

## The Role of Technological Frames of Reference and Institutional Logics in the use of ICT

Henrik CJ Linderoth  
School of Engineering  
Jönköping University  
Jönköping, Sweden  
Email: henrik.linderoth@jth.hj.se

### Abstract

*The concept of technological frames of reference (TFR) has been used to uncover people's sense making of information and communication technologies (ICT), in order to deepen the understanding of ICT use. But the role of the organization's institutional context in the development of TFR has been overlooked, and most studies of TFR has been snapshots of frames. In order to contribute to the knowledge of ICT-use, the aim of the paper is to analyse how the interplay between institutional logic and TFR evolves over time. The aim will be pursued by the analysis of a case study of telemedicine use in a Swedish county during a 12 years period. It is concluded that the framing process moves between different levels of understanding guided by varying institutional logics. The understanding moves from an abstract level of what is best for the organization, to an understanding what is best for the group. Significant actors play a crucial role establishing dominant frames, or in re-framing the understanding the ICT. In this process institutional logics is drawn upon either to initially create a legitimacy for the ICT-use, or as an argument for non-use.*

### Keywords

Technological frames of reference, institutional logic, ICT use, telemedicine.

### INTRODUCTION

Peoples' sense making of a technology has been an important component for the understanding of information and communication technologies' (ICT) use (see e.g. Griffith 1999; Gephart 2004). In this strand of research the concept of technological frames of reference (TFR) (Orlikowski and Gash 1994) has formed the basis for a genre of studies on the interpretive aspects of ICT and organizational change (Davidsson 2006). This genre focuses on the outcome of organizational members' interactions and sense making of ICT that in turn shapes the use of ICT. In the genre TFR are viewed as (Orlikowski and Gash 1994:178):

*"...the understanding that members of a social group come to have of particular technological artifacts, and they include not only knowledge about the particular technology but also local understanding of specific uses in a given setting".*

However, research on TFR has been criticized for overlooking the broader organizational and social processes in relation to which frames are formed, and lead researchers to "lose site of the temporal experience of meaning making" (Boland 2001). Moreover do Gal and Berenete (2008:139) claim that:

*"...the framework remains limited in that technological frames are generally taken as given without methodically exploring the social processes that give rise to them or inquiring why specific frames exist and how they relate to wider social and organizational contexts".*

It can be claimed that this critique against the TFR-framework actually is more directed towards the outcomes of previous studies and writings on TFR, than towards the concept itself. Davidson (2006) highlights the problems when she states that previous studies of TFR in general have been snapshots of the frames and exhort researchers to look outside the organizational "box" and include the institutional setting of the organizational environment that shapes organizational members interpretations and actions related to ICT (Chiason and Davidsson 2005). To include how the institutional setting shapes the use of ICT is not a novel theme in IS-research. It is well known that the institutional setting of the organization shapes organizational practices (see e.g. Di Maggio and Powell 1982; Scott 1995). In research on ICT Walsham's (1992) concept of multi-layered contexts and Orlikowski's (1992) structurational model of technology are examples of how the institutional setting is included in ICT-research. However, a closer scrutiny of how the framing process is shaped by an organization's institutional setting is more rare, even if for example Jacobsson and Linderoth (2010), in a study of a company in the building and construction industry, showed how institutional properties shape actors frames of reference and the use ICT, but no deeper scrutiny of the framing process was conducted. Process studies of TFR have for example been

conducted by Olesen (2014), but in this study frames remained more static, because it was showed how unchanged dominant technological frames cause repeated historical patterns of use of multiple ICT systems that cause organizational inefficiencies. Thus, the issue is how the institutional setting can be conceptualized and included in a framework explaining the framing process? One way ahead is to use the concept of institutional logics in order to include the wider context in which the framing process occurs. Scott (2001:41) describes institutional logics as follows:

*“Individuals do construct and continuously negotiate social reality in everyday life, but they do so within the context of wider, pre-existing cultural systems: symbolic frameworks perceived to be both objective and external, that provide orientation and guidance.”*

The institutional logic approach aims to explain how the underlying differentiated belief systems of higher-order societal institutions shape the cognition and behaviour of individuals and organizations, which at the same time can actively reshape and change these belief systems (Friedland and Alford 1991). Hence, in order to contribute to the knowledge of ICT-use, the aim of the paper is to analyse how the interplay between institutional logics and TFR evolves over time. The aim will be pursued by the analysis of a case study of telemedicine use in a Swedish county during a 12 years period.

