal choice to be important. In relation to personal focus I will seek explanations in technology acceptance and health psychology.

The empirical findings in chapter 6 are sorted into three main categories according to their importance to the professional's choice. The interview process resulted in the impression that most informants emphasized some motivation factors, and presented these as important in the open interview process. I assembled these into the group of factors motivating VC use. Other empirical findings are necessary for the professionals' choice without being particularly emphasized in the interview process. These findings are sorted into the group called "premises for choosing VC", and represent basic factors needed to make the VC intervention function. These findings will be compared with the main findings in the non-user group, because they would appear to be in opposition to each other in decisions to use or not to use VC. Some findings affect the professionals' choice of VC in a negative direction, making the respondents choose not to use VC, preferring traditional forms of problem solving.

7.1 Motivation factors for the use of video conferencing

7.1.1 Access to the specialist resource

Access to the specialist service has three aspects that are mentioned as important in the user motivation. First, the timing is important. The user must get help when needed, without any delay and within the time margins that apply to the particular case. Second, the help must be

relevant, providing access to expertise that is not available locally, to deal with the specific issues for which advice is sought, with a response that is applicable to the problem and to the responsibilities of the person seeking the advice, The most appropriate specialist to talk to will be different depending on the problem, the case, and the kind of expertise needed. This indicates the importance of flexibility at the central site, and the need to tailor the team to the kinds of issues raised and advice sought.

VEMI is adopted as a part of the virtual service. Traditionally the hospital is not very open to providing support for the municipal primary care service. The emergency department is commonly an exception. Specialists are available to provide advice on the phone, if they are not occupied with other duties. However, this is informal and there is no guarantee that this service will be delivered, VEMI is implemented as a different service with distinct opening times and guaranteed response to requests. This service has been adopted as a new option from the University Hospital, and it is highly appreciated by the users of the service. The use of VEMI and the translation and the stabilization of such a service are seen as a clear motivation factor in this investigation. During the study some examples have been observed of services not functioning, with negative results. This will be commented on later. Both findings show the importance of the translation process (May, 2003) in the situation. The VC equipment provides an open and flexible solution in which users can seek and obtain the support needed. Getting help in time is an absolute requirement in this service, highly appreciated when it goes well, and judged equally negatively when it not functioning. The development or stabilization (May, 2009) of this service is a challenge, because failure has such extreme consequences.

One of the nurses described her worst case scenario, when there were problems securing the patient's airway. She felt supported by having the anesthesiologist present to provide support as part of the virtual team. This shows how the implementation process is forming a new tool. Through adoption of the tool, the organization has created the opportunity for this development, and the translation is forming the use (May, 2009).

Support in performing examination procedures when local competence is lacking, is one of the new translations revealed in this investigation. The performance of examination procedures is essential to diagnosis. This procedure can be performed exclusively by specialists, or by other doctors guided by specialists. To be able to do a procedure when guided by a specialist is usually not adequate, but in emergency or distance situations it can

make all the difference. Support from a specialist can make it possible to obtain the correct diagnosis, but without that support the diagnosis may not be made. In this case the examination is done, and the result interpreted, all at a distance. This is highly appreciated by the local team. The translation achieved in this case is more than the smaller institution had expected. This kind of cooperation expands the user possibilities of the VEMI equipment.

Access to specialist knowledge has been found to be very important. Health professionals are not strongly focused on the tasks associated with network building. Access to specialist advice as a motivation factor in building information and communication systems is not much dwelt upon (Hanseth and Aanestad, 2003). In more general terms, such as cooperation, the importance of this communication can be found in the development and implementation of information systems in health care (Berg, 1999).

Are the respondents, as professionals, primarily focusing on medical usefulness? This point is essential in building a lasting service, as long as the access to the specialists is a service which is strongly wanted. This is the main motivation for users initiating the stabilization of the concept. Tjora (2009) believes that for an understanding of users' motivation, a focus on specialist contact is of importance in the perception of contextual awareness. The contextual awareness indicates why this communication is particularly interesting regarding the professionals' problem solving in the situation. Their desire to contact the specialist can also be seen as the professionals' perception of their usefulness (Chuttur, 2009); they are choosing VC because of this communication possibility.

7.1.2 Sharing and understanding the complex emergency situation

The goal of common understanding is identified by the American College of Emergency Physicians describing the use of telemedicine in emergency medicine. In this paper they use the term "collaborative real time management". This is a typical aspect in VC through the development of common understanding (Case et al, 1998)

Common understanding of the emergency situation is the basic element in the VEMI communication. When the situation is going well this is important, but there is potential for failure in understanding as well. It is taken as a matter of course that those who are in the same room have a common understanding. Distance means that there is greater potential for misunderstanding in the virtual team. This is especially noted by the distant partners of the virtual team, the specialists.

Common basic education is also seen as a guarantee of similar professional understanding. A shared understanding of the main issues in the patient situation is a goal of all medical reporting. The communication is satisfactory when the other side understands the situation. Common understanding of clinical information is important for the result of an intervention, and even for the patient's eventual outcome. Further it is the basis for success of the subsequent care and therapy. To know that the situation is understood provides quality assurance for the local institution.

Problems may arise between professionals with different educational backgrounds, and this is one of the contextual aspects of the study. When different categories of health professionals and medical specialties are involved in a patient's care, they all have different variations and focus in their medical language. The differences in language between the generalist clinician and the specialist may be significant. There may be different medical traditions and wording, a different understanding of concepts, different native cultures between doctors, and lack of fluency in the spoken language. Features such as time pressure in the situation may contribute to misunderstandings.

Ensuring that the specialists are updated proves that the information is being conveyed and that the quality of communication in the emergency medical chain is being maintained. This demands that the data communicated is correctly forwarded through the links in the chain. Observing the correct communication of patient data satisfies the concerns of the staff at the smaller institution.

Sharing and understanding have a variety of collaboration aspects. The collaboration is created by the VC communication, sharing patient information, images of the patient and the team at work and also and sound from communication with the patient. It is all in real time, and it is possible to improve the quality of the information in the course of the consultation. For the smaller institution this is close to having the specialist resource present. The professionals in the peripheral institutions greatly appreciate the close relations and the quality assurance related to the transfer of data.

Being aware of potential communication problems will support quality assurance. Online communication makes this possible through instant feedback in the course of communication. The team will thereby seek to optimize the communication. Working to archive optimal communication is an element in the development of a stable service; it is a translation and stabilization process (May, 2003).

Both in the access to the specialist and the sharing and understanding of the situation, the informants' focus is a medical focus, seeking to improve the patient's outcome. Both of these features are seen as important by the professionals, because of their contribution towards optimizing the goals of health care.

"The core activity in health care work practice is "managing patients' trajectories": doing investigations, monitoring intervening…. In all but few instances, managing patients' trajectory is a collective, cooperative enterprise." (Berg, 1999:90)

The respondents evaluated these as key activities and reasons for choosing the VEMI concept. They are regarded as factors important for ensuring the system's contribution to improving the patient outcome. It is an interesting finding, illustrated by the example in Chapter 5.2: a story that shows the consequences of a lack of common understanding. Communication quality is essential for quality of health care (Aas, 2007:12).

7.1.3 Features improving quality in emergency communication

First-hand information is an advantage, and it is one of the advantages of VC. Information transmission may be less effective if it passes through several links.

Normal communication in the emergency medical chain is through information passing from one person to another. Information passing between people or which is repeated several times is always in danger of being changed or interpreted wrongly. Each time information passes, there is a danger of changes in the receiver's understanding and interpretation.

