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National standards in local setting

Implementing electronic Nursing and Care messages at the University Hospital of North Norway
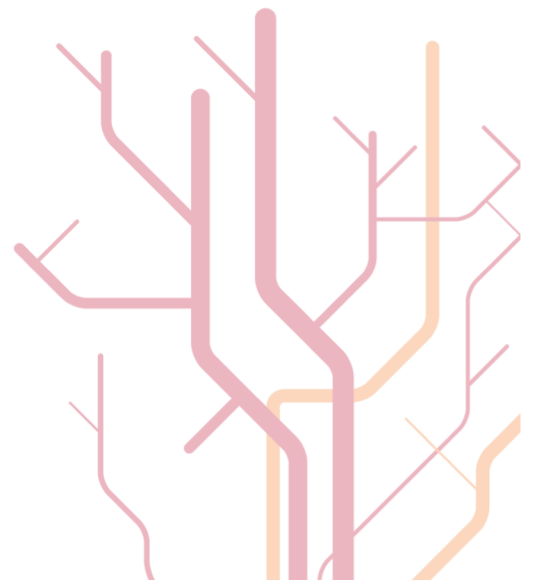
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Abstract

This thesis is an interpretive study examining national electronic Nursing and Care Messages (NUC messages) implemented into a local setting. From the outset the messages were created to support and enhance efficiency and quality for cross level communication when exchanging health information related to shared care. The study focuses on theory of standards and standardization as the NUC messages is to be perceived as a standard. Analytic tools from Actor Network Theory are used to examine the process of how the messages were created. This contributes to an in-depth understanding of the end-users experiences after implementation of NUC messages at the local setting, which is the University Hospital of North Norway. Findings are that even though the electronic messages enables a time efficient way of communication, the message standard still have features that negatively impacts the use of them. The NUC messages seem to have a weak inscription that makes the standard flexible and enables alternative use. Additionally, this flexibility implies that compliance to the standard is challenged. Despite various efforts from local actors in the national test and piloting phase, alternative and local translations of the standard have not been possible to negotiate after the messages were designed. The standard of NUC messages seem to have reached the state of irreversibility instantly when designed. The study examines how the standard of NUC messages regarding their naming, in-messages structures and messages pathway creates a tension when adopted into local practice with alternative requirements of communication in cross level care. Interdependency between the technology of NUC messages and its enabling but also restricting effect on use is identified. Users experiences are positive but still questioning the lack of adjustment to local requirements. This study's findings indicate that from a local viewpoint this tension between national standard and local needs hampers the full potential of enhancing the quality of communication that the NUC messages were set out to provide.

Foreword

Writing this thesis has been a cumbersome task but I am happy now to have completed. It has been rewarding to look at my own work practice and work experience in the framework of theory. This has given me some perspectives I consider useful and worthwhile to bring along in my continuing work. It has been hard to find time for the task considering my job at the hospital and other duties in life.

I wish to thank Line Nordgård for her contribution to this thesis and that is not only as an informant in the thesis interview. Line works as an ICT advisor of the municipal of Tromsø and has been one of the motivating reasons why I have taken on the effort to write this thesis. The collaboration with high spirit and quality of the cooperation we have had, first in the ELIN-k project and further on in the FUNNKe project, have been and still are an inspiration to me. Our cross level collaboration, I think, is a model for the organisations we represent, we aim to make each other good and seek joint solutions when problems occur and not only what is best for ourselves but what will be best in total.

I also wish to thank the super users for electronic messages in the hospital. They have been my main co-workers in the hospital when implementing the electronic messages. The network of mostly nurses and the inpatients wards where they work has accordingly to the work of implementation been a field for observations. Their welcoming openness to me in this matter has given me valuable/rich insight in the arena where the messages aim to function. I recognize the stress and bustle in nurses work practice and finds it remarkable that most of them have managed to find room to attend the implementation of electronic messages at all. Some of them have additionally contributed to this thesis by being informants for my investigating interviews.

I want to thank my supervisor Gunnar Ellingsen for his feedback to my thesis' structure and content. My colleague Hanne-Grete Heggelund Hansen has in a last minute contribution helped solve layout problems in the thesis, and I am so grateful she was willing to help me.

Last, but of most importance of course, is the good will and support from my family, my husband and daughter. They have never questioned whether or not I should spend time

working on this thesis. This has been a significant support and made it easier for me to take on the task for the thesis and complete it. My husband has even read through it all and commented on all misspellings and shortage of commas in my long and complicated sentences. By writing this thesis I want my daughter to know that although I am a grown woman, already educated in to a profession, it does not exclude additional studies.

Tromsø, September 2013

Gro Wangensteen

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1. Introduction

The development of the electronic Nursing and Care messages (NUC messages), the implementation of them in the University Hospital of North Norway and users subsequently experience is the subject for this thesis. The study subject covers processes and encompass events that has run for some years.

1.1. Background for thesis

Quality of health care is not alone dependent on the care actions of health care workers. The health care sector is an information-intensive business generating huge volumes of data and the ability to share data is vital to efficiency regarding shared care (Grimson, Grimson & Hasselbring, p. 49). Norwegian health authorities recognize this and have for the last decade subsequently prepared parliamentary reports and strategies to secure a best possible practice in information exchange between health care personnel (Helse Departementet & Sosial Departementet, 2004; Helse- og omsorgsdepartementet, 2008; St.melding nr. 9, 2012). Health authorities have further initiated a transition to such practice by establishing development programs and implementation programs for electronic messaging (Skarsgaard, Lyngstad & Askevold, 2011; Helsedirektoratet, 2011; Norsk Helsenett, 2012).

Documentation of health information is both based on health care professions' traditions as described for nurses documentation (Moen, Hellesø, Berge, Mølstad & Quivey, 2008; Heggdal, 2006) but is also a legally obligation embedded in the Health Personnel Act § 8 (Helsepersonelloven, 1999) and Regulation of Patient Records (Forskrift om pasientjournal, 2000). The majority of health care personnel in Norway record electronically in patient's records (EPR) (Aanestad & Olaussen, 2011, p.10) and the use of information and communication technology (ICT) enables sharing of information in alternative ways than traditionally done by paper based sources, oral transmissions, use of telephone and meetings, fax, postal letters etc. This way the EPR is not only a vault and archive of health care documentation but also a communication tool that channels shared information. The time effective feature of ICT is regarded valuable and so are the re-use of health information, the documentation of and security of communication and contribution to work processes (Helse Departementet & Sosial Departementet, 2004; HOD, 2008; St.melding nr. 9, 2012).

As a participant in projects realizing these visions and fulfilling the strategies, the field and motivation for writing this thesis is based upon the work I have done in the hospital as an employee. I am a nurse working as an EPR advisor with responsibilities to the national project ELIN-k. The ELIN-k project aimed for development of the portfolio of national standard electronic NUC messages and their accompanying national guidelines. Subsequently it has been my task and responsibility as project manager to plan and implement the NUC messages in the hospital where I work, and by that initiate and enable the hospital's health personnel to embark on electronic cross level communication. This work has been the hospitals way to accommodate and contribute to the national vision of electronic communication in the cross levels of health care (Helse Departementet & Sosial Departementet, 2004; HOD, 2008). This has also been the hospitals contribution to the vision and an objective for the regional project FUNNKe (Nasjonalt senter for Samhandling og Telemedisin, a).

With my background as a nurse and a former super user for the EPR, I have had previous experience from planning and have had responsibility of implementing both technology and standards in to every day work practice for nurses. This was when the hospital in 2004 purchased the nurse module for the EPR. The module included the nursing plan feature/functionality that embodied the nursing classification systems of NANDA[1] and NIC[2] (Wangensteen & Igesund, 2009). The implementation was a long process and involved adoption, adaption and adjustment of standardized concepts in nurses' documentation. It accordingly affected the work routines and made possible a strategy for change that led to more effective and qualitative work practice regarding documentation, interaction and information exchange among nurses in the ward where I worked. The way standards were adapted in a non-standard work practice is later studied and articulated in the works of Ellingsen, Monteiro and Munkvold (2007) and the work of Torbjørg Meum (Meum, 2013; Meum, Ellingsen, Monteiro, Wangensteen & Igesund, 2013) and is regarded as co-constructing practice seen as a interplay between global standards and local practice in nursing.

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[1] http://www.nanda.org

[2] http://www.nursing.uiowa.edu/cncce/nursing-interventions-classification-overview

It was from this experience I came on board in April 2009 to this new task of implementing yet another technology including standards. It should become quite a different experience and as I initially took it for granted that I could draw upon previous experience, the situation turned out to have more contingencies that I not saw before embarking on the task. These contingencies and problems emerged in the evolving and maturing process both in my self and in the developing process of it all. I was at starting point not aware of the Actor Network Theory (Latour, 1991; Law, 1991; Asdal, Brenna & Moser (ed.), 2001; Aanestad & Olaussen, 2010) or theories about standards, but had just before the implementation process recognized the importance of some of the characteristics contributing to successful implementation of telemedicine highlighted from Obstfelder, Engeseth & Wynn (2007). Although the subject of their article clearly had investigated implementation of telemedicine applications, it was not hard to see the relevance to the implementation of electronic NUC messages meant for use in health care cross level collaboration and communication. The 6 characteristics (ibid, p 4) of a successful implementation were kind of obvious and easy to transport to my own project when the criteria were:

"1. Description of the health–related challenges that the technology intends to solve" would correspond to: NUC messages would support, in order to enhance, the cross level communication between nurses for patients' in their line of care.

"2. The technology is recognized as a benefit" would correspond to: Traditional collaborating methods by telephone and paper based documents are considered time consuming and as a slow transferal of health information.

"3. The technology is seen as a solution to a medical or/and a political problem" would correspond to: Political issues regarding distribution of level of patients' care are a high priority. Faster transmission and better quality of transmission of health information is regarded a contributing factor to support the medical safety of cross level care and political goals of coordination in health care services.

"4. There is a collaboration between promoters and users" would correspond to: The making of NUC messages was a collaboration between actors of interests like the health authorities, the nurses association (the different develop and proliferation projects) and the nurses (users) at the hospitals and municipals.

"5. Organizational and technical issues are addressed" would correspond to: Technical support were arranged for both organizations UNN and the municipal of Tromsø.

And finally, "6. Plan for future use and finance is considered" would correspond to: The FUNNKe in UNN project plan, the FUNNKe regional project.

All these criteria were literally something that were relevant and in range of what could be included in the implementation project of electronic NUC messages at our hospital. It was accordingly the considered focus regarding the planning of the implementation project. In planning, the 6 criteria was like a "check list" to secure every angle was covered, so that a successful implementation and subsequently use and effect of the NUC messages could be a reality.

At starting point for writing this thesis though, I recognized that the "check list" did not provide in-depth insight to the apparent success the implementation has been. Neither did the "check list" serve as a support of understanding the troubles that had emerged along in all the stages/phases of the process. Subsequently, I wanted to look into a more extensive amount of elements regarding the NUC messages; the creation, implementation and users experience a little closer in the perspective of theory.

1.2. Research questions
Main

The main objective is to uncover a deeper understanding of the process of the creation of the NUC messages, the implementation and the actual use of the messages in our local setting.

RQ1. Which challenges and actors contribute regarding the development of national electronic Nursing and Care messages?

RQ2. How is users' influence possible in the design and adjustment phase of the creation of standard Nursing and Care messages?

RQ3. How can national standards Nursing and Care Messages be adopted and adjusted for implementation into local setting?

RQ4. Do national standard electronic Nursing and Care Messages contribute to the quality of information exchanges in health personnel's cross level communication in our local perspective?

1.3. Thesis structure

The organization of the text is as follows: chapter 2 covers the theoretical framework of this thesis. At start the chapter provides an introduction to the topic of technology and its impact and influence on labour and social perspectives. Further, theory of standards is accounted for. Last, some main concepts from the Actor Network Theory will be accounted for as a framework to understand and describe the topics of this thesis. In chapter 3 the research method used in this study is elaborated on as well as design, research setting and data collection. In chapter 4, first there is a presentation of the actors contributing and influencing to the making of and further initiate the deployment of the messages. The second main part of chapter 4 describes the three phases of the University of North Norway's adoption and adaption of the NUC messages: 1) Test and pilot phase, 2) implementation and 3) how the messages are perceived from users point of view. Chapter 5 provides a discussion of the findings of my research in light of the theoretical framework acquired to achieve understanding of the thesis research questions. Chapter 6 provide a conclusion accounting for a short summary of the discussion and point out how the research questions can be answered. Considerations on own process and future use of the messages are presented, and recommendations for future research are suggested.

2. Theoretical (Socio Technical) approaches

2.1. A short introduction to the history of technology and social interdependencies

The line up to the time Actor Network Theory was articulated is valuable to take in mind because former thoughts of technology and how it affects work gives the theory a place in the line of thoughts. The notion that a theory do not occur from nothing is articulated from Hanseth when he states, " Knowledge is highly systemic" (Hanseth, 2004), a stand that highlight interdependencies in production of thoughts and theories.

The industrial revolution enabled mass-production when introducing new technology that made it possible to streamline work processes. In the 19th century Karl Marx described the relationship between technology and those who manoeuvres machines, the workers, as alienating in society because new machines entailed challenging work practice for workers and altered working conditions (Aanestad & Olaussen 2011, p. 20). English scientists elaborated on these ideas from 1920ies as they by observation could identify that the relationship between technology and working conditions and social aspects had implications of the efficiency of production. It affected both scale and quality of production results. The Human Relation theory was elaborated in England by the founder Elton Mayo and his contemporary fellow scientists. Their studies of work processes in factories and mines identified that the mass production line of organizing broke the social aspects of work. Both effectiveness and resilience in the organisation of work was affected negatively when social aspects of work was challenged and altered. How a workplace is been organised and how interaction of the workers and the technology is facilitated was discovered of great importance for the production results, and that focus on the interplay and the equal attention, to both social and technical aspects, was a key to success in production areas involving new technology (Aanestad &Olaussen 2011, p. 20).

Along with this awareness, the science of technology and social entanglement emerged. This perspective encompasses that technology combine with the social and also cultural aspects, has its place in society and this is through the shaping features of technology (Asdal et al., 2001, p. 10).

The social and cultural angle towards use of technology, in production and to better working conditions, was well received in the Scandinavian countries. In Scandinavian countries the workers participation in work organizing is highly consistent with the democratic spirit where equality in society is a highly regarded value. In Norway the Norwegian Labour Party had governed for many periods after World War 2, and the sociotechnical ideas was widely appreciated and adopted by the collaboration between workers unions and employers (Aanestad &Olaussen 2011, p. 21-23,). Not only as means to regulate working conditions and better production outcome but it also came to be a part of design of technology where both angels, of workers and owners of productions, were considered equal important. Users of technology and their knowledge of how the work was to be conducted was regarded a pivotal contribution and principle of design for new technology, the participatory design method.

This method was further a drawn upon and also adapted in to the design of information and communications systems. The concept of the *sociotechnical* was established (Aanestad & Olaussen, 2011, p. 26-27) which comprise both the technical and social entanglement and interdependencies. Law (1991, p. 10) refers to the historian Thomas Hugh about the concept of social technical order comprising the notion that what appears to be social is partly technical and vice versa. In his understanding nothing is in practice purely technical or social. It also includes the economic, political, the scientific etc …

Two major perceptions of technology and human behaviour emerge; the one of determinism that covers a stand that technology inherits a logic of its own that determine its use. On the other hand is the constructionist notion that society and its users develops the technology it wants and use it how they want (Monteiro, 2000) or find ways to work around its restricting or mismatching function (Pollock, 2005). Accordingly it is evident that any interplay between technology and organisations will influence and change behaviour and an organisation's outcome. Hanseth and Monteiro (1997, p. 2) sum up that an intermediate position is to regard that technology has both enabling and restricting implications.

Science and technology studies (STS) and its objective is to contribute to the reality shaping forces by identifying and formulating concepts that relates to the field of interaction of technology, science and society. STS provides an analytic and methodical approach that fit well with the material and concrete aspects of work and is inspired of the contributions from philosopher Thomas Kuhn. Kuhn stated that science is an accumulative practice that involves the notions of science as culture, as material practice and the importance of case studies as methodology and not just a cognitive and rational way of deriving theories (Aanestad & Olaussen, 2011, p. 26- 27). In STS the empirical and the theoretical is regarded reciprocal necessary. This is the backstory to the Actor Network Theory where it in the 1980-ies was motivated a new stand that developed **analytic** resources that regarded that production of technology and science not only was motivated by cultural and social interests, but also was an approach that not favoured neither the material nor the social and cultural. The notion is that reality is not a given but a construct by actors (ibid, p. 27).

I will further on elaborate on some of the analytic concepts from Actor Network Theory, see sections 2.3 – 2.7.

2.2. Standards

It is worthwhile to see into the concept of standard a little closer because the electronic NUC messages are meant to be a national standard. According to Hanseth and Monteiro (1997), technology is the material of standards and standardization is closely connected to building of information systems. They state there is a technical basis of standards, which regulates the communication pattern within technology and information infrastructure. The electronic NUC messages are a part of the EPR, and the EPR are in it self an electronic infrastructure (Hanseth, 2010). The massages are also part of the electronic infrastructure in cross level communication when they are electronic "travelling" on the technical highway (the health network) to its destination communication receivers EPR.

Timmermans and Epstein (2010) elaborate on the concept of standards in their article and bring to attention, already in the article's headline, that we live in a world of standards but state that the world itself is not a standard world. The concept of standard is described as "a source of authority and a level of achievement, ..." (….) "...something one aspires to live up

to." (ibid, p. 70 - 71). Standardization on the other hand is associated with dull sameness and flattening of life and is generally thought of as a less flexible feature that can imply dehumanization when applied to humans and reductionist when leaving elements out, implying it does not exits, or is not visible, if it is not part of the standard (Bowker, Timmermanns & Star, 1995). The process of standardization they describe as "… a process of constructing uniformities across time and space, through the generation of agreed-upon rules" (Timmermanns& Epstein, 2010, p. 71). Both terms are to most people features that tend to disappear into the background as something invisible and often become taken-for-granted parts of technical and moral infrastructures in life. They state that standards aim to render equivalence across culture, time and geography and are ubiquitous tools for regulating and organizing life concerning many aspects. The authors (ibid) add that the standards are agreed upon rules constructing unity. The standards make thing work together over distance and cultures and are both a part of technical and cultural lives and actions. In the world of health care this correspond well as standards apply for a wide range of material, cultures and activities. Hospitals for example, were I work, are filled with health care personnel educated in standard professions and competences like nurses and medical doctors. There are standards that classify patients' diseases (International Classification of Diseases[3]) and nurses' actions (Nursing Intervention Classification[4]). Their professional tools and technologies are standards; syringes size, volume and lumen, various scopes, and tools of measurements for blood pressure or for blood content. The Electronic Patient Records are built on standards and there are standard codes that shape the medical image technology like the DICOM[5] standard (Digital Imaging and Communications in Medicine). Hospital work practice draws upon standard medical treatment procedures example: NCSP[6] (- NOMESCO Classification of Surgical Procedures) and procedures for cooperation and coordination both within a profession, and between professions and these standards both shape the culture in a hospital and work practice.