## THE FRAMING PROCESS

In their article Orlikowski and Gash (1994) outlined a framework based on the concept technological frames of reference (TFR) for studying interpretive processes related to ICT in organizations. The central concern was how people make sense of ICT and how their interpretations influence their actions related to ICT. At the core of the concept is the understandings members of social groups develop with regard to a particular technological artefact and the knowledge developed, not only related to the specific technology, but also its uses in a given setting. In their paper Orlikowski and Gash (1994:183f) identify a frame structure, or three domains that characterized peoples interpretations of the studied technology:

- Nature of technology: people’s pictures of the technology and their understanding of the technology’s opportunities and function.
- Technology strategy: people’s perceptions why their organization has bought and implemented the technology. It includes an understanding of the motive or vision behind the adoption decisions and the technology’s eventual value for the organization.
- Technology in use: people’s understanding regarding how the technology will be used day by day, and possible or actual pre-conditions and consequences connected with technology use.

Orlikowski and Gash stated that frames derived from empirical data are more context specific than those identified from literature (see also Bijker 1995; Orlikowski 1992). Linderoth and Pelegrino (2005) found that the influence of the three domains, reinforcing people’s interpretations of a technology, will alter over time, particularly before and after a technology is put into use. However, Davidson (2006) concluded in her review of research on ICT-induced change processes applying the perspective of TFR, that a majority of research has been on frame content, which always is context dependent, and adding to or expanding domains identified by Orlikowski and Gash (1994). Davidson (2006:30) suggests that a more dynamic perspective on frame changes as an ongoing interpretive process, triggered by a variety of organizational circumstances, could help to move TFR research beyond the well-established tenets of TFR theory, compared to earlier studies mainly based on snapshots in time. One way of open up the organizational box is to link the framing process with the institutional logics, which allows to mutually address macro level structures, as well micro level interpretations and practical use situations (see also Jensen et al 2009). Even if the institutional logic is supposed to shape a rational and mindful behaviour, organizations and individuals choose between available multiple, often contradictory, logics when ‘editing’ the roles and scripts embedded in institutional logic (Weber and Glynn 2006). Moreover, even if Orlikowski and Gash (1994) positioned TFR as a complimentary perspective to power and politics (Davidson 2006), Olesen (2014) shows how a powerful group can exercise an influence over dominant frames over time. Thus, it is difficult to isolate the interpretive process from power and political processes (Markus and Björn-Andersen 1987), for example do executive champions, project leaders, or lead designers sometimes have prominent roles in IT-mediated change processes (see e.g. Heng et al 1999; Newman and Sabherwal 1996).

Accordingly can it be assumed that the institutional logics significant actors draws upon will shape the stabilization and closure of TFR. This is, when members in relevant social groups begin to think and talk about the technology in increasingly certain terms and the interpretive flexibility of an artefact diminishes (Bijker 1995:86). This implies that group members’ progress from the understanding of what a technology might be used for to what it will be used for, and what it is used for, increasing their focus on certain features and applications (Davidson, 2006:32). With regard to telemedicine this process is of certain interest. Because telemedicine is basically a video conferencing system to which different optical equipment can be connected.

Applications for the daily practice are not pre-defined, but are to be developed in the local settings where the technology is deployed (Linderoth 2002). In other words, telemedicine can be regarded as a service that needs to be filled with content (Ekeland 2007) and in the process of content development TFR and institutional logics will have an important influence.

## METHOD AND DATA COLLECTION

Case study research is a research strategy that is strengthened by the possibility of combining data collection methods which focus on understanding the dynamics present within a single setting (Eisenhardt 1989). In line with recommendations from Yin (1994) and Eisenhardt (1989) the empirical material was therefore collected from a variety of sources, including qualitative data such as semi-structured interviews, participant observations, meeting participation, and document analysis, and quantitative data consisting of records of frequency of use of the telemedicine in the studied organization. The data collection began with meeting participation and interviews. Meeting participated in were project meetings and meetings with equipment suppliers. In addition did I together with the project group participate in visits by four different equipment suppliers where telemedicine systems were demonstrated. The objective with the introductory data collection was to gain knowledge of organizational members' understanding of telemedicine with regard to a) for what specific purposes did they want to use the technology; b) how they wanted to use the technology; c) what did they want to achieve with technology use. Because the data collection began before project group members started to interact with the technology, and continued several years after the termination of the project, it is possible to analyse: 1) The original understanding held by project group members and other actors in the project context; 2) Discover how and if the understanding of the technology changed over time and if there is a changed focus on certain applications; 3) Compare the understanding of technology among social groups not involved from the outset, with the understanding social groups involved at the outset. To trace the underlying institutional logics shaping the understanding of the technology was first done in the analysis of interviews, because (Coffey and Atkinson (1996:80):

*"...the analysis of narratives can provide a critical way of examining not only key actors and events but also cultural conventions and social norms."*

At the end of the study, institutional logics were traced by actually investigate for what purposes the technology was used for. This is based on the assumption that the way technology is used, is also a reflection of the institutional logics in an organization (see also Orlikowski 1992). In practice this was done by analysing a data record containing information about the use of telemedicine with regard to communication patterns among social groups. These patterns were then compared with ordinary communication patterns in the health care sector. Thus, by tracing the influence of institutional logic over time it has been possible to trace how different elements of the institutional logics have played a more or less important role over time in shaping TFRs and by that the further use of the technology.