The advantage of first-hand information is that it avoids information passing through several links, with the danger of being modified or changed. You can trust the information, and know it is correct. This is important in a setting where the amount of information is high, and the speed and the quality of transmission can also be demandingly high. It is an aspect of uncertainty if one does not know what information may have been lost. In that case one person must act as an intermediary, passing the content of discussion to the other professionals. First-hand information for the whole team is transferred into the emergency team as one of its working practices by means of the VC. For the person holding the telephone in a communication between GP and specialist, the difference in communication is smaller. For the other members of the local team the difference is major. The transformation is experienced differently and with different significance for the members of the team who would otherwise be receiving second-hand information.

Importance of direct communication

Direct access to specialists is an exception in Norwegian health services. Yet there is an expectation of direct contact in the different levels of health services, even in emergency situations. When this is experienced it is highly appreciated. This kind of direct communication between levels is a political goal in Norway (HOD, 2009:35). This kind of direct contact is expected to become more usual in the future, giving the professionals a feeling of being "future oriented", creating a demand for technological success, as is shown in the concept of bootstrapping (Hanseth and Aanestad, 2007:390).

There is a value in this possibility of contact, even when it is not in actual use. The value of this access is the existence of the service, available for when it is eventually needed. This is the benefit of an existing and negotiated service, even if it is not in active use.

There may be differences between nurses and doctors in this focus on direct communication. To some extent the doctors already have direct communication by means of the telephone. Nurses are usually dependent on indirect communication with specialists. So the use of VC may be experienced as a more substantial change and improvement in the nurses' experience of communication through VC. Nurses are empowered through being able to participate in discussions with specialist, instead of being excluded from them when the doctors communicate by means of the telephone (Wilson et al, 2010:76) Direct (Nurse to Nurse) communication is changing the roles in the team from the doctors transmitting the information they find relevant, to the direct communication within the whole virtual team with a broader focus (Berg, 1999:90).

Face to face communication

Face to face communication is different to any other form of communication. Face to face is the optimal human communication, a standard against which every other form of communication is measured. The videoconference communication showing the members of the both local teams is a kind of face to face communication. The respondents compare VC communication with face to face communication.

The benefit of seeing the other person when communicating with them is in general assumed to be useful. In communication theory the aspect of seeing congruence between what is said and the speaker's body language is understood to be a basic indication of trustworthy

communication. This is also the case in emergency situations (Chandler and Wallace, 2007:20)

For the local part of the team, the perception of the specialist's feeling of responsibility is of importance. The face to face contact gives the impression of specialists being involved responsibly. The specialist's face is a source of information in an evaluation of the quality of the communication between partners. This also indicates that it is easier to become engaged when experiencing this face to face situation. Face to face interaction, even though it is seen on the screen, is an advantage through being as close to normal communication as possible. The possibility of reading body language and of observing the congruence between what is said and seen is a special quality of VC for some individuals (Aas, 2009). Several aspects of VC communication are experienced as improving communication compared with the use of a telephone (Bolle, 2009). These are situations translated into the communication setting and experienced as a step forward in communication. Quality communication contains several aspects with potential to be influenced by acceptance of technology and motivation. This kind of acceptance may be linked to the acceptance in the concept of bootstrapping and the concept of success. Improved communication is a tool in bootstrapping and a motivation for network building. It is also a key to the successful acceptance of the technology. Face to face communication in VC would appear to affect the quality of communication, for instance through greater psychological involvement (Bolle, 2009:6) and engagement in problem solving. Making diagnoses and giving treatment are regarded as being aspects of problem solving (Aas, 2007:13).

The perception of improved personal security

Professionals need to feel confident at work. Not feeling confident is stressful in a working situation. We perceive that we need to master all of our challenges at work. Emergencies are generally highly stressful, and put all systems to the test. Emergency situations demand knowledge and skills from those managing the situation. Without any support you feel alone. Many generalists without emergency medical education feel that the rare emergency situations are the most stressful part of their work.. With VEMI the local professionals no longer have to meet the challenging situation alone. Knowing that back-up was available from specialists was for some health workers a real contribution towards feeling confident at work.

This experience of being helped, with increased margins of security, is a central element in the feeling of personal safety associated with using the VC system. Personal experiences are important in motivation. The theoretical foundation in this thesis is not suitable for explaining personal choices. On the other hand, learning that personal choice is important in the motivation for using the VEMI concept is an important finding of the study. This finding shows clearly that personal experiences are an element of the professionals' motivation for using the VC solution.

In the concept of bootstrapping, authors seek support from psychological models, emphasizing the importance of the individual factors, including the differences between individual users.

"*...individuals' preferences vary. In many cases our preferences are not static and given, but dependent on other peoples' actions."* (Hanseth & Aanestad, 2003:386)

Bootstrapping theory acknowledges that users are different. One of the basic dimensions in bootstrapping is the individual's choice (Hanseth & Aanestad, 2003). The translation of the use of VEMI as a factor in individual's confidence is put into the system by the individual user. This kind of motivation affects and shows the different aspects of technology acceptance (Chuttur, 2009).

New patterns of work as seen in the VEMI concept

The pattern of clinical work is generally organized to optimize the patient outcome. The work tasks utilize the possibilities available at the time, and the staff will try to optimize every case by using available resources in the most effective way. The professionals were exploring new patterns of work in the use of VC in the emergency situation. This gives the VC concept an expanded user area and options, showing the flexibility of the tool and the possibilities for users to adapt the technology to their individual work tasks.

It is possible to see the team exploring and developing new ways of cooperation, when doing a piece of work never done before in the organization. These new patterns of work, initiated in a potentially urgent emergency situation, are expanding the range and scope of procedures undertaken by the local staff. An expanded procedure is experienced for instance in the situation where the specialist is guiding the GP in performing an ultrasound procedure. This changes the way that the situation is normally handled. This is associated with some risk, with an unpredictable outcome. It has to be informed by the professional's clinical confidence in

the real time clinical data available, and the decisions are related to the challenges in the situation (Wilson, 2010).

A situation where the local staff leaves the patient, and congregate in the dispatch centre for monitoring is another example of new patterns of work. This is a distressing example of the way in which the technology may be used, absolutely not an ideal situation. Locally the case is creating a potentially serious situation, leaving the patient alone without anyone taking care of them. An unstable patient needs continuous observation, as one never knows when the situation might take a turn for the worse. The example shows a distribution of work different from the planned use of the concept, and it gives rise to concern as a risky way of working.

A successful patient outcome indicates success for the expanded procedure; failure means a possible end in the use of the innovation, and a risk that the professional may be called upon to defend a work pattern not proved to be acceptable. In terms of the concepts of success and bootstrapping this is risky, putting the reputation of the concept at stake (Broens, 2007) (Hanseth & Aanestad, 2003).

The learning and experiencing aspects of the situation are secondary to the clinical aspects, but these also carry the element of risk. Negative experience will have greater influence when there are few examples. It is recommended that practical training in the use of the new technology starts with experience in non-critical situations (Hanseth & Aanestad, 2003:390).

Exploring new potential uses of the technology and positive outcomes of its use in potential critical situations are both motivating factors for users. A reservation in this case is the fact that people and professionals are individually different. Both of these instances relate to the translation of the technology into new and unproven situations (May, 2003). The technology is experienced as useful, and the professionals accept the technology because of its proven usability (Broens, 2007).