Standards are usually intertwined in one another and are easily distributed and they also entail ethics and values that heavily impacts on people's lives and possibilities for actions

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[3] http://www.who.int/classifications/icd/en/

[4] http://www.nursing.uiowa.edu/cncce/nursing-interventions-classification-overview

[5] http://medical.nema.org

[6] http://www.volven.no/produkt.asp?id=130&catID=3&subID=9&oid=

and behaviour (ibid). In hospital regulating standards of conduct and actions are imposed by law in the Health Personnel Act (Helsepersonelloven, 1999), the Patient and Users Rights Act (Pasient- og brukerrettighetsloven, 1999) and the Specialist Health Service Act (Spesialisthelsetjenesteloven, 1999) (to name a few) affecting areas like for example the issue of patients' confidentiality, the patients' right to get treatment and hospitals duty to provide health services.

Use of standards can be a means for weak organisations to impose otherwise unwanted rules to coordinate wanted activity (Timmermanns & Epstein, 2010). Some standards are formal and authoritative in this way, but others are result of an implicit and shared understanding like the standards of knowledge and conduct that adhere to a profession/vocation. Although standards are interwoven and invisible in many aspects, standards are albeit not entirely an imperative feature though the use of standard have voluntary dimensions as well.

Timmermans and Epstein (2010) states there are several types of standards including those of design and procedural standards that are those who have most relevance for this thesis subject. The procedural standard helps to specify how processes are to be performed (ibid, p. 72). The line in which messages are sent is a defined structure of a communication process between nurses so the procedural standard can be recognized in the national guidelines of the NUC messages. It can also be in the procedure that the messages are to be created and certificated. In design standards, it is the definition of properties and features of tools and products, and that standard contribution to uniform quality and compatibility. This design standard is one that applies for the NUC messages as they were specified into a technology standard and standard of naming, structure and function. Timmermanns and Epstein further states that design standards are not easily made and are called upon from scientist and engineers to bring solutions to particular problems, but can be results of trials and failures. Other parties with allegations of bias and wrong policies can later contest standards designed. Albeit the standards features of connecting different worlds together and bridging and coordinating cross level activity, it is evident that one call for analysis of the local use of universal standards constructed. This is what this thesis will conduct, to bring a closer insight to the local use of the national standard NUC messages.

A model for insight to standards is to look into the standards directly. Timmermans and Epstein offer conceptual tools to execute such analysis and describe the phases of Creation, Implementation, Resistance and a close look of the Outcomes of standards.

First: Standard-setting is accomplished by multiple parties, and standards can be imposed top-down or emerge by consensus among stakeholders. Standards are motivated by issues like safety, efficiency or redistribution of resources. "Depending of the process of standard-setting, standards can imply a lowest common denominator of available options, the power of the strongest party in standardization, a negotiated order among some or all stakeholders, or a confirmation of how things are done by most parties. Standardization has thus emerged as a form of regulation and being part of the team that set standards can be a tremendous advantage. Yet the power of standardization depends on whether standards are actually implemented." (Ibid, p. 79)

Secondly: "The voluntary nature of many standards makes it difficult to develop momentum unless built-in incentives promote compliance." Every standard implies script that specifies roles of users, their skills, motivation, requirements, tools and final outcomes as Akrich states (1992). When implementation of standards moves from design to procedural issues, it becomes more challenging to hold a standard in ways that satisfy diverse interests. Every standard is both over-determined and incomplete and delegates additional work to make it work. There is both a need for the standard to be flexible and not, and users compliance or resistance can rely on this. But over-flexibility can tip a standard over to uselessness. A standard has to be fitted in to the world of routines and practice that already is filled with standards. Implementation of standards may fail on many reasons such as lack of compliance and lack of knowledge, maladaptation and resistance. Very few standards work as intended because users tinker with it and that is not entirely due to failure of the standard itself.

Third: Standardization can promote success because it is transparent and can be accounted for. The use of standards can provide transformations of an existing social order and the specificity of standard matters because different standards renders different outcomes. Local elements can be erased by standards and herein lies its powers to allow new

manipulations. Loss of local diversity is replaced by other desired benefits. Yet the outcome from standards is a standardized world but not as a uniform world though the standards are subjected to transformation due to use and time circumstances and thereby to some degree go out of use. Standards and standardization aspire to promote stability and order.

2.3. Actor Network Theory (ANT)

The NUC messages are of national standard and Timmermanns and Epstein encouragement to look into standards have lead to looking into the Actor Network Theory as a tool to in-depth analysis of the creation of the NUC messages. Hanseth and Monteiro (1997) states that standards that build technology are never neutral and it is important to look into the processes that contributes to the complexity of standard making. By uncovering these contributions new insights can be achieved that one was not aware of in the process.

Whereas ANT is not particularly connected to research in Information Systems (IS), it is widely adopted by scientists who look into the **processes** of designing IS to uncover how IS is used while adopted in society, and how it influences human behaviour, and how technology taken in to use include users bottom up strategies (Monteiro, 2000). I found these concepts relevant for looking into the process of development and use for the NUC messages, as the messages are a feature in the EPR and an EPR can be regarded as an IS.

ANT consist of the notion that when you are acting with technology, you are in fact *interacting* with technology, and this is influenced not only of the relationship between you and the technology or tool, but is influenced by a lot of other factors additionally. Monteiro illustrates "For instance, when driving a car, you are influenced by traffic regulations, prior driving experience and the car's manoeuvring abilities…" (…) " … not only the car's motor capacity, but also your driving training, influences your driving" (Monteiro, 2000 p. 4). The wide range of surrounding factors is in ANT considered actors that act together and hence the name that states the notion of actors in networks. The act is linked to all its influencing factors and produces a network. The actors then are not only the person driving and the car, but also all the technical and non-technical elements. It is a heterogeneous quality of actors that ANT comprises. The actors are given their status through the semiotics notion that signs apply meaning in relations to one another (Aanestad and Olaussen, 2011 p. 28).

As a corresponding example is the setting for this thesis, the hospital setting and the communication with cross level nurses where the NUC messages are to function and not only the NUC messages themselves. The nurses, interacting with EPR sending messages, are of same training, they are influenced by their surroundings, their category of patients and the patients' in-hospital pathways, laws and regulation influence their communication actions, different kinds of co-workers, their age, gender, and previous nursing experience are different and play out differently when communicating with cross level nurses. Each nurse is indeed an acting network acting with other nurses who also are acting networks. They together form networks interacting together through the technology of NUC messages.

2.4. Actors/actants/ intermediaries

Callon (1991) distinguishes between intermediaries and actors. Intermediaries contribute to describe their networks. But what are they? He lines out that

"….intermediaries are anything passing between actors which define the relationship between them". Anything. But Callon suggest they can be categorized in four main groups, which I here exemplifies in brackets

 1) texts (national strategies for electronic communication and the local communication procedures),

2) technical artefacts (the EPR with the features communications tool of NUC messages and the secure line of infrastructure provided by the Norwegian Health Network),

3) human beings (participants of the messages development and the nurses who eventually use the messages),and

4) money (reimbursement connected to cross level communication and financial ability to buy the NUC messages and to pay for its running ICT support).

They are actors because they circulate in a shared relationship with other actors and they create that the space they circulate in. And the intermediaries become, or are, actors when they have authorship and that is when an intermediary puts other intermediaries into circulation in the network. The interplays and aggregation of intermediaries makes Callon state that an actor is also in itself an actor –network (Callon 1991, p. 142).

ANT position of giving human and artefacts, both of technical and other materials, the same status is pivotal to the theory. The same status of human and non-human actors is in ANT for

analytic purposes (Monteiro, 2000) and is not a method to weigh in ethical perspectives (Monteiro, 2000 p. 4). The theory is a framework that offers a vocabulary to detect and describe the contribution of both human and non-human mechanisms that go into the joint effort in the process of constructing technology and standards (Hanseth & Monteiro, 1997). This corresponds directly to this thesis research question 1, see section 1.2. A famous quote from Latour describes the method in a simple way "follow the actors" (cited in Law 1991, p. 11). It can make it difficult to hold a critical distance to their points of views when following the actors. Especially when being an actor in the network oneself. But it makes it possible to increase the level of detail and precision in the descriptions of the concrete mechanisms in work that tie the network together. The actor-network is possible to regard as the **context**. Those elements or actors in a context is what shapes action because they participate in the social (Monteiro, 2000).

Hanseth and Monteiro (1997) state that ANT regards society as an interwoven socio-technical web consisting heterogeneous networks of actors including institutional arrangements, textual descriptions, work practices and technical artefacts. This notion is easy to correlate to the health care world which in the NUC messages are to function. See presentation of actors in section 4.1 – 4.1.6.

It is a challenge to delineate one actor network from another, it can be rather unmanageable, so it is critical to what to include or exclude in the analysis (Monteiro, 2000 p. 5). This especially will be a challenge for me as I am a participant, an actor, as well as a researcher in this analysis. See further in chapter 3, especially section 3.3.

2.5. Inscription
As technology is designed, it obviously is designed for the purpose of use. No technology is made to stay unused. It is clear that technology or tools has ascribed intentions to what it is supposed to serve, either to facilitate a task, to help a work assignment to be more efficient to conduct, or to make new work operations possible. This adheres to the NUC messages as they are meant to enhance and to support cross-level communication in health care. Monteiro (2004) says that inscription is about how patterns of use is delegated and embodied into a technical artefact. This may be seen as a deterministic perspective but it is

rather a way to describe how an anticipated and possible feature is ascribed to the design and concrete material of the tool or technology.

One classical illuminating example of the notion of inscription is from Bruno Latour (1991). A hotel manager wants his guests to leave the hotel door room keys when they exit the hotel. The key itself does not impose this behaviour and the manager is left with customers who may or may not understand to leave the key behind. To impose wanted behaviour the hotel manager first place instructions in hotel room's walls and by the front desk reception where the guests can read that they are supposed to leave the keys behind exiting the hotel. This action or intervention has little result in the guests-key-leaving behaviour and now the hotel manager attach a metal piece on the keys to make the guest question why it is there and thereby remember to leave the key. As this has some effect, but not a 100% success, the hotel manager further experiments on how big and how heavy the metal piece must be before he gets the wanted result; that every hotel guest leaves their keys when exiting the hotel. The weight and size of the metal piece added to the key makes it difficult to ignore the key and the guest wants to get rid of it because it is unpractical and uncomfortable to carry it; hence the wanted effect on key-leaving behaviour. The metal piece was the material and practical object in which to inscribe behaviour; the key itself did not impose this behaviour. The key it self is the tool adequate to lock an unlocked door which is the wanted situation from the hotel manager.

The classical example here is about a simple tool and an relatively uncomplicated inscription, but the method itself is suited for transfer to more complex technologies and for information technology as well, and additionally, for situations including work practices and what ever interplay between users of technology and the technology itself. The process of finding the exact weight and shape of the metal piece is also an example on whether or not an inscription is weak or strong. The inscription is weak if it allows alternative behaviour or the possibility to avoid wanted behaviour, and opposite it is strong if it imposes inflexible or forced behaviour. This is one of the aspects that will be looked into regarding the NUC messages, how are they designed to impose "messaging behaviour"?

Latour (1991) states that inserting behaviour is kind of a program or a statement and it affects the social sides of the situation as it affects the material in which it is inscribed into.

The statements are to be studied in the order or which succession of the context it has been produced.

Akrich (1992, p. 208) says " a large part of the work of innovators is that of "*inscribing"* this vision (or prediction about) the world in the technical content of the new object". She uses the term script or scenario to depict the motivation for design. The main objective is to match the imagination of the future work practice with a technology that function optimal to make the imagined scenario feasible. It is "… like a film script where the technical object defines a framework of actions together with the actors and the space in which they are supposed to act" (ibid, p. 208). The obvious uncertainty when the technology is ready and taken into use is the unforeseen ways that technology actually is used. The ways can be both intended and not intended, and thus the following consequences of altered conditions in work environment and cooperation. Akrich gives the notion of de-scription a vital place in this process. She states that there is a tension in the fact that the scenario inscribed in the object and the real scenario described can be displaced. De-scription is analysing the mechanisms that allows the relation between form and meaning to constitute the technical object and to let it come into being. It is within this sphere one can detect the success or failure of the end objects and the process of making them come through. The inscription, which intends to impose actions, also delegates roles and competences that affect the social environment in which it function. The inscription also represents interests. By studying the sequence of inscription it is possible to detect which inscription are needed to achieve a given purpose (Hanseth & Monteiro, 1997).

2.6. Translation, the process of negotiation
Latour (1991, p. 125 - 126) says translation has to do with displacing of the program of action (or inscription) into another. Callon (1991) explains translation like this: A translates B whether or not it is human or non-human, individual or collective. The elementary operation of translation consist of a translator, something that is translated and the medium in which that translation is inscribed. The medium must be defined and can be of diverse features; roundtable discussions, public declarations, texts, embodied skills, technical objects, currencies, - all these features support and execute the translation. Design it self is a translation because the need it represents, when it is adopted by the users of the technology, it is brought out in the solution the technology provides. Translations can

change over time and can be compromises and a result over a process of iteration that adjusts the translations. The translation of the intentions and the final technical solutions to actual need, was part of the process that the creation of the NUC messages went through and this will be discussed in chapter 5, section 5.2.2.

Monteiro (2000) elaborate on Callon and Law when they outline and state that as actors from the outset have a diverse set of interests, and stability (or the aim to manage them) depends on the ability to translate others' interests to ones own. This is done by re-interpret, re-present and appropriate the others' interests so that they match ones own. Translation is part of a negotiation process of aligning interests. Translations generate ordering effects like devices, agents, institutions and organizations and are embodied in texts, machines, bodily skills that become their support and their more or less faithful executive.

Actors' authorship and identity is important parts of translation. Is A really an actor? Which intermediaries imputes to A and gives A his identity? What gives A the right to speak on behalf of others? (Callon, 1991, p. 146). In a network the actors' co-ordination and alignment is dependent of to which extent the actors can fit together despite their heterogeneous activities. Referring to the identity of actors' authorship it is vital for the network to identify and depend on and be able to mobilize the skills in the network so that translating not becomes a costly affair. When actors' identity and status is questioned it is difficult to mobilize parts of the network and translation is hampered.

Translations can be accepted or rejected. A successful translation generates a shared space, equality and commensurability (Callon, 1991, p. 145) and conversely an unsuccessful translation create miscommunication among the actors.

Hanseth & Monteiro (1997, p. 9) outlines that negotiations produce winners and losers as translation alternatives reflect interests differently.

Akrich (1992) says that to follow the mismatch of ill-fated technological design projects it is important to follow the negotiations that has been in the process of inscribing possible

behaviour and use of technical artefacts. The aspects of negotiation of local translation in the ELIN-k project will be discussed in chapter 5.

2.7. Irreversibility and normalisation i.e Standards

Irreversibility is also a vital concept in the ANT vocabulary. Irreversibility is synonymous to normalisation (Callon, 1991, p. 151).

Callon says all translations are in principle reversible but irreversibility of translations depends on:

a) the extent to which it is subsequently impossible to go back to a point that translation was only one amongst others
   and

b) the extent to which it shapes and determines subsequent translations

Durable and robust translations can resist competing translations. The robustness of a translation is dependent on whether the identity of the actors in the translation is resistant to erosion. But the heterogeneity of actors network make them fragile, so the greater the coordination it is in the network, the more likely it is that their translations can resist competing translations. If a translation search for a substitute or additional translation that seek to prolong and extend its scope; irreversibility is adhered. Callon (1991) says when decisions are made on previous translations it will be harder to change the former translation and it will be more an more a standard, a norm to be relied upon. This creates a systemic effect that can be outlined as normalisation and irreversibility of translations. Irreversibility limits further translations by aligning actors and intermediaries and thereby curb new translations. When a norm or standard is set and the cost to challenge it is overly expensive the more the translation is irreversible (Callon, 1991).

To sum up, this chapter started with the exploration of the theory of standards because NUC messages are meant to be of national standard. Vocabulary from ANT has been used as a theoretic analytic tool that can support the aim to understand the process of creation of a standard. At the end of this search the ANT vocabulary, in its last processual concept describes how, in the creation process of a standard, the normalisation and state of standard is achieved. The vocabulary's relevance to technology in health care are identified and ANT

will further be a support to the upcoming analysis of the creation process of the NUC messages and how it affected the use of them successively according to the thesis objective and research questions.

3. Method of thesis investigation

3.1. Research design

According to Walsham (1995) and Klein and Myers (1999) the interpretive method are highlighted as rewarding in the studies of entanglement of information systems (IS) technology, the human actions and social issues connected to its implementation and use in an organization. The interpretive method derives from the empirical stance where insight and knowledge is obtained from field studies as significant to the tradition of ethnography and is part of qualitative research.

Klein and Myers (1999) outlines that interpretation can be part of quantitative and critical research also. But in IS research interpretive implies the assumption to that our knowledge is gained through construction of a range of elements like language, shared meaning, tools, artifacts and documents (Ibid, p. 69). It focuses on the dependencies and interdependencies of construction elements, and the complexity where they emerge in the making of situations, and to understand the phenomena through the meaning that is assigned to them. Interpretive studies aim to produce understanding of context and processes and how it influence behavior and organizations.