The data collection encompasses mainly two periods. During the first period between 1994-1999 a comprehensive case study of a telemedicine project was accomplished with the aim of uncover actors' expectations about the future use of technology and how the technology actually was deployed. In practice the project was divided into two-subprojects defined by the sites involved. The sub-project1 General telemedicine (GTE) concerned communication between two health centres, one county hospital and one university hospital. The specialties involved were dermatology, orthopaedics and otorhinolaryngology (ear, nose and throat diseases). The second sub-project, telepathology (PAT), included pathology and cytology at the university hospital, and surgery and gynaecology at a county hospital. The data collection was undertaken during 1994 to 1999 (the equipment was purchased and installed in August 1996). Interviews were carried out on four occasions: in 1996, 1997, 1998 and 1999. In total 62 interviews were carried out with 32 respondents (physicians, politicians and managing directors of hospitals). Multiple interviews were conducted with 15 respondents. The data from second period encompasses seven formal follow up interviews (with physicians and the managers for the telemedicine support unit), on-going informal contacts, and access to a record containing data from 1650 occasions between June 2003 and January 2006 when telemedicine has been used. Each time the system was used, the part initiating an interaction needed to fill in some data before s/he could log off the system. Data registered encompassed: date, time, host (who initiate the interaction), connected (who has been contacted), duration of contact, comments and person initiating the contact. The 1650 interactions were first analysed with regard to frequency of consultations conducted at medical clinics and health centres. Then data was analysed with regard to task: clinical or administrative use; with regard to between which hierarchical levels consultations have been conducted: inter-regional, regional, county, or health centre. Finally, the data record analysed can be regarded as evidence of what the technology is used for with regard to who has used it, who has been interacting with whom, and for what purposes.

## **TELEMEDICINE: A MEANS FOR BRINGING DISTANCE OR TIME?**

In this section the use of telemedicine between 1994 and 2006 will be described and analysed. The focus will be on actors' understandings the technology's nature, strategy and technology in use, as well as plausible explanations for how the institutional logics shape the use. The analysis will be divided into three sections based on time periods in the case studied. The first period, 1994-98, is the period before and during the project was implemented. This period is characterized by testing and experimenting with the telemedicine in the GTE-project, where it is a shifting understanding of technology's nature, and at the outset a vague understanding of technology in use. However, in the PAT-project there is a relative stability in the understanding of technology's nature, strategy and use.

The second period, 1999-2002, is at the beginning, characterized by a continued testing and experimenting with the telemedicine. During the period a stabilized understanding of technology's nature and use occurs in a few social groups, which later will lead to a closure and a stabilized use with a relatively high frequency. Furthermore does a stabilization and closure occur on the top-management and political levels regarding the future existence of telemedicine in the county. The telemedicine infrastructure is expanded by decisions on further investments in equipment and commitments are made for setting aside resources for the development and maintenance of the infrastructure. For example is a support department, the TeleMedLab, established in 2000. In January 2006 the telemedicine infrastructure encompass approximately 70 units in the county, and in September 2007 approximately 100 units are installed in health centres and hospitals.

During the third period, 2003-2006, the understanding of technology's nature and use reach a closure, and technology strategy, value for the organization, concerns more value for significant actor groups concerned, than on the organizational level. Moreover, the initial understanding of telemedicine as a time bridging technology, mainly held in the GTE-project, faded finally away, due to underlying conflicts within the institutional logics. However, at the outset is the conflict between institutional logics and the TFR developed not obvious. But as will be showed, when significant actors groups perceive benefits from an identified technology application, certain institutional logics drawn upon when giving meaning to technology can lose in relevance. As well can certain institutional logics be drawn upon when significant actors groups resist use when their understanding of technology in use develops.

### **First period 1994-98: Frame congruence and emerging incongruence**

At the outset the understanding of telemedicine's nature is focused on its capacity to bridge distance and making medical specialist knowledge accessible in settings lacking medical specialists. This understanding has two origins. First, telemedicine has previously been tested in northern Norway, an area similar to the studied county, with a sparsely population, implying that a number of health centres are located more than 100 km from the nearest hospital. Second, telemedicine consultations are, at the first glance, similar to traditional telephone consultations conducted between primary and hospital care. The understanding of the nature of technology is further translated into a technology strategy expressed in the overall goals formulated for the projects running between 1996-98. The overall goals for the telemedicine projects were the following:

- to increase value for patients through access to medical specialists, without travel
- to support the development of competence in the organization
- to decrease the costs for the county
- to investigate the long term effects that telemedicine may have on the structure of health care in the county.

