Managed Networks of Competence in Distributed Organizations

- The role of ICT and Identity Construction in Knowledge Sharing

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Inge Hermanrud

Abstract

Knowledge is seen as a main driving force for current public organizations to fulfill their mission in changing environments, and for some organizations the response is to design managed networks for knowledge sharing and learning. Distributed organizations, which this study examines, are particularly challenged to develop knowledge sharing and learning across distance to strengthen their operative units.

Communities of practice have become a central notion for the management of knowledge in organizations. However, the elaboration of communities of practice seems to assume that the members regularly work together or at least meet during lunchtimes and at meetings in which they share their work experiences. Some, though, do not have the opportunity to work together or meet directly face-to-face, since they are spread around large geographical areas. The purpose of the present work is to elaborate on this issue.

This dissertation addresses gaps in existing literature regarding the role of managed networks and communities for knowledge sharing in distributed organizations. In particular the role of collaborative ICT and identity construction is discussed. The overarching research question for this dissertation is: What are the main factors hampering and facilitating knowledge sharing through managed networks of competence? The two sub- questions are:

1) What is the role of the GoToMeeting™ tool, when sharing knowledge in managed networks of competence?

2) What is the role of identity construction for knowledge sharing in managed networks of competence?

The overarching theoretical idea that this dissertation extends is structuration theory. ICTs are from this perspective seen as structural resources that shape the

social practices of the participants using them while being influenced by this use. Through this duality of technology comes the shape of the community and the identities of those participating in it. This approach combines Giddens structuration theory with Wengers theory on communities of practice, and emphasizes the social, technological and contextual factors that contribute to the dynamics of networks and communities of practice.

The empirical context includes the following networks: The Fishery Network in the Norwegian Taxation Authority and two accident networks, two networks for psychological well-being and the network for occupational hygiene in the Norwegian Labor Inspection Authority (main research site).

This research is aligned with the social constructivist approach to grounded theory where categories and concepts emerge from my interactions with the field and questions about the data. The strength of this approach is twofold:

1. The social constructionist view has the ability to uncover some of the complexity of human sense making. It views knowledge as socially constructed through interactions in particular contexts. This perspective goes beyond the deterministic perspectives of ICT and organizational structure (network structure), where both are thought to have embedded features influencing people.

2. Grounded theory analysis is particularly useful for the explorative nature of this research project.

Data consist of interview data and observational data collected from 2008 to 2012. This thesis contains five papers, contributing to different perspectives and the perspectives are:

Paper 1: Media use, social networking and knowledge sharing,
Paper 2: Work role identities and their barriers to online knowledge sharing,
Paper 3: The sharing of work practice across distance,
Paper 4: The use narration to overcome learning barriers when sharing complex practices, and, finally,
Paper 5: Focusing on how the construction of identity influences the transfer of knowledge in a managed and online context.

This study offers deep insights into the role of the collaborative ICT tool GoToMeeting™ for knowledge sharing. Findings underline that the tool has limitations regarding knowledge sharing, in particular for communities with a more interpretative knowledge orientation. However, closeness to actual work practice is also accomplished by the participants' use of actual documents, stories and pictures when sharing online. Yet, the participants find it hard to interact socially, to get to know each other and to discover who knows what, which is very important for knowledge sharing. Technology is not the only problem here. Other contextual factors – individualism, group size, mixed signals from management, managerial control and overload of top-down issues create problems for the networks.

The main theoretical contribution of this work is the enlargement of structuration theory into knowledge sharing through online managed networks of competence. The dissertation develops a perspective that views technology (ICT) as a medium for identity construction. The findings underline that some work identities are more difficult to signify online than other identities, hence influencing the trajectories of

the communities in the organization. There is an emphasis in this dissertation that knowledge sharing is hard to enact in traditional ways online. Though, to some extent the participants establish new ways to share knowledge by means of storytelling and the use of work documents and pictures from an inspected site. Grounded on this, the study contributes to the practice based idea that ICTs can facilitate knowledge sharing by facilitating the observation of the work practices of others. Furthermore, this study extended the emergent perspective on ICT use, and in particular the negative impact of ICT mediated multitasking from work activities to online networks of competence meetings.

This study contributes to the communities of practice literature, by changing the focus from identity construction as a facilitator for knowledge sharing, as described in the literature on communities of practice, to the role of identity as a barrier which hamper knowledge sharing. The findings demonstrate that multiple and contradictory identities create barriers linked to knowledge interests and commitment. In particular, my study emphasizes the identity problems in the relationship between old-timers and the newcomers which may hamper the sharing of experiences from old-timers to newcomers.

This dissertation contributes also to the study of organizational and social identity by extending the fragmented view of social identities and identity in organizations to managed networks of competence. Findings contributes to our understanding of the tensions between organizational knowledge and professional knowledge that is nurtured by the networks of competence, and the more tacit work-based knowledge which is usually constructed in a master–apprentice relationship during work, which creates unclear learning trajectories for the newcomers participating in the networks of competence.

To nurture formal networks of competence, this study highlight that there is a need for managers to; 1) better understand the participants traditional ways of sharing knowledge to support interaction, 2) take on an leadership role to clarify the purpose of the formal networks, but not control what network members are discussing, and finally 3) give the networks concrete tasks to develop their competencies, social network and in particular the know-who. Finally, I suggest that it is necessary to look more deeply into how ICT mediated knowledge sharing, personnel turnover and organizational change in current organizations can change communities in organizations and how organizations add to the differences between the generations as important areas which should be prioritized in future knowledge management research.

Table of Contents

List of tables and figures

1 Introduction

Managing knowledge has long been seen as important in organizations and the so-called 'Knowledge Era' or 'Information Age' has seen a number of advances in this field (Newell, Robertson, Scarborough & Swan, 2009). In a changing environment, public organizations, as well as private enterprises, have to adapt to new circumstances. While learning and knowledge sharing are emphasized as being important for the competitiveness of private enterprises (Newell, et al., 2009; Wang & Noe, 2009), public organizations have to learn new ways to fulfill their mission in a changing environment. For the individual task handler in a public organization, knowledge sharing can improve decision making, which in turn produces benefits for the citizen's quality of life (Wiig, 2002). The fact that public organizations can be described more and more as professional bureaucracies and rely more on professional judgments than written rules (Mintzberg, 1980) also underlines the importance of knowledge and knowledge sharing across task handlers within a public organization.

When using a practice based approach to develop the necessary competencies, it is insufficient for organizations to rely only on enrolment and training systems that focus on selecting employees who have specific knowledge, skills, abilities, or competencies or who are involved in helping other employees acquire them (Brown & Duguid, 1991). Organizations also must consider how to transfer expertise and knowledge from experts to novices (Hinds, Patterson, & Pfeffer, 2001). Thus, organizations need to emphasize and more effectively exploit knowledge-based resources that already exist within an organization (Wang & Noe, 2009). Lave & Wenger (1991) and Wenger (1998) proposed that individual learning is a product of informal activities and participation in social practices, sometimes conceptualized by researchers as situated, workplace or organizational learning. However, there are also limits to an organization's ability to access previous experiences just through

informal networks. This is particularly true in an organization in which the employees are geographically dispersed and work in different projects, a context which leaves fewer opportunities for informal interaction. There may therefore be good reasons to develop more formal means of linking individuals across an organization to fuse knowledge sharing and collective competencies.

Some of the literature on organizational learning (Agyris and Schøn 1978; Brown and Duguid, 1991; Cyert and March, 1963; Wenger, 1998) refers to the academic study of learning processes in organizations (Easterby-Smith and Lyles, 2011). This research area has traditionally contributed to the increased understanding of and has offered some criticism of learning processes in organizations, with particular regard to the nature of the knowledge under discussion. This is somewhat in contrast to those who write about 'learning organization' (Senge, 1990) with the aim of improving learning capacity in organizations (Easterby-Smith and Lyles, 2011). My focus is the social, relational and in-practice nature of knowledge and the role of communities in organizations, where the knowledge of organizations is nurtured (Brown & Duguid, 1991; von Krogh, 2011; Lave and Wenger, 1991; Wenger, 1998 and Østerlund & Carlile, 2005).

1.1 Specifying the research problem

The overarching theoretical idea that this dissertation seeks to extend is structuration theory (Giddens, 1979, 1984) and in particular the fundamental duality of technology. ICTs are seen as structural resources that allow them to influence and shape the social practices of the participants using them while being influenced by this use. Out of the duality of technology comes the shape of the community and the identities of those participating in it (Rosenbaum & Shachaf, 2010). This approach combines Giddens structuration theory with Wengers theory on

communities of practice, and emphasizes the social, technological and contextual factors that contribute to the dynamics of networks and communities of practice.

This dissertation aims at to fill in some gaps in the research concerning the role of ICTs in knowledge sharing, an area that requires further research (Wang & Noe, 2010). Research into knowledge management has traditionally been associated with a technical ICT based approach aimed at creating ways of measuring, disseminating, storing and leveraging knowledge to enhance organizational performance (Easterby-Smith & Lyles, 2011). A shortcoming in current research is that most empirical work on knowledge sharing relies heavily on research on face-to-face settings or research on company intranet, e-mail forums or blogs (see Hayes, 2011 for an overview). While 'lessons learned' from projects stored in databases are not widely used (Newell et.al, 2006), collaborative information and communication technology (ICTs) tools offer new opportunities for knowledge sharing because they enable dialogue, storytelling and the sharing of documents stored on computers - which can be used as a 'tool for knowing' in the setting of a managed network of competence.