Interpretive studies draw upon the notion of phenomenology and the hermeneutic circle described in the work of philosopher Hans Gadamer (ibid, p. 71). The fundamental idea in the circle is " ….that we come to understand the complex whole from preconceptions about the meanings of its parts and their interrelationships" …"The process of interpretation moves from a precursory understanding of the parts of the whole and from a global understanding of the whole context back to an improved understanding of each part" (Klein and Myers, 1999, p. 71). It is an iterative process. The authors refer to Gadamer when they outline that the criterion for correct understanding is the whole with all its details, and if not all details are achieved, then understanding fails. The process includes the theoretical perspectives, experience and horizons of researchers as well as the field or issues of study, but the fundament though is human understanding, and in the end the emerging shared meaning of the whole implying the interaction, dialogue, and the influence the parts and the whole have to each other. This state is a result of the repeating cycles in the circle, and is in principle never finished, constructing a web of understandings. The hermeneutics include the ability to reflect not only upon meaning but also what the interpreter bring along. Klein

and Myers outline that the hermeneutic task is to uncover tension between the interpreter and the material of interpretation. Another task is to seek meaning in historical and social context, as actors by actions contribute in the making of their physical and social reality. This reality is not regarded as a fixed notion but it is a constantly changing process, nothing is static, and interpretive methods therefore studies and try to understand moving targets. The process of creation, testing/piloting and implementing electronic NUC messages is such a moving target, it is a process that took place over many years and still is in the run.

Walsham (1999) draw upon Geertz when he highlights the need of "thick descriptions" to gain insight to the complex situations to be interpreted. Thick descriptions are gained both from observations, interviews and studies of the artifacts that emerges in the field of study. Like the hermeneutics, theory must be included as a background and part of the interpretive process. Walsham (1995) draw upon Eisenhardt while suggesting that there are three distinct uses of theory linked to design and data collection: a) as an initial guide to design and data collection, b) as part of the iterative process of data collection and analysis and last c) as a product of the final product of the research. These three points comply with the hermeneutic circle. The applied theory gives the researcher a framework in which to navigate in the process of investigation. According to hermeneutics this is a prerequisite for building further understanding and a new conception of the whole.

Field studies provide, if done properly, detailed insights to the premises that underlie what people do, both what the think they do and what they are not aware of. These ethnographic methods produce the material to real-life understanding (Forsythe, 1999, p. 129). The role of the researcher in the field is much elaborated on in description of the interpretive and qualitative methods of research (Walsham, 1995; Klein & Myers, 1999; Forsythe, 1999; Thagaard, 2009). The researchers role as an outsider with a distance to the field of study is questioned/contested in various ways. Klein and Myers in principle 3 (1999, p. 72) state one principle of interpretive field research is the socially construct of data through the interaction of the researcher and participants. Walsham (1995) elaborates that to gain access to the field implies that the researcher at least for a time must be part of the field group or organization, otherwise observation is not possible, the part as an observer embed the insider yet outsider position, and emphasize the impossibility to remain purely objective.

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Thagaard (2009) describes that when researcher does field studies in own field it is an advantage that the researcher already knows and has access to the environment of the study, and is not restricted to information provided by observation and interviews. But accordingly there is a risk of overlooking nuances that are not part of ones own understanding and experiences. Forsythe (1999) correct/contest this notion that an insider does the best field work because the field work requires a mental distance that often lack when a systematic analytic overview is needed. Walsham (1999) state that a researcher inevitably influences those people and situations of research and in that sense an interpretive researcher is also conducting action research (action research will be elaborated on further in this chapter, section 3.3). It is of most importance for the researcher to mediate the role as not fully part of the environment for a field study so, that in spite of the influence mentioned here, she can remain an appropriate distance and communicate a non-personal part of the field. Nonetheless being an outsider or insider as a researcher, Walsham (1999) states it is essential that this position in the research is explicit and reflectively disclosed in the report where research results are promoted. As I do in this thesis, disclosing the active part I have had in the processes I examine.

Interviews are a major source for data collection. The research interview is a talk between a researcher and an informant guided by the themes the researcher wants to get information about (Thagaard, 2009, p. 89). Interviews give the researcher after the interview a possibility to step back and examine the data in detail the data that provide material for interpretations. While interviewing it is worthwhile holding a balance by being open and welcoming to being over directive in the interviewing situation. An interview is a non-judgmental form for listening (Walsham, 1995). Access of people's thoughts, views and aspirations through the research interview requires social skills and sensitivity as well as planned techniques and well formulated questions. Forsythe (1999) says it is imperative to treat the answers as data for interpretation and not as final results because the answers must be considered in context with the field observation. Myers and Newman (2007) states as the interview is an excellent means of gathering data, it should be carefully conducted, as the situation of interviews are filled with difficulties and pitfalls, like social dissonance between researcher and interviewee, the dramatic feature of an interview and the amount of flexibility in the questions and situation. Their article propose ethics of interviewing

containing a) permission – from the ethics committee and the interviewee, b) respect- to their time, position and knowledge, c) fulfilling commitments; keeping confidences, presenting findings and results (Myers & Newman, 2007). Krumsvik (2013) is citing Kvale when he defines an often used form of research interview, the semi-structured interview, like this: *"a planned and flexible interview with the purpose of obtaining descriptions of the life world of the interviewee with respect to interpret the meaning of the described phenomena"*. Interviewing includes accordingly recording and transcribing the interview. Transcription must be carefully conducted. To include non-verbal information such as atmosphere, body language, pauses and sighs and laughter can be crucial to the material that further is to be interpreted.

To get valid data from interviews the selection of respondents must be carefully conducted. In qualitative studies Nyeng (2012) says that the research intend to give insight in context, social processes and relations regarding a case or phenomena, or to explore new things and clarify events. Then the election of respondents is mainly directed in finding respondents who are able to give qualified information connected to the study objective.

In qualitative and interpretive design data collection can be of various sources. Walsham (1995, p. 78) citing Yin lining out the sources to be documents, archival records, interviews, direct observation, participant observation and physical artifacts.

3.1.1. Thesis research setting

The objective of this thesis is to look into the processes that led to the creation or development of the national electronic NUC messages in Norway. This process was conducted with the contribution from a wide range of actors, both at national level and at the University Hospital of North Norway and municipal of Tromsø. I also look into the implementation of electronic NUC Messages at the University Hospital of North Norway. I do so within the theoretical framework of standards and the vocabulary of the Actor Network Theory.

As learned from section 3.1 the interpretive method aim to examine to understand a subject more than to prove a subject. The interpretive method seems to fit the purpose of this thesis and that is why the method is chosen. Interpretive method applies to real world research.

Robson (2011, p. 3 - 4) says research in real world environment apply for small projects related to change of problems or practice in real people's lives, or policy often seeking to evaluate an initiative or a service. Real world research typically is conducted outside laboratories and academia/universities. There is a real world environment in the projects and the hospital that is the basis of this thesis.

3.2. Data collection

The field of this study is the environment of national projects, in which the NUC messages were developed and later, the hospital of North Norway in which they were tested, piloted and subsequently implemented. Working first as a project coordinator for the hospital and the municipal of Tromsø, and later as the project manager for implementation in the hospital, access to the real world environment of the thesis subject is implied.

For this thesis the main methods are interviews and documents. The direct observation of the field of action is also a part of the data collection but was not planned as a part of the thesis data collection. The observation still must be recognized as a background for the study I have conducted. Additional observation was not possible as the process had already passed on and due to limited amount of time for this study.

Data sources	Numbers	Context
Observation	1. Participant in ELIN-k project 2. Participant in FUNNKe project 3. Project manager in FUNNKe in UNN	1.National project's telephone meetings, work shops, conferences, local meetings in Tromsø/UNN test and pilot 2. Work group meetings, OSO body board meeting, regional work shops/conferences 3. Arranging and conducting training for NUC messages with all in-patients wards at

Data sources	Numbers	Context
		UNN, training and follow-up after training and ongoing support
1. Semi-structured interviews 2. Informal discussions ad hoc interviews	8 2	1: 5 nurses/super users of NUC messages, 1 nurse advisor/ NUC messages supporter, 1 municipal nurse in administration of nurse and care services in Tromsø, 1 nurse/ICT advisor/project manager municipal of Tromsø. Participant and representative for local and national electronic message projects. 2: two participants from the preliminary project of ELIN-k
Documents		Projects plans, messages specifications, official reports and strategies, laws and regulations, all sorts of project documents minutes, e-mail correspondence, users manuals, procedures and guidelines.

3.2.1. Case field Observation

As a participant in the different projects that will be discussed in this thesis, the observation was not at the time part of a master thesis, it was simply a part of the work task responsibilities as a project worker and project manager. Due to scarce resources in the

hospital for implementation of NUC messages, the role as project manager also included the tasks of training and follow up the health personnel in the use of the NUC messages. It is fair to say the time spent in the field is extensive, although I cannot account for the time spent exactly. Additional observation seemed a waste of time and superfluous compared to the role executed in the implementation project. The insider and outsider of the observer perspective described in various texts (Walsham, 1995; Forsythe, 1999; Thagaard, 2009) apply here, and if an additional observation had been conducted, the outsider perspective would likely be perceived from the field as artificial. As an already insider, it would be hard to not be approached as the insider that had been the case in previous contact with the field. As an insider though, still there has been a distance to the health personnel I have trained and supervised. As a nurse myself it has been useful to communicate the common ground between us in the execution of training and supervising conducted as a project manager. Not only to minimize social dissonance as discussed in Myers and Newman (2007) and Thagaard (2009, p. 103), but to ease the training, showing the trainee that my understanding for the use of the messages is grounded in real nursing experience communication with cross level nurses in patients' nursing and care trajectories. The distance between trainer/supervisor and health personnel had still been obvious though as the real use of NUC messages are not a part of the project manager's actual works tasks. The observation that has resulted in data collection is as such not a planned source of "evidence" and scientific rules for conduct of such an observation is not met. The field observation was not agreed upon, scheduled or organized in a scientific way (Thagaard, 2009; Robson, 2011). It is fair to assume though that the health personnel participating in the implementation project know that projects usually are evaluated and put in writing as project reports. The lack of a scientific arranged observation may be regarded as a shortcoming and as a lack of validity to the data from the field, and may be questioned and challenged as anecdotal. Accordingly, the data collection for this thesis must be of additional sources.

3.2.2. Case interviews

The qualitative research interview is to be regarded as a powerful tool and an excellent means of gathering data (Meyers & Newman, 2007; Walsham, 1995; Thagaard, 2009; Robson, 2011). Accordingly, interviews were planned as part of this thesis data collection. A part of this thesis is to explore how the NUC messages came to be developed and the

process of involvement in testing and piloting the messages. These aspects are helpful in order to understand the use of the messages after implementation. However, in regard of this thesis scope and extent, to seek up and do interview with the participants from all past messages projects was delineated/excluded to limit the task. Though some informal discussions and ad hoc interviews was performed with earlier participants in the ELIN-k preliminary project. Also the roundtable and informal discussions about the creation of the messages with some of the ELIN-k phase 2 participants was conducted in the run. Regarding this thesis objective, what was regarded most useful, was to examine the experiences, perceptions and insight into the use of messages from those actual end-users of the electronic NUC messages. The thesis project and data collection was registered and approved by the privacy protection office at Norwegian Social Science Data Services[7].

To select who to interview was done out of the knowledge obtained from the work as project manager. At first, the work as project manager had provided a near full hospital network of participants from the implementation project. NUC messages super users in the wards and their nursing leaders were part of an already established network. Gaining access or using time to expand this network was not an issue. The network included different kind of health workers; nurses, auxiliary nurses, health secretaries, medical doctors, health personnel of other professions working in psychiatric care units; psychiatric nurses, psychiatric auxiliary nurses and social workers, occupational therapists, teachers, children's care workers, psychologists and psychiatrists. They represented units in the hospital that had more or less use of the NUC messages for their admitted patients. As part of observation from training and follow up and previous investigations (Wangensteen, 2013) there was clearly a difference in the compliance to the procedure for using NUC messages and actual the amount of the NUC messages used in the hospital. Secondly, as a way of selecting who to interview, the interviews was arranged with super users from wards that had extensive use of the messages and those who had little need for the messages, believing that their experiences and perceived opinions could differ and thereby gain richness to the data collected. Super users was also assessed to have an unique position not only being users of the NUC messages themselves, but also as trainers in the use of NUC messages for

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[7] http://www.nsd.uib.no/personvern/

colleagues, they would have an extensive overview over others use as well as their own. Last, who to actual contact was kind of arbitrary, picking from whom I previous had little to do with or much to do with. To get a good mix was essential. Nurses' leaders were also included among the interviewees. Assuming they would have a different perspective not using the messages themselves, but relying on the use of the messages as part of the cross level collaboration with municipal care givers knowing leaders are responsible for additional procedures linked to overarching agreements of financial matters concerning the transmission of patients. A municipal nurse, with responsibilities in administration of the municipal nursing and care service office in Tromsø, was interviewed. The last of the interviewee was the collaborating municipal project manager in the ELIN-k project. All of the interviewees are guaranteed anonymity (Thagaard, 2009; Myers & Newman, 2007) but the identity of the municipal project manager is impossible to keep hidden thus it is only one of the kind. I refer to her as municipal project manager because it is as her role as collaborating project manager she contribute to the thesis and not as a private person. She accepted to contribute to the data collection under these conditions.

All but one of the super users approached accepted to be interviewed. An information document and consent form was handed them and all of them signed. The interviews was scheduled to be conducted within their work hours and the place of interview was either at a quiet room at their ward or at an neutral office or meeting room in the E-health and ICT department at the hospital, where I work. The interviewees chose where and when to meet so they could be in charge of these aspects in the situation. Both Thagaard (2009) and Myers and Newman (2007) discuss the qualitative research interview as a drama that must be staged and carefully acted out. So here the stage was arranged so that the interviewee had the best place to play in, assuming they chose the best time and place. The roles were explicit communicated referring to the usual context of previous contact. The interview was semi-structured as a guide for subjects to be covered was prepared. The interview was flexible and gave room for the interviewees' opinions and sharing of themes that was not covered by the prepared interview guide. As an introduction, the interviews started with the practical perspective as it was suggested that the use of the NUC messages, according to the procedure, was a useful way to start the interview, making the starting point something familiar and a mean to ease "the drama" (Myers & Newman, 2007). The interviews was

recorded on my password restricted work mobile smartphone and later on transferred to my personal home computer. Subsequently, they were transcribed and printed out to paper and the audio files deleted. All of the interviews were transcribed but one, as I considered there was nothing new from the informant that had not been conveyed in previous interviews. The interviews were subsequently interpreted and analyzed, and responds were categorized and organized in a matrix according to the themes in the guide and new themes that were brought in to the interviews by the interviewees.

3.2.3. Case documents

The last source of data collection for this thesis is the various documents and texts that adhere to the development/test/pilot process and subsequently the implementation of the NUC messages. Some of these documents are official and can be retrieved from the Internet such as guidelines, project FUNNKe documents, laws and regulations, and specifications for standards concerning electronic messages. Data is also collected from scientific theoretical texts that contribute to the basis for this thesis. Also there exist a large amount of correspondence; meeting minutes and others documents about work that have been done in the different projects. These documents are not available to public and are here a part of the data that is unofficial. It has been important to re-view these documents to fresh up my memory about what has been part of the processes, but also important to look back at them again, now from a distance in time, it is easier to make alternative interpretations of them.

These ways of collecting data; observation, interviews and documents are means to secure the findings and is called triangulation of data. Triangulation entails the notion that data gathered can be strengthened if different sources of data collection derive same findings (Robson, 2011, p. 158; Walsham, 1995) and thereby give the findings more validity.

3.3. Reflections on my role as a researcher

As participant of the ELIN-k project and project manager to the "Subproject FUNNKe in UNN" it is evident that the position as a researcher of this thesis is not as an outsider looking into unknown landscape. The thesis is affiliated with both the methods of evaluation research and action research. Both research methods are easily connected according to Robson (2011, chapter 8). He also states that researchers tend to bemoan the lack of

influence that research has on practice. Opposite this statement, the position to research on one's own practice is what applies to this thesis. Robson says that the nature of action research is primarily distinguishable in terms of its purpose, which is to influence and change something. And change here is not meant as a stand alone event but a change process (ibid, p.192). As a participant in the process of getting the NUC messages ready and implemented for use it is easy to relate to the acting part and acknowledge the affinity this has to this thesis research. Robson says improvement and involvement is central to the action researcher (ibid, p. 188), and I acknowledge that this was a part and goal in the various projects for the NUC messages I acted in. He states that action research also implies to seek understanding of practice and the situation at hand, and involves collaboration between researcher and field of practice. This is also a stand that applies to my acts in the projects.

Likewise, researchers are often asked to evaluate in the purpose of improving a program, to understand why it works or not, and to find out if clients needs are met (ibid, p. 179). It is not only an assessment but also aim to assist in improving what is being evaluated by carrying implications for change. The aim of evaluation is not to prove but to improve (ibid, p. 182). The outcome of evaluations has interest and concern for stakeholders and remain some pleased and some not. Last, Robson states that reporting findings from an evaluation is a disseminating strategy to get across the finding to those who it would benefit, or to those who need to be informed. It is vital to be aware of what you seek to achieve while reporting, but findings must be made public (Ibid, chapter 18). I relate to this as I recognize the time and interest I invest in getting my findings across by writing this thesis.

4. Findings

4.1. Presentation of actors

Latour says to follow the actors. To conduct an in-depth study of the thesis topic, my first interest in research question is to identify the actors involved, see section 1.2. Hence, first in this chapter the actors i.e. the contributors and background factors/the context - the networks or the electronic NUC messages will be presented. The initiating actors, the health strategies are presented in section 1.1. There are so many actors, and many of them participate in several of the networks, both on national and local level. Figure 1 display an overview.

After this presentation of actors and networks, three main stages of the process will be described a) testing/piloting, b) implementation, c) outcome/users experiences
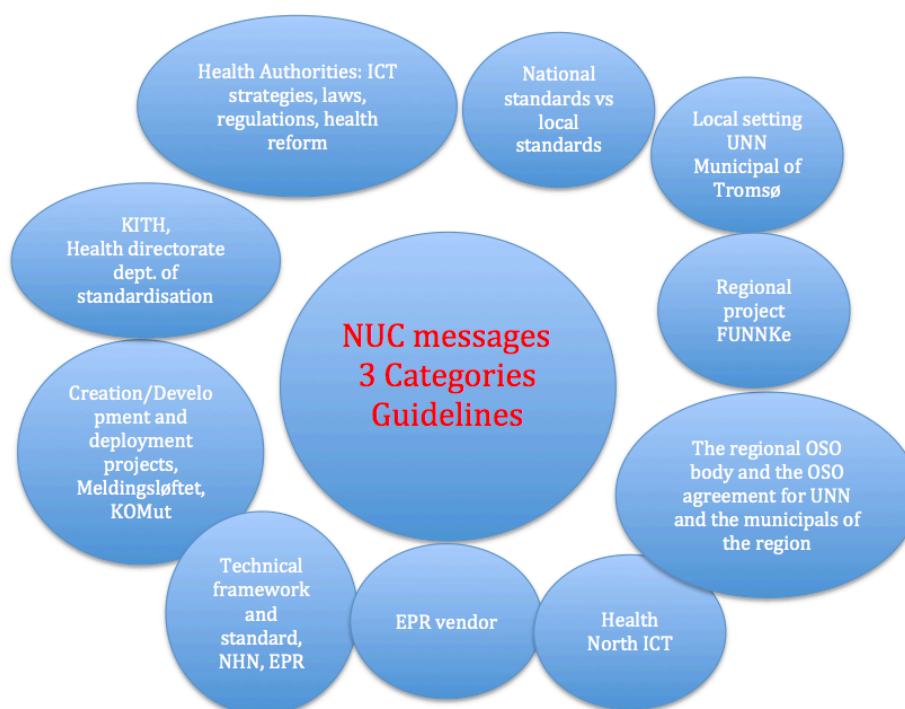

Figure 1. Actors

4.1.1. Technical framework

The information exchange between the EPRs is enabled by the secure Internet line provided by the Norwegian Health Net[8] and is further regulated by rules of conduct and security (Helsedirektoratet, 2010) that apply to all users of the communication channel. The Rules of

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[8] http://www.nhn.no

Conduct, for short called the NORM, is a set of requirements which intention is to secure all health information sent and received. It comprise both technical, law and organizational requirements down to a practical level (Helsedirektoratet, 2010).