The goals for the project are not unique for the county studied. They express a common understanding of the value of the technology in telemedicine discourse during the first half of the 1990-ies, mainly based on Norwegian telemedicine projects in sparsely populated areas (see e.g. Gammon 1993; Danielsen 1993; Nymo 1993). The goals developed are broad enough to appeal to all of the social groups concerned: patients, general practitioners, medical specialists, politicians, hospital managers, and tax payers. Moreover is it not an explicit aim to reach all the goals. Instead is the opinion expressed in interviews and project documents that the aim is to investigate the potential of telemedicine in realizing the goals. All interviewed: physicians, politicians and managing directors of hospitals share the understanding of technology strategy expressed in the overall goals. These social groups can draw on an underlying institutional logic where use of telemedicine strengthen the legitimacy of operations. A more efficient use of resources appeal to hospital managers and politicians, increased service to patients appeal to politicians and to some degree to physicians, especially better access to medical specialists is attractive for general practitioners, and the knowledge sharing dimension is attractive for medical specialists and general practitioners. The technology strategy remains rather stable, but the understanding of how the value for the organization would be realized, the understanding of technology in use, will be more shifting,

especially in the GTE-project. One explanation for this can be found in an ambiguous understanding of technology's nature.

From a vague to a clearer understanding of technology nature

In the GTE-project there are struggles of developing the understanding of technology in use. This is obvious in meetings of the project group when attempts are made to identify what telemedicine might be used for. The lacking imagination becomes clear when applications for the three medical specialties involved would be identified by groups of medical specialist and general practitioners. The groups do not come up with any concrete suggestions, instead it is decided that different applications had to be tested when the equipment is installed. One reason for difficulties to develop an understanding of technology in use, might originate from an incongruence in the understanding of technology's nature, its opportunities and functions. At the outset telemedicine was mainly regarded as a means for bridging distance, an understanding borrowed from the Norwegian telemedicine projects. But after project group members' visits at a number of technology demonstrations during the winter and spring 1996 the group members' understandings turned to view the technology as a means for bridging time. This shift in the understanding comes to surface at a meeting in August 1996 when the manager for the GTE-project stated that:

*"In January [1996], emergent, ad hoc, consultations were just mentioned in a subordinate clause, but now the interest is mainly directed towards these consultations."*

As the understanding of nature of technology shifts, the understanding of technology in use becomes more clear, when the understanding changed from viewing telemedicine as a means that should give patients access to medical specialists without travelling, to a means that could be used for solving medical problems here and now. Project group members realize that emergent, *ad hoc*, consultations would be of great value for both the general practitioner and the patient, because a medical problem could be solved "here and now". When the understanding of technology's nature shifts, it can be claimed that actors draw on an underlying logic of the organization of health care operations these are either organized on a planned, or emergent basis. The understanding of technology in use becomes more fine-grained among some general practitioners. A general practitioner states before telemedicine is implemented:

*"You understand rather fast, when you have tried to call the university hospital and get hold on a medical specialist, that this [telemedicine] will not function.....There must be a physician stand by, who you can call and who can walk to the room with the equipment."*

This incongruence between the understanding of how technology would be used in practice and the practice in which it should be used, seemed to have some institutionalized roots. A hospital director states that:

*"Accessibility of medical specialists has always been a problem in the health care sector and this problem would not be solved by the use of telemedicine."*

Accordingly, the accessibility to medical specialists becomes problematic during this period and how successful general practitioners are in getting access depends to a large extent on their prevailing contacts with the medical specialists. Nevertheless, the understanding of telemedicine as a means for bridging time persists for some years. During the period September 1996 – December 1998 156 consultations are conducted between the health centres and medical clinics involved. 55% of the consultations conducted are *ad hoc* and 45 % are pre-planned, and the frequency of consultations to the three medical specialties involved is rather equally distributed.

The frequency of *ad hoc* consultations could have been even higher, but the dermatologists did not have a telemedicine unit at their clinic. Instead they had to walk through the hospital to the video conferencing studio, implying that the very majority of consultations with dermatology were planned. This condition also implies that telemedicine is understood as an intruder in the clinic's activities. Furthermore some dermatologists fear that telemedicine use would imply a drain of patient flow to the clinic. This fear is grounded in the fact that financial compensation is based on the number of patients visiting the clinic, as well as research activities are depending on a continuous flow of patients. Moreover do dermatologists as well as many other medical specialists interviewed, emphasize the importance of the physical meeting with the patients. For example, a surgeon states that pre-surgery judgements need to be done in front of the patient, whereas the general practitioners think that pre-surgery judgements should be a perfect application for telemedicine. A dermatologist states further that:

*"...you need to touch, feel and smell the patient's skin and show that you don't think the skin is disgusting"*

However, other medical specialists claim that the physical presence of the patient could sometimes be overestimated, but they said that they would not speak out this opinion in front of colleagues.