While shared identities, common knowledge and overlapping values create the social conditions helpful for knowledge sharing (Hislop, 2013), this dissertation contributes to the fragmented perspective on social identities. In the fragmented perspective organizational identity is viewed as hybrid and social identity is viewed as multiple, processual and situational (Brown et al., 2005; Kärreman & Alvesson, 2001), which means that an identity can fuse multiple meanings and actions from situation to situation. The fragmented view underlines the problematic nature of social identity for knowledge construction. Multiple social identities can be a source of power or conflict, reducing potential beneficial effects of identity (Humphreys & Brown, 2002) such as when employees resist, or at least side step, managerial

demands to identify with a group management have assembled in a formal intra organizational network. Disassociation can be mobilized by stressing the lack of compatibility with current identity and members' goals.

While social identity is a core concept in the literature on communities of practice (Brown & Duguid 1991; Lave & Wenger 1991 & Wenger, 1998) many studies focus only on the benefits of social identity for learning (Willem, Scarbrough & Bulens, 2008), and problems of identity have often been underestimated in existing research (Hong & Fiona, 2009 and Macpherson & Clarke, 2009). Hong & Fiona (2009) state that a failure to understand these challenges undermines the potential for cultivating a community that shares a common identity and joint practices.

1.2 Problem statement

Based on the observed knowledge gaps, my study`s overarching research question in this dissertation is: What are the main factors hampering and facilitating knowledge sharing through managed networks of competence?

I would argue that this issue is particularly important, because existing research has focused on knowledge sharing within and across communities of practice. A study of managed networks of competence offers opportunities to investigate how these formalized networks are restricted by, make use of, and how they influence existing communities in relation to knowledge sharing.

My main RQ can be broken into two more specific questions. In this dissertation I will address the following two research sub questions (table 1) with reference to the individual papers where the questions are addressed most directly, even though all papers contribute more or less to both research questions.

Table 1 Research Questions

Research questions	Papers where the question is addressed
Sub- question 1: What is the role of the GoToMeeting™ tool, when sharing knowledge in managed networks of competence?	Paper 1, 2, 3 and 4
Sub- question 2: What is the role of identity construction for knowledge sharing in managed networks of competence?	Paper 2 and 5

The networks of competence are in this study defined as formal intra organizational network - initiated by management to develop individual and organizational knowledge across dispersed assigned members through self – organized knowledge sharing and learning activities. Since managed networks are often online networks (Agterberg et.al., 2010), as with the cases in this study, the role of ICT is the subject of the first of the two research questions. The aim is to deepen our understanding of ICT mediated knowledge-sharing activities in order to increase our understanding of the impact of ICTs on knowledge sharing. This includes the influence of human agency, the physical properties of the particular ICT, and the context in which it is used.

From a practice based approach it is of particular interest to investigating whether or not the tool (GoToMeeting™) is used in a way that the participants can 'observe' the work of others in order to facilitate the sharing of work and work related stories (Ardichvili, 2006). The second, interest is in understanding how participants are assigned to different networks of competence, with different knowledge

orientations, and how they utilize this collaborative ICT for knowledge sharing across geographical locations.

By collaborative ICT I mean technology which can function as a mediator for collaboration concerning knowledge sharing and learning between individuals within a distributed network. From the perspective of social constructivism I use Rochelle & Teasley´s definition of collaboration as:

> "*a process by which individuals negotiate and share meanings relevant to the problem-solving task at hand…. Collaboration is a coordinated… activity that is the result of a continued attempt to construct and maintain a shared conception of a problem*" Roschelle & Teasley (1995 p. 70).

Today collaborative ICTs range from the new web 2.0 technologies like wikis and blogs (Larusson & Alterman, 2009) to videoconferencing, file sharing, instant messaging and e-mail (Majchrzak, 2000), as long as they facilitate the sharing and negotiation of meaning. The tool in use GoToMeeting™ in NLIA is an relatively old desktop conferencing tool which combines audio conferencing with screen (desktop) sharing, which allows remote and synchronous communication (voice and chat). It is a web-based tool that allows everyone in a group meeting to share whatever is on each participant's computer (documents, pictures, spreadsheets, PowerPoint™) and to engage in collaborative writing.

By addressing identity, the second research question seeks to obtain a deeper understanding of the social processes that are involved in these managed networks of competence. In the literature related to communities of practice, such processes are regarded as being crucial for understanding knowledge sharing and learning. I would argue that my two research questions are definitely interrelated, because

Wenger (1998) views practice (work practice as well as ICT use) and identity as two blurring categories. Marabelli and Newell (2012 p. 19) state; "*Practices are not just descriptions of what is done; rather they constitute who we are and what we know*." This not only applies to work practices but also to knowledge sharing and learning practices (which also are a part of work practice). To formulate the relationship between research question one and two in a very concrete ways I suggest the following; tell me how you share your knowledge, and I can tell you who you are and what your knowledge consists of.

It is apparent that the social and relational aspects of learning and knowledge sharing within different communities of practice do matter (Brown and Duguid, 1991; Lave and Wenger 1991). While the proponents of communities of practice emphasize how efficiently sticky and tacit knowledge can be shared through joint practice, the problems that may arise between different communities of practice with conflicting identities and norms (Hong & Fiona, 2009) and role of identity in heterogeneous contexts (Macpherson & Clarke, 2009) are yet to be discovered. A study of managed networks of competence is interesting, since they may not necessarily overlap with one community of practice, but organize members with more or less different identities, knowledge and practices. A study of managed networks of competence in distributed organizations like the Norwegian Labor Inspection Authority (NLIA) and The Norwegian Taxation Authority is particularly interesting, since it (may) offer a context for knowledge sharing where the participants are heterogeneous in terms of knowledge and practice. Geographical dispersion, creates looser social ties among practitioners, even if there is a degree of similarity in their practices (Heizmann, 2011). I also intend to explore what kind of new communities and interactions may emerge out of such formalized networks. This is also of interest since distributed organizations often attempt to unify their scattered units into one integrated unit via ICTs.

To sum up, the main aim of this dissertation is to develop knowledge about current efforts to promote knowledge sharing across distance within managed networks of competence. Intra- organizational networks are in general seen as an important tool for organizational success. They contribute to new knowledge, new understanding, new contacts, new opportunities, time for reflection, and finally to self-development. However these benefits do not come easy, on the contrary, as we will uncover in this dissertation. Instead of benefiting from each other, the participants experience barriers and conflicts, as further barriers to knowledge sharing rise.

1.3 Motivation for setting up managed networks of competence

The Taxation Authority and NLIA had similar motivations for setting up networks for knowledge sharing. Their motivations were that they needed to develop their expertise among their front staff (taxation officers and inspectors) due to rapid changes among their clients. As an example, for the Taxation Officers, fishing quotas have become the important asset of a fisherman. These changes create new issues, such as whether the loss of a fishing quota can be written off the firms' income as if the fishing boat had sunk. Labor Inspection Officers face similar issues related to change: What are the risks with the new chemical in use in aquaculture? Such issues need to be addressed by front staff as they come on to the scene.

Since only the first of the individual papers elaborates on findings from both the Norwegian Taxation Authority and NLIA, NLIA is the main research site in this dissertation.

In 2003, a government white paper (St.meld. nr. 17 (2002–2003)) initiated comprehensive reforms in several of Norway's regulatory bodies as NLIA`s entire

organization underwent a complete overhaul in an attempt to strengthen the operative units (Helleren, 2005). The core of the organization, the directorate, has had its number of employees reduced, and responsibilities have been handed over to the seven regions in the authority. The conducting of inspections by this authority is meant to take place in projects and organizational learning through networks. The authority implemented competence network structures in 2005/2006.The networks have so far meant a more or less permanent assignment to a specific competence network for the individual. Projects, on the other hand, run from one to three years. The official aims in setting up managed networks of competence were threefold (Norwegian Labor Inspection Authority, 2008 p 3):

1) To clarify what knowledge and competencies are needed. NLIA explicitly emphasizes that there are several opinions regarding what kind of knowledge or competencies are needed and how knowledge should be distributed in an organization - and whether the Inspectors should be generalists or specialists, or if both is desirable.
2) To accumulate knowledge in the regions. While the NLIA used to keep its experts at its central core (in Oslo), after the re-organization they chose to develop their expertise in different regions, so that the geographically dispersed inspectors can accumulate knowledge 'as near as possible' to the inspection activities. The networks organize the front staff, the inspectors, within a region out of seven in the country.
3) The networks of competence are aimed at promoting the sharing and learning of knowledge among the employees, in particular from the experienced employees to the newcomers, and to provide input about the authority's policies (plans and prioritization).

NLIA has recognized the negotiated and distributed nature of knowledge. This is illustrated by the debate over how the networks should be labeled. Some argue that these networks are not 'networks of competence', as management (in NLIA) labels them, but 'professional networks', stressing the development of academic knowledge within the networks. Others use the broader concept of a 'network of competence', emphasizing the mix of professional and experience-based knowledge which needs to be developed and integrated.

Networks in The Norwegian Taxation Authority (Fishery Network) and NLIA (two accident networks, two networks for psychological wellbeing and one network for occupational hygiene) were selected for this study. The Taxation Authority and NLIA are both geographically distributed public organizations, with employees dispersed around the country. While the networks in NLIA are regional, The Fishery network (Taxation Authority) is 'national' in the sense that it is the only network in its field and organizes taxation officers from all of the coastal regions (North and West) of Norway. In both organizations the networks are 'managed' by a coordinator, a colleague who has the resources (20 % time resource) to organize the network meetings.