The technical framework for Norwegian health messages is the XML programming language according to the catalogue of ICT standards from DIFI[9]. The ebXML framework for transport adheres (KITH, a). The KITH XML format is reckoned as a basis for compatibility of the messages from sender to receiver. In addition to the XML there are national formats of display (visningsfiler) so received messages look the same whatever vendor has made them (KITH, c). In Norway there are numerous EPR vendors and the main objective here is that a NUC message should be displayed in the sender EPR as it presents itself in the receiving EPR. The ELIN-k project aimed to provide the national standard for the NUC messages according to the components of the technical standards (NSF, 2006; Skarsgaard et al., 2011). As the scope for this thesis is not the technical components, this will not be discussed further in the thesis.

4.1.2. The national body of standardization

A major contributing participant in the ELIN-k projects was the national body of standardization. At the time of the ELIN-k project the standardization body was organized as a governmental financed enterprise called Kompetansesenteret for IT i Helse- og sosialsektoren (short; KITH) (KITH, 2010). In 2012 it was reorganized and is now a part of the eHealth Department in the Health Directorate. It is named department of Standardization (short EISI). KITH/EISI provides technical standards and national codes and terminology for use in the health and social services in Norway. Their scope and focus is also information security, electronic information exchange and Electronic Health Record systems. Standardization and coordination activities according to their scope is a main task and they also take part and contribute in international standardization work and networks.

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[9] http://www.standard.difi.no/forvaltningsstandarder

4.1.3. EPR vendor

UNN uses an electronic patient record system from the vendor DIPS ASA[10], a commercial ICT actor in the health information system arena. The EPR from DIPS is both a patient administrative system as well as a document archive for patient documentation. DIPS is the largest supplier of EPR systems to hospitals in Norway. The vendor was early on a partner in the ELIN-k phase 2 project aiming to design the electronic messages according to the specifications made bye the initial or preliminary part of the ELIN-k project (DIPS, 2013). DIPS has been a part of the test and pilot part of ELIN-k phase 2 and further in the deployement process.

4.1.4. Development projects of tools for sharing health information

4.1.4.1. Pre ELIN-k History

The first program for development of the new tools of communication was the ELIN project (ELIN: short for <u>El</u>ectronic <u>In</u>formation-exchange). The project's objective encompassed the development of message exchange formats for electronic Referrals and Discharge Summaries. The messages support communication between General Practitioner doctors (GP) and hospitals. In the northern part of Norway all the GP's and hospitals had been enabled to communicate electronically this way since the early years of 2000. Electronic formats for requisition and reply regarding blood tests and x-rays was also developed and subsequently implemented (KITH, b; Hanseth, 2010).

4.1.4.2. The ELIN-k project

The largest group of health care personnel is the nursing group. There is a substantial collaboration between nurses and other health care personnel in the municipal context (Skarsgaard et al, 2011). This includes collaboration between home care nurses and the patients' GP, but also the collaboration between municipal nurses and the hospital health care personnel, when the patient is in need of municipal nursing after discharge from hospital. With reference to Health authorities strategies (Helse Departementet & Sosial Departementet, 2004) and their own e-health strategies from 2005[11], the Norwegian

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[10] www.dips.no

[11] The strategy from 2005 is no longer avaiable from the NSF web site, but it is referenced in a newsletter available from https://www.sykepleierforbundet.no/ikbViewer/Content/378273/05-10%20NSFID%20nyhetsbrev.pdf . The current strategy is available from https://www.sykepleierforbundet.no/Content/174152/Strategie-helse.pdf

Nursing Association[12] (Norsk Sykepleierforbund, short; NSF) decided to initiate the ELIN-k[13] project. ELIN-k were financed by the Norwegian Health Directorate but executed by NSF in collaboration with KITH and the Municipals Central Organization[14] (Kommunenes Sentral Forbund, short; KS). KS also had a strategy of e-health outlined in 2006 that fitted well in the endeavour of realizing a communication tool between the municipals and the hospitals.

The project objective was to develop a set of messages called Nursing and Care Messages[15] (NUC messages) for the support of nurses' cross level communication and collaboration. There were two situations to be covered. A set of NUC messages was to be designed to support the collaboration between municipal nurses and the GP setting in the project ELIN-k phase 1. Additionally for ELIN-k phase 2; a set of message was to be designed to support the collaboration between municipal nurses and the hospital when collaboration is needed in joint patient trajectories. National guidelines for the electronic NUC messages were prepared too (Skarsgaard & Askevold, 2011). The ELIN-k project was organized in stages;

1. A preliminary project which objective was to prepare the NUC messages specification
2. The main project of ELIN-k included subsequently:
   a. A period of time for the EPR vendors' design and development of the messages
   b. Testing, piloting, adjustment and completion of the national standard NUC messages and their accompanying guidelines ready for deployment

The University hospital of North Norway and The municipal of Tromsø[16] were together participating in the ELIN-k phase 2 project, as one of 5 national pilots.
The ELIN-k project also planned for developing NUC messages covering municipal health centres and emergency rooms collaboration. These objectives, and others too, were never realized and will not be covered here. The ELIN-k project was terminated in 2011 and in 2012 transferred to NHN for follow up of deployment.

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[12] https://www.sykepleierforbundet.no

[13] The K in the ELIN-k is short for Kommune (= Municipal)

[14] http://www.ks.no; KS, national association of local and regional authorities

[15] In Norwegian: Pleie- og omsorgsmeldinger, short PLO-meldinger.

[16] Tromsø also participated in ELIN-k phase 1

The contributors and method of developing the NUC messages will be described further below in this chapter, see section 4.2.

4.1.5. Local setting and actors

4.1.5.1. UNN
The University hospital of North Norway (UNN) is the largest hospital in the Health Region North. The hospital employs about 6000 workers and is situated in 9 different locations, where the largest venues are situated in the municipal of Tromsø, the largest town in North Norway (UNN, a). UNN serves as local hospital for the county of Troms and the Ofoten area, that comprise some 30 municipals, and a population of about 187000. The hospital is also serving all population (about 477000) in Health Region North for some selected medical specialties in their university hospital function (UNN, b).

As implied in the name, it is a hospital deeply connected to academia both in sense of collaboration in education and training for all kinds of health care personnel, and as a contributor to science and development of treatment and care for it's patients. Treatment is given as inpatient and outpatient care. Additionally to the primary functions of a hospital the National Centre of Integrated care and Telemedicine (Nasjonalt Senter for Samhandling og Telemedisin, short: NST) is a part of the hospital. NST has 4 different departments. The department of Integrated Care, and the department of E-health and ICT (NST, a) are of special significance to this thesis subject as contributors and basis for the electronic message deployment project FUNNKe and the department in charge of participation in the ELIN-k project. The Integrated Care department in NST also holds the secretariat for the OSO body that will be described further in this chapter.

4.1.5.2. Tromsø
The municipal of Tromsø is a town with a 70000 population (Tromsø kommune, a). Tromsø is the largest town in north Norway. The nursing care units are diverse and multitude, covering both institutional care and home based care (Tromsø kommune, b) and unit for administration of nursing and care services (Tromsø kommune, c).

4.1.5.3. OSO

In the local setting around UNN and the municipals the hospital serve, there are a joint collaboration body called Overordnet Samarbeidsorgan[17][18] (short: OSO). This is a body, required by The Health and Care Service Act §6-1 (Helse- og omsorgstjenesteloven, 2011) which assignment is to prepare agreements among the hospital and municipal parties based on national requirements and local needs in order to regulate the collaboration between the parties when they collaborate in joint/same patients' trajectories. On this basis, the OSO negotiate and prepare local service agreements (OSO, 2012). Here it is outlined the duties that each party has in case of hospitalization for patients that have municipal nursing and care services before hospitalization and those who are hospitalized and cannot be discharged unless municipal nursing and care services are provided for. The NUC messages as such are not a part of the OSO agreement. But the OSO agreement number 5 (UNN, c) says that if the national NUC messages are implemented then they are mandatory in the communication between the parties. Attachment 2 and 3 to the OSO' s ICT agreement number 9 (UNN, c) translates communication duties described in the OSO service agreement number 5 as a specific guide for NUC messages.

4.1.5.4. FUNNKe

National health authorities initiated programs to deploy the developed messages so that the strategies for electronic communication in the health services in Norway could come in to practical use. The program was called Meldingsløftet[19] and was initiated and conducted by the Health Directorate (Helsedirektoratet, 2011).

Ahead of Meldingsløftet, NST had outlined and organized an implementation plan for the northern part of Norway including all electronic messages available for all collaborating care levels health and care workers in the northern health region (Helse Nord = Health North, short: HN). FUNNKe[20] is the facilitator organization in HN and provides initiative to start

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[17] http://www.unn.no/overordnet-samarbeidsorgan-oso/category20775.html

[18] Overordnet Samarbeidsorgan can be translated Overarching Collaboration Body

[19] The word *Meldingsløftet* is possible to interpret two ways, *melding* means message while *løftet* means both lift/elevate and promise in definite form

[20] FUNNKe is short for the then participating actors: **F**astlege (general physcisian or regular doctor), **UNN** (University hospital North Norway) **K** (kommune norwegian for municipal) and the **e** stand for **e**lectronic communication. In addition to be a pronounceable short, it also can be perceived as an abbreviation of the word to function or to work. The projects short name is very adequate to point to the aim of the project, both as will "FUNNKe" and that the help/initiative/competence and resources the project provide for the health actors itself

electronic communication, competence in both organization and technical levels and some financial aid to support the actors involved. FUNNKe is governmental financed from the Ministry of Health and Care, and is a part of NST/UNN.

The electronic communication between municipal General Practitioners (GP) and hospitals had been a reality for several years due to the initiative, financial and technical support[21] of HN in the early years of 2000. Most GP in the northern part of Norway communicate with the so-called "old messages" - Referrals and Discharge documents.
Therefore the main objective in project FUNNKe is to support the municipals nursing care personnel to communicate electronically with the GPs. The second objective is to support the municipals nursing care workers to communicate electronically with the hospital (NST, b).

As part of the FUNNKe second objective the subproject "FUNNKe in UNN" was initiated in UNN and completed in 2012. This is one of the hospital's contributions to FUNNKe; to deploy the NUC messages in own hospital. Completing the "FUNNKe in UNN" project has made the hospital fully capable to communicate electronically with collaborating municipal nurses. This is an addition to the existing channel of communication between the hospital and the GPs.

4.1.5.5. ICT support

Some years ago HN reorganized all the ICT support service units in all HN hospitals in to one enterprise[22]. The enterprise Health North ICT (Helse Nord IKT; short HN-IKT) is providing ICT services primary to manage the ICT systems in the HN hospitals in many different levels, like daily drifting the ICT applications, and participating in ICT projects.

HN-IKT provides the technical support and is the collaboration partner for UNN in the projects ELIN-k and FUNNKe. In the message projects the department of EPR and Patient Administrative function (EPJ/PAS) and the department of Electronic Data Interchange (EDI)

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makes the electronic form of communication function/brought to life one hope that an electronic form of communication. The project name was kept when the project expanded to comprise the whole HN region.

[21] Provided by the HN technical enterprise Health North ICT

[22] http://www.helse-nord.no/helse-nord-ikt/category12573.html

have been close partners. Both departments have contributed in setup and diagnostic of malfunction in the EPR message module and its complementary message applications. Especially the HN-IKT EDI department has been, and still is, an essential resource in the daily running of the message applications and is also a supporting resource for the communication partners of UNN, the municipals and the GPs.

4.1.6. The NUC messages
The chain of messages and standards of naming, contents structure and function
The development of electronic NUC messages is also the introduction of several standards. There are standards in message trajectories, line of structure/pathways and standards of content and structure of the messages and the naming of them.

Traditionally nurses across levels of care interact in various ways and situations. Hospitalised patients from municipal care levels triggers collaboration from healthcare workers on both sides. The points of interaction are
1. when the patient is transferred from the municipal care level to the hospital
2. when the hospital starts to plan for the discharge of the patient after hospital treatment
3. when the patient is transferred from hospital level to municipal level of nursing care

The messages developed are correlated by name, structure and function that reflect respectively the situation they are meant to support and have resulted in a portfolio of 10 NUC messages. The Nursing and care messages are subdivided into 3 different categories: Logistics, Dialogue and Professional (fagmeldinger) NUC messages.

To make the names recognizable I include the Norwegian names in the following display of the different messages:
Logistics messages are messages meant to be used in order to alert the across level part about stages in patient admission when hospitalised. These messages include no health information but give information of the name of the patient, and account for the nature and date of patient's situation. There are four situations covered by these types of care messages. The messages are only possible to send from hospital level addressing the

municipal care level. The nurse cannot write anything in the message. The structure and content are predefined, and the message is sent automatically from the EPR when the nurse chooses to alert the municipal care by activating and confirming variables in the EPR that thereby produces the messages.

1. Admitted Patient (Innlagt Pasient)
2. Discharge Ready Patient (Utskrivingsklar Pasient)
3. Aborted Discharge Ready Patient (Avmelding Utskrivingsklar Pasient)
4. Discharged Patient (Utskrevet Pasient)

The Dialogue messages are interactive messages meant to support an interactive communication between the nurses in the different levels of care. There are three kinds of messages. They are open in structure like e-mail. The content must be written in free text. Only the name and different options of codes embedded in the messages are made to indicate the purpose and content of the messages. Both parties can send and receive these messages.

1. Inquiry (Forespørsel)
2. Response To Inquiry (Svar På Forespørsel)
3. Error/Deviation (Avvik)

The last category of messages is rich in template and complex **professional messages** embedded with numerous textboxes and check off boxes possible to use if needed. The messages are dynamic in feature meaning that only the textboxes and check off boxes one choses to fill in are included in the message sent. The message has a rich structure where predefined information already inherent in the EPR is retrieved into the message when opened. One message is from the municipal level and two of the messages are from hospital. The messages are opened as a document in the EPR.

1. Admission Report (Innleggelsesrapport)
2. Health Information Application (Helseopplysning ved søknad)
3. Temporary Discharge Report[23] (Utskrivingsrapport) (not in use in UNN, see section 4.2.4.)

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[23] Take note that instead of the Nursing and Care Massage *Temporary discharge report* UNN uses *Discharge summaries* for medical doctors and nurses. The electronic message *Discharge summary* is not part of the NUC messages portfolio. And

4.2. The creation of NUC messages

This section comprises an extensive description of the creation of NUC messages bridging the early stages and work from the preliminary ELIN-k project up to completion of the NUC messages in ELIN-k test and piloting phase. Time-wise this is a period of time from 2006-2011. The main focus though is from the time UNN was actively working in the test and pilot stage, from around 2009-2011.

4.2.1. The preliminary ELIN-k contribution; Process and method of making the NUC messages

The first realization process of making the NUC messages was conducted by the work of the preliminary project of ELIN-k (NSF, 2006). The method used was called the ELIN method and draw upon the BIT project method. BIT is short for "branch specific ITC solutions" and is a method described by Innovation Norway[24]. The method involves the steps including the branch itself defines and describes their needs and owns the developing projects, and that the vendor/designers develop the IT solutions to meet the needs described. Both parties often finance the projects. The vendor owns the solutions and can profit from sales of the solution to other parties in the branch, both national and international. In this case the nursing community was the branch. All the suppliers of hospitals EPRs and municipal EPRs in Norway were participants of the ELIN-k project. The preliminary project of ELIN-k aimed to prepare specification for messages, specification of workflow function and presentation and user-friendliness of the messages. For this thesis subject two specifications are relevant:

- Functional requirements in ELIN-k Project - Part 1 - General functional requirements for all sub-areas
- Functional requirements in ELIN-k Project - Part 4 - Functional requirements for specialist (hospital) health systems

   (NSF, 2006; Skarsgaard et al, 2011)

The ELIN-k preliminary project was established with a board, a project group and a reference group. Relevant representatives and stakeholders were populated in the groups with

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UNN has made a decision to not provide the collaborating health care workers; GP and municipal nurses, with temporary documents. The health information accompanying patients' discharge from hospital will be complete and not a temporary version.