Aligning with the logic

Contrary to the GTE-project, the project manager in the PAT-project has a rather clear understanding of technology's nature and use. Two main applications are identified, one bridging time, another bridging distance: frozen section procedures, especially in connection with suspect breast tumours, and pathology conferences. The frozen section procedure is a pathological laboratory procedure to perform rapid microscopic analysis of a specimen and is most often used in oncological surgery. For the applications identified the project managers has rather carefully outlined the routines to be performed in for both applications. For example get the laboratory personnel at the district hospital, who should assist in the frozen section procedure, an adequate training. Even if surgeons interviewed are positive to the idea as such at the outset, the surgeons at the district hospital who should use the technology are sceptical if they could trust the answers, because the method is not scientifically validated. The method becomes rather soon validated scientifically by the manager for the PAT-project, and the results shows that there are no significant differences between the traditional frozen section procedure (diagnosing in a microscope on site), and diagnosing via tele-pathology (diagnosing via a remotely maneuverer microscope). However, concerns are also raised about how the patients would react if they are given the answer "cancer" half an hour after a specimen has been taken. The surgeons feels a bit ambivalent, because no studies are known regarding patients reactions in these cases. I am however informed by a physician who is working with telemedicine in another county that studies exists, telling that the sooner a patient get the result of the analysis, the better it is, even if the result is negative for the patient. But discussing the coming treatment should be waited with. A few years after the first study, I am discussing another reason for this ambivalence with some physicians and nurses. The idea is that if a test confirms cancer, the surgeon need more time to prepare mentally for giving the bad news, than the five to ten minutes they have from they get the answer of the analysis until they should give a patient the answer. Some physicians and nurses agree with the idea, whereas others disagree. The second application, pathology conferences between the clinic of gynaecology at the district hospital and pathologists and oncologists at the university hospital, is more successful and becomes included in the routines. One reason for the positive outcome, mentioned among pathologists and gynaecologists, is the organizational routines established for facilitating conferences. For example, conferences are held at the same time, the same day in the week, and detailed routines are set up for how to report a case that should be discussed at the conference. Additionally is it important to engage medical specialists with the right competencies for the topics discussed in order to provide the participating gynaecologists with a perceived value of participating in the conference. After a year gynaecologists understanding of pathology conferences change from that of a mean for competence development, to an integrated part of the operations. The manager of the clinic says that the conferences had changed their way of working with the patients. Sometimes he has heard gynaecologists discussing a patient case saying: "*Let's wait to the conference until we decide on further treatment.*"

### **Period 2 1999-2002: Towards a closure**

The overall understanding of how the technology will be used change not dramatically in the beginning of this period. *Ad hoc*, consultations are still in focus. In the GTE-project the understanding of technology in use has also proceeded. The project manager gives a concrete example of how they in the ear, nose and throat clinic has learned to manage incoming telemedicine consultations:

*"We already have a function [doctor on duty] to be constantly stand-by for answering incoming questions from health centres and other hospitals. While the [telemedicine] equipment is in the same room is it difficult to imagine that this solution not should function."*

During this period the most dramatic change in understanding of technology occurs in the dermatology clinic. The process starts when a new physician, who later become the head of the clinic, becomes responsible for telemedicine issues. She applies for funding of new equipment, and initiates a project where she will study if telemedicine could solve the staffing problems at the dermatology clinic at a district hospital 140 km away from the university hospital. The idea is that the nurse at the district hospital should take pictures of patients' skins, send the pictures to the university hospital where the dermatologist examines the pictures at the same time as s/he is in contact with the patient via telemedicine and further treatment is discussed. As the current situation is, the dermatologist depart by bus at 06.00 in the morning to the district hospital two to three times per week. At the hospital they are meeting and examining patients the whole day and in the late afternoon, they spend another two hours by the bus. This duty is rotating among dermatologists, but even if they get compensated with one day off, this duty is not popular. When finished, the project is considered to be a great success, as the dermatologists' discomfort with catching the bus at 06.00 in the morning is removed. And, no one involved is complaining about the fact that the patient not is physically present. Furthermore becomes the decision to serve this hospital via telemedicine from the university hospital irreversible, or it would require some extra effort to move back to the previous routine, i.e. letting dermatologist start commuting by bus again. Moreover, the nurse at the county hospital who is involved at the outset retires after a few years. When a new nurse is employed, using telemedicine consultations is the way of working.