The inspectors in NLIA work within one region (the whole country is divided into seven regions), and are assigned to one of four regional networks, usually on the basis of their professional orientation or area of interest. The sharing and learning of knowledge is supposed to take place mainly via the use of ICT. The geographical distance between the different members can be as much as 1300 km, and, owing to their limited budget, they may only see each other face-to-face twice a year for two days at a time. The networks meet up online around once a month for one to two hours. While they are able to share everything they have on their computers and engage in meetings over the telephone, the participants do not actually see each

other. In face-to-face meetings, they visit a work place as a group and discuss what they have experienced there. Alternatively, they can invite an external expert lecturer or practitioner to give a talk on a particular topic.

1.4 My labeling of the networks in the study

`Competence Networks` and `Managed Networks of Competence' are how I have labeled the phenomenon in my most recent articles (3, 4 and 5). My conceptualizations and re- conceptualizations of the networks in my study demonstrate how my understanding has developed in relation to empirical data and theory.

In the first paper I used the term "professional knowledge-sharing network". I labeled the phenomenon this way since the informants in the Fishery Network (Taxation Authority) used the term professional network (fagnettverk) and the informants in the Accident Network (region 1) labeled the networks in two different ways: professional network and competence network (kompetansenettverk) - some informants stressing professionalism (disciplinary expert knowledge) and others stressing more the combinations of different types of knowledge and competencies (experiences and skills). In paper two the literature on networks of practice (Brown and Duguid, 2001) and the term 'managed communities' (Newell et al., 2009) provided insight about my data. Networks of practice (NoP) have been defined as self-organized groups of members who share the same practice, but who are geographically dispersed and often rely more on online channels for communication (Brown & Duguid, 2001). Managed communities have been defined as ways of developing new or formalizing already existing communities (Newell et al., 2009). By adding, managed to networks of practice, I have to some extent replaced the self- organized aspect with top-down design and control. But even though the networks are set- up by management (the participants are assigned),

many of the activities are still ‘self- organized’ since they choose an agenda for their meetings. Since ‘Kompetansenettverk’ is the official term and the most frequently used term in the Norwegian Labor Inspection Authority, the term managed networks of competence is used in my later articles. The networks of competence are in this study defined as formal intra organizational network - initiated by management to develop individual and organizational knowledge across dispersed assigned members through self – organized knowledge sharing and learning activities.

1.5 A note on terminology

While the term knowledge sharing is used in paper 1-4, knowledge transfer is used in paper 5. In the literature these concepts sometimes are used interchangeably and sometimes authors make distinctions between the two. While Willem and Scarbrough (2002) define knowledge sharing as reciprocal process of understanding, influence and exchange that is embedded in the activities of the organization, Argote & Ingram (2000) define knowledge transfer as;

> "*the process through which one unit (individual, group, department, or division) is affected by the experience of another*" p. 151.

From a practice based approach this means that we can define knowledge transfer as if one observe the practice of a colleague and based upon the observation of this practice change his or hers own work practice or at least find a story (experience) useful for his or her own practice.

1.6 Structure of this dissertation

This interpretative study of networks of competence consists of five papers and a summary. The 5 papers are focusing on theoretical perspectives on the role of ICT, the role of identity and the role of communities for knowledge sharing and complementary findings. The papers appear after Chapter 5 of this summary. The summary is organized in the following manner: After this introductory Chapter, Chapter 2 presents how I situate this research within social constructivism and a practice based epistemology. Chapter 3 elaborates the theoretical picture developed through the work with this dissertation. Chapter 4 elaborates the methods applied and ethical issues involved. Chapter 5 provides a summary that integrates the 5 individual papers and offer conclusions and implications for the research field of knowledge sharing and implications for management. The five papers are presented in the appendix G.

2 Situating the Research

The aim of this chapter is to situate the research both epistemologically and ontologically. In the following sections, I position my research within social constructivism[1] (epistemology of practice) and not within positivism, and I write about how the social constructivist paradigm views reality and knowledge as socially embedded. In particular, I refer to pragmatism and social interactionism, a philosophy and a theoretical tradition that have influenced the practice-based approach and constructivism in general, and are, together with constructivist grounded theory, regarded as a '*strong theory-method package*' (Charmaz, 2009). Critical realism is also discussed in this chapter, since this philosophy gives insights into recent debates and a degree of balance, as well as potentially offering an alternative to social constructivism.

The conflicts regarding the foundations of science and knowledge can be described as 'science wars'. In the 1960s and 1970s, these 'wars' were especially heated between the positivists and the interpretivists. The positivists argue that the social sciences should be founded on the same principles as the natural sciences, for instance perceiving reality (ontology) as objective and external to individuals, a science that is value neutral and objective. The interpretivists, on the other hand, claim that reality is a social construction, where we create subjective reality based on experiences and interaction, namely science that sees social reality as accomplished through social construction (Charmaz, 2006). Over the last five

[1] The terms constructivism and social constructionism tend to be used interchangeably and subsumed under the generic term 'constructivism', in particularly by Charmaz (2000, 2006). But within learning theory constructivism proposes that each individual mentally constructs the world of experience through cognitive processes - social constructionism at the other hand has a social rather than an individual focus. Social constructivism is therefore less interested (if at all) in the cognitive processes that accompany knowledge (Andrews, 2012).

decades, the idea that the natural sciences should function as a role model for social sciences has gradually become less influential. The main reason is that social scientists today acknowledge that human beings interpret their world and act according to their own will (Korsnes, Andersen & Brante, 1997). Mingers (2008), a researcher within the field of knowledge management, argues that the standoff between positivism and interpretivism has been ameliorated in favor of some form of pluralism. Some simply accept the validity of different paradigms (e.g., Jackson, 2000, Robey, 1996), or one that actively seeks to combine research approaches (e.g., Goles & Hirschheim, 2000; Mingers, 2001; Tashakkori & Teddlie, 1998).

This research is aligned with the social constructivist approach to grounded theory (see chapter 4), where categories and concepts emerge from my interactions with the field and questions about the data (Charmaz, 2000). The strength of this approach is twofold:

1) The social constructionist view that has the ability to uncover some of the complexity of human sense making. Viewing knowledge as socially constructed through interactions in particular contexts (Newell et. al. 2009). A perspective that goes beyond the deterministic perspectives on ICT and organizational structure (network structure), where both are thought to have embedded features influencing people.
2) Grounded theory analysis, is particularly useful for the explorative nature of this research project.

2.1 Reality and knowledge as a social construction

Social constructivism assumes that people create and construct social realities through individual and collective actions. From the social constructionist perspective (Berger & Luckmann 1969), human knowledge is regarded as constructed between people in day-to-day activities in various social situations. Social constructivism

suggests that we need to assess the meanings that learners co-construct in their interactions with others. Organizational researchers within a social constructivist epistemology are interested in uncovering how the socially constructed nature of knowledge is applied in both its production and interpretation (Hislop, 2009). Social constructionists study what people at a particular time and in a particular place take as real, how they construct their views and actions**.**

Social constructivism is presented in radical and moderate forms. Moderate constructivists take a relativist position with regard to scientific knowledge. They see it as their task to explain variations in knowledge (defined as shared beliefs) by relating the differences and changes in social structures. The independent existence of a social reality is presumed and not questioned; consequently, moderate constructivists do not challenge explanatory frameworks of standard social sciences (van den Belt, 2003).

An example of the most radical social constructivists is Gergen (2009) who claim that all human intelligibility (including claims to knowledge) is generated within relationships (and not through individual cognitive processes) —or what he labels 'relational being' (Gergen, 2009 p.1). It is from relationships that humans derive their conceptions of what is real, rational, and good. From this perspective, scientific theories, as all other reality posits, should not be assessed in terms of truth. However, this radical ontology is ethically problematic, since any action is a product of relations (societal, organizational) , the individual cannot be held responsible for his or her actions.

Furthermore radical constructivists (such as Knorr-Cetina, 1983 or Latour & Woolgar, 1986), in contrast to moderate constructivists, do not assume the existence of pre-given social structures which can be used to account for the

content of knowledge; in their view, 'nature' and 'society' are seen as being 'co-produced' (van den Belt, 2003). The more moderate versions of critical, social and epistemological forms of constructivism imply that research analysis is contextually situated in culture, time, and place (Alvesson & Skjöldberg, 2008). Epistemologically, social constructivists see facts and values as linked, and therefore they acknowledge that what they see or do not see rests on values, and therefore researchers are advised to be open and reflect on their values and assumptions (Charmaz, 2006).

2.1.1 Pragmatism and symbolic interactionism

Pragmatism is one of several traditions that has influenced social constructivism and in particular the practice-based approach. The pragmatists view reality not as something which is ready made, but something that is still in the making (James 1981), as cited by Strübing, 2007), provides us with a strong picture of the pragmatist perspective of reality:

> "*Pragmatist philosophy … conveys an image of the world brimming with indeterminacy, pregnant with possibilities, waiting to be completed and rationalized. The fact that the world out there is 'still' in the making does not augur its final completion at some future point: the state of indeterminacy endemic to reality cannot be terminated once and for all. It can be alleviated only partially, in concrete situations, and with the help of thinking agent. The latter has the power to carve out an object, to convert an indeterminate situation into a determinate one, because he is an active being. The familiar world of color, sound and structure is his practical accomplishment, i.e. he hears because he listens to, he sees because he looks at, he discerns a pattern because he has a stake in it, and when his attention wavers, interest ceases, and action stops – the world around him sinks back into the state of indeterminacy*". (James 1981, as cited by Strübing, 2007, p. 583).

Reality is nowhere other than in active experience, i.e., in action. On the other hand, pragmatists do not deny that 'something out there' might exist independently of social actors. However, for them any possible 'something out there' can be linked to the active search for the solution to practical problems. Reality becomes so, consequently, only as long as it is a part of the environment within which actors act (Strübing, 2007).