[24] In Norwegian: Innovasjon Norge, a governmental and county financed company for innovation http://www.innovasjonnorge.no/Om-Oss/Lov-om-Innovasjon-Norge/)

representatives from the NSF, DNLF[25] (the Norwegian association for medical doctors), KS, Health Directorate, National ICT[26], University of Oslo, NST and KITH. Most important for this thesis subject is the project group that lay ground for the specifications of the messages and their function. The 10 persons project group were mostly nurses from municipals and some nurses from hospitals, and two GP's also contributed. Their objective and task was to describe, with background from their professional experience and competence, what kind of messages was needed and describe the needed function, naming and describes the intersection points in which NUC messages could provide support. The goal was outlined to create the "Good professional message". A communication structure, a pathway, of messages was illustrated, see figure 2.
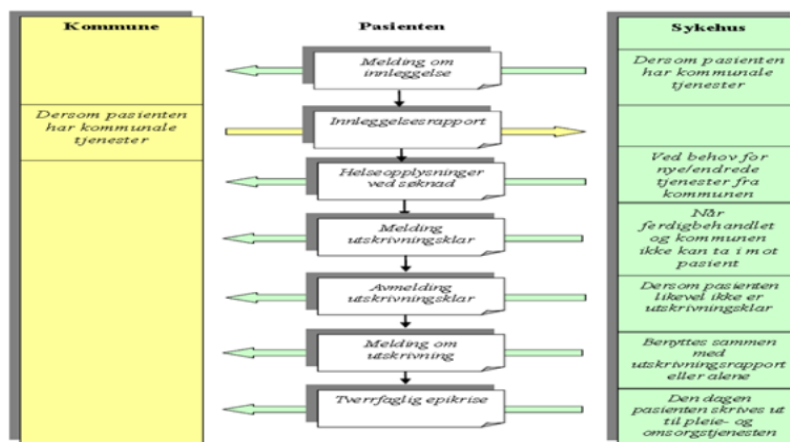
Figure 2. Pathway for NUC messages between hospital and municipal nursing and care services

There is no indication in the documents that other contributing factors like the Regulation for patients ready to be discharged from hospital (Forskrift om Utskrivingsklare pasienter, 1998) or regional/local agreements were brought in to consideration. There is no sign in the project documents that a message covering the need for an Early Alert was discussed or considered. Informal discussions and ad hoc interviews with two of the preliminary project participants enlightens that there in fact were discussions about Early Alert. The work group excluded an Early Alert message due to an interpretation of confidentiality according to Act of Management § 13 (Forvaltningsloven, 1967). The informants also stated that the group

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[25] http://legeforeningen.no

[26] The fellow organization of ICT for hospitals in Norway, http://www.nasjonalikt.no

recommended the form and content of the Discharge Ready Patient to be a logistic message. From informal talks with participants from the preliminary ELIN-k workgroup, a notion surfaces/was articulated that the line of messages was already outlined before the work group started their work, and that their work was perceived as a quality and approving assignment. Who it was that had prior outlined the messages was not explicit mentioned in the informal discussions, and will not be covered further in this thesis.

4.2.2. ELIN-k project life and work arrangements

In April 2009 UNN aimed to start the period of testing and a subsequent pilot of the NUC messages. Problems occurred immediately as the message module was not installed in the test base so the testing could not start. The hospital's ICT support, HN-IKT, was tied up in other hospital projects and was not able to set up the message module for testing until autumn 2009.

While waiting for testing to begin, project time was spent reading the ELIN-k documents (project directive, messages' specifications, strategy documents etc.) and overarching documents like Regulations that applied to communication between hospital and municipal and the local agreements. Contacts (networks) were established with various parties; in our own organization and with the municipal of Tromsø. On national level contact was established towards national participants like the national ELIN-k project managers and other pilot participants. The national project Meldingsløftet initiated a series of conferences that the Troms/UNN pilot attended. The objective of the conferenced was to raise awareness and competence amongst stakeholders to embark on the task of making electronic communication in health communities a reality.

The national project arranged regularly telephone meetings between all the pilots and national project management and vendors during the project period from 2009-2011. There were also meetings arranged were only the pilots and the national management attended. These were meetings in person at the KITH offices in Trondheim. The topics of the telephone meetings were to present and discuss the status for each pilots and the vendors work. The topic of the Trondheim meetings were more overarching issues, like roundtable discussions

regarding the messages guidelines, the display files, the content of the messages and other joint issues regarding operating the local projects and so forth.

4.2.3. Translation and Negotiation in ELIN-k project

During the first meetings (August and November 2009) in Trondheim, our pilot from Tromsø/UNN raised the issues of the mismatch of local needs and the national naming, structure and formats, that we learned was planned and ordered from the national project on the basis from the preliminary project of ELIN-k.

1. The first issue Tromsø/UNN raised was the lack of the message Early Alert. A need for this message was based in the local OSO agreement and had been a communication requirement for several years. The national management of ELIN-k referred to the preliminary ELIN-k project that had assessed an Early Alert messages out, due confidentiality issues. The national ELIN-k management stated that if local obligations imposed/required an Early Alert message, the message Health Information by Application was appropriate to use. Although the suggestion was something that could be accepted it still left us with the problem of naming. The term Early Alert is a well-established term in the nursing profession and also incorporated in the OSO agreement. The Tromsø/UNN pilot suggested that the Health Information by Application messages be fitted with an outside-message tag. An Early Alert tag could signalize to the municipal receiver of a Health Information by Application that it was intended as an Early Alert. The other pilots did not have the same requirements in their local agreements and therefore our request of Early Alert tag for Health Information by Application was declined. Subsequently the Tromsø/UNN pilot requested that the national guidelines regarding the message Health Information by Application was recognized as a message to use in need of an Early Alert.

Leaping into the future.... In the late of 2011 the preparation for the Coordination Reform (St.melding nr. 47, 2009) set new requirements regarding Early Alert. From 2012 Early Alert[27] was by Regulation §8 (Forskrift om medfinansiering av spesialisthelsetj., 2011) made a

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[27] The regulation does not name the alert as Early Alert but as a a requirement within 24 hour to alert the municipal of an admitted patient with need for care services after discharge. A more fitting name would be "24 hour Alert". To not add to the already rich level of details in this thesis, I choose to still refer to the communication requirement as Early Alert.

mandatory part of the communication between hospital and municipal nursing services (no longer was the confidentiality issues of Act of Management § 13 a topic). The former ELIN-k pilots and the Meldingsløftet participants, were asked to convey their opinion on how to adjust and encompass the NUC messages for this new requirement. In December 2011 there was a conference in Trondheim where all participants were to display their view of the Early Alert. All contributors stated that there should be designed a new NUC message with the name Early Alert with the structure including the required concepts of information that the new regulation requested. If that was not possible all participants stated the message Health information by Application could as a second choice be altered to fit the new requirements. KITH declined the preferred solution and decided that the Health information by Application was to be slightly altered, by name and structure, to fit the new requirements. The guidelines were adjusted accordingly (Helsedirektoratet, 2012). The KITH decision was explained and based upon the experience from the ELIN-k project that designing, testing and piloting a new message was too time-consuming so the second best solution was chosen, believing this would be a faster way to encompass NUC messages to the requirements of the up coming Coordination Reform. The message now is named Health Information and meets one of the requirements of the new regulation by ICT function; the other two must be included in free text.

2. The second main incongruence/discrepancy between the national message and the local agreement imposed to the UNN/Tromsø pilot, was the message Discharge Ready Patient. The ELIN-k preliminary project had pictured the following scenario when a patient was ready to leave hospital: Because there had been a previous application inherent with health information to the municipal nursing service, the message to serve as a alert was ordered as a logistic message. This type of message has no health information included and the ELIN-k preliminary project assessed that this would be sufficient information towards the municipal. The then current Regulation for Discharge Ready Patient (Forskrift om utskrivningsklare pasienter, 1998) stated in § 3 which criteria that was to be included in order to declare a patient Discharge Ready Patient, and in § 6 it stated that the hospital was obligated to account for these criteria when alerting the municipal that a patient was ready to be discharged. Based upon the interpretations of the ELIN-k preliminary project, the national ELIN-k management did not agree upon this regulation's authority regarding the

form of alert, stating the Regulation was subsidiary and did not apply other than to those parties who had not local agreements. The other pilots concurred. The Tromsø/UNN pilot needed a Discharge Ready Patient message where health information could be included. One suggested way to solve the problem was that the vendor could add to the message design the possibility to add free text in the message. The vendor had not developed this in the existing logistics messages despite requirement for this was vaguely described in the specification. This proposition from Tromsø/UNN pilot was applied for but declined from the vendor. (Later KITH revised specifications for NUC messages to inherent/include the possibility to add free text in an annotation textbox, but the vendor have not still designed this function in the messages.)

This assessment of the regulation was difficult to accept so the Tromsø/UNN pilot subsequently requested that there was conducted a legal assessment on the issue. The legal assessment was conducted by the NST legal advisors and was presented in January 2010. The UNN/Tromsø pilot read the legal assessment as a support of the Regulation §6 (ibid) and subsequently the OSO agreement's take on the message Discharge Ready Patient. The national ELIN-k project management read the legal assessment in association to their opinion. The other pilots concurred with the latter. The result was that the Tromsø/UNN pilot request for alteration of the message Discharge Ready Patient was not met, and not to be redesigned as a message possible to include health information. The Tromsø/UNN pilot presented this issue and its failed results to the OSO board with the intention to suggest that the OSO board involve in negotiation with the ELIN-k project. The OSO body sent a letter to the national ELIN-k project citing the Regulation §6 (ibid), the NST legal assessment and explaining the need for a message to include health information when alerting the municipal of a patient ready to be discharged from hospital. The OSO request made no difference (in the OSO body archive of documents and correspondence it is not even possible to find an answer from the ELIN-k project regarding this letter of request). The message Discharge Ready Patient remained on a logistic format. Ultimately the Tromsø/UNN pilot was left with a two-message solution. In order to accommodate the OSO agreement when to alert the municipal that a patient in hospital is ready to be discharged

- one must first send the Health Information by Application message to fulfil the agreement of updated health information

- Secondly and additionally the message Discharge Ready Patient is to be sent. The messages are to alert of which date the patient is ready to be discharged and include also the adequate named message of the situation.

The Tromsø/UNN pilot requested that the use of Health information by Application for the purpose of giving updated information was included in the national guidelines for NUC messages. This request was accepted and included in the national guidelines by the national ELIN-k management.

Additional requirements and feedback from our and the other pilots were also stated in this period of time in the ELIN-k work. I will not account for these here in order to limit the scope of this thesis. But especially the topic of cumbersome user interface (lack of user-friendliness) and lack of the outpatient feature for the NUC messages was addressed. Not only to the national ELIN-k project management but also of course in discussions with the vendor and national messaging networks. This issue were told to be a part of the evaluation after piloting and nothing to be dealt with until further.

4.2.4. Testing and piloting

From autumn 2009 the message module was set up in the UNN test base and an extensive testing of the messages was conducted in collaboration with the municipal of Tromsø. Assistance in set up was provided from HN-IKT. The HN-IKT also assisted in searching and identifying when malfunctions occurred. Lots of technical and work flow/practice malfunctions were identified and these problems were shared and addressed in the telephone meetings with the national ELIN-k management and the other pilot actors. The malfunctions were as well reported notified in writing to the adequate stakeholders; the vendors and the national ELIN-k project, including KITH. This period was also a time were the messages was constantly evaluated for use. At the same time preparation for piloting in the hospital were made. Due to the constant revealing of new malfunctions in the message module, malfunctions in EDI programs, time for the vendor/KITH to acknowledge problems as malfunctions and upgrading pace for the EPR in the hospital and the municipal, because of all these factors out of the Tromsø/UNN pilots control; piloting was not ready to be conducted until late in 2010.

UNN selected two in-patients wards to pilot the messages. Only 9 messages were piloted, as the message Temporary Discharge Report was not ready to be piloted at the time. Waiting time in 2009 and 2010 to get ready to start the pilot was used to train electronic communicating with NUC messages to the two wards in UNN and additionally all nursing units in the municipal of Tromsø. When piloting was possible the two in-patients wards in UNN could communicate with all nursing units in Tromsø. The pilot was conducted for one month in December 2010.[28] When piloting the Temporary Discharge Report in December 2011 the UNN wards rejected the message due to poor user-friendliness and some safety issues regarding display of medication within the message. Only a few messages of the type Temporary Discharge Report was sent in the pilot that lasted one month in December 2011. The disappointing result was reported to the Patient Record Committee (Journalkommitéen) at UNN and they concluded that the Temporary Discharge Report was not to be taken in to use in UNN.

4.3. Implementation of NUC messages in UNN

Preparations. A users' manual for electronic communication was prepared. The national guidelines for NUC messages were adjusted to local setting. A procedure for electronic communication with the municipals was translated from the "non-electronic" procedure. An information map was prepared to display which municipals in Northern Norway were electronic communication parts to UNN[29]. Risk analysis for introducing and implementing electronic communication in the hospital was conducted. The OSO agreement number 9 was prepared (OSO, 2012) (see section 4.1.5.3).

4.3.1. Organizing the implementation of messages in UNN

This section is written with referring to the FUNNKe in UNN project report (Wangensteen, 2013)

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[28] After the pilot, the Tromsø/UNN pilot let it open for the wards to continue communicating electronically waiting for the last message to be ready for piloting. Both parties wanted to go on communicating electronically waiting for the pilot of Temporary Discharge Report. The waiting time was one year.

[29] Interested readers can look up the users' manual, the guidelines, the procedure and the information map under FUNNKe web site "Nyttige dokumenter", bullet **DIPS- bruk av meldinger** and bullet **Prosjektdokumenter- helseforetak**: http://telemed.custompublish.com/nyttige-dokumenter.4817240-164942.html

After piloting the last NUC message implementation of the messages in the hospital was the next step according to the objective for FUNNKe (NST, a). A plan for implementation was prepared, presented to and approved by the hospital board in March 2012. The main objective was:

> "All in-patient wards at UNN will within 2012 be able to communicate electronically with municipal Nursing and Care services (NUC) for hospitalized patients in a message flow that follows locally adapted national guidelines" (Wangensteen, 2013, p. 4)

The plan identified 49 in-patient wards at UNN to be included for implementation of the NUC messages. Implementation comprised two key aspects:

1. Technical set up for the NUC messages in the EPR for each ward. Technical set up also comprised giving name to workflow features for NUC messages for each ward. Administration of users access to the new message module and it entailing features.

2. Training of users. How to make use of the messages, when to use them according to the OSO agreement and as part of the inpatient hospital pathway/trajectory. Practical exercises and introduction to new work routines accompanying the NUC massages. Introduction to UNN guidelines for NUC messages comprising responsibilities for use and in case of malfunction and error. The training was also conducted so the users were capable to communicate electronically according to the in-hospital procedure[30] for discharging hospitalized patients to municipal nursing care services.

The traditional in-patient wards at UNN were the main participant/target groups in the FUNNKe in UNN project. The NUC messages supporting communication regarding patients in the hospital to municipal care setting, are, due to technical design, limited to admitted patients' pathways only. The order of which the implementation was to be conducted was based on the priority regarding some notions of practical and logical sense:

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[30] The procedure used in training was a translation from the exiting procedure at UNN regarding Discharging of patients from hospital to municipal Nursing and Care Services. This procedure had been revised according to the Coordination Reform some months previously.

- In-patients wards with more patients to communicate about was a first priority to others wards with fewer patients who were in need of municipal nursing and care services after discharge from hospital
- The host municipality to the various/different UNN locations must be electronic connected as a communication part to UNN before the wards at the UNN localization could be part of the implementation project.

A wide set of activities was part of the plan as means to achieve the main objective of the implementation. Activities were planned for project management (and a supporting/additional project worker), for in-patients wards management and their appointed super users and HN-IKT.

4.3.2. The method of implementation
Resources in the hospital were scarce and the implementation plan was influenced accordingly taking use of super users to help in implementation. The method of super users is commonly used in the hospital as a method to proliferate knowledge and skills both when implementation and training for various work tasks and work routines is needed. The method entails that appointed personnel pass on competencies (is given training for or already have) to colleagues that need this specific knowledge or skill as part of work practice/duties. Super users are a source of valuable knowledge and skill in a more constant presence due to their employment and attendance in the ward. In contrast will outsider trainers not be able to support the everyday practice in the same present and immediate way. The training given from FUNNKe in UNN project manager and the fellow colleague from the E-heath department would be from such an outsider position. Both trainers are educated nurses with many years experience from the nursing profession.

The implementation started in April 2012, and the somatic in-patients wards in UNN's Tromsø location were the first ones out during spring 2012. The majority of psychiatric wards in Tromsø were implemented in the autumn 2012. Major UNN locations in the municipals of Harstad and Narvik were also part of the implementation in the autumn of 2012, also the location of UNN in the municipal of Lenvik and Balsfjord. Trainers were the

FUNNKE in UNN project manager and a fellow colleague EPR advisor from the E-health department at UNN.

4.3.4. Training method for NUC messages

The training sessions was conducted as learning by doing sequences where the trainer sat by the computer logged on a test base of the EPR surrounded by some (1 up to 5-6) super users. The training consisted of displaying the practical manoeuvres connected to the making of all NUC messages and their accompanying features and work tasks as they were to be conducted to comply to the UNN procedure regarding *Discharge of hospitalized patient over to municipal nursing and care services*. The procedure was actively part of the teaching session. Simultaneously, the guidelines for NUC messages and users manuals were presented. The scope of the FUNNKe project was presented so the scenario of a fully electronic communication channel in the health region north, and the same for national vision, was mediated to the super users. The training sessions closed with a section where all the super users, one by one, was encouraged to try out the features of the message module and ask clarifying questions about the module and how to embark the new way of communication. If possible real patients from their ward (and part of the production base of the EPR) in need of municipal nursing and care services were used as suitable examples in the first exercises for super users. The sessions lasted some two hours. Some wards wanted many sessions for many super users. Some wards only was in need of one session and had few super users.

The follow up was hands on and very close from the project FUNNKe in UNN, checking in person up or by telephone (with the additional possibility to share desktop) at the ward on a daily basis. In a joint decision the follow up was reduced and adjusted to the appropriate need. How much follow up was needed varied very much according to how many patients were in the ward possible to communicate electronically about, how the training was received, and the super users ability and time to pass the skill on to colleagues. As a main level of standard the super users must be sufficiently able to carry out further training of colleagues before follow up from the FUNNKe in UNN could cease. After ended follow up, in case of need, a standing offer to contact the FUNNKe in UNN trainers by phone or e-mail was mediated to the super users. Follow up was also adjusted from the FUNNKe in UNN

project managers surveillance of message traffic retrieved from statistic report generated from the EPR. Wards that obviously did not take messages in to use, or did not seem to draw/benefit from training or show interest, was actively approached to support a more sufficient compliance, or to sort out what might be the problems preventing the practice of electronic communication.

By the end of 2012 44 of the 49 wards was able to electronically communicate with the municipal nursing and care services. The remaining wards were not possible to include due to the practical/logical requirements for being included as mentioned earlier.

During 2012 the FUNNKe in UNN project manager also invited and initiated the set up to become a electronic communications partner to UNN for the largest municipals in the county hosting UNN localizations. The last two remaining municipals were set up in the winter and spring in 2013.

4.4. Users' experiences

This section will present the experiences as told from the interviewees. The interviews were conducted in late March and early April in 2013. As the implementation project started in April 2012 those who were interviewed had about one year of experience using the electronic NUC messages.

Due to the observations from the implementation and the follow-up and according to the insights of the ANT a set of questions were prepared for the semi structured interviews. The prepared interviews with the municipal nurses were differently planned but included many of the same aspects.