### Period 3 2003-2006: A closure is reached

During this period a closure is reached with regard to how the technology is used for. It can be stated that the interactions via telemedicine to a large extent follows an established institutional logic. This is, conferences between hospital, where most often clinical and laboratory specialists are involved (see table 1). It is, however, worth to note that appr. 25% of interactions involves dermatology. The relatively high frequency of interactions between health centres can be explained with local circumstances. A few health centres are located in sparsely populated areas where the nearest hospital is located at least 100 km away, and in these locations it is a problem to recruit physicians. Therefore health centres are cooperating via telemedicine. A health centre can from time to time (e.g. week-ends) be staffed with a nurse and when s/he needs advice from a physician, a telemedicine consultation is conducted with the doctor on duty at another health centre. What is more worth to note is that use at the sites involved at the outset, is more or less faded away, except for dermatology, pathology and gynaecology.

Table 1. Communications patterns 2003-2006

Hierarchical level	Number of consultations	% of total
Hospital-Hospital, clinical	977	59%
Hospital-Hospital, other	18	1%
Hospital-Health Centre, clinical	357	22%
Hospital-Health Centre, other	105	6%
Health Centre-Health Centre	193	12%
<b>Total</b>	<b>1650</b>	<b>100%</b>

It can be claimed that actors in laboratory specialties implicit or explicit, consider themselves as a support to clinical specialties, which reinforces laboratory specialists understanding of telemedicine as a mean for improving their services. Medical rounds, or conferences is an institutionalized practice at hospitals that all medical specialists are familiar with. Therefore, clinical specialists do not have to feel a threat of a changed power relations because roles and relationships between actors involved are un-changed. What is new is that the colleagues appear on a screen instead of the other side of the table. However is the offering of services to smaller hospitals, especially in other counties, not un-controversial at the outset. Some representatives for specialist clinics at university hospitals feared for losing patients (revenues) from other counties, due to the construction of the financial compensation system. But now university hospital buy and sell services via telemedicine to hospitals in other counties. For example are radiotherapy rounds a service sold to a neighbour county, and the department of pathology is buying highly specialized pathology competence via telemedicine. However, the understanding of telemedicine as a means for bridging time, i.e. *ad hoc* consultations from health centres to hospitals challenged the institutional logic, this is, the roles and relationships between hospital and health centres. This application implied that new routines had to be developed in order to meet the demands from the primary care. A general practitioner said that:

*“Suddenly is the primary care coming and putting demands on the hospital care, to for example develop routines for managing incoming consultations from the primary care....or to develop services for the primary care”*

In this way institutionalized roles and relationships between hospital- and primary care is challenged at its bottom line. Suddenly hospital care would become a service provider to primary care, which would be a radical re-thinking of roles and relationships. Moreover, medical specialists’ institutionalized generic interpretive power based on their specialist competence is challenged, i.e. to decide whether a patient should get access to specialist competence or not. But if telemedicine was understood as a technology that primary should bridge distance, i.e. patients and health care personnel did not have to travel in order to meet, roles and relationships, and power relationships was not challenged to the same extent at the bottom line. Moreover, the consultations between health centres is a further evidence that telemedicine became understood as a mean mainly for solving problems inside a hierarchical levels and not between them. The development in dermatology challenge, however, to some extent the argumentation above. But the relative success can be explained by dermatologist re-gaining of interpretive power that implied a re-interpretation of the nature of technology: from a means to bridging time, to a means to bridging distance and solving staffing problem. This implied that a real perceived problem (the bus travels to the district hospital) in their operations can be removed. The first period’s application with planned consultation with health centres and the walk through the hospital, did on the contrary not solve any perceived problems, sooner new perceived problems were created. Thus, when technology is put into use there is a shift in

technology strategy focus, from the organizational level to the group level. This is, what is the technology's value for the group? A similar observation can be made in the case with the frozen section procedures. But in this case surgeons imagine technology in use on beforehand and understand the application as something that might create an increased discomfort for the group. This is, having five to ten minutes to prepare mentally to give a patient the news that she has cancer. This understanding is not outspoken, instead are arguments based on different institutional logics used when scepticism towards the method is expressed.

## CONCLUDING DISCUSSION

The aim of the paper has been to analyse how the interplay between institutional logics and TFR evolves over time, in order to enhance the knowledge of ICT-use. In order to fulfil the aim a case study of telemedicine use in a Swedish county during a 12 years period has been analysed. It is concluded that the framing process moves between different levels of understanding guided by varying institutional logics. The understanding moves from an abstract level of technology's generic features and what is best for the organization, to an understanding what is best for the group. Significant actors and actor groups play a crucial role in establishing dominant frames, or in re-framing the understanding of the ICT. In this process a varying set of institutional logics is drawn upon. Initially with the aim of creating a legitimacy for the ICT-use. If the understanding of technology in use reinforces the technology strategy, this is, prove an eventual value for the significant actor group/s concerned, the role of institutional logics diminish. But if the understanding of technology in use not reinforce the technology strategy, this is, an eventual discomfort for the significant actor group/s concerned might emerge, these groups draw on a varying set of institutional logics when arguing for non-use.