Derived from pragmatism**,** symbolic interactionism (Blumer, 1969; Cooley, 1964; Mead, 1934) assumes that people construct reality—society and themselves—through interaction. This perspective addresses the dynamic relationship between meanings and interpretations, i.e., the active process through which people create and mediate meanings—meanings that arise out of actions, and that in turn influence actions. Human beings are active and use their experience and socialization is part of this. Symbolic interactionism views social life as a process, and social order and personal identity as continuously restructured or changed (Alvesson & Skjöldberg, 2008).

While social constructivist researchers in general are interested in uncovering and describing the processes of social construction, researchers with a pragmatic ontology seek to develop theories on social interaction in the context of solving practical problems, in particular with the aim of improving practice. Table 2 contrasts positivism with social constructivism founded on pragmatism:

Table 2 Pragmatism & Positivism (adapted from Charmaz 2009, pp.139)

Positivism	**Pragmatism**
Assumes scientific method	Takes a problem-solving approach
Presupposes an external reality	Views reality as fluid, somewhat indeterminate
Assumes an unbiased observer	Assumes a situated and embodied producer of knowledge
Assumes discovery of abstract generalities	Assumes a search for multiple perspectives
Aims to explain empirical phenomena	Aims to study people's actions to solve emergent problems
Views facts and values as separable	Sees facts and values as co-constitutive

Positivism assumes the discovery of data in an external world, where abstract and objective truth can be reached if the researcher is a neutral and expert observer who observes without preconceptions. Social constructivism views truth and generalizations as partial, conditional and situated in time, space, positions, actions and interactions (Charmaz, 2009).

2.1.2 A practice-based version of social constructivism

From a realist point of view, practices are activities we can observe. From a social constructivist perspective, the meanings of the practices are the essential aspects. Practices are not just descriptions of what is done; rather, Marabelli and Newell (2012) describe them as practices that constitute who we are and what we know. Berger and Luckmann's (1966) notion of constructivism assumes that reality is constructed as people develop their representations of the world and act according to them. The practice-based approach starts with the premise that the world is constructed through our practices, rather than that our practices are the product of our social construction (Leonardi & Barley, 2010). Our actions are consequential, bringing the social world into existence through everyday activity, so that practices

are the primary building blocks of social reality (Feldman & Orlikowski, 2011). In other words, practice has ontological primacy in the social construction process since practices produce organizational reality. Feldman and Orlikowski (2011) acknowledge that this also goes for research practice as it produces particular kinds of consequences in the world for which we, as theoretical producers, are responsible.

2.1.3 Critical realism

Critical realism (Bhaskar, 1986, 1989) has gained increased popularity and is seen as a balancing or alternative view to social constructivism (Alvesson & Skjöldberg, 2008). This philosophy accepts elements of both positivism and interpretivism, but maintains a realist core (Mingers, 2008). Critical realism combines a realist ontology (a real world exists) with an interpretive epistemology. The critical realist makes a distinction between the real (all objects, mechanisms and events), the actual (those events that do or do not occur dependent on the interplay of structures and mechanisms), and the empirical (the events that are experienced by humans and which can be the basis for science). Researchers with a critical realist ontology do not claim generalizable laws (as do positivists), but will argue for the existence of some structure or mechanisms, whether or not these can perceived.

Critical realism shares with Giddens' (1984) structuration theory and other constructivists such as Berger and Luckman (1966) the assumption that action and structure are mutually constituted. However, critical realists consider that social structure exists independently of current human activity. Kilduff and Tsai (2003) point out that all network research adopts 'some version of critical realism' since concepts such as heterogeneity and homogeneity and other pre-structured elements are important elements in their analyses. Delanty's (2005) opinion is that the differences are not so much between social constructivism and critical realism,

but between radical or moderate versions of both. Within a critical realism perspective, researchers will seek to identify the structural elements related to knowledge and mechanisms (such as social capital) that facilitate knowledge sharing.

2.2 Objectivist vs. practice-based perspectives to knowledge

In the literature, knowledge sharing is viewed from the perspectives of two competing epistemologies, the 'epistemology of possession' and the 'epistemology of practice', with various sub-streams. Here I will compare these two epistemologies and move on to the sub-streams (process and practice) within the epistemology of practice addressed in this dissertation.

2.2.1 The objectivist perspective on knowledge

The objectivist perspective falls within the neo functionalist discourse on knowledge management (Hislop, 2009; Schultze & Stabell, 2004). The objectivist character of knowledge is described in Table 3:

Table 3 Objectivist Epistemology (adapted from Hislop, 2009, pp. 19)

Nature of knowledge from an objectivist epistemological standpoint
Knowledge is an entity/object
Based on a positivist philosophy; knowledge regarded as objective 'facts'
Explicit knowledge (objective) privileged over tacit knowledge (subjective)
Knowledge is derived from an intellectual process

These ideas are rooted in positivism, which considers that the social world can be studied scientifically, i.e., that social phenomena can be quantified and measured, that general laws and principles can be established and produce objective knowledge as a result (Hislop, 2009). Cook and Brown (1999) label this perspective

'the epistemology of possession', viewing knowledge as a cognitive entity, a resource to be accumulated, captured and transferred. The objectivist idea that explicit knowledge can exist and be shared in textual forms builds on assumptions regarding language that there is direct equivalence between words and what they denote (Hislop, 2009). From the objectivist perspective with regard to knowledge, social life is made up of individuals who navigate an objective external world through cognitive processes (Newell et al, 2009). This perspective relies on individual learning theory, where learning is identical with the enhancement of individuals' mental models, and happens when individuals obtain information and knowledge, which can subsequently guide their individual and organizational behavior. Learning comes through individuals' work with their cognitive structures (Brandi & Elkjær, 2011). Building on these assumptions, the sharing of knowledge from this perspective has been referred to as the conduit model of knowledge sharing. This model proposes that knowledge is shared from an isolated sender to a separate receiver.

One main criticism of this perspective is that if learning begins with a change in mental models, how then is it possible to learn from practice and practicing, i.e., from the body and emotions, and from the taken-for-granted and unspoken history and culture (Cook & Yanow, 1993)? The objectivist perspective has also been criticized on various other grounds:

- for not taking into account the more subjective, highly equivocal and dynamic nature of knowledge (Weick, 1990);
- for having a determinist view of the role of ICT (Robey & Boudreau, 1999) and a functionalist view of organizations (Burrell & Morgan, 1979); and
- that this perspective exaggerates the separation between tacit and explicit knowledge, whereas, in fact, tacit and explicit knowledge are mutually constituted (Tsoukas, 1996).

2.2.2 Process- and practice-based perspectives on knowledge

Cook and Brown (1999) describe process- and practice-based perspectives as the 'epistemology of practice'. This can be seen as a shift from viewing knowledge as an entity to knowledge—or 'knowing', as some writers prefer—as inseparable from human activity (Orlikowski, 2007). It is argued that the focus of enquiry should be on the process of knowing and the capability to act (Blackler, 1995; Brown & Duguid, 1998, Schultz, 2000). It also relates to the replacement of individual learning theory with social learning theory in the organizational learning literature, which coincides with the social constructivist turn in social science and educational studies (Berger & Luckmann, 1966; Brandi & Elkjær, 2011). Knowledge is not a traceable entity, but should be viewed as relative, provisional, and primarily context-bound (Blackler, 1995; Orr, 1990). Table 4 provides a summary of the key characteristics:

Table 4 Practice-based epistemology (adapted from Hislop, 2009, pp. 34)

Characteristics of knowledge within an practice-based epistemology
1. Knowledge is embedded in practice
2. Tacit and explicit knowledge are inseparable
3. Knowledge is embodied in people
4. Knowledge is socially constructed
5. Knowledge is culturally embedded
6. Knowledge is contestable

This perspective stresses that thinking and doing are fused in knowledgeable activity in undertaking specific tasks. There are several sub-streams within this perspective. Newell et al. (2009) distinguish between two main sub-streams: the process perspective and the practice perspective, both sharing the 'epistemology of practice'

and see knowing as a social activity. The following table 5 accounts for the different orientations regarding knowledge from these two sub-streams or perspectives.

Table 5 Process and Practice perspective on knowledge (adapted from Newell et al., 2009, pp. 18)

Perspective	Process	Practice
View of social life	Individual and collective interpretations embedded in social interactions, roles & structures	Materiality interwoven (human and non-human) practices centrally organized around central shared practical understandings
View of knowledge	Knowing as a social and organizational activity—socially constructed through interactions in particular contexts	Knowing as practice—constituted by and constituting fields of interconnected practices
Major locus of knowledge	Embedded and encultured in social context	Embedded, embodied and invested in practice

Researchers aligned with the process perspective define knowledge in terms of a social construction in a particular context, in contrast to those who view knowledge as constituted in practice and constituting fields of interconnected practices (the practice perspective) (Gherardi, 2011). Knowledge from the process perspective is viewed in terms of knowledge or knowing as a process of sense making, where actors negotiate their understandings in their interactions. Knowledge is therefore, according to Newell et al. (2009):

- equivocal, subject to different meanings and interpretations;
- dynamic, in that accepted meanings can change as actors and contexts change;
- context-dependent, in that it is difficult, if not impossible, to separate knowledge from the context in which it is produced.

Examples of the social constructivist process perspective can be found in Lave and Wenger's (1991) and Wenger's (1998) seminal works on communities of practice, which have their roots in the social constructivist learning theory of Vygotsky (Gherardi, 2012).