4.4.1. Interview themes

1. The method of implementation. Teaching method and the teaching materials as means to train for skills to use the NUC messages.
2. The perceived results, did personnel in their wards possess the necessary skills to communicate electronically and according to the procedure and the procedure being the concretisation of the OSO agreement and the national Regulation from the Coordination Reform? Compliance with the procedure.

3. User-friendliness?

4. The issue of incongruence of naming and structure in the message formats was in the test and pilot period an major issue of concern, how was these issues a reality for actual users of the messages?

5-6. I also wanted to know their opinions and experiences regarding what the NUC messages entailed of good and challenges that I my self did not learned from observation when training them and during the intensive follow up in the implementation weeks and after. I therefore asked if there were topics in the message module or the cross level communication, positive or negative that was important to them that I had not presented or asked.

4.4.2. Interview responses
1. Method of training and the supporting documents.

All of the respondents stated that the super user method was adequate to implement the skills required to communicate with the NUC messages. The super user method was acknowledged as a familiar method used in many other situations where transferral of skills was to be implemented both regarding new employees, but also because of the challenges regarding employees work shift making them variously available for training. Closeness to the competence in the ward was highlighted as a beneficial part of the super user method, especially because of nurses shift work. Some of the respondents stated that it had been difficult in a busy workday to find time to teach co-workers. Some wards had few collaboration situations to practice over, and this prolonged the implementation. All super users stated they felt competent to communicate electronically towards the municipal Nursing and Care services and to pass on the skill to their colleagues, but most of them addressed the need for repeating training and continuous support. All the respondents mentioned training the medical doctors as a major problem that not yet was accomplished, resulting in shortcoming in compliance regarding the procedure in total from their ward. As a sum up, some of the wards had better results of total personnel that were skilled in electronic communication than other wards. A complicating factor was also the fact that only a few municipals are electronically connected to UNN so the personnel had to handle two different methods of communicating with the municipal Nursing and Care services. The procedure was mentioned from most of the interviewees as a useful support/artefact as it is

brief/short but sufficient so that personnel could comply the demands of the OSO agreement. A printed copy of the procedure was reported spread about and was very much accessible to personnel in the wards. The guidelines and the user manuals were seldom in daily use, if used; as a last choice when in doubt with no one around to ask for support. The map was often put up on the walls to remind the users which municipal where encompassed in the electronic communication procedure. If they did not remember the practical manoeuvres they asked each other or called for help (the FUNNKe in UNN manager or the fellow trainer from E-health department). They asked for the e-learning program, which they had been envisaged at implementation start point would be ready, and be at their disposal and support their training. The e-learning program had had not yet been published, of reasons out of control of the project manager.

The municipal respondent claimed that they sometimes were approached to help the hospital personnel in how to make the messages. This was often in a context where for example the municipal complained or did not accept the messages sent to them.

2. **Compliance to the procedure of Discharging patients to the municipal Nursing and Care services**

Most respondents state that although they know the procedure and the practical manoeuvres in the EPR so the messages can be made and sent, the time aspect of the procedure is mainly not met. They are a day or two late according to the massage pace and pathway, and that is especially in regards to the messages Admitted patient and Early Alert (Health Information by Application). The content required for Early Alert is also not qualitatively good enough. According to the requirements of content in the national Regulation §8 a-c (Forskrift om medfinansiering av spesialisthelsetj., 2011) some nurses write very short, hardly adequately informative and lack the required information about expected duration of the patient's admission, and subsequently expected date of discharge from hospital.

Nurse S:

"Well, often when I come to work on Monday and a patient is admitted during the week-end the initial messages are not sent. I have to be there constantly to remind the personnel of our communication duties. They know how to do it but forget to execute the task, I even made them a checklist"… "..it is difficult to accommodate the

required date that indicate length of hospital stay that we are obligated to inform about according to regulation. How can we know how long the patient is in for? We have to take a guess at it, but some nurses just skip this piece of information in the Early Alert, it is too difficult."

Several of the respondents mentioned especially that there had been problems regarding the requirements of extra health information when alerting the municipal about a patient ready to be discharged. The two-messages solution was hard to fulfil, but as a result of complaints from the municipal Nursing and Care services and perhaps withdrawal of reimbursement tied to this messages, the skill covering the communication the Discharge Ready Patient has improved during the first year.

3.   User-friendliness of the messages module

Nurse L:

"… we are used to the cumbersome user-interface in the EPR so this is no surprise, but it would have made it so much easier if it was better facilitated. Some of the younger nurses find it easier and the not so computer skilled tend to leave these communication tasks to them. It can be an uneven distribution of work load that creates frustration".

Some states that the messages Health Information by Application is so big and cumbersome that it is difficult to fill in the information and to get a full overview over what the messages contain. One tell that some nurses did not understand that the text boxes was possible to fill up with so much words as one wanted because the format is so narrow, displaying only about 3 cm for each text box. Some report they find it difficult that the messages are spread out, put in different windows and that two of the messages content are not possible to display (this is a reality for logistic messages Admitted Patient and Discharged Patient). The message Health Information by Application is made so that both nurse and medical doctor can write in the same massage and it is possible to send a started message in the EPR workflow to the next writer. No respondents report that this is something they have managed to teach their personnel and as a result this message is sent in two copies to the municipals, one from the nurse and one from the medical doctor. The respondent from the municipal Nursing and Care services experience this as fragmented and cumbersome to gain

overview over the received information but says it is better though than not getting the full information.

4. The national standards in local use

Nurse B:

> "It would be so much better if the messages were named logically. An Early Alert is named Health Information by Application, it is evident that this causes problems! This you must alter, we cope, but it does not provide quality either when it is the wrong name, and the inside structure does not list the required concepts. When people have to think and remember themselves the risk is that they forget and write something else than the mandatory information".

Many of the informants give a lot of examples to how this could have been better. The procedure also outline that they are to write initially in the Health Information by Application the purpose of which the message is sent. The fact that the Health Information by Application messages are meant to cover three different communications situations, is not easy for the municipal Nursing and Care services either, as they never know when receiving this message in what intention it is sent.

Municipal nurse:

> "Some times it is impossible to understand from the content in what purpose the message is sent. Then I have to analyse the content, and I write them (the hospital) a dialogue message and tell them how I perceive the message. I usually decide by the order the messages are sent by, but sometimes they do not send them in the agreed order and the content can be hard to interpret; Maybe it is a Early Alert, maybe it is a part of an application, maybe they mix them together. Sometime it is hard to decide." …. "I also mean that the agreement is an ideal situation that we want but not fully are in reach of. The agreement are too little concrete, one example is the concept that are to be described regarding the level of function of the patient. What does this comprise? We see the hospital describes this very different, some with rich level of details some with next to nothing. How are we suppose to manage to assess and plan/provide/offer the right level of Nursing and Care Service?"

Nurse H:

"The doctors are frustrated that the mandatory concepts of information they are to fill in to these messages format are not inherent in the message structure, so they must remember them and they often forget. It is a challenge to obtain the wanted quality. Why cannot the messages' inside structure be altered according to the agreement requirements? This contributes to mess and misunderstanding, making it chaotic!"

Municipal project manager:

"In all these years we have addressed the problems of the Early Alert and the Discharge Ready Patient message. Although they (the ELIN-k and KITH) say it is important to give response to the malfunctions and other problems we have detected, our feedback have lead to no consequences and the design we were handed stays the same." Interviewer: Why is that you think?"
Municipal project manager: "I think when the vendors have programmed something it is too costly or time consuming to alter it. The testing and piloting have not resulted in many of the major adjustments we need to fit hour local setting. To me it is not understandable and we are left with solutions that are cumbersome. In my opinion there has been too little focus on the user interface as well, same story. The ELIN-k stated it wanted to provide for the good professional nurse message, but the KITH certification does not capture the actual problems of user-friendliness or a well-adjusted workflow function of the NUC messages. It is the price of being part of a pilot project. I hope that when the rest of the health community are starting to use these messages that more voices will speak out of the short comings of the NUC messages, ours voices are not been heard."

5. **Challenges**

Nurse B:

"The municipal very seldom sends the Admission Report. They complain to us because we do not send health information added to the Discharge Ready Patient messages. But we have sent it the day before and regard it sufficient

updated. If we complain to the municipal,… well, it has been some difficult situations."

Nurse L:

"The introduction of electronic communication has made difficult the oral discussions and collaboration with the municipal Nursing and Care services that previously was very appreciated in our ward. Now if we call them they say we have to send electronic messages. It creates a distance. We do not know who the readers are in the municipal, and we know a lot of the messages are read by the administrations of the municipal Nursing and Care services. A professional discussion with the actual municipal caregivers is not easy to conduct. These NUC messages are not exactly of chat features even though they have the interactive feature …"

Nurse L:

"The messages were implemented shortly after the Coordination Reform was just started. We did not only have the messages to learn, we had to learn the new mandatory communications requirements at the same time. In addition it is the problematic situation that not all the municipals are electronic connected to UNN yet; our nurses and doctors have to conduct a new procedure in two different ways, the old way and the electronic way. So I'll say it has been a lot to accomplish, but we will manage better as times go on."

Nurse H:

"The hospital management could be better regarding the OSO agreement and the practical use of it. I have voiced that the Department of Integrated Care and Coordination at NST should offer more practical assistance with how to understand and interpret the OSO Agreements and obligations. Especially it has been a problem regarding the reimbursement claims."

6. **Positive aspects of electronic communicating with NUC messages**

The overall response though is that the NUC messages contribute positively in the everyday work practice for the following aspects:

1. The time-consuming and constant workload by calling the municipal Nursing and Care services is replaced by sending messages that one can send when the nurse have time for it in her busy day.
2. The message is documented in the EPR both for collaborating personnel in the ward but also in the municipal EPR.
3. The nurses can check that messages are received in the municipal.
4. The technical functions of electronic messages are reliable, there have not been many technical errors in traffic, and personnel can trust the transmission of their messages.

Nurse T: "I think it is very good function with the electronic messages. We write them and they write back. One does not need so much time in the telephone anymore, it is a big relief."

5. Discussion

In this chapter I will look into some of the concepts I learned from theory and see how they can be associated with the findings of my research regarding the NUC messages.

5.1. Standards and the process of creation of NUC messages

From the introduction we have learned that the health care sector is an information-intensive business generating huge volumes of data and the ability to share data is vital to efficiency regarding shared care (Grimson et al., 2000, p. 49). In reference to this statement the setting in this thesis is about the need of sharing information (i.e. health information) necessary to cope with the work tasks in the cross level care services. This is recognized as a prerequisite for the patient's safety and continuity of care (Helse departementet & Sosial departementet, 2004; HOD, 2008; NSF, 2006). The safety and continuity aspects outlined can be considered as contributors to quality in care for the patient. Sharing health information can here be regarded as a part of a standard that provide quality of care due to the way information is shared, for this thesis indicating that electronic sharing of health information can enhance and secure a wanted quality of collaboration.

A nursing standard. The concrete setting is the creation phase/design, adaption and implementation of the electronic NUC messages. The University Hospital of North Norway and the municipal of Tromsø have been collaborating in several of the message projects presented in this thesis. The messages, of national standard, are an endeavour to support efficiency of sharing information. They are also meant to contribute to a standard that supports quality in the nursing profession regarding coordination of health services for patients in their care, drawing from the nursing profession's common knowledge and work practices. The Norwegian Nursing Association (NSF) took upon the task to ensure that the messages designed were founded on nursing needs and angles of collaboration. The objective was outlined to create the "Good professional message". It is fair to say one can interpret this as the "Good NURSE message". According to Timmermanns and Epstein their explanation of a standard can be "….. a source of authority and an articulated level of achievement" (2010, p. 70). In my understanding this imply that standards can represent the feature of quality. So when some standards are result of an implicit and shared

understanding, like the standards of knowledge and conduct that adhere to a profession/vocation (ibid p.70 - 71), the shared understanding is a result of a quality that is passed on and considered valuable in a profession. The NSF's objective to create the "Good professional message" (NSF, 2006) can correspond to this way of describing a standard, as referred to the good practice, i.e. the good quality, of nursing regarding collaboration and health information exchange.

Unifying standard. Accordingly, Timmermanns and Epstein (2010) further state that standards aim to render equivalence across culture, time and geography. One way to adhere this to the objective of the ELIN-k project is that their initiative was based on the notion to secure and unify the methods of cross level communication in nursing, as existing work practices (cultures) of communication varied in different parts of the country (geography), and was of mixed methods. Information exchange was performed by telephone, fax, and nurses paper based documents in different formats and structures (Helse Departementet & Sosial Departementet, 2004; NSF, 2006). As an example; nurses in (the geographic area of) UNN had for some years previous been able to transfer nurses' Discharge Documents electronically to the municipal of Tromsø, while this had not been possible in other hospitals in Norway. But also within UNN, the practice of electronic transmission of Discharge Documents was implemented to a various degree, due to different in-house (wards) cultures and know-how, some nurses practiced electronic transmission of health information, others printed the documents out and sent it by post or with the patient. Creation of standard NUC messages intends both to standardize the method of information exchange, but also standardizing the messages exchange structure and content of tables, and also naming of messages. The standard of NUC messages was meant to comprise these various aspects and to support/enhance the quality of communication thereby.

Design and procedural standard. Timmermanns and Epstein also state that there are both design and procedural standards. The procedural standard aspire to specify how processes are to be performed (2010, p. 72). This can apply to the ELIN and the BIT method of which the messages were developed (see section 4.2.1.), but also how the ELIN-k project intended to set a standard for how the order of messages was meant to follow a standardized pathway. A joint pathway of the health information flow provides and aims to secure and

structure the cross level communication, and thereby contribute to the same quality cross cultures and geography in health sector. The pathway can be perceived as a standard, but the pathway is actually presented in the less imposing form as guidelines. I will discuss this later.

The design aspect, says Timmermanns and Epstein, gives a definition of properties and features of a tool and the design standard contributes to uniform quality and compatibility. This aspect is also included in the ELIN-k objective of the "Good professional message". The preliminary project of ELIN-k provided, in order to achieve these design properties, a set of specifications so that uniform quality and compatibility of the messages was possible to design regardless of the many vendors. The preliminary project of ELIN-k aimed to prepare specification for messages, specification of workflow function, message presentations and user-friendliness of the messages. On a technical level, the messages were set to be of XML programming standard, so they could be compatible with existing electronic message applications and the electronic infrastructure in the health community, like the NHN and receiving EPR's message modules. Identical presentation/display of messages in sender and receiving EPR was outlined as a wanted quality inherent in the NUC messages modules. This last aspect was considered very important because of messages reliability for the users, which imply that a NUC message sent was to be displayed exactly the same in sender and receivers EPR (NSF, 2006; Skarsgaard et al, 2011). KITH prepared a set of national display/presentation standards (KITH, c) to contribute to this feature which is considered a key to enhance quality, and make sure that information bits are not lost in different vendors own design of display files. The hospital's EPR vendor has implemented this display features for all but two NUC messages, and therefor do lack full compliance to the design standard regarding two messages. See example in figure 3.

Avsender	Universitetssykehuset Nord-Norge - Nevrologisk-og nevrofysiologisk avdeling - Nevrologisk post Tromsø
Pasient	Line Danser **FNR:** 131169 00216 **Bostedsadresse:** Testvegen 123,9009 TROMSØ,TROMSØ**Telefon:** 161506516
Mottaker	Alta kommune PLO **Adresse:** 9506 Alta

Melding om innlagt pasient			
Kontaktpersoner helsepersonell			
Hendelse	Tidspunkt	Sted	Merknad
Pasient innlagt	2013-01-07 12:29		

Kontaktpersoner helsepersonell		
TESTNAR, EILA, UNIVERSITETSSYKEHUSET NORD-NORGE HF	tel:07766	Kontaktpersonen er angitt som ansvarlig behandler for pasienten.

Dokumentinformasjon	
Informasjon om forsendelsen	Forsendelsesstatus: Ny
Melding sendt:	2013-01-07 12:30
Meldingsid:	8565e3c2-ce63-4065-ba53-1cf126558744

figure 3. Standard display format of a NUC message, here the message Admitted Patient

Some of the respondents report they find it difficult that two of the messages content is not possible to display in the EPR (this is a reality for logistic messages Admitted Patient and Discharged Patient, see bullet 3 in section 4.4.2.). Not knowing what content have been sent in a message hampers the nurse's ability to get an overview over her communication actions. Misunderstandings regarding the messages can relate to this incomplete compliance to design standard, and correlate directly to nurses' reduced compliance in the standard pathway of messages, and hence reduced quality of communication.

Implementing the standard at UNN

The method of implementation of the NUC standard was meant to support the standard in a way so it could actually be adopted into every day cross level communication practice. Timmermanns and Epstein say, " Yet the power of standardization depends on whether standards are actually implemented." (2010, p. 79). The super user method, chosen for implementation of the NUC messages at UNN, is a familiar method at the hospital for sharing and implementing skills and competencies. The interviewees reported that the method of the implementation, the supporting texts (user manuals, procedure, information map) and follow-up from FUNNKe in UNN project manager, was a suitable method for implementation of the NUC standard. Additional views was mediated though, when one nurse focused on the fact that the NUC messages was just an electronic way of acting the communication tasks that had been substantially altered by the new requirement from the Coordination reform. As she approved of the training method for electronic communication, she focused on the lack of information about the new procedure and the local agreements from the hospital's Integrated Care department in NST. She stated that a more basic understanding of the new OSO agreements would have supported the understanding of electronic communication in a better way. Another nurse outlined the additional sides of implementation of the electronic standard.

Nurse L:

> "The messages were implemented shortly after the Coordination Reform was just started. We did not only have the messages to learn, we had to learn the new mandatory communications requirements at the same time. In addition it is the problematic situation that not all the municipals are electronic connected to UNN

yet; our nurses and doctors have to conduct a new procedure in two different ways,

the old way and the electronic way. So I'll say it has been a lot to accomplish."

The standard is not easy to follow because it can not be practiced towards all the municipals.

5.2. Implications for NUC messages

Timmermanns and Epstein (2010) say standards are not easily made but intend to bring

solutions to particular problems. Standards can be results of trials and failures. The authors

point to the benefit of analysis of standards, which include the phases of Creation,

Implementation, Resistance and Outcome of standards. These phases correspond with the

objective of this thesis and also to the vocabulary of the Actor Network Theory that

provides, in my comprehension, a more detailed set of conceptual tools that can bring

understanding of the processes. I will in the following look into the creation of the NUC

messages, and the implications regarding the implementation and the outcome using the

standard of NUC messages in UNN.