Not all these new patterns of work, occurring in the combination between technical possibilities and the offer of competence available, can be predicted. They might occur as a coincidence of the professionals, the medical needs and the technical possibilities in a particular situation. New possibilities may be revealed in a specific situation, with the particular composition of resources available at the time. Berg states that: “A core feature of IS development process within complex organizations… is their fundamental unpredictability” (Berg, 2001:146)

The picture and voice give an added value in team communication

The picture affects understanding. Voice and picture together are the closest one can get to daily human communication. The study respondents have provided examples of how there may be increased possibilities of better understanding through the picture, or the picture and sound combination. An expanded number of clinical experiences will become possible, guided by the picture and voice communication. The overall understanding of the situation is better, meaning both qualitatively better and also quicker. This indicates that it may be possible for the team to come to a conclusion or diagnosis more quickly, which is one of the core reasons for clinical communication.

The added value in the picture is about trusting the information received through the picture. This is important in the clinical setting (Aanestad, 2003:304).

Advantages associated with mediating the situation through the picture

A situation where there is divergent interpretation between members of the team is difficult and time consuming. Different diagnosis means that different therapy will be prescribed. A discussion without agreement means that time is lost. The picture can focus the discussion. The picture is described as a support in ensuring that the perception is shared, and through voice communication it is possible to confirm that both participants have a similar understanding (Bolle, 2009; Wilson, 2010). This is the main advantage of the use of visual communication. The picture itself gives an improved understanding, but the discussion based on the pictures is what makes the difference. In the use of VEMI, discussion of a case may use any of several digital resources; real time clinical data, radiographic images, pictures of the patient, and the local team at work. In the use of ultrasound mentoring, the transmitted image is used in procedure guidance and as patient data at the same time. The full range of potential ways in which the image can be used to improve understanding and treatment is yet to be explored.

7.2 Premises for choosing VC

Some of the empirical findings showed no evidence of reasons for choosing to use the videoconferencing system in preference to traditional communication. The findings were all presented as a part of the story from the informants, but not as a reason for their user motivation. Some of these issues were mentioned by both the users and the non-users, with opposite characteristics ascribed to them. I interpret these aspects as being necessary for the

users in making their choice, and as a basic demand of the VEMI concept. When it is not present, that is an argument for not using the concept. That is why I am calling this section "premises for choosing VC".

Stability of the solution

Stability is quality, and it is important for two reasons. First, it will be compared with the existing technology, the telephone. Second, in the time-critical emergency situation all equipment is expected to function, every time. All malfunctions mean loss of time and risks of impaired patient outcome. Stability is experienced as an absolute requirement for the system and as a criterion for success (Broens, 2007). Every experience of a technological intervention not functioning is a reason for choosing not to use the equipment. Stability is normally a technological question, both a question of stability of the technology and the service and maintenance when there are operational difficulties (Obstfelder, 2007). VEMI has the service function of the general VC service in NHN (Norwegian Health Network), which does not cover a 24/7 service, but which is only a daytime service. This may be a problem when errors occur when staff members are on duty, but are not experienced. This service needs to be established to make a stable service.

Requirements for the equipment; easy to initiate and easy to use?

The initiating procedure must be simple if it is to be used in time-critical patient situations. The procedure is regarded as simple. It is agreed within the team that the procedure must be simple, but the decision to initiate its use is a subject of discussion by the team. The specialists find it relevant to follow the patient through VC from the moment they arrive at the smaller institution, while the local professionals receiving the patient physically tend to prefer to wait until the patient has been initially examined and the local staff members are prepared for the VC (Bolle, 2009).

The equipment should be easy to use, so as to avoid taking the focus of the staff away from the patient. Time is critical, and all time spent not focused directly on patient care is a threat to patient outcome. Health professionals are already familiar with patient monitoring equipment and other features of medical technology; VC is different. It is communication equipment, without any tradition of use in the emergency situation. It is a piece of equipment seen as a potentially time-wasting factor. This demand that the technology should work in

such a way that it requires no attention from the professionals engaged in caring for the patient, for instance by having to pause to address the camera or the microphone.

In addition to some construction improvements made in the technical unit, the organizational elements have been optimized for the team collaboration. Altogether this gives the experience of the VC technology being very simple. This is due to the strong focus on simplicity; the solution is specially designed for the work tasks (Hanseth & Aanestad, 2003:390).

The picture and sound quality affect the performance of the virtual team

The sound and the picture quality are regarded as important, so important that equipment giving problems in these features will not be considered as useful. The quality of transmission is more or less taken to be a matter of course. The sound quality is not experienced as a problem. No problems are mentioned in relation to verbal communication between team members.

The picture quality is important as a carrier of quality information. The image is identified as one of the factors enabling specialists to take their decisions, or at least as one of the information sources needed for decision making.

"*The clinician builds up confidence in diagnosis and management, based on the quality of information on which the management is based*" (Wilson& al, 2010:73-74)

Picture quality was identified as one of the issues about which professionals may need to decide whether the quality is sufficient for the task, but they did not define what "sufficient" is. What we can state clearly is that the quality of resolution needed changes according to the situation, the task and probably the professionals participating at the time. The picture is important when it is trusted, and it affects the interaction in the virtual team. Aanestad has studied picture quality in a surgical context:

"*What was considered sufficient image quality was first of all related to the surgery itself (which problems were to be solved), but also to the configuration of the rest of the socio-technical network*" (Aanestad, 2003:305)

Aanestad's finding is that the picture quality affects the entire socio-technical network as a collective result (Aanestad, 2003:306). One finding indicates that the picture and sound quality affects the team cooperation and is an aspect of improved quality assurance in team cooperation. This is supported by Bolle (2009:6) and by Wilson et al:

"*There was an expectation that high media quality would enhance the sense of presence among the participants."* (Wilson et al, 2010:74)

Even seeing the members of the other team through VC is regarded as a benefit in emergency situations, contributing to the establishment of trust and confidence (Chandler and Wallace, 2007).

We must avoid disturbance in team communication

Disturbing communication is of two kinds: misunderstandings and noise.

To avoid misunderstanding, first of all we must know that we are discussing the same matter. Misunderstandings are potentially dangerous, for instance those concerning diagnoses and seriousness of symptoms. To know that you are discussing the same matter is essential. Seeing the common picture is a security factor giving the team confidence that they are seeing the same material. As a background for decision making, experiencing the same factors and having certainty about common experience are both important.

Noise in communication is negative. Two different kinds of noise were reported by our informants. Noise in the surroundings can disturb the communication in different ways. For instance, private communication between two of the health professionals has been found to be disturbing for the team as a whole. Another example of the disturbing effect of noise was the case of a patient hearing and misunderstanding the communication between the health workers. A sick person hearing and interpreting a conversation may find it traumatic and different from the normal kind of communication. Noise affects health workers when they are focused and working under pressure. It must be avoided. The most effective way of avoiding unnecessary noise is through organizational and cooperative practice. Broens et al call this intramural work practice, the internal inter-professional cooperation, negotiating and building working protocols. This is a way of preventing unnecessary noise, through the negotiation of best practice and through making professionals aware of the dangers associated with unnecessary noise. The professionals solve the immediate problem through verbal agreements and experience, even in the absence of any formal agreement. Lack of protocols is common in telemedicine (Broens, 2007:305) and should be dealt with in future.