During the framing process, institutional logics shapes the three frame structures, or domains: technology's nature and strategy, and technology in use. The three domains are interlinked from an abstract to a more practical level, and vice versa. At the outset, the nature of technology, the understanding of technology's opportunities and function, is a blend of technology's features, institutional logics, and general discourses and others practical experiences of technology. In the case studied, the experiences from the Norwegian projects provide the project group with a nearly ready made understanding of technology's nature: making medical [specialist] knowledge accessible by bridging distances between remote health centres and hospitals in sparsely populated areas. This understanding is transferred into a similar Swedish setting, where a technology strategy, the technology's eventual value for the organization, is formulated. In this process actors draw on multiple institutional logics that appeal to varying actor groups concerned. In this sense advocates for the technology try to create legitimacy for actors concerned to invest in- and use the technology. Thus, strategy creators take advantage of technology's interpretive flexibility when developing a variety of understandings these are aligned with a diverse set of institutional logics.

When the understanding of the use day by day and actual pre-conditions and consequences of use, the technology in use, a capability of imagination is needed in order to imagine how the technology can be useful for the organization and the own group. However, because telemedicine is aimed for communication between two, or more groups there is a need for a decreased interpretive flexibility of technology in this stage of the process. Or, the understanding of technology can still be diversified as long as the underlying institutional logics do not interfere with each other. In the GTE-case interfering institutional logics can be witnessed already in the early stages. This originate from the understanding of the nature of technology, a means for bridging time. When general practitioners and medical specialists develops their understanding of technology in use, an incongruence emerge because the groups draws on sometimes on different institutional logics and the focus moves from technology value for the organization, to the technology's value for the group. When general practitioners make sense of *ad hoc* consultations, they see more equality between patients in rural areas and in cities, in this sense telemedicine create justice between patient groups. As well do general practitioners see an opportunity to solve a problem here and now. Some medical specialists also draw on the logic of patient equality, but some of them see telemedicine as a creator of VIP-channels for patients from rural areas, because the patients can pass a queue. In this sense telemedicine creates injustice. But the main reason for the failure of *ad hoc* consultations is that the prevailing logic that defines the relation between primary care and hospital care is challenged. This is an understanding that emerge when an understanding of technology in use grows in the significant actor group. This also implies that the understanding of technology strategy is not reinforced, because the significant actor group do not see any value for them.

When the frame domain technology in use not is reinforcing the domain technology strategy due to challenges of the institutional logics the use of technology will rather soon fade away. One way re-vitalizing the process is a re-interpretation of technology's nature by a significant actor group. This is what happens in the dermatology clinic. The head of the clinic is re-interpreting telemedicine to the original understanding, a means for bridging distance, and also by adding the understanding of telemedicine as a means for solving staffing problems. In this case the domain technology in use is reinforcing the domain technology strategy because a discomfort in



dermatologists' day to day practice is removed, no more bus travels. Because the significant actor group perceive better working conditions the institutional logics earlier drawn upon, the need for patients physical presence, diminish. This example also shows the importance of coherence between the frame domains and reinforcement of technology in use on technology strategy. The same phenomenon can be observed in PAT-project and conferences between pathologists and gynaecologists. In this case the process is supported by the fact that conferences between clinical specialists and laboratory specialists is a well-established institutional logic in all hospital. Consider for example the more than 100 years old radiology rounds. Thus, the new way of working does not challenge any established power relations, or roles, they are sooner reinforced. However, even if there is a consistence between the three frame domains and institutional logics are supporting, use cases can still fade away, as the case of urgent answers on frozen sections. In this case the significant actor group's understanding of technology in use, leads to an understanding that the groups discomfort could increase. Nevertheless, giving patients negative news is a part of physicians' day to day activities, but they probably have more than five to ten to prepare mentally. In this case, the arguments against the use case is based on a varying set of institutional logics in order to make arguments for non use more legitimate.

In this paper a so called open ended technology has been the case for analysing the framing process and the influence of institutional logic. Implementation of these of technologies follows a kind of bottom-up approach where management is rather absent. Topics for future studies can be other kinds of more "closed" systems, like electronic patient records and ERP-systems, these are initiated more top-down. But the framing process can also be studied in settings without strong professions like health care.