An example of the practice perspective is Gherardi and Nicolinis's (2000) paper 'To Transfer is to Transform: The Circulation of Safety Knowledge'. This reveals how safety knowledge is a collective endeavor through which heterogeneous materials and entities, such as ideas, concepts, artifacts, texts, persons, norms, and traditions, are mobilized, modified, translated, distorted, exposed, used, ignored or hidden in view of some practical accomplishment, such as safety on a construction site. It is inspired by authors such as Latour (1987, 2005) who represent an attempt to bring forward the role of non-human acts (or socio-materiality; Orlikowski, 2007) in the construction process. This has been interpreted as a hint of pragmatic realism brought into radical constructivism (van den Belt, 2003).

A notion of constitutive entanglement presumes that materiality and technology, as well as humans, are constitutive to organizational life; the material and the social are considered to be inextricably related. As Orlikowski (2007) puts it, "*there is no social that is not also material, and no material that is not also social*" (p. 1437). This is in line with the radical constructivists where the 'nature' and the 'social' are seen as co-constructed (Knorr-Cetina, 1983). From this perspective, knowledge is not individual (in someone's head) nor embedded in technology; it is bound up with the material and social context in which it is used, i.e., a strong process view. It is also an example of the phenomenological legacy where practice theories view actions as 'taking place' or 'happening', not isolated but in relation to other actions, practices, life and world (Gherardi, 2012; Sandberg & Dall'Alba, 2009).

2.2.3 Weak and strong views of process within the practice-based approach

When organizations are viewed from what Chia (1999) calls an 'entitative' conception of reality, process is conceptualized in terms of interaction between stable entities, namely, entities such as actors, roles, knowledge and technologies. The process view is weak in the sense that one assumes that the world consists of entities whose interactions constitute process. In this sense, the entities exist ontologically prior to the process they engage in; they shape the process, while remaining intact throughout their participation in the process. Writers tending towards a strong process view, on the other hand, work from the ontological position that the world is process and the entities, as far as they exist, are products of process rather than existing prior to them (Bakken & Hernes, 2010).

In a recent article, Marabelli and Newell (2012) distinguish between three forms of knowledgeability. The first view is the containment view (see table 6) that sees knowledge as located in relationships between people engaged in a particular practice. Knowledge from this perspective is difficult to share, not only because it is tacit (Nonaka, 1994) or sticky (Szulanski, 1996), but because it is embodied in the social and cultural context from which it originated (i.e., everyday work). Thompson (2011) argues that there is a drift towards a more entitative construction of communities from the process-oriented work of Lave and Wenger (1991) to Wenger (1998), as in the latter organizations are seen more as social designs directed at practice (Wenger, 1998, p. 241).

The mutual constitution view recognizes two equally important epistemologies, in which knowledge is possessed by individuals (the entitative view) who interact in a generative dance of knowledge and knowing when engaging in an actual practice (Cook & Brown, 1999) (the process view). While the mutual constitution view

combines the entitative and process views, the radical approach adopts a strong process view.

Table 6 Forms of knowledgeability (adapted from Marabelli and Newell 2012, pp. 18–30)

Approach	Authors	Key Concept
Containment view	Brown and Duguid (1991), Lave and Wenger (1991), Wenger (1998)	Knowledge is embodied in the everyday activities of an established community of practice (working knowledge)
Mutual constitution view	Cook and Brown (1999), Marshall (2008)	Knowledge as a 'thing' and knowing (working knowledge) are complementary and these two dimensions of knowledge can be used at different organizational levels (i.e., knowledge is possessed by individuals; knowing is socially created)
Radical view	Feldman and Orlikowski (2011), Sandberg and Tsoukas (2011)	Knowledge is practice

The radical view is a strong process view since it puts practice first ontologically; knowledge exists as a product of practice. Knowledge and practice are here ontologically equivalent (Sandberg & Tsoukas, 2011) and knowledge is inseparably tied to practice and cannot exist as an entity outside practice (Feldman & Orlikowski, 2011). From this perspective, tacit and explicit knowledge are not at two ends of a continuum, but are two sides of the same coin. Tsoukas (2011) argues for this from a phenomenological perspective and, in particular, how practices draw our awareness towards some particularities that will shift in a new context. By focusing on particularities after an action has been performed, we are not focusing on them in

terms of their bearing on the original focus of the action; this changes the meaning, and therefore the idea that someone can focus on a set of particularities and convert them into explicit knowledge is inappropriate. However, we can engage each other in a dialogue that helps remind each of us how we do things and enables distinctions we have not previously noticed or which have escaped our attention to be brought forward (Tsoukas, 2011).

2.3 Conclusion

My literature review shows that the positivist–interpretive debate has cooled somewhat within the social sciences, where the moderate versions of different philosophical positions agree that the reality we perceive is socially constructed—constructivists, pragmatists and critical realists alike. I have discussed two paradigms in the current literature on knowledge, one treating knowledge as an object that can easily be shared, the other emphasizing that knowledge is socially constructed and embedded in culture and practice. The practice-based approach views human agency and social structures as co-constituted. Pragmatism, social interactionism and phenomenology offer important foundations for interpretive and social constructivist research (epistemology of practice) in relation to knowledge, that have helped me to consider how knowledge is socially constructed and socially embedded in activities and always 'still' in the making. Viewed from a phenomenological standpoint, our (human) way of interpreting and dealing with the world does not take place in isolation, it is inherent in the practices of our culture and society, and is continually enacted by us in an un-mindful way. Practice form the active agents focus and awareness, and hence their knowledge or knowing. I also find that the practice-based approach to knowledge (and

knowing) offers a particular type of social constructivism, viewing our world (and knowledge) as more or less constructed and enacted in practice.

3. Theory: A practice-based approach to knowledge sharing

Having positioned the research problem of knowledge sharing within a greater context of current research perspectives, I now move to a review of selected literature in the field. The purpose of this review is to provide a useful background for the research problems addressed in this dissertation.

This dissertation extends the overarching theoretical idea of structuration theory (Giddens, 1979; 1984), which views the role of ICT and identity as a structuration process where actors' ICTs use and identity construction relevance is confirmed or rejected during concrete interactions in a given context.

Theories on communities and cross-community knowledge sharing are presented here to provide necessary prior understanding and to compare findings with earlier research on knowledge sharing through communities. Since recent research has found multitasking to be a common occurrence in technology-supported meetings over distance, modern theorizing about multitasking and multi-communication in contemporary workspaces is included to help me so as to discuss my findings that relate to research question 1 – the role of ICT in knowledge sharing. Likewise, literature on the difficulties of identity in learning and the relationship between social identity and social capital is included to help me to discuss the role of identity construction for knowledge sharing in the managed networks of competence (research question 2).

3.1 The purpose of a literature review in interpretative research

The purpose of a literature review in the positivist style is often to generate hypotheses that can be empirically tested. The interpretative definition of theory is that it emphasizes understanding, rather than being just an explanation. These types of theory assume that emergent, multiple realities, facts and values are linked, truth

provisionally and social life processually (Charmaz, 2006). While positivists contribute to theory by verifying or rejecting their theories within a discipline, I have the opportunity to pursue contributions in more than one theoretical direction when collecting rich data.

3.1.1 My approach

Glaser and Strauss (1967) argue that, when working within grounded theory, literature reviews should be delayed until after the completion of the analysis: they do not want the researcher to see the data through the lens of earlier ideas. Some have interpreted this as a naive tabula rasa view of the researcher or as being too ambiguous (Charmaz, 2006). Charmaz (2006) suggests that we should conduct a literature review and then let it lie fallow until categories are developed. For this dissertation, the literature review has been conducted several times when writing up my research proposal, attending research courses and attending conferences. But it is also fair to say that the literature was reviewed more heavily during the later stages of the research as themes emerged from the data. Furthermore, theories served more as a sensitizing device during subsequent data analysis (van den Hoonard, 1997); that is, existing theories were used to formulate research questions, or as a supplier of useful concepts during analysis or as a device for future questioning when theoretically sampling new informants. While the research project is ongoing, the contributions of each paper in this dissertation all have at least one common feature: they deal with community-based knowledge sharing, and online and managed contexts.

3.2 Structuration theory: The duality of ICT and the duality of identity

Structuration is a social theory of the creation and reproduction of social systems. It was developed by Giddens (1984) and is based on the analysis of both structure and agents without giving primacy to either. Giddens' structuration theory, which emphasizes the role of practice, has been extended into two practice-based streams (out of seven practice-based streams; for an overview, see Corradi, Gherardi & Verzelloni, 2010):

1) The Practice Lens (Orlikowski, 2000) and;
2) Knowing in Practice (Orlikowski, 2002)

The three core concepts in this theory are structuration, social practices and the duality of structure. The term `structuration' refers to the ongoing instances during which society and individuals are created and recreated during interaction. Structure emerges as a largely unintended consequence of the structuration process. The term 'structuration' in this dissertation refers to how the role of ICT and identity is created, recreated or changed. The term 'social practices' is about the enactment of the structures that make social life possible; the recurrent actions and interactions taking place, enabled and constrained by structures:

> "*The essential recursiveness of social life is constituted in social practices; structure is both medium and outcome of practices. Structures enter simultaneously into the constitution of the agent and social practices, and exists in the generating moments of this constitution*." (Giddens 1979: p.5)

The above quote frames the `duality of structure`. ICT and identity represent structures. ICT is seen as a major factor altering the structure of an organization (Orlikowski & Robey, 1991). ICT is a structure and resource that people can draw

upon as people engage in social practices, e.g. sharing knowledge (Orlikowski, 1992; 2000). ICT is influenced and shaped by its use. The duality of ICT implies that when people use it, they create and recreate themselves and their communities' ongoing moments of structuration. In this view, the norms of ICT use and individuals' social identities emerge as largely unintended consequences of the structuration process (Rosenbaum & Shachaf, 2010). Equally, identity categories involve resource knowledge sharing, and lived actors creating, recreating or constructing new categories of identities.