All aspects of technical usability contribute in the professional's acceptance. In general this is found to be a basic element in the success of telemedicine (Broens, 2007) (Chuttur, 2009)

7.2 .2 Organizational aspects

Experiences as a virtual organization

The main experience of communication so far is mainly positive. But VC communication is an expansion of normal communication, and demands restructuring. The lack of negative experiences or heavy burdens relating to the structural change makes the experiences positive.

"*The virtual organization is different from the ordinary organization*" (Aas, 2007:98)

The virtual team is an organization brought together to solve specific problems. There are few complaints about the consequences of organizational change from staff of the smaller institutions. This is because the organizational changes at the smaller institutions were minimal. On the specialist side, the organizational challenges were much more comprehensive; the changes included adapting the existing organizational structure associated with trauma care to take account of VC responsibilities. Staff members were alerted to a VEMI case as if to a "trauma alarm" in the hospital, but the response was less comprehensive and more tailored to the particular case needs.

The need for a stable and reliable organization

The experience of a lack of agreement between the partner hospitals is a reason for rejecting VC communication as a tool. Staff from some of the smaller hospitals noted that from time to time there had been no specialists available for consultation when they were needed,

The question arises whether the specialist institutions fulfill their responsibilities differently if they and the smaller hospital both belong to the same organization. Is this a problem of an organizational nature? One of the smaller hospitals has merged with the university hospital and a respondent finds this to be a possible reason for their closer cooperation.

"*Organization merger can be used to reduce problems of cooperation*". (Aas, 2007:24)

The experiences of broken agreements were all between institutions belonging to different organizations. Several suggestions are presented, such as negotiating appointments and the development of more detailed terms of agreement.

System affects the patient trajectory

The ways in which patients are managed through the emergency medical chain vary. The quality of the patient trajectory is not always optimal. The interplay is affected by experiences

as well as by unpredictable personal factors. Success demands organizational effort (Broens, 2007:305-6).

The need for (negotiated) organization improvements

The VC organization is not mature; it needs development. The minimum requirement for new initiatives is an agreement on cooperation between the local and specialist services, and clear procedures for the use of VC.

"For organizations planning to engage in telemedicine, it is important to communicate about how the collaboration should be done." (Aas, 2007:41)

The collaborating institutions all need an agreement containing a statement of the intentions for the cooperation as well as commitments for delivery by each of the parties. A failure to deliver is destructive for subsequent cooperation. Failure to deliver on an explicit agreement means that the intended way of managing the work is disrupted. When staff members are not available at the required times, this is a failure to conform to the agreement and should be dealt with as such. The agreement should ensure the expected pattern of response from the members of the team in emergencies.

Developing and negotiating the necessary procedures

It is regarded as essential in an agreement of cooperation to have explicit agreement about procedures and other requirements between the participants. Without procedures, the practice will be unpredictable and unstable. It is important for avoiding the possibility that use of VC may become a time trap for patients. The time trap may mean that time is lost and that there are delays in the provision of urgent care for patients at risk, even though the whole intention of the VC agreement is to achieve the opposite effect and to speed up the provision of appropriate care. Procedures are also important to clarify patient needs.

Procedures clarify what is required of the staff. This is important for those who are permanently employed and even more important for temporary members of the team.

Another of the reasons to clarify procedures is to avoid the decision to abandon VC because of the professionals' sense of insecurity. Procedures showing clearly the indications for the use of VC have been negotiated but they are still adapted to the needs and resources of individual institutions, and they are not generally familiar to all GPs. When telemedicine requires changes in the formula for collaboration, such as new roles and responsibilities, there

is a need to clarify the situation through the revision of existing agreements (Broens, 2007). Experiencing shortcomings in this respect is a threat against the acceptance of the VC concept.

The importance of expanding the availability of specialist services

To achieve the optimal VC service, all specialists at the specialist hospital should be party to an agreement. The negotiation with the various departments at the university hospital (UH) to make available all of the specialists on duty has not yet been concluded. There is a real need for a general or overall agreement, covering the spectrum of emergency conditions and patient needs.

To expand the network of specialists

Expansion of a network is normally a matter of increasing the number of users; in the VEMI case it is more a question of the expanding the range and quality of the specialist service.

"*The development of large scale networks requires some kind of coordinating and governance structure including some kind of standardization bodies."* (Hanseth and Aanestad, 2003)

The expansion of the network is usually not an important issue for the individual user in need of a tool for the tasks of daily work. They need a functioning network among a limited number of partners, and an expansion in the range and number of specialists available until they are all a part of the telemedicine team available at the university hospital.

But in terms of the concept of success, this is hard to sustain if the network is not growing. If the goal is that of building and maintaining large-scale telemedicine services (Wootton, 2010) we need to expand the network of users. This means expanding the service until it is available to all smaller hospitals and institutions in the region.. The smaller hospitals should both be able to offer support and advice to the smaller health institutions and themselves be getting support from the university hospital. Our respondents building the network of users see the growing network as a guarantee of future service delivery. The service is assumed to be better with a higher number of users. The only concern is that the number of local users might become so high that it strains the University Hospital's systems and resources.

Some of our respondents would appear to be in the group of highly interested users (Hanseth and Aanestad, 2003), but in the VEMI case some of the respondents represent the group of users which are not active.

To develop and maintain a service for a single user and for minimal use seems irrational from the point of view of the specialists offering the service.. There must be a minimum level of use before the system can be regarded as delivering "value for money". The best way of doing this is by building up and expanding the number of users, and the number of institutions using the service.

The VC service is a kind of network which is less dependent than many others on the concept of "critical mass".

"In some cases the value of the network technology for a particular user is higher if there are few users than many" (Hanseth and Aanestad, 2003 :390). In the VEMI case the professionals in organizational roles are discontented to be using their time and other resources on network administration. It is likely that more administrative time will be spent when the network expands. There is a demand for sufficient resources to maintain the quality of the service. VC services are fairly simple to use and administer, and they can help to ensure that access to limited resources is improved (Hanseth and Aanestad, 2003:390). The VEMI network has this characteristic, but some of the problems found are expected to increase with the expansion of the network. For example, in VEMI, the specialists are the limited resource. They will come under increasing pressure when the network expands. VEMI has the characteristics of a one-to-one or many-to-many (NtoN) network. This kind of network is consequently harder to start growing than one-to-many networks (Hanset and Aanestad, 2003:390).

The specialists have another issue to take into consideration. The complex structure of the Norwegian health service, with the VEMI participants being located in primary, secondary and tertiary provider organizations means that responsibility is diffuse. The problems become obvious when a lack of resources creates the demand for extra effort from some of the participants. Working protocols are necessary to secure access for the smaller institutions, and for the specialists to avoid overload (Broens, 2007).

The importance of developing an understanding of good practice in communication

New ways of communication are not learned automatically. The value of a multidisciplinary team is that each case is seen through the eyes of the different team members. Their advice will contain knowledge from different perspectives and different understandings of priorities. They need to discuss the issues before definitive diagnosis and treatment are delivered.

The specialists' need for discussion among themselves is not of interest tor the local team. Their priorities are different, with different time constraints for the sequence and priority of tasks. They are interested in the specialists' conclusions and advice, not their discussion. This means that clear and useful communication is free of disturbing elements, and is narrowed to the desired focus. This must be understood and accepted by the specialist team. The specialists control the microphone and need to understand when to turn it off during internal discussions.

This kind of good practice is experienced and learned. Once the professionals are aware of the hazards, the initial agreement between the local and specialist organizations should be renegotiated. Once again the agreement should be considered as the starting point, and then it should change as knowledge spreads throughout the network (Broens, 2007).