5.2.1. Implications regarding Inscription in NUC messages

The Nursing and Care messages are obviously made for the purpose of use. The efficiency

and safety of information exchange to support of the patients' line of care is the head reason

for its development and design. Theory states that inscription is building intentions into a

technology, to in-scribe. The intention is to facilitate a task or help a work assignment to be

more efficient and also bring about a new way of doing it. Monteiro says inscription is how

pattern of use is embodied in to a technical artefact (2000). Both Latour (1991) and Akrich

(1992) bring forward the term of scenario or script about the field wherein the users are

going to use the artefact, Latour explain it as a program of action. It is vital though that the

inscribed scenario actually covers the real task or assignment it is supposed to support or

enhance. Akrich says tension between the scenario inscribed in a technology and the real

scenario can easily be displaced. And it is in the space of analysis, the de-scription, one can

detect the success or failure of the end product. In the case of creation of the NUC messages

the preliminary ELIN-k project lined out the scenario the NUC messages are meant to work

in. The scenario they seem to have drawn from is of the implicit and shared more universal

understanding of nursing, like Timmermanns and Epstein says about the standards of

knowledge and conduct that adhere to a profession/vocation (ibid, p. 70 - 71). The overall

response from the interviews was that the NUC messages contribute positively in the work practice, see section 4.4.2., bullet 6. This may be because the messages support the scenarios well known to nurses' communication on behalf of their patients in cross level situations. The logic of the message pathway follows the patients' way through their stay in the hospital and the familiar junctions of cross level collaboration.

Hanseth and Monteiro (1997) say inscription represents interests. Here for the NUC messages, the interests that are inscribed are based on the national health authorities intention to secure transmission of health information, which again is recognized as a prerequisite for the patient's safety and continuity of care, in order to enhance the quality of it (Helse Departementet & Sosial Departementet 2004; HOD, 2008).

From Latour's example of the hotel key he derives the concept of weak or strong inscription. Strong inscription is when the technology imposes forced behaviour, and the opposite for weak inscriptions. From the findings we learn that even though the messages are fitted into a well-known scenario, there is little in the message module itself that impose the users of the EPR to actually send messages. Timmermanns and Epstein say a standard is powerful only when taken into use (2010, p.79). The NUC messages have flexibility that makes it easy to work around them or not take them into use. This we can derive from the fact that overall most interviewees state that they manage to write and send messages and understand the pathway of them, but they do not send them correctly in the prescribed scenario; at least not according to the time-line the national guidelines prescribe or to the content requirements from the OSO agreement. One typical example is the initial messages Admitted Patient and the Early Alert that both are messages meant to be sent immediately after patient's arrival at the hospital and within the first 24 hours:

Nurse S:

"Well, often when I come to work on Monday and a patient is admitted during the week-end the initial messages are not sent. I have to be there constantly to remind the personnel of our communication duties. They know how to do it but forget to execute the task, I even made them a checklist".

This can be an indication that the NUC messages have weak inscription regarding the issue of users not making them in correct timeline. The apparently weak description in the NUC messages does not impose a "message-sending" behaviour. To send the messages in time, the quote here indicate, that outside and additional interventions are necessary. Reminder from the super user and a checklist can be means to achieve NUC messages-sending behaviour and thereby compliance to the standard message pathway, as it is not imposed by the technology it self.

The messages do not provide the standard of structure that ensures that the mandatory content in local agreements are listed as a reminder to the user. The lack of in-messages structure/template can be an example of weak inscription when it does not enforce the writer of the message to fill in the required information. This applies especially to the Health Information by Application message, which in the standard NUC guidelines are meant to cover the communication regarding Early Alert in addition to other communication tasks. To enable a multi use of the message, the standard in-message structure have to be flexible, but that is on the cost of a strong inscription. Inside the message there is no structure/template according to the Regulation §8 a-c that are mandatory content[31] for national standard of Early Alert (Forskrift om medfinansiering av spesialisthelsetj., 2011). The lack of fixed structure reduces compliance according to required content in the message. After the 2011 December workshop, accounted for in section 4.2.3., KITH ordered from the vendor to fit in one of the mandatory information pieces from the Regulation. UNN have not yet taken this version of the message into use but plans to do so in autumn 2013. The lack of inside structure to impose the local information pieces is not inherent in the Health Information by Application either. And there is no technical feature in the EPR that allows a local set up of such a standard template.

The users' experiences outline the lack of inscription due to in-message structure and state it affects quality:

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[31] the Coordination Reform made "Early Alert" and its content mandatory from 2012

Nurse H:

"The doctors are frustrated that the mandatory concepts of information they are to fill in to these messages format are not inherent in the message structure and they must remember them and they often forget. It is a challenge to obtain the wanted quality….."

On the other hand, during the interviews I learned that initially there was a low compliance to mandatory content in the health information added when the patient was ready to be discharged. The interviewees reported that non-compliance was a result due to the lack of local fitted in-message structure for Health information by Application. But as a result of complaints from the municipal Nursing and Care services, and perhaps withdrawal of reimbursement tied to these messages, this skill covering the Discharge Ready Patient reportedly has improved during the first year (see bullet 2 in section 4.4.2). Nevertheless its' improvement, this indicates that the message have weak inscription because it allows alternative behaviour or the possibility to avoid fulfilling the inscribed scenario because the in-message' structure is not built into the technology. This is unlike the metal piece added to the hotel key from the example of Latour. The message module and its affordance do not coerce the user to comply with neither the national nor local standard, regarding the mandatory time and content aspects for these messages. Akrich says that the inscription objective is to make the imagined scenario feasible by the optimal function of the technology (1992, p. 208). When the inscription is weak though, there is a call for other measures to make users take the technology into proper use. The complaints from the municipal and the lack of reimbursement are outside support of the technology that seems to be necessary added to make the NUC technology work as it has a weak inscription.

According to the Latour example (1991); the NUC messages have no "metal pieces attached". The logistic messages have the content component inherent though; if the nurse chooses to mark for and send a logistic message, the content is fixed. Content wise the logistic messages have a strong inscription and comply with the NUC national guidelines. The current Regulation regarding Discharge Ready Patient alert does not comply with the local requirement for the Discharge Ready Patient, so in one way the inscription fits the national standard but not the local. The strong inscription for the logistics messages is of no use in

the local setting for the message Discharge Ready Patient since the local requirement is different than the national Regulation.

Weak inscription may also be an advantage. Timmermanns and Epstein stats that it is a fine line between a standard being sufficiently flexible so that users can tinker with it and adjust it to their needs, and that it is so loose that it will not be taken into use. A standards success is often related to its flexibility (ibid p. 81). Despite its' reported problems in this thesis' findings, the NUC messages are indeed adopted for use in UNN's cross level communication. The weak inscription also allows to deviate from the procedural standard or of its' national guidelines. UNN has not taken the NUC message Temporary Discharge Report into use. This is partly because of its lack of quality, but also as a result of a decision from a previous in-hospital documentation project stating that temporary reports are not a good enough standard health information accompanying the patients' discharge from hospital. Had the message scenario inscription in the EPR been stronger, this tinkering with the standard may not have been possible, and the UNN perception of good health information quality would have been curbed.

5.2.2. Implications regarding translation and negotiation in creation of NUC messages

The translation of the program of action, inscribing the scenario is a vital part of designing and taking a technology into use (Latour 1991). The basic translation consists of a translator, something that is translated and the medium it is translated in, the medium that the translation is inscribed (Callon 1991). Callon says that the medium must be defined and can be of many features like public declarations, texts, embodied skills, technical objects and roundtable discussions. Taking this theory into the setting of creation the NUC messages, the first translator can be the nursing group of expertise represented in the ELIN-k preliminary project work group. As translators they translated their knowledge about nurses collaboration (their embodied skills), scripted a scenario and put it into specification (text) that was the base for designing the NUC messages. They did this in accordance to public declarations like the Health Authorities ICT strategies (Helse Departementet & Sosial Departementet, 2004), the NSF ICT strategy (NSF 2006), and the different legalisations that refers to the scenario of collaboration for nurses in cross level communication (Forskrift for Utskrivingsklare pasienter, 1998). Secondly the vendors translated their perceived

translation into the design of the technology, the embodiment of the NUC messages. Callon says that design in it self is a translation because the need it represent. Here the NUC messages, with its affordances in the EPR, are the material translation of the need that was scripted.

Monteiro (2000) says that actors at the outset may have a diverse set of interests and that translation is part of a negotiation process of aligning interests. The preliminary ELIN-k project report does not account for the process of translation in detail. Informal discussions with some of the participants uncover that acts of translation within the work group excluded some of the nursing traditional communication needs like the Early Alert. This was based on the notion that the Early Alert communication was to be restricted. This notion was based upon an interpretation of the duty of confidentiality in case preparation outlined in the Act of Management in Public Service (Forvaltningsloven, 1967). In UNN the Early Alert had been a regular part of communication practice for years prior to the implementation of electronic communication. Health information, as an Early Alert, had been sent the Municipal Nursing and Care Services on the behalf of the patient with the patients' oral consent. This practice was based on the Heath Care Personnel Act § 22 (Helsepersonelloven, 1999) stating that a patient can free health care personnel from the confidentiality injunction. This practice has also been included in the then current OSO agreement, see point 2.2, bullet 1 (OSO, 2009). The Tromsø/UNN translation differed in this matter from the preliminary ELIN-k working group's translation. Interestingly though, when the Coordination Reform launched the new regulation, with communication obligations regulating the two parties coordination, the Early Alert was included as a mandatory communication obligation in § 8 (Forskrift om medfinansiering av spesialisthelsetj., 2011). Now there was no referral to the Act of Management in Public Service § 13 (Forvaltningsloven, 1967) or to the Health Care Personnel act, in § 22 regarding confidentiality (Helsepersonelloven, 1999). So summing up, this interest regarding an Early Alert has changed in time. The message's name did not changed though, and neither did the in-message structure as hoped (see section 4.2.3.).

The interests have changed for the Discharge Ready Patient message too. Initially it was translated so that the health information previous sent in the messages pathway was sufficient for the municipal to prepare the municipal for planning nursing and care services.

This translation was a direct consequence of why the message Discharge Ready Patient was specified as a logistic category of message, a message not possible to include health information. The health information needed was placed in the message Health Information by Application sent previously and this scenario was the one translated into the message Discharge Ready Patient. Interestingly the then current regulation §6 (Forskrift for Utskrivingsklare pasienter, 1998) was a direct reason regarding the Tromsø/UNN wished for the Discharge Ready Patient to be a message possible to add health information. But the current regulation §10 (Forskrift om medfinansiering av spesialisthelsetj., 2011) has now reduced this injunction in some way see §14 (ibid), so logically now a days, the message type Discharge Ready Patient fit the current regulation. But despite this, the OSO body did not alter the requirement for health information when alerting Discharge Ready Patient. It is fair to assume the OSO considered the old regulation was holding of better quality supporting transfer of health information across level of care.

Callon (1991, p. 145) says that translations can be accepted or rejected and a successful translation generates a shared space, equality and commensurability. It is not an unreasonable stretch to consider that the objective for the ELIN-k project was to translate its perceived scenario into the messages and thereby achieve this shared space, equality and commensurability as Callon outline. A shared space, referring to the scenario and translation of these features into the NUC messages, would portray the common ground as a base of the standards. The common ground also imply a wanted quality that Timmermanns and Epstein calls for, referring to the authoritative standards that implicit the shared understanding and knowledge of a profession, and that these standards are agreed upon rules that unify (Timmermanns & Epstein, 2010). It is reasonable to see the work of the ELIN-k preliminary project work, and subsequently the ELIN-k main project, as promoters for this shared space via their translations.

The incongruence of interests between the ELIN-k and the Tromsø/UNN participant was subject of negotiation as the Tromsø/UNN participants in various ways attempted to translate the local needs into the final translation of the ELIN-k. Monteiro says that translation is part of a negotiation process of aligning interests (2000). The Tromsø/UNN

participants performed different interventions negotiating to obtain a successful translation that could accommodate the local need in the national NUC messages, see section 4.2.3.

Hanseth and Monteiro outlines that negotiations produces winners and losers as translations alternatives reflect interests differently (1997, p. 9). The Tromsø/UNN negotiations attempting to impose alternative translations based on local needs were indeed a reflection of different interests. The negotiations however did not alter the previous translation of interests in the NUC messages or their features/affordances. The original translation from the preliminary ELIN-k project was maintained. Timmermanns and Epstein state "… to be a part of the team that sets standards can be a tremendous advantage." (2010, p. 79). All the negotiating conducted by the Tromsø/UNN pilot was, in the frame of this theory, likely a waste of time as the Tromsø/UNN pilot was not a member of the preliminary project ELIN-k. Callon says that durable and robust translations can resist competing translations because of great coordination within a network (callon1991). The Tromsø/UNN pilot was as such not part of the coordinated part of the network. We were outnumbered as well and our power to impose alternative translation was not strong. There is still an unanswered question though, why the ELIN-k projects could not accommodate the technical adjustments Tromsø/UNN suggested. It would not hamper the original use of the messages and the solution could have accommodated "both ways" without excluding the alternative (local) translation or scenarios. Diverse interest could have been united in a translation in design like proposed from the Tromsø/UNN pilot.

Callon (1991, p. 146) says that actors' authorship and identity is important parts of translation. Is the translator really an actor and which intermediaries imputes to the translator and gives him his identity? It is fair to ask this question regarding the issues of winners and losers of negotiations. In this case both parties are definitely actors in the processes of making specifications, testing and piloting of the NUC messages. The actors in the ELIN-k project were all assigned to this task on basis from the intermediaries like national authorities strategies and financed projects though participants of different levels. Their identity were imputed as nurses and as representatives for their organisations, the hospitals and their host municipals. The ELIN-k managers though, were imputed authority on a different level as responsible for the project in total and the technical authority that

accompanies the KITH managers department of standardisation in the health sector in Norway. With management's authority and power to decide, involved they carried a different strength than the pilot participants. When disagreement occurred, the Tromsø /UNN participants had means to negotiate the translation, but no power to decide. The power of decision was included in the managers' identity.

Callon (1991, p. 146) says that an alignment of interest is dependent on the networks and actors co-ordination. The network of ELIN-k participants did not fit together with the Tromsø/UNN translation. The other participants seemed to be able to translate the original translation to their own interests. There was hence no possibility for actors co-ordination regarding translation of the messages outlined in this thesis . The preliminary ELIN-k projects translation of the use of the messages was different and this did not change during the negotiation process either. The identity of the Tromsø/UNN participant was not recognized as someone that could speak on behalf of the whole group because the interests did not match the others. The initiative to align Tromsø/UNN interests in the NUC messages was subsequently not met.

According to the history of technology referred to in section 2.1., the tradition of workers' participation in technology design was a result of insight into how the entanglement of technology and the social impacts on scale and quality of production. It is fair to understand that the ELIN-k management acknowledged this perspective as they had chosen the ELIN-method/BIT-process to be the project method of ELIN-k. Somehow it may not have been fully adhered to, or so it can seem, reading the statement from the municipal project manager:

> "In all these years we have addressed the problems of the Early Alert and the Discharge Ready Patient message. Although they (the ELIN-k and KITH) say it is important to give response to the malfunctions and other problems we have detected, our feedback have lead to no consequences and the design we were handed stays the same." (see section 4.4.2. bullet 4).

Her perception of the impact and influence from her feedback and participation is not congruent with her expectation regarding the possibility inherent in the ELIN-method.

On the other hand the participatory design method also is stated to be in the democratic spirit of our time. One significant feature of democracy though, is that the majority rules. Tromsø/UNN translation was voiced and assessed in negotiation, but as a minority the translation had not enough power to get through. In sum though, it is obvious that the expected level of influence to the end product was not what was perceived as possible at start for participation in the ELIN-k project. From the Tromsø/UNN pilot point of view the ELIN-k project did not live up to what the participatory method intended to achieve. The feedback did not pay off and it is fair to state that the messages are not what was wanted according to the local Tromsø/UNN pilot.

Yet another point is possible to make in this section, and that is that the lack of influence on design can hamper the local agreements that is imposed on the users according to the Health and Care Service Act §6. 1-2. Here the parties of communication is not only given the possibility to agree upon different rules for their communication, they are obligated to make a local agreement. The NUC messages though have not the flexibility to adjust to local needs according to the findings of this thesis analysis. There is a tension between the local and the national also in the fact that there are guidelines for use. Guidelines are not so strict as mandatory use. The flexibility of this is in some way beneficial to UNN as discussed in 5.1. under headline for procedural standards.

Drawing upon Timmermanns and Epstein (2010) a shared understanding of conduct of profession and agreed upon rules is what makes a standard. Being the only participants differ in translation it is no surprise the Tromsø/UNN translation did not come through. The standard is supposed to impose unified collaboration behaviour and the alternative needs (the local need) may therefore be a practice one seeks to eliminate by developing this standard. Timmermanns and Epstein state that local elements can be erased by standards and herein lies its powers, and that loss of local diversity is replaced by other desired benefits (2010, p. 83). The benefit here can be the uniform way of communication with no room for local variation.

When the Tromsø/UNN translation was not met on a design level, it was met on a guideline level. The Tromsø/UNN need was included in the national guidelines stating how the Health

Information by Application message could cover the needs that represented the Tromsø/UNN translation and local needs (Skarsgaard & Askevold, 2011, p. 23).

The last phase of translation was conducted when preparing for implementation in UNN. As some of the NUC messages had not suitable naming, structure and right type of category feature and the function of the messages was not fitted to local needs; a translation was offered in the supporting implementation training material and procedure. Here the literally translation was materialized in the user manual illustrating the difference in naming, structure and function so the nurses could translate/adjust what they saw in the EPR to the requirements in the local collaboration agreement. The procedure was a direct translation between national names of message and the local names and also including a direct guide to the local structure requirements that was not inherent in the national structure. Timmermanns and Epstein (2010 p 72) say that procedural standards help to specify how processes are to be performed. The structured line of messages is a process of communication, and the national guidelines that accompany them are a way to specify how this line of communication process is to be conducted. In our local guidelines the process of communication is to some extent altered from the national to fit the local requirements. The Tromsø/UNN collaboration is using the messages as they are but not quite the way they are intended to be used, not the same standard of process. This way of alternative use can also adhere to the concept of work around according to Pollock (2005) when he states that function mismatch or restriction in a computer system can be dealt with from end-users. Timmermanns and Epstein (2010) also states that implementation of standards may fail due to lack of compliance, maladaptation and resistance and that fact that very few standards work as intended because users tinker with it. The adaption and translation of the messages fitted for use in the Tromsø/UNN collaboration can be an example of the tinkering part. Timmermanns and Epstein supports this kind of tinkering when stating that a standard has to be fitted in to the world of routines and practice that already is filled with standards. Tromsø/UNN already have an agreed upon standard of collaboration and the national messages must fit it to this, even though is does not fit exactly. One last example of that is also the decision to not take use of the 10th NUC message, the Temporary Discharge Report. Instead UNN has made a decision in previous project that exclude Temporary Discharge Reports.