3.3. Emergent Communities

According to Newell et al. (2009), research on emergent communities has tended to build on the seminal works on communities of practice by Brown and Duguid (1991), Lave and Wenger (1991) and Wenger (1998). A community of practice is characterized by members who share work activities and engage in work together over a certain period of time, developing a shared identity, language, artifacts, norms and values in the process. Learning through imitation, observation, narration and storytelling gives rise to shared knowledge (von Krogh, 2011). Emergent communities are of interest for a number of reasons (Newell et al., 2009):

1. They are an important context for knowledge sharing across formal boundaries.
2. They emerge from the bottom up, where individuals voluntarily contribute because they have something to learn.
3. Knowledge sharing is facilitated by mutual engagement (trust and mutual relationships), joint enterprise (shared norms and accountability in behavior) and a shared repertoire (circulation of shared stories and concepts related to practice).

Communities of practice have been identified as a mechanism through which knowledge is held, transferred and created (Brown & Duguid, 1991; Lave & Wenger, 1991; Wenger, 1998). Following the publication of Lave and Wenger's study (1991), both researchers and practitioners have focused upon communities of practice. In the next sections, I will address the three seminal works on communities of practice:

1. *Situated Learning: Legitimate peripheral participation* (Lave & Wenger, 1991). A theory of newcomer learning with an emphasis on its role as a continuous, active, engaged, situated and identity-forming process.

2. *Organizational learning and Communities-of-Practice: Toward a unified view of working, learning and innovation* (Brown & Duguid, 1991). An article highlighting the role of communities of practice in the improvisation of new understanding, where canonical accounts of work prove inadequate to `get the job done' and emphasis is instead placed on the importance of storytelling in knowledge sharing and innovation. The article sees organizations as a community of communities.

3.Communities of practice: Learning, meaning and identity, Wenger´s 1998 book gives weight to social identity and trajectories of participation, and which concentrates on individuals and their multi-membership in different communities.

While the networks in this study are influenced by some formal control, e.g., managerial participation and evaluations, it is not possible to force anyone to contribute; the agenda at the meetings are the groups to decide. Therefore the networks in this study are somewhat in between a work group and a network of practice (**see paper 3**). The managed networks of competence in this study are not

communities of practice since participating is not voluntary, but obligatory. The participants are assigned to a formal network. In this respect the managed networks of competence might not be as dynamic as a well-functioning community of practice, where new members are absorbed into a community, as existing members leave, and as the knowledge and practices of that community adapt with changing circumstances (Mørk, et.al., 2012). However the networks of competence in this dissertation is viewed as an attempt to nurture networks or communities of practice in the organization or at least develop some of the network or community of practice outcomes – knowledge sharing and learning - by organizing these networks, hence also potentially influencing existing and emergent communities in the organization.

3.3.1 Knowledge sharing through Legitimate Peripheral Participation

Lave and Wenger (1991) originally developed their social learning theory out of an empirical interest in apprenticeships as an alternative to school-based learning (Østerlund & Carlile, 2005). What they describe is a theory of newcomer learning whereby novices or newcomers acquire knowledge and skills through interaction with experienced members. In this respect, the progression of gaining competence and membership in a community is linked to changing identity, and involves newcomers gradually taking on more expert roles, or as referred to by Lave and Wenger (1991), `identities of mastery`. Peripheral participation – i.e. active involvement in practice – is identified as a key process in learning. The supreme relational force of the theory focuses on the differences or tension between being an outsider or newcomer and being an insider to a set of practices (Østerlund & Carlile, 2005). The focal point of Lave and Wenger (1991) is the process of becoming part of a shared practice. The central proposition is that learning is more than simply acquiring knowledge: it is about an identity change.

Apprentices get on a trajectory towards gaining membership in a particular community, and this result in a continuum of expertise within a community of practice, where some members participate more actively and frequently than others (Ardichvili et al., 2006). Socially speaking, newcomers move centripetally towards the center of the community (full membership) as they increasingly identify with the community's practices. Apprenticeship usually involves no external tests, and progress is visible to the learner and others in the process of work itself (Lave & Wenger, 1991). Newcomers become old-timers through the social development of increasingly centripetal participation, which depends on legitimate access to ongoing community practice. They develop a changing understanding of practice over time from their participation in the ongoing activities of the community. Newcomers and old-timers are dependent on each other: newcomers in order to learn and old-timers in order to carry on the community of practice. At the same time, the success of both new and old members depends on the eventual replacement of old-timers by newcomers who become old-timers themselves. According to Lave and Wenger (1991), the term `master and apprentice` is not a teacher–pupil relationship: masters usually do not have a direct, instructive impact on apprentices' learning activity, but they are crucial in providing newcomers to a community with legitimate access to its practices.

From this perspective, knowledge can be shared from the master to the newcomer through interaction (observation, communication and collaboration) if the newcomer is granted participation in the community's ongoing activities. If not, a newcomer in the organization might still be an outsider to the community and the activities where knowledge sharing takes place. Informal learning from other group members is a key element of this process: "… *learning to become an organizational member is far more a question of socialization than of formal learning*..." (Trowler & Turner, 2002: p.242).

Knowledge sharing is, from Lave and Wenger`s (1991) perspective, linked to an identity forming process – a trajectory; however, power and conflict between generations, masters, journeymen (young masters) and novices can create problems and barriers to this trajectory, and consequently, identity forming and knowledge sharing. While communities of practice is an entity, this book contains a strong ontological process view, since communities of practice only makes sense as a construction in relation to legitimate peripheral participation (Thompson, 2011).

3.3.2 Knowledge sharing through storytelling and improvisation

According to Østerlund and Carlile (2005), the most widely adopted approach to situated knowledge and communities of practice within the organizational literature stems from Orr (1990, 1996) and Brown and Duguid's (1991, 1998, 2000, 2001) adaptation of Orr and Lave and Wenger's (1991) work. The overall theoretical perspective remains the same as the latter, but Orr's empirical data (1996) is based on Xerox service technicians' engagement in knowledge-sharing practices. Based on Orr's specific insights, Brown and Duguid (1991) make the more general claim that reliance on canonical practice (espoused practice) can blind an organization's core to the actual, and usually very valuable, practices of its members (including non-canonical practices). Brown and Duguid (1991, 2001) call attention to how Orr's technicians create and share narratives over and about troublesome copy machines. Facing novel issues, the technicians work together in diagnosing problems through narration; the integration of the situation's various facts is accomplished through a conversation. The knowledge produced therefore emerges out of a collective effort around a shared practice. This form of social construction is improvised and situated. People engaged in a shared practice draw on separate experiences and do not form an entirely homogeneous group. These differences allow community members to engage in a task by complementing each other's activities in an

unfolding improvisation (Brown & Duguid, 1991). The gap between espoused and actual practice may become too large for non-canonical practices to bridge. To foster working, learning and innovating, an organization should therefore close that gap. To do so:

> "… *an organization needs to reconceive of itself as a community-of-communities, acknowledging in the process the many non-canonical communities in its midst. It must see beyond its canonical abstractions of practice to the rich, full-blooded activities themselves*." (Brown & Duguid 1991: p.53)

Østerlund and Carlile (2005) find in Brown and Duguid (1991) a similar shift from historically constituted structures toward emerging structures, similar to that found in other workplace studies, such as those by Barley and Tolbert (1997) and Orlikowski (1992), that build on Giddens' (1984) structuration theory or the organizational literature on improvisation (McGinn & Keros, 2002; Miner et al., 2001; Weick, 1998). It is in the day-to-day unfolding of practice that new structures continuously emerge – such as the socially distributed repositories of knowledge embedded in technicians' 'war stories' (Østerlund & Carlile, 2005).

Brown and Duguid (1991) stress that organizations can re-picture both their environment and their own identity, and that these two are mutually constitutive. Orr's technicians do not assume that there is one correct answer or a universal view to be discovered; rather, they repeatedly look for innovative ways to impose new structure, ask new questions, develop new views and become a new organization. Such a reconceptualization is something that people who develop non-canonical practices are continuously doing: shaping their own identity (and that of their community) on their own terms. Brown and Duguid (1991) accentuate the role of

storytelling as a more central way of communicating than codifying it in ICT systems. According to Newell et al. (2009), stories are important because:

1. They present information in an interesting way.
2. They personalize information (whom we might have heard of).
3. They bring people together, emphasizing a shared social identity and interests.
4. They express values – often containing a moral about behavior leading to either positive or negative outcomes. (p.171)

Stories and narratives are two separate concepts: a story is a description of what has happened, whereas a narrative is a story that offers a particular point of view of the situation (Bruner, 1986), like a lesson learned. Narratives are ways to create and negotiate meanings and identity. At the same time, they are important resources with which to maintain, develop and distribute practical knowledge within work groups (Gherardi, 2012). Narratives provide a way for people to share their knowledge with one another so as to solve collective problems (Brown & Duguid, 1991).

3.3.3 Communities of Practice: Learning, meaning and identity

The above heading is the title of the seminal work of Wenger (1998) on communities of practice. In this book, he specifically stresses the importance of trajectories through distinct levels of participation in a community, and the tensions of multi-membership in separate communities as a key dilemma for the individual. The nature of boundaries between communities is also explored. Wenger abandoned the concept of legitimate peripheral participation, and used the idea of an inherent tension in a duality instead. Meaning and identity is, according to Wenger (1998), negotiated through a development of participation and reification.