## REFERENCES

- Bijker, W. E. 1995. *Of bicycles, bachelors, and bulbs: Toward a theory sociotechnical change*. Cambridge MA: MIT Press.
- Chiasson, M., and Davidson, E. 2005. "Taking industry seriously in IS research," *MIS Quarterly*, 29, pp 2-16.
- Coffey, A. & Atkinson, P. 1996. *Making sense of qualitative data*. London: Sage.
- Danielsen, T. 1993. "The challenge of computer-mediated communication in health care.," *Teletronikk*, pp 72-77.
- Davidson, E. 2006. "A technological frame perspective on information technology and organizational change," *The journal of applied behavioral science*, (42:1), pp 23-39.
- DiMaggio, P. J. & Powell, W. W. 1983. "The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields", *American sociological review*, 48 (April), pp 147-160.
- Eisenhardt, M. K. 1989. "Building Theories from Case Study Research," *The Academy of Management Review*, (14:4), pp 532-550.
- Ekeland, A. G. 2007. *Teleradiologiske praksiser i Nord Norge 1996-2001 (Tele-radiology practises in Northern Norway 1996-2001, PhD thesis)*. Tromsø, Norway: University of Tromsø, Department of Sociology:.
- Friedland, R. and Alford, R. R. 1991. 'Bringing Society Back In: Symbols, Practices, and Institutional Contradictions', in W. W. Powell and P. DiMaggio (eds.), *The New Institutionalism in Organizational Analysis*. Chicago: University of Chicago Press, pp 232-263.
- Gammon, D. 1993 "Restraining and facilitating factors in the diffusion of telemedicine - A interview study," *Teletronikk*, (1), pp 78-84.
- Gal, U. and Berente, N. 2008. "A social representations perspective on information systems implementation; Rethinking the concept of 'frames'", *Information Technology & People*, (21:2), pp133-154
- Gephart, R. 2004. "Sensemaking and the newmedia at work," *American Behavioral Scientist*, (48), pp 479-495.
- Griffith, T. L. 1999. "Technology features as triggers for sensemaking," *Academy of Management Review*, (24:3), pp 472-488.
- Heng, M., Traut, E., and Fisher, S. 1999. "Organizational champions of IT innovation," *Accounting, Management & Information Technology*, (9), pp 193-222.
- Jensen, T. B., Kjærgaard, A., and Svejvig, P. 2009. "Using institutional theory with sensemaking theory: a case study of information system implementation in healthcare," *Journal of Information Technology*, (24:4) pp 343-353.

- Linderoth, H. C. J. 2002. "Managing telemedicine: From noble ideas to action," *Journal of Telemedicine and Telecare*, (8:3), pp 143-150.
- Linderoth, H. C. J., and Pellegrino, G. 2005. "Frames and inscriptions – tracing a way to understand IT-dependent change projects," *International Journal of Project Management*, (23:5), pp 415-420.
- Markus, M. L., and Bjørn-Andersen, N. 1987. "Power over users: Its exercise by system professionals," *Communications of the ACM*, (30), pp 498-504.
- Newman, M., and Sabhewal, R. 1996. "Escalation of commitment to information systems development: A longitudinal investigation," *MIS Quarterly*, (20), pp 23-54.
- Nymo, B. J. 1993. "Telemedicine," *Teletronikk*, pp 4-11.
- Olesen, K. 2014. "Implications of dominant technological frames over a longitudinal period", *Information systems journal* (24), pp 207-228.
- Orlikowski, W. J. 1992. "The duality of technology: Rethinking the concept of technology in organizations," *Organization Science*, (3:3), pp 398-427.
- Orlikowski, W. J., and Gash, D. C. 1994. "Technological frames: Making sense of information technology in organizations," *ACM Transactions on information systems*, (12:2), pp 174-207.
- Orlikowski, W. J. and Yates, J. 2006. ICT and organizational change - A commentary. *The journal of applied behavioral science*, 42 (1), pp 127-134.
- Scott, W. R. 1995. *Institutions and organizations*, Thousand Oaks, CA: Sage.
- Scott, W. R. 2001. *Institutions and organizations*, 2<sup>nd</sup> ed. Thousand Oaks, CA: Sage
- Walsh, J., Henderson, C., and Deighton, J. 1988. "Negotiated belief structures and decision performance: An empirical investigation," *Organizational Behavior and Human Decision Processes*, (42), pp 194-216.
- Walsham, G. (1992) *Interpreting Information Systems*. Chichester: Wiley.
- Weber, K. and Glynn, M.A. 2006. "Making Sense with Institutions: Context, thought and action in Karl Weick's theory", *Organization Studies*, (27:11) pp 1639-1660.
- Yin, R. K. 1994. *Case study research - Design and methods*. Thousand Oaks, CA: Sage.