7.2.3 Teaching and the development of competence

Frequent short training sessions and the need for weekly interaction

The only ongoing training in VEMI is in the weekly five minutes' connection. When the system was first implemented, there was training though simulated emergencies.

The primary purpose of the weekly contact is to test the communication link, but it also includes a short training session. This is regarded as important from a quality assurance perspective. The short weekly training session ensures that the members of the virtual team are familiar with the microphone and camera. When no other training is planned in the organization, this is the most important training that happens. It is not regarded as sufficient training for real emergencies, and this means that the organization has not succeeded in preparing the professionals for the challenges which they may confront.

A perhaps unintended consequence of the weekly connection is that the different members of the virtual team get to know each other as individuals and as members of the virtual team. The virtual organization has no formal meetings. They meet unexpectedly, when emergencies occur.

The short training sessions, which function as informal meetings in the virtual organization, are important to familiarize staff with the faces of people in other parts of the network. Our informants regarded it as important for the functioning of the team to know the faces of other team members. The organization does not systematically address this need, and this demonstrates a clear potential area for improvement (Aas, 2007:22).

The role of the dispatch center as coordinator and initiator

The training is usually not self-driven, not even the weekly five-minute testing of the system. It has to be planned, regulated by contract and accomplished. The dispatch center is the competence center in more ways than one. It is the key contact point for all the smaller institutions, and it is the most experienced unit. Experiencing a lack of training, the staff at the dispatch centre suggested initiating new teaching activities.

The respondents search for the coordinating institution. Coordinating institutions differ according to the network size and tasks to be taken care of (Hanseth and Aanestad, 2003). The VEMI network is so big, and the institutions' roles so different that a coordinator is needed from the macro perspective, for the standardization of procedures and the arrangement of training as needed.

The value of planned, simulated, emergency training

Respondents consider clinical training to be valuable. But for all respondents the only simulated emergency training done was that which was related to the implementation of VEMI several years ago. None of the institutions has yet repeated the clinical training. The staff who experienced the initial training remembered it as valuable for learning and as a motivation factor.

VC in clinical emergency settings offers a new and unaccustomed situation for users. The situation offers communication with new participants, new possibilities and new demands (Bolle, 2009). Respondents participating in simulated emergencies express their satisfaction, and evaluate the training as an important experience. Time has passed since the implementation of the network, with considerable staff turnover, so most of the present staff have never been trained through the use of the simulated emergencies.

Simulated emergencies are regarded as important. As a central part of the program of introduction to the VEMI concept, it was crucial for disseminating understanding and acceptance among the professional staff. It is important to be familiar with the VC equipment. Knowing the equipment means knowing the different aspects of the tool and their potential. The simulated emergencies are not designed primarily to familiarize staff with the equipment, rather to ensure that they are familiar with the characteristics of collaboration within the virtual team (Bolle, 2009, Hagen, 2006, Aas, 2007). The characteristics that are seen to be

important include sharing and understanding the emergency situation, and optimizing the work according such understanding.

Familiarity with the equipment is an important part of the acceptance of, and a reason to choose, the VC technology. Acceptance of technology is a success criterion (Broens, 2007). The acceptance of the technology comes through knowledge and participation in its use. Equipment which is seldom used in real situations should be frequently used in training. One reason why training is important within an emergency system is that:

"..the users should start using and obtaining experience with the technology in non-critical activities and situations" (Hanseth and Aanestad, 2007:390)

Ideally, the first experience in VC communication should be in a training context, not in a stressful emergency situation.

A strategy for continuous training of new employees is essential for keeping the whole organization prepared to respond in an emergency. Those informants who had never experiencing simulated emergencies expressed that this was a weakness. Regular training is a key factor in maintaining the organization's preparedness, and in ensuring the success of a telemedicine project (Broens, 2007).

Competence improvement in real clinical situations

Some respondents indicated that they regarded participation in clinical emergencies as a good way of learning clinical emergency skills. Other informants had the opposite opinion. One of the nurses proposed that clinical training in simulated situations was a more valuable way of learning for two reasons. First, you can never plan when to have an emergency situation and put it into your curriculum. This makes the simulated training situation a more reliable context for learning. Second, clinical training is different from real cases, even if the intention is to re-create the challenges associated with the real case. But the clinical situations are also different, and the training will normally cover many aspects of a real situation.

One of the physicians was not convinced about the pedagogic value of the clinical situations. She argued that the emergency situation is so action filled that learning had no place. Emergencies are stressful, and being stressed is not an optimal learning situation. The potential for learning should be positive because emergency situations are rare.. But the real situation is not always seen as a field of learning. The real situation may not offer much useful

content for training, and the focus is different. The situation may be too stressful to be a good learning situation. This is supported in learning theory; all kind of stress reactions reduce learning aptitude (Svartdal and Flaten, 1998).

There are different views about the pedagogic value of the clinical situation. The real case has its own surprises, hard to replicate in a simulated training environment, and therefore it has a special value which is impossible to re-create. One respondent remarked that learning is dependent on your education, and to some extent it is therefore individual. Another respondent noted that a situation outside of your own area of special competence has the greatest potential for learning. The contribution of the specialist is not seen as important in a learning situation by all respondents.

Training by means of VC is commonly used in surgical settings, and it is widely regarded as positive both as a training procedure and in "telementoring" in real cases (Wilson, 2010). Professionals need training, in the context of either simulated emergencies or real emergencies. The point made by Hanseth and Aanestad (2003), that experience should be gained in a non-critical setting, has different implications in emergency VC. The professionals need training to feel confident in real clinical situations. This is called "self-efficacy", which can be explained as "The chance for us to act increase proportionally with the belief in our ability to do it". (Espenes and Smedslund, 2001:89). Self-efficacy will strengthen motivation for users and will be an obstacle for non-users.

7.3 Situations that include potential problems

7.3.1 Communication in different situations

Information transmitted to the key contact or to the whole team?

A situation in which the whole team receives information is different to one where only the lead doctor obtains it directly. A single team member receiving information is a situation changes the communication force within the group. This kind of knowledge monopoly might be regarded as natural in terms of the different roles or as a complicating factor in the team communication. Change in a professional's status and changes in inter-professional relations are shown to change communication (Berg, 1999:90). However, a knowledge monopoly may be reasonable when professions have different information needs associated with intra-professional tasks.

"..telemedicine may require changes in collaboration and (team) roles, rights and responsibilities" (Broens , 2007:306)

This is a diffuse consideration relative to the advantages of sharing. There may be different inter-professional opinions, even intra professional and situation-related differences. In our case respondents clearly express their satisfaction with the commonality of information in the virtual team.

Users will not bother the specialists unnecessarily

Every potential VC situation demands positive answers to two key questions before contact is initiated: Will the patient benefit from the communication? And is the nature of the case such that it is acceptable to bother the specialist team?

The specialist hospital has accepted the value of VC in the management of serious cases. The situations when VC is relevant in less serious cases have not been clarified. The indications for initiating contact have not been clearly negotiated, nor are they documented in the text of the written agreement.