Wenger uses the word ‘participation’ as per the common usage: the taking part or sharing with others in some enterprise or activity. By ‘reification’, Wenger refers to the process of giving form to our experience by producing objects that congeal (or harden) this experience into ‘thingness’, which give us points to focus on and lets us organize the negotiation of meaning. He puts it this way:

> ”*Any community of practice produces abstractions, tools, symbols, stories, terms and concepts that reify something of that practice in a congealed form*.“ (Wenger 1998: p. 59)

The structural characteristics of a community of practice are defined by a domain of knowledge, a notion of community and a practice (Wenger, 1998). Firstly, a domain of knowledge creates common ground, inspires members to participate, guides their learning and gives meaning to their actions. Secondly, the notion of a community creates the social fabric for that learning; a strong community fosters interactions and encourages a willingness to share ideas. Thirdly, while the domain provides the general area of interest for the community, the practice is the specific focus around which the community develops, shares and maintains its core of knowledge. The characteristics of communities of practice are presented in the text box below.

1) Sustained mutual relationships – harmonious or conflictual
2) Shared ways of engaging in doing things together
3) The rapid flow of information and propagation of innovation
4) Absence of introductory preambles, as if conversations and interactions were merely the continuation of an ongoing process
5) Very quick setup of a problem to be discussed
6) Substantial overlap in participants’ descriptions of who belongs

7) Knowing what others know, what they can do, and how they can contribute to an enterprise 8) Mutually defining identities 9) The ability to assess the appropriateness of actions and products 10) Specific tools, representations, and other artifacts 11) Local lore, shared stories, inside jokes, knowing laughter 12) Jargon and shortcuts to communication as well as the ease of producing new ones 13) Certain styles recognized as displaying membership 14) A shared discourse reflecting a certain perspective on the world

Source: Wenger, 1998: pp.125-126

Wenger's (1998) focus is clearly on identity. Nearly half of the book is devoted to this topic. Table 7 below illustrates the parallels between practice and identity:

Table 7 Parallels between practice and identity (adapted from Wenger, 1998, pp.150)

Practice as…	**Identity as…**
Negotiation of meaning (in terms of participation and reification) Community Shared history of learning Boundary and landscape Constellations	Negotiated experience of self (in terms of participation and reification) Membership Learning trajectory Nexus of multi-membership Belonging defined globally, but experienced locally

Wenger's emphasis on the individual's perspective allows him to introduce a multi-communal perspective in contrast to Lave and Wenger's intra-communal viewpoint (Østerlund & Carlile, 2005). By addressing identity, Wenger directs the individual in a social perspective, and calls our attention toward broader methods of identification

and social structures than communities of practices alone. As individuals, Wenger highlights that we negotiate our identity (and practice and knowledge) in relation to several communities, as we reproduce our existing modes of participation and engage in new social relations.

3.3.4 The seminal works compared

The three works are different in several dimensions. Firstly, they differ regarding their emphasis on homogeneity across participants in a community of practice. While Lave and Wenger (1991) focus on becoming an insider to a set of practices through interaction with a master, Brown and Duguid (1991) emphasize how varied experiences across colleagues contribute to innovation; meanwhile, Wenger (1998) accentuates how multi-membership gives access to various types of knowledge. Secondly, given that Lave and Wenger (1991) are apprenticeship-oriented, they pay less attention to the learning of the established members in the community than Brown and Duguid (1991) and Wenger (1998), who are collegial-oriented in their description of communities of practice. Thirdly, while Lave and Wenger (1991) emphasize identity constructions as a movement towards becoming an expert (a more or less predefined trajectory), Brown and Duguid (1991) emphasize that identity construction through work and storytelling can produce new identities that help people to break out of the formal descriptions of practice and engage in innovation. Lave and Wenger (1991) and Wenger (1998) underscore the importance of identity construction in the individual's decision to join a community of practice, whereas Brown and Duguid (1991) concentrate on how the social construction of identity can change practice.

3.4 Managed communities

With the recognition of the role of emergent communities, organizations have tried to exploit these advantages in a more systematic way. These managed communities

can overlap with the emergent communities in an organization inasmuch as they are really formalizing and enhancing already existing identities and learning around shared practice (Newell et al., 2009). Nonetheless, there are several knowledge risks associated with the attempt to formalize a community or networks in an organization:

1) It may introduce rigidities that inhibit innovativeness and adaptability (Thompson, 2005).
2) It may conflict with the communities system of self-management (Hislop, 2009).
3) It might privilege formal objectified knowledge, and neglect the non-canonical tacit, practice-based knowledge developed by communities (Brown & Duguid, 1991).
4) Strong focus on the organization might deny the practice-based and socially embedded nature of learning which makes networks valuable to members, and instead turn networks of practice into teams that perform given tasks (Agterberg et al., 2010).

Several authors have argued for a `light touch' approach when managing communities of practice; that they should be tended and not controlled (Thompson, 2005; Ward, 2000). Several authors propose reinforcing the best attributes of communities of practice:

- Identify communities of practice in your organization (McDermott, 1999; Wenger, 2005).
- Emphasize practice-based, peer-to-peer-based learning methods (Brown & Duguid, 1991; Stamps, 2000).
- Reinforce self-management (McDermott, 1999).

- Insure continuity (Baumard, 1999).

However, Roberts (2006) underlines that the contemporary trend in society towards an increasing sense of individualism, and away from collective and community forms of identity and action, limits opportunities for developing and sustaining communities of practice. Roberts (2006) further points out that turbulence, which requires people to constantly change and adapt, makes it difficult to sustain the type of long-term relationships and identity necessary for communities of practice to develop. The introduction of project work also challenges communities, as people may only work together for a short period of time to complete a task. Lindkvist (2005) recommends the use of the term `collectivity of practice', which shares the network of practice construct's concern with distributed knowledge in large organizations. These networks are not communities, but temporally goal-oriented groups or project teams involved with knowledge creation and exchange.

3.5 Online and virtual communities

Social relationships are traditionally seen as emerging from face-to-face interactions. However, the Internet and other ICT systems have enabled new networks to develop amongst groups who are geographically dispersed and unable to communicate face to face. Newell et al. (2009) acknowledge that social relations and communities can develop equally well through online as well as face-to-face interactions. ICT can help to extend the experience of shared meanings and understandings beyond physical co-location.

From a practice-based approach, knowledge cannot be transferred through ICT in a straightforward way (Newell et al., 2009) since it may not be accepted as `truth'. Online communities or networks are therefore regarded as most effective when they enable the social construction of knowledge through conversations around

shared cultural objects, such as texts, stories or problems, and when ICT infrastructure and shared work difficulties makes online interactions meaningful (Brown & Duguid, 2000).

Brown and Duguid (2000) describe a continuum of networks from communities of practice defined as:

> *"… relatively tight-knit groups of people who know each other and work together directly ... typically face to face communities that continually negotiate with, communicate with, and coordinate with each other directly in the course of their work*."(p.143)

They also describe them as electronic networks of practice consisting of weak ties, in which individuals may never get to know each other or meet face to face. Networks of practice have been defined as self-organized groups of members who share the same practice, but who are geographically dispersed and often rely more on online channels for communication (Brown & Duguid, 2001).

Some use the term `virtual' communities of practice (Ardichvili, 2008; Ardichvili, Page & Wentling, 2003; Dubé, Bourhis & Jacob, 2006), and are distinguish from general online forums by being related to people who are engaged in the same practice within an organization. Virtual communities of practice, without excluding face-to-face meetings, rely primarily on ICT to connect their members (Dubé et al., 2006). In their seminal work, Dubé et al. (2006) constructed a framework based on previous analysis and empirical research of virtual (online) communities of practice.

Table 8 Typology of organizational virtual communities of practice (adapted from Dubé et al., 2006: pp.75-80).

Demographics	Orientation Life span Age Level of maturity
Organizational context	Creation process Boundary crossing Environment Organizational slack Degree of institutionalized formalism Leadership
Membership characteristics	Size Geographic dispersion Members' selection process Members' enrollment Members' prior community experience Membership stability Members' ICT literacy Cultural diversity Topics' relevance to members
Technological environment	Degree of reliance on ICT ICT availability

As illustrated in the 21 structuring characteristics above, the key finding is that virtual communities of practice may vary a great deal, and must be treated as unique personalities where there is no 'one-size-fits-all' solution to nurture or develop them. However, even though virtual communities of practice continue to be located within the 'practice genre', the emergent, process-oriented ontology of Lave and Wenger's (1991) original concept has been completely replaced with an entitative ontology, since it is unclear in what sense virtual communitie**s** of practice

actually exist in their status as an organizational form, in their membership, in the ongoing dynamic activity of their members (Thompson, 2011) or in their knowledge.

It is anticipated that distributed communities with a high cognitive ability (e.g. a shared frame of reference) which are motivated to share knowledge (e.g. a shared purpose), but which have no or few structural opportunities to do so (e.g. a sparse network), will be in need of communication tools and that the level of the ties' density might increase over time (Brown & Duguid, 2001).

On the subject of technology, virtual communities of practice may use a large pool of traditional media (phone, teleconference, fax, etc.) and more or less sophisticated technological tools, such as e-mail, videoconferencing, newsgroups, online meeting spaces, databases, websites and intranets, to establish a common virtual collaborative space.

Virtual communities of practice that are created in an organization can be highly disrupting and stressful for the participants. Dubé et al. (2006) point out that heavy reliance on ICT may be a burden on the network or community members, especially when they are not used to interacting with technology. A lack of competence, lack of self-confidence and/or resistance to technology may reduce participation in the community. If participation becomes obligatory, it may force people into unfamiliar roles and ways of sharing, and into developing skills to create social ties through technology (Dubé et al., 2006). Deprived of an abundance of face-to-face contacts, especially at the beginning, virtual communities of practice may have problems or take longer to establish a sense of identity, or both (Cramton, 2001; Dubé et al., 2006). There can be several explanations for these challenges. On the personal level, identification with others can be related to those who are helpful and those who are not. In face-to-face settings, reciprocity appears to be critical for sustaining

supportive relationships and collective action (Putnam, 1995). Ardichvili (2008) suggests some generic enablers of virtual communities of practice for knowledge sharing: a supportive organizational culture; the presence of personal knowledge-based trust; and the availability of adequate tools.