5.2.2.1. Local negotiations

The users in the hospital addresses the problems of lack of naming and structure and try to negotiate a better solution to the FUNNKe in UNN project manager.

Nurse B:

> "It would be so much better if some of the messages were named logically. An Early Alert is named Health Information by Application; it is evident that this causes problems! This you must alter …."

Nurse H:

> " The doctors are frustrated that the agreed upon/required/mandatory points/terms of information they are to fill in to these messages format are not inherent in the message structure and they must remember them and they often forget. It is a challenge to obtain the wanted quality. Why cannot the messages' structure be altered according to the agreement? This contributes to mess and misunderstanding, making it chaotic!"

The quotes display that the interviewees imputes an authority and power into the project manager so that they can have fixed what they regard a mismatch in need to what the technology provides.

5.2.3. Irreversibility and normalisation in creation of NUC messages

Callon (1991, p. 151) says the state of irreversibility occurs when there in fact is impossible to go back where alternative translations are possible, and when this translation shapes and determines subsequent translations. Durable translations can resist competing translations and the actors in the translation must be resistant to erosion.

Drawing upon findings of the negotiation conducted by the Tromsø/UNN participants I am highly confident to say that the NUC messages in fact had reached the state of irreversibility already when the Tromsø/UNN participant joined the test and piloting phase of ELIN-k. As accounted for in section 4.2.3., the ELIN-k management stated that first the test and pilot work must be completed before adjustments could be made. But participant experiences display that some of the wanted adjustments were not possible.

Municipal project manager:

> "In all these years we have addressed the problem of the Early Alert and the Ready to
> be Discharge message. Although they (the ELIN-k and the KITH) say it is important to
> give response to the malfunctions and other problems we have detected, our
> feedback have no consequences and the design we were handed stays the same".

Here the municipal project manager voices an experience that contradict the intentions
from the ELIN-k management that adjustments were to be made after test and piloting was
completed. Maybe it was an intention to adjust after test and piloting, but it did not come to
a realization according to the experience to the municipal project manager. It is fair to
assume there had in fact been a better end-result of the messages if pilot feedback had been
met, at least from the Tromsø/UNN pilot's point of view.

Callon says (1991) that when decisions are made upon former translations it will be harder
to change the former translation and it will be more and more a standard. After
unsuccessfully negotiating for a message to fit the need for an Early Alert in 2009-2010, the
chance to fight for it appeared again some years later due to new requirements of the
Coordination Reform (St.melding 47, 2009; Forskrift om medfinansiering av spesialisthelsetj.,
2011). The KITH body invited in December 2011 the ELIN-k network and all its actors to
contribute to the adjustment of the NUC messages to this new demand. This time all the
actors had the same translation and tried to negotiate the same. Despite the united
translation of the new situation, the KITH body decided that there would not be a new
message, they stayed put to the former translation of how to send an Early Alert. KITH
stated in their decision that it would be too costly, time wisely, to make a new message. The
existing message Health Information by Application was subsequently slightly adjusted to fit
the new requirements. This corresponds to Callon (1991) stating it can be hard to change a
former translation and when the cost is overly expensive the translation will be irreversible.
The former translation of not making a message Early Alert was sustained in this example
even though it would have been a great opportunity, given by the Coordination Reform, to
finally design perfect Early Alert message. Here we experienced that a new translation was
not longer possible, and the former translation shaped and determined subsequent
translations, this is also corresponding to Callon (1991).

NUC messages as support to an experienced good standard of communication

Timmermanns and Epstein (2010) say standards are motivated by issues like safety, efficiency or redistribution of resources. The NUC messages are mostly well received and are in daily use in the hospital. From interviews the responds are that time efficiency is an appreciated function of the new form of communication, because it free time to other work tasks. Still there are some additional comments regarding the messages. Nurse L says that the implementation of NUC messages has not been all-positive and although it has improved and supported efficiency and documentation of health information and across level communication, the technology also hamper some interaction that was previously appreciated part of collaboration.

> "The introduction of electronic communication has made difficult the oral discussions and collaboration with the municipal Nursing and Care services that previously was very appreciated in our ward. Now if we call them they say we have to send electronic messages. It creates a distance …... These NUC messages are not exactly of chat features even though they have the interactive feature …" (see section 4.4.2., bullet 5)

The messages' impact on communication is an example of the sociotechnical entanglement. The messages are praised for its support regarding time-effectiveness, but also limit the social interaction that had wanted qualities too.

User-friendliness was one goal in the ELIN-k regarding the messages. User-friendliness was thought of as a contributing factor of the good standard electronic message. This may not have been adequately achieved.

Municipal project manager:

> "To me it is not understandable and we are left with solutions that are cumbersome. In my opinion there has been too little focus on the user interface as well, same story. The ELIN-k stated it wanted to provide for the good professional nurse message, but the KITH certification does not capture the actual problems of user-friendliness or a well-adjusted workflow function of the NUC messages."

According to field observation and respondents in this study, there are indications that user-friendliness is not sufficiently met in the end product of NUC messages, and this has an impact on quality and distribution of workload and the standard it self.

Nurse L:

> " … we are used to the cumbersome user-interface in the EPR so this is no surprise, but it would have made it so much easier if it was better facilitated. Some of the younger nurses find it easier and the not so computer skilled tend to leave these communication tasks to them. It can be uneven distribution of work load that creates frustration".

And the cross level communication seems to be troubled when the standard is not easy to comply to. Here are some illustrating examples:

Nurse B:

> "The municipal very seldom sends the Admission Report. They complain to us because we do not send health information added to the Discharge Ready Patient message. But we have sent it the day before and regard it sufficient updated. If we complain to the municipal,… well, it has been some difficult situations."

Municipal nurse:

> "Some times it is impossible to understand from the content what purpose the message is sent. Then I have to analyse the content and I write them (the hospital) a dialogue message and tell them how I perceive the message. I usually decide by the order the messages are sent by, but sometimes they do not send them in the agreed order and the content can be hard to interpret, maybe it is a Early Alert, maybe it is a part of an application, maybe they mix them together. Sometime it is hard to decide."

These examples also indicate that the NUC message technology impacts on the social and cultural in the communication between nurses, and can illustrate the entanglement of technology and the social/cultural according to the notions that technology has shaping features (Asdal et al., 2001, p. 10).

6. Conclusion

In this chapter I will try to find answers from my study to the researcher questions I posed at the beginning of the thesis. The method of interpretation aim not to prove a matter but provide a ground for expanding understanding of a case. So the answers must be thought of as an illumination of the topic rather than pure facts alone.

6.1. Research question and possible answers

RQ1. Which actors contribute regarding the development of national electronic Nursing and Care messages and what are the main challenges?

In this thesis I have first examined the creation of the electronic NUC messages that later was implemented at UNN in 2012. The subsequent implementation was a result of health authorities' previous strategies and initiatives that was set out to accommodate the enhancement and improvement of quality for transferal of health information when patients' cross levels of care. Electronic communication was regarded a suitable method to overcome identified communication problems connected to time efficiency and misplaced health information hampering continuity in the line of care.

Latour says to understand the process of creation one must follow the actors (Law, 1992). In this thesis I have identified some of the many actors and the networks they have participated in. The actors are presented especially in section 4.1.- 4.1.6.. They are human and non-human actors, and when the most obvious actor is the NUC messages them selves, the messages would have not come to realization had it no been for the above mentions strategies, the people in the various message projects, in national and local levels, that partly created them and later promoted the use of them. The prepared specifications that the vendors used to design them are actors as basis for creation. The accompanying guidelines acts as promoters for use of the standard messages and the inherent standard way of communication. At an overarching level the Laws and Regulations are actors that promote use of the NUC messages. The down to earth level of technical support and infrastructure of message transport are actors that put messaging in to material reality. And of course the actors in practical material test and pilot, leading to actors in implementation

project including the actors in end-users actual training, and subsequently the actors that finally adopted the messages in their cross level communication.

Many challenges are identified along the process, one of the most obvious is the time spent in the creation of the messages that was prolonged. The ELIN-k had originally a time frame up to 2009 but was years late, not fulfilling the piloting of the last NUC message until late 2011. Proliferation was not possible until 2012. Despite the completed implementation UNN the collaborating municipals are in process to implement, but not all are, and leave UNN to handle communication both electronically and by old methods. Lack of concurrency seems to be a key challenge in the creation as well as in deployment of NUC messages.

Another major challenge is of course the alteration of scenario that was imposed on the NUC message standard when the Coordination Reform, with its accompanying laws and regulations effective from first of 2012, set new requirements for communication acts between cross level collaborating health care personnel. Then the inertia in standard changing was evident. UNN has not yet taken into use the new version of the Health Information by Application.

RQ2. How is users' influence possible in the design and adjustment of the making of standard Nursing and Care messages?

The ELIN method was the project method of ELIN-k. The method enables the users, or their representatives, to outline the scenario and respective design specification on which the vendor designed the technical solution, here; the NUC messages. The preliminary ELIN-k project was probably the group that had best opportunity to influence the design of NUC messages. This is what one can read out of the preliminary ELIN-k report. Informal discussion with work group member indicates though, that they in some regard experienced that the standards was already set at starting point and that only some alterations was possible. The actors from Tromsø/UNN pilot report that apart from obvious malfunctions, there was no possibility to influence the design or the underlying scenario. Negotiations on behalf of their local alternative translation failed. End-users are also trying to alter the design by negotiating to local message manager, but this turn out fruitless because the local implementations manager have failed in the same effort on national level.

RQ3. How can national standards Nursing and Care Messages be adopted and adjusted for implementation into local setting?

Adjustments from the national design and standard to local level are only possible by direct translation between national standard to local practice. This is conducted both by adapting guidelines, users manuals, procedure and regional agreements to fit local requirements. Information of the difference in national and local requirements regarding cross level communication by the NUC messages is the subject of the end-users training and follow-up.

RQ4. Do national standard electronic Nursing and Care Messages contribute to the quality of health information exchanges in health personnel's cross level communication in our local perspective?

Users experiences report an overall satisfaction with the opportunity to communicate electronically with cross level collaborating health care personnel. The health authorities objective to enhance and improve the exchange of cross level health information in patients' pathways seems to be considered a success by end-users. Users are reporting it is time efficient and contribute to the continuity of care because it is a fast and reliable technology. Some incongruence between the national names, in-message structure and the prescribed scenario reduce quality of information, interrupts the standard order of information and hampers personnel's compliance to the local standard or locally agreed upon communication requirements. A reported cumbersome user-interface in the NUC messages module is experienced as not enough user-friendly, and quality of information and line of information is challenges and hampered as a result.

6.2. Considerations on learning process and further use for NUC messages

Akrich states

> "De-scription is analysing the mechanisms that allows the relation between form and meaning to constitute the technical object and let it come into being. It is within this sphere one can detect the success or failure of the end objects and the process of making it come through."

Summing up I think this is what this thesis have provided, an analysis of some of the mechanisms that have constituted the technical object of NUC messages and let them come in to being. The initial knowledge I have had regarding this NUC message project was limited. My preconception has been influenced of prior experience of implementing a global standard into a small delimited local setting and the "check list" from Obstfelder, Engeseth and Wynn (2007). By adding theory about standards and standardization and conduct an analysis with the conceptual tools from the Actor Network Theory I have gained new knowledge about the longitudinal process I have been a part of. I have according to the interpretive method retrieved data from various sources, which again is the basis of my analysis. All the data collected, analysed and interpreted, have made me see the difference from prior implementation experience as the then process had substantially less actors and fewer outside contingencies than the project in this thesis. I my self too, had to act in substantially more networks and in different levels than in the prior experience. According to the hermeneutic method I have extended my perspectives and knowledge. As an action researcher I have during the process also influenced the end-users in the implementation of NUC messages in the hospital. When the Tromsø/UNN negotiation failed to impact and alter the national standard of NUC messages I have made adjustments/translations so that the national standard can be suited for local use. The action research method implies research in own practice and its purpose is to change something. My assignment as participant to these discussed message projects have been according to the action research method; namely to change and enhance communication and collaboration by enabling health care personnel in my own hospital to electronically communicate with cross level municipal nurses. This communication is regarded a contributor to safety and continuity of patients' line of care.

Timmermanns and Epstein (2110, p. 71) says that implemented standards eventually have a way of sinking below the level of visibility and becoming taken for granted as technical and moral infrastructures. As my study shows, it is fair to say that we are far from that stage at present. Many municipal have not yet started communication electronically and the deployment project FUNNKe have no power to make them start but provide incentives, initiative and support of technical and organization. The time range in these projects has been near a decade. Given the inertia in creation and implementation of this standard it is worth mentioning the health authorities latest vision of digital services in the health care

sector (St.melding 9, 2013). Here they state that sharing of patients' health information by electronic messages is old fashioned and the future is to prepare for sharing health information through giving health personnel access to the patients' EPR. This of course implies that the patient has a file in only one national EPR that comprise all health sectors and not as today when the patient has one file in an EPR for every level or organization from where he is given health care. That is why the vision is "One citizen- one patient record" (St.melding 9, see chapter 3 for point about messaging). The vision gives association to the similar project in England with massive delay problems (Coiera, 2009). The prospects of fulfilling the Norwegian vision accordingly grants time space to reach full implementation of the communication technology of the Nursing and Care messages.

6.3. Conclusion and further implications

Conclusion. In this thesis the creation and subsequently implementation of national standard NUC messages in local practice have been examined. The overall results and users experience retrieved from data collection is that the standard electronic NUC messages at some degree are contributions to an improved quality of communication between health care personnel in patients' cross level care. Tension is identified between national standard and local needs for some of the messages regarding names, in-message structure, type of message and this has a negative impact, making it hard to comply to both the national and local standard pathway of messages lined out.

Implications. Further implication of this mismatch of standard and use can come to a critical point if health authorities in future will require statistics from use of NUC messages according to the national guideline or Regulation. The local standard of how to alert the municipal in case of Discharge Ready Patient will be challenged. Then the local adjustment and use will generate numbers that reference to a local use, and that use deviate from national assumptions. This scenario may force the local practice to transfer to a national standard, which today is regarded of less good quality.

On a national level the same problem will occur if health authorities require statistic for how many patients hospitals have communicated in the message Early Alert. A number for this

will not be possible to retrieve, because the national standard not provide specific message for this communication task as Early Alert is sent in a different named message.

Last I call for a longitudinal in-depth study to investigate the use of the messages and their inherent affordances to verify if they actually provide quality in cross level communication in health care. And to what degree the mismatch of naming in-message structure hampers quality. This I can only make assumptions about on basis from this thesis investigation, because although we have come as far, implementation or change is, according to Robson (2011), a process and not a stand-alone event. I think we are still in the process of implementing the electronic NUC messages. We are just past the starting point of it all.

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Attachment 1

Forskrift   **1998-12-16 nr. 1447**

Forskrift til: Kommunehelsetjenesteloven

Forskrift om kommunal betaling for utskrivningsklare pasienter

Fastsatt av Sosial- og helsedepartementet 16. desember 1998 med hjemmel i Lov av 19. november 1982 nr. 66 om helsetjenesten i kommunene § 5-1 tredje ledd.

  Endret: 26. november 2002 nr. 1576
              19. mai 2003 nr. 653

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§ 1. Virkeområde

Denne forskriften gjelder mellom regionale helseforetak og kommuner som ikke har inngått avtale om overføring av utskrivningsklare pasienter fra sykehus til kommunehelsetjenesten.

En slik avtale anses inngått når det regionale helseforetaket og kommunen har godkjent avtalen. Avtalen skal regulere rutiner for samarbeid mellom spesialisthelsetjenesten og kommunehelsetjenesten om den enkelte pasient. Avtalen bør regulere kriterier for når en pasient er utskrivningsklar, hvem som har avgjørelsesmyndighet, hvordan uenighet skal løses, hvordan kommunen skal varsles, varselfrist, døgnpris, når avtalen skal tre i kraft og hvordan avtalen kan endres.

Forskriften gjelder ikke for pasienter i langtidsinstitusjoner eller pasienter i psykiatriske sykehus.

§ 2. Krav om betaling

Det regionale helseforetaket kan kreve betaling av kommunen for utskrivningsklare pasienter som oppholder seg i sykehus i påvente av et kommunalt tilbud.

Det samme gjelder for utskrivningsklare pasienter som oppholder seg i private sykehus dersom pasientene er omfattet av avtale mellom det regionale helseforetaket og sykehuset, jf. Lov av 2. juli 1999 nr. 61 om spesialisthelsetjenesten m.m. § 2-1a tredje ledd.

§ 3. Når en pasient er utskrivningsklar

En pasient er utskrivningsklar når følgende punkter er vurdert og konklusjonene dokumentert i pasientjournalen:

1. problemstillingen(e) ved innleggelsen slik disse var formulert av innleggende lege skal være avklart,
2. øvrige problemstillinger som har framkommet skal som hovedregel være avklart,
3. dersom man avstår fra endelig å avklare enkelte spørsmål skal dette redegjøres for,
4. det skal foreligge et klart standpunkt til diagnose(r), samt videre plan for oppfølging av pasienten,
5. pasientens samlede funksjonsnivå, endring fra forut for innleggelse, og forventet framtidig utvikling skal være vurdert,
6. dersom pasienten har behov for spesialisthelsetjenester som er utenfor den aktuelle avdelingens ansvarsområde, skal det sørges for at relevant kontakt etableres, og plan for denne oppfølgingen beskrives.

§ 4. Avgjørelsesmyndighet

Sykehuset avgjør når pasienten er utskrivningsklar.

§ 5. Klage

Kommunen kan påklage sykehusets avgjørelse til Fylkesmannen.

§ 6. Varselfrist

Betaling kan kreves fra 10 dager etter at kommunen skriftlig er varslet om at pasienten er utskrivningsklar. Kommunen skal samtidig gjøres kjent med sykehusets vurdering etter § 3.

Fristen løper tidligst fra den dagen pasienten blir erklært utskrivningsklar.

§ 7. Betalingssats

Døgnprisen fastsettes av Sosialdepartementet.

§ 8. Ikrafttredelse

Forskriften trer i kraft 1. januar 1999.