Another factor which should be taken into account when developing a protocol for the situations requiring VC is the potential for over-triage. Particularly the uncertain and inexperienced doctors should be offered a tolerant interpretation of the criteria for initiating a VC consultation. In a situation where a trauma patient is brought to the hospital, the hospital will normally call a trauma alert. A little over-triage should be tolerated also in use of VC in other emergencies and in diffuse situations. The specialists at the university hospital have been shown to be more tolerant to over-triage than are the local doctors (Bolle, 2009:7)

This kind of concern might appear to be insignificant, but it is not. Nurses give examples where young and uncertain doctors will avoid VC communication rather than reveal their lack of experience. Two points should be considered: First, it would be sensible to negotiate a contract between the two institutions in which the indications for contact are clearly stated (Broens, 2007). This agreement should permit the inexperienced staff to have a low threshold for initiating contact. When the contract is agreed in writing, one obstacle to contact is removed. Second, examples of situations that might potentially trigger a VC consultation should be incorporated into the training, so this is a possibility known to all of the emergency staff likely to be on duty.

The diffuse emergency situation

Most emergency cases are initially diffuse. It is important to clarify the situation and to determine the diagnosis without unnecessary delay. Are there benefits associated with initiating VC with the specialist consultant quite early in the case? A decision to delay contact may mean that the specialist involvement in the case begins unnecessarily late. This is a typical dilemma, but a late involvement will reduce the specialists' overview. In general, the specialists prefer to be involved early (Bolle 2009:6).

The uncertainty about whether to choose one or the other solution often ends by perpetuating the traditional pattern of activity. The conclusion that VC could have been beneficially used is often retrospective. The diffuse situation is similar, with the patient's condition deteriorating unnecessarily before the specialist is called upon.

When the situation deteriorates

Some clinical situations change rapidly. The case may start normally, apparently without complications. Then suddenly it turns into a real emergency. It is not easy to reorganize an ongoing plan.

The diffuse situation and the deteriorating situation both have no clear clinical answers, at least initially. The case needs to be investigated by the responsible clinician. These situations are unstable, rapidly changing and unpredictable, involving different players communicating clinical and logistical data simultaneously. The term "negotiated order" (Strauss, 1993) describes this, meaning that there should be flexible organizational arrangements. This kind of meeting of the virtual team is not planned but still follows some procedures. The procedures are created, maintained and changed through these interactions (Strauss, 1993:254). Some of these experiences need to be more clearly negotiated between the partners in agreements and formal procedures.

As a backup in the rare situations

Having a backup solution offers security both for the professionals and for the patient. A backup system may offer security for the users. A backup system could in some cases be a problem if it is rarely used, and not incorporated as a system which everybody involved knows and can manage. Choosing the right tool for the task is essential. Having an extra tool in the toolbox can be an advantage.

Some institutions make only minimal use of the VC system, which is used mainly as backup.. These institutions need to be drawn into active participation in the training and quality assurance activities and to become active partners in the network. If they are passive for too long, it becomes necessary to rebuild the service, as the engagement at that facility has been lost.

Communication involving relatives

New communication opportunities may lead to unintended patterns of use. Unintended use may include exploring new ways of solving problems. The flexibility of the tool makes it easy to choose, and it may be useful in a broader range of situations than it was planned for. Emergencies may well involve the unexpected and lead to unintended uses.

When professionals are using the flexibility in the system, experienced through new situations, they end up forming a new service. The situation has similarities with the innovations associated with the use of ultrasound after it was first introduced.

"Plans are nothing, planning is everything" (Dwight D. Eisenhower). Eisenhower's famous words concerning the invasion of Normandy in 1945 put planning as a responsive and dynamic action focusing on the uncertain situation. This can be seen as the setting for the prepared and flexible organization. The characteristics of the emergency situation, complex and diffuse, with time pressure and demand for correct decisions, are the background for optimizing communication. These are the characteristics forming the whole idea, and as such forming the specifications for the whole concept of VC.

7.3.2 Potential problems regarding the motivation of users

Asynchrony in communication in time and subject

Discussing an issue in real time is the easiest and the most common form of verbal communication. Asynchrony in the communication is disturbing and has a negative effect. When this occurs, the local team will often prefer to mute the other voices, or turn off the sound. The booker, the responsible person in the situation, has the right to turn off the sound and to otherwise manage the use of the specialist resource.

Generally the smaller institutions prefer to turn the sound off in the case of asynchrony. This is a simple technical problem, for which solutions already exist. However, those who want the sound muted are those who control the sound level. This is a question of being aware, of

negotiating the rules for the virtual team, and making this a part of the administrative training (Broens, 2007). For the smaller institutions, this active choice is also a proof of their independent position in the virtual team.

Internal differences in practice and conflicts regarding use

In general respondents report the level of conflict experienced as low or absent. Any conflicts are usually related to minor disagreement about the optimal choice in the situation. Different practice and conflicts regarding use of VC might arise between professions or between members of the same profession. There are differences in user motivation reflected in the choice of recommended therapies and in the use of the VC tool.

Conflicts are negative in a work environment which is dependent on teamwork. Conflicts are less likely when the team has confidence in the leader's direction. However they tend to arise in situations when the experienced nurses' view is overridden by an inexperienced or locum doctor.

One way of avoiding conflicts is by having in place a negotiated agreement about the management of cases, seen in formal agreements and negotiated practice. The agreement on common practice must be negotiated and established in practice to avoid problems regarding disagreement. Another way of avoiding conflict is by ensuring that the various categories of staff, both temporary and permanent, are familiar with the institution's chosen way of managing cases. So far, neither of these tools is in common use at the participating hospitals.

"In telemedicine it is important to define roles clearly. Who should do what, and who is responsible for what, should be made clear." (Aas, 2007:39)

"... we have the question as to which employees, with which competence, from which organizations, should be bundled together to solve tasks with which characteristics." (Aas, 2007:98)

The lack of common practice in the use of VC is a hindrance, so the professionals tend to turn to the traditional, safe, and familiar solutions.

Conflicts within the virtual team about cooperation between the institutions

Conflicts may arise about how the system should be used and the capability of delivering the desired service. The institutions have built up the system and the concept together, but they have not yet finished the job.

"In telemedicine it is important to define roles clearly. Who should do what, and who is responsible for what, should be made clear" (Aas, 2007:39)

This should be the main topic of discussions between the institutions for organizing services in terms of "negotiated order" (Strauss, 1993). These negotiations should not reach decisions once and for all, but should be flexible, taking account of the different institutions' capabilities, services offered, and needs.

Dissatisfaction arising from the unavailability of qualified specialists

Local institutions sometimes experience a lack of clinical quality in the support that they receive from the local hospitals which are their first point of contact for advice. The problem most commonly arises in institutions with few specialists, or where there is a temporary shortage of specialists or at times when there are only inexperienced "specialist" staff members on duty. This means that the appropriate specialist advice is not available to the local institutions when they need it. The hospital is supposed to provide specialist assistance when needed, but the reality is different. There is an option to contact the specialists at the university hospital, who are available as backup. However this option is rarely used because this is not the normal trajectory for the patient. The smaller hospitals should be firmly encouraged to fulfill their obligations to provide support for the local institutions. When this does not happen it should be regarded as non-conformity and treated as such.

Variations in the need to use VC related to the level of personal knowledge?

There is variation between individual professionals in their need to consult; a too-standardized formula for consultation would not answer all the different needs. There is a demand for building a service which is based on a standardized initial response, with flexible follow-up according to the case. The characteristics of the individual case and the competence of the responsible local doctor together determine the kind of specialist advice which is needed.

Variation in practice is normal, and the different patterns of practice develop out of the need and personal preferences of the individual users. This is the need for building an

“extramural”, macro perspective, as well as work practices grounded in the “intramural”, micro perspectives needs (Broens. 2007). The flexibility in the organization must accommodate the individual differences. This is the strength of the technical solution, but it is a challenge to the organization.

In general, any lack of positive factors is a negative influence for use of the system. The informants are aware of negative factors, stating that their experience of these factors will make them choose not to use the VC solution. The fact that respondents mention these factors does not always mean that they have fully experienced them and their consequences. Instead, some have been experienced, and of those, some are expected and feared, and others have had surprising outcomes.. Even the negative experiences have often ended with some positive aspects of learning or the discovery of new possibilities.

Not getting help in a critical situation

This has not been experienced by any of our respondents, but is known to have been experienced by other participants in the network of VEMI users during the period under review. So it is a topic covered by our respondents. Lack of help when needed means that access is unstable, and makes it hard to trust the service. The organization works to ensure that this does not happen, but due to the autonomy of the different institutions such episodes often reveal an internal problem at the smaller hospital. Requests for advice which are rejected at critical moments are perceived as a breach of trust, and in the worst case this is the end of communication.

Negative experience in the emergency situation - are there extra pressures associated with being observed by the specialists?

The quality of the work experience is important. The response of the specialists is crucial for the professionals at the smaller institution. Tolerant and the establishment of trust should be a feature of the training and behavior of the specialists engaged in the VC encounter. This is one of the factors which have been recognized and understood to be important which are not always translated into action.

Experiences which indicate a need to improve the tool

Negative experiences can be incriminating and devastating. The experience of using technology is something that is possible to change. A change in the technical solution may entail a change in organization. Most changes have positive and negative features.

An initial problem for VC novices is the unfamiliar feeling of being watched. A positive experience, in spite of the negative expectation, can create a shift towards a positive attitude to the technology. It is hard to predict the consequences of negative experiences, but they may be critical.

Positive experiences would appear to be valuable, potentially negative experiences with a positive outcome may be even more valuable. The positive experience is associated with the acceptance of the technology.

"This review showed that technology acceptance among both patients and professionals was influenced considerably by the patients' and the professionals' attitude toward telemedicine technology" (Broens, 2007:305)

7.4 Reasons for not using VC

One of the smaller institutions has implemented the VC solution for emergency use, but after more than two years the VC system is never used for emergencies. This means VC has never been used in emergency situations after the system was implemented. One nurse and one doctor represent the non-user institution in this study. Generally, neither of them puts forward any strong argument against the VEMI solution, nor for the use of traditional problem solving methods by the local health professionals.

7.4.1 Aspects relating to access to specialist service and transport.

The general access to the specialist resource

The health centre in Vadsø accepts emergency cases, as do the other smaller primary care institutions. The staff at the local health care centre can perform the necessary stabilization of patients for transport to the hospital for definitive therapy (Røyse, 2007)

The health centre needs access to the specialist service. Their evaluation of the access situation to hospital indicates no need to expand the service. For transferring a patient to the hospital, they have access to a variety of transport resources. The institution has access to an

SAR helicopter less than one hour away, crewed by an anesthetist. The health professionals are used to triaging and stabilizing emergencies. They have sufficient access to transport by ambulance car, helicopter (Seaking) and fixed wing aircraft (air ambulance). There is well organized telephone contact with the local hospital in Kirkenes and the university hospital in Tromsø. This is typical of the general situation in the emergency chain, allowing for some local variations in distance and quantity of the services available (Røyse, 2007)

The staff are generally satisfied with the existing options based on the use of the traditional emergency tools without VC. The emergencies in Vadsø, according to the informants, are more usually characterized by medical emergencies than by trauma. The composition of the patient group is important for the professionals' choice of logistics and intervention. What you are familiar with is, in general, the safest. If you have a satisfactorily functioning solution, there is no reason to change it.

The capacity to send the patient to secondary care is essential. Ambulance use in Finnmark is 36% higher than in the rest of Norway (Myrbostad, 2005). This indicates that more patients are sent, but there is no evidence for higher road ambulance use in Vadsø compared with the rest of Finnmark. When traditional patient transport is regarded as optimal, a new option has to be even better.

There is another feature associated with the use of ambulances which may possibly affect the use of VC. A patient sent to another institution is a patient not occupying a bed in the nursing home, which means less use of resources. This may not explain the practice at Vadsø, but is likely to be a factor in the transport decisions at smaller health institutions in general.

Problems are solved the traditional way

Using the traditional solution is normally the safest. Because the professionals control the traditional solutions, they perceive them as the safest. For consultation and to obtain information from the hospital, the telephone is used. It is a safe and well accepted feature of local cooperation with the hospital. Videoconferencing in emergency situations is regarded as a good idea, but not suitable for Vadsø. The emergency situation is not seen as the time for experiments in clinical practice.

There are good reasons for using traditional solutions; the best is the professionals' preparedness. They know the traditional way of working; they are not practiced in VC communication in emergencies. Trying to change a traditional solution, well known within

the entire health care institution is not an easy task. The new solution has to be significantly better than the traditional method for it to be preferred (Svartdal/Flaten, 1998)

We send the challenging cases to the hospital

The organization has one main task in relation to medical emergency and trauma cases: to stabilize them and prepare them for transport elsewhere. The safest, cheapest and easiest response in these situations is to send the patient to hospital. Sending the patient away solves the problem for the smaller institution. This is not the same as a holistic calculation of what is cost efficient for the health care service as a whole, but in fact, that is not the responsibility of the smaller institution. Ignoring VC and simply sending the patient away appears to be a way of avoiding the demanding cases. This is normal strategy for smaller health care institutions.

Could the VC communication have been used in an emergency case?

There are emergency situations which have potential for the use of real time VC communication. These are all resolved by use of traditional methods. Two aspects are important in the situation. There are resources in the institution, and an effective patient transport system is available. Is the VC equipment ready to be used? Vadsø is a relatively big place, indicating that there are several doctors (GPs), available, some of whom are very settled and experienced in the local context. By efficiently using the transport options for transfer to the hospital, they resolve their problem through using traditional technology. Concerning possible uses of the technology, there is a range of different experience and opinion among the respondents. It has not been clarified whether the technical equipment was actually available for use. With this kind of doubt one has to assume that the equipment is not ready for use. The organization is not prepared to meet the demands of a VC cooperative initiative. Without building and preparing an organization, the use of VC is out of question. A third point leading to the same conclusion is that the users are not prepared. That is another key precondition for effective VC use in emergency situations. In the management of emergency cases, the tasks are well rehearsed, and the use of unfamiliar equipment is naturally excluded.

The threshold for using unfamiliar technology in a stressful situation is significant. The concept of self-efficacy (Espenes, 2001, Bandura, 1997) predicts that this will not happen before comprehensive preparation is undertaken.

7.4.2 Factors relating to the service

Is there an interest in rebuilding a service?

The use of VC in emergencies is not expected to make any extra contribution to the management of the emergency cases. The main reasoning is associated with the institutions' expected need for services and the expected outcome of specialist participation. VC as an option is in fact no option until the access to specialist service is organized, and the specialists are prepared to make an effort.

In most places there are differences in behaviors between professional groups and between individuals. Nurses at Vadsø are experienced and skilled users of VC for non-emergency purposes. As a group they are skilled, and structure their own use of their contacts (not the dispatch centre). One nurse (N5) identified one specific problem in potential VC user situations, that of patients being mis-referred. Patients may be mis-referred due to a lack of reliable information, for example because of the absence of their health record. This example indicates potentially useful areas of improvement.

Building a service is always dependent on the two cooperating partners. If a specialists does not follow up a request for advice, that can be the end of a promising cooperation. When the request from the smaller institution is not followed up from the hospital, routines fall apart. Nurses in Vadsø are familiar with the demands associated with a reliable VC service. They are experienced in the use of VC in elective situations. From their experience, they can identify weaknesses in the emergency organization. Nurses recognize the doctors' responsibility in terms of the emergency service. This means that the nurses have their own opinion about what should be done, but that they do not want to fight to accomplish it.

Wanda Orlikowski observed the use of information technology in organizations and found that;

"..people's mental models and organizations' structure and culture significantly influence how groupware is implemented and used" (Orlikowski, 1992:362)

Does the image give any valuable additional information?

In Vadsø the doctor's response is clear about the contribution of the image in the management of emergency cases: the picture is not necessary to clarify the emergency situation. This is a

clinical statement, not a technical one. Emergency VC has not been tested in the clinical setting locally, to observe whether the picture can transmit useful additional information. This means that at Vadsø the image has never contributed in any way in emergency settings, and it is not expected to do so. Besides, the professionals are used to, and are skilled in, trusting and interpreting voice information.

We are not trained in using the equipment

The professionals at Vadsø are not trained in using the VEMI system. This is partly explained by staff turnover. There is a clear problem associated with maintaining a particular competence in an organization with a significant staff turnover. But also, in all institutions, there needs to be regular training, especially if the system is not in regular use.

At the initial stage of use, all innovations need a highly motivated user. It would appear that at Vadsø, the lead clinician is not in the category of people who are highly motivated to use this system. This means that the most important professional is not sufficiently interested to direct the project forward. According to Hanseth and Aanestad (2003), this is the most critical factor in a successful project. Vadsø has never had a lead clinician driving the VEMI project forward, and being the "highly motivated user".

"*To succeed in the enrolment of the first users of a telemedicine network, highly motivated users need to be identified – users who believe telemedicine technology may be designed and used in ways adding important qualities to the care process they are involved in*"(Hanseth and Aanestad, 2003:390).

Finding a highly motivated user is one of the tasks for the project organizers prior to the implementation. This is probably a task which was not dealt with in the project group.

To have a system in use, we need competence in the organization.

In the health centre in Vadsø, there is no official policy about using or not using VC in emergency cases. There is agreement about that point between the different groups of professionals. Their traditional way of managing emergency cases has been developed over the years and is adapted to their resources.

Lack of training becomes another factor which leads people to conclude that an innovation is useless. It is hardly a part of a user plan to pursue that professionals are able to handle a communication not practiced in an emergency situation. The lack of training support offered

by the VEMI organization might also be a reason why the use of the system has not been established.

8 CONCLUSION

The users' motivation is influenced by their professional needs, the outcome for the patient and the need to have an efficient channel of communication for cooperation between the different parts of the emergency medical chain. The capacity to resolve health care problems is essential, but that is not the only factor in the decision on whether or not to use the VC system that has been made available.

This study has provided **some** indications about the professionals' main reasons for choosing to use the VEMI videoconferencing solution. Some of the reasons that are important to the professional users are associated with usefulness, for instance in the access to the specialist resource at the university hospital and the shared understanding in the complex emergency situation. These are reasons most useful for the professional problem solving by doctors and nurses. In the same category are other aspects of videoconferencing's capacity to improve emergency communication, for instance the opportunity for direct face to face communication. Another interesting finding was that respondent also gave examples of the development of new ways solving problems. When staff experienced such situations, they found them to be extremely motivating.

The only other reason to which similar importance was attached was that significant personal benefits were sometimes experienced in the work situation, for instance gaining a sense of confidence. In other words, all the main reasons for choosing to use the VEMI system were associated with the professionals' motivation to do an optimal job.

The second main category covers reasons for choice expressed as requirements. If the VC system is to be used, the concept must fulfill some requirements. Not all of the ideal functions or attributes of the VEMI system are yet in place, and aspects of the organization need continuous improvement to ensure a large scale success. The two most important aspects were, firstly, the desire to develop a well functioning organization meeting the smaller needs. This related to professional quality, respect in the collaboration and a system with defined roles and indications. The second important requirement was the maintenance of teaching and competence development in the virtual organization. The main aspect is an ongoing communication training system addressing the training in collaboration for all professionals involved, including all potential users.

Both of these important areas were judged to be insufficiently developed so far, and it was observed that they must be improved to make VEMI a success. There was also a demand for high quality in the technical solution, but the experiences so far were satisfactory. However there are still technical aspects which must be resolved or improved before scaling up the solution.

There were some negative issued raised, reasons to reject the VEMI solution. There were different perceptions held by the part-time users and the respondents who were classified as non-users of the system. Their main reason for choosing to use the traditional tool of telephone communication in emergencies is the fact that it delivers a satisfactory service. In combination with the existing logistics, most cases are managed satisfactorily. There is no reason to change a well functioning service if the alternative has not been proved to be better. The second main point made by the non-users relates to the users' demands. These are the same issues as those mentioned by the users, but the non-user respondents had come to an opposing conclusion. From the non- users' point of view, the solution is useless if it is not followed up with a functioning organizational solution, included a collaborative specialist service. The training of the personnel must be available to all potential users. The non-users also referred to a key point in the bootstrap concept, namely the presence of a highly motivated user. According to the concept of bootstrapping, a key difference between user and non-user sites is the lack of an interested and skilled person initiating the process at the non-user site. (Hanseth and Aanestad, 2003). The absence of a motivated professional in a key leadership position meant that the non-user institution simply never engaged with the opportunity to innovate. It may well be useful to take account of the concept of bootstrapping when planning the organization and training of health professionals in the use of VEMI .

Although this was not directly a topic of my investigation, some of the comments made in the interviews indicated that it might be fruitful to examine more closely the differences in experience and motivation among the two professional groups, nurses and doctors, within the virtual team. To some extent the members of the two different professional groups gave different emphasis to different aspects of the system and its benefits. The nurse respondents gave a clear impression that participation in the virtual team improved the level of empowerment among the individual members of the team.. This was not stated explicitly, but was expressed in the content of the nurses' topics and expressions. Nurses were empowered through being able to participate in discussions with the specialists, instead of being excluded

by the one- to- one nature of telephone communication between doctors. This was also observed by Wilson et al in their investigation of ViCCU/ ECHONET projects (Wilson et al, 2010). Every instance of empowerment of the team members can be used to strengthen the empowerment of the team as a whole.

The professionals' choices reflect their understanding of the possibilities which the telemedicine concept offers for enhancing the performance of their work in emergency situations. Their choices reflect their understanding of the importance of the new opportunities to their job performance

Is a better understanding of the users' intention a path to telemedicine success? From the professionals' perspective, the success of the service at micro-level is the important factor, and they focus less on building and maintaining large-scale telemedicine services. At the same time, the professionals' requirements for the service indicate what should be taken into account to ensure success on a larger scale. The variety in empirical findings mirrors the complexity in telemedicine, and shows the need to give attention to a range of different perspectives, including the personnel, medical, technical, organizational, competence building, and national political perspective.

As a qualitative interpretive study this investigation has provided indications without categorical answers. The discussion of the reasons for professional users' choice has elicited their advice about how a collaborative VC service should be established. The main findings and demands indicate several areas of interest for more detailed investigation. There is a need for follow-up studies to show how a "micro-level success" can be scaled up to become a useful large-scale service.

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