In electronic networks of practice – Web-based forums in which anyone can access and participate (Wasko & Faraj, 2005) – findings have shown that the norm of reciprocity is not a significant predictor for the helpfulness of knowledge contribution. Wasko and Faraj's (2005) explanation is that online-based interactions may be generalized rather than dyadic, and direct reciprocity is not necessary for sustaining collective action. The inconsistent results indicate that the relationship may be contingent on other factors, such as the personality of the participants and perceived usefulness of the community (Wang & Noe, 2010). For example, Kankanhalli et al. (2005) found perceived reciprocity to be conclusively related to participants' likelihood to contribute knowledge to the community under weak rather than strong pro-sharing norms. This suggests that strong pro-sharing norms may compensate for a low level of reciprocity within a community (Wang & Noe, 2010).

At the level of community, Amin and Roberts (2008) point out that the benefits of online communication in knowledge-transfer processes are higher for professional communities (whereby you become a clinician through individual academic study, teamwork and virtual interaction) than communities of task or craft (whereby you become a midwife, tailor or flute maker through an apprenticeship in a close-knit, face-to-face community), because once individuals have mastered a body of professional knowledge, they appear to benefit from exchanges of knowledge facilitated by online communications with dispersed members from their profession.

Their explanation is that the presence of professional standards and identities ensure the circulation of knowledge.

3.6 Cross-community knowledge sharing

Cross-community knowledge sharing is characterized by its lack of elements that assist knowledge sharing within a community of practice – i.e. the willingness and ability to share knowledge. When a group of people have a weak shared identity or different sense of identity, cross-community knowledge sharing is difficult due to: 1) a lack of common knowledge; 2) tacitness and context specificity making transferability difficult; and 3) epistemic differences (i.e. their knowledge is based on diverse underpinning assumptions and values), which stem from different disciplinary knowledge (Hislop, 2009).

Brown and Duguid (2001) contend that the advantage of communities of practice is that common practices create social-epistemic bonds; on the other hand, people with different practices have different assumptions, outlooks and interpretations of the world around them, and different ways of making sense of their encounters.

Carlile (2002) has shown that long-term investments in areas of expertise – for example, in engineering disciplines – make people reluctant to share knowledge with representatives from other areas, and they tend to be aware of interests that separate their work practices from those of other disciplines.

Carlile (2002, 2004) has developed a framework for understanding the barriers of cross-community knowledge sharing from a practice-based approach. He distinguishes between barriers related to language (lack of a common language), interpretation (varying interpretations of the same) and interest (unwilling to adopt the practice of others). These barriers are to some extent manageable – through the

creation or use of a common language, the development of mutual understanding and by developing social relationships between relevant people. This can be achieved through boundary objects, or physical or linguistic/symbolic entities that are common to a number of communities, which provide a direction for negotiation (Hislop, 2009).

From a symbolic interactionist perspective, Swan et al. (2007) found that protocol and databases constituted crucial objects for dealing with different knowledge interests and a lack of willingness to transform knowledge. Positive ideology and values associated with these objects established some legitimacy that was crucial in facilitating interaction. This appeared to be particularly critical in dealing with obstacles with different knowledge interests and a lack of willingness to transform knowledge.

An article by Mørk et al. (2008) addresses the challenges that arise when knowledge production occurs in cross-disciplinary settings. They claim that the networked character of knowing may lead to path-dependent learning processes, and radical change can become limited if the knowledge required by new or changed practices is incompatible with the existing stock of knowledge. As an implication, they advise that the communities of practice approach could be enriched by looking at diversity and discontinuity in the epistemic cultures and networks, with which the different communities of practice are associated.

The study by Barrett and Oborn (2010) examines the evolving use of boundary objects in cross-cultural software teams. They unpack the interacting elements that both facilitate and constrain knowledge sharing, and which trigger conflicts at distinctive stages of the software team's development. Specifically, they found that the use of boundary objects at transitions involving definitional control and the

subsequent redistribution of power/authority may inhibit knowledge sharing. The subsequent reifying of cultural boundaries, along with negative stereotyping, led to relational conflict as cross-cultural differences emerged.

From a practice-based approach, Gherardi and Nicolini (2002) argue that, through the course of perspective-making and taking, the process of knowledge should not be integrated into one, but take the form of a dialogue where each community maintains its own voice while listening to the voice of the other.

3.6.1 The negotiation of safety knowledge

Gherardi and Nicolini's (2002) article provides interesting input to my understanding of health and safety knowledge. They investigated the accounts of the causes of accidents provided by the members of three different communities of practice (engineers, site managers and prime contractors) internal to a medium-sized cooperative building firm. While the perspectives are unalike, comparison among perspectives is made possible by a discursive practice targeted at the alignment of elements (both mental and material) within mutually accountable discursive positions. Nonetheless, these alignments are provisional and unstable; they produce tensions, discontinuities and incoherencies (dissonance) just as much as they produce order and negotiated meanings.

3.7 The role of collaborative ICT for knowledge sharing

Due to the weight given to communication and information in knowledge work, information and communication technology has been closely associated with the development of knowledge management initiatives, and knowledge management has a strong ICT focus in the commercial arena (Hayes, 2011). Much of the literature and practice on knowledge management assumes that knowledge can be codified and stored. Sambamurthy and Subramani (2005) is an example of this assumption.

They suggest that knowledge management involves "developing searchable document repositories to support the digital capture, storage, retrieval, and distribution of an organization's explicit documented knowledge"(p.2).

The assumption that knowledge can be transferred by the use of ICT has attracted criticism from process- and practice-based researchers. Brown (1998) maintains that reliance on ICT (Internet) as a means for transferring knowledge is insufficient. In particular, it is regarded as more difficult if the sharing takes place across domains of knowledge. Abstractions recorded and shared on the Internet must, according to Brown, be considered as inseparable from historical and social locations of practice. When there is no history of working together, Zack (1999) argues that integrative applications are unsuitable. Instead, he recommends the use of interactive applications (e.g. chat, videoconferencing) that support collaboration, of which GoToMeeting™ in this study is an example. Research has shown that employees' comfort level and skill regarding the use of computers is likely to influence the usage of collaborative electronic media for sharing (Jarvenpaa & Staples, 2000).

On the topic of the distributed nature of knowledge, specifically in distributed organizations, ICT can play a role in knowledge-sharing activities. However, from a practice-based approach, ICT cannot determine knowledge sharing (Newell et al., 2009). Olivera's (2000) analysis of a consulting company reveals that people are more likely to interact with people than rely on computer-based systems (e.g. intranets). People prefer to turn to their co-workers rather than an explicit source of information. Newell et al. (2009) claim that if people have not worked together before, considerable effort and resources need to be invested so as to encourage sociability, understanding and familiarity. In the current research, ICT-mediated knowledge sharing is more likely to be successful if the participants share a sense of what the practice is and what the standards for judgment are (Brown & Duguid,

1998), share similar practice and identity (Orlikowski, 2002) and have established a social network (Huysman & Wulf, 2004).

3.7.1 How can ICT influence opportunity structures and authenticity for knowledge sharing?

Opportunity structures refer to the benefits of sharing knowledge in the community, as well as occurrences for doing so. Narrow opportunity structures imply that knowledge-sharing benefits can only be realized through a limited number of relationships with colleagues sharing very specific knowledge at very specific times and places. On the other hand, broader opportunity structures involve more relationships that share broader and more explicit types of knowledge in several virtual and physical places. Opportunity structures do not mean that colleagues should have full knowledge of each other, which is impossible from a practice-based view of knowledge. Yet, given that interests and knowledge are intimately connected, and as it takes time to identify sharing possibilities – because colleagues often have different knowledge interests – cues about when, where and how knowledge sharing can take place help to coordinate the differing interests of knowledge (von Krogh, 2011).

The introduction of ICT for knowledge sharing can aid new opportunities for sharing broader explicit types of knowledge, but the development of new cues for handling various interests in knowledge might be needed in order to facilitate the sharing of tacit knowledge. However, collectively meaningful cues take a long time to evolve and learn. Haythorntwaite and Hagar (2005) underline that the use of ICT arises from social practices, including norms about the proper use of the tool, but also what is discussed, and the languages and genres appropriate for communication.

From the perspective of opportunity structures, an online meeting in the networks of competence can facilitate a new arena for knowledge sharing and a broad opportunity structure, but it is not clear whether individuals will coordinate the sharing of tacit knowledge (as an example, there might be limitations on how much the experienced are willing and able to share, and what they are capable of doing).

When interests in knowledge are diverse, it is also possible that social norm 'authenticity' could have an impact on the community or network as a resource for knowledge sharing. Authenticity means that the closeness of observations matters for the acceptance of new knowledge. The social norm of authenticity can have a beneficial effect on colleagues' appreciation of `better' knowledge within opportunity structures. However, how ICT influences authenticity in knowledge sharing needs more attention in research on knowledge sharing through communities (von Krogh, 2011).

3.7.2 Role of ICT in context: Multitasking during computer-supported meetings

Bannister and Remenyi (2009) emphasize that ICT is a significant enabler and amplifier of multitasking. When participants multitask, they simultaneously engage in other activities (such as writing an e-mail) while attending the meeting, thereby maybe paying less attention to the meeting's agenda. Tang (2005) has found multitasking to be a common event in technology-supported meetings over distance, and considered it both as a positive and a negative activity. In general, multitasking can increase effectiveness by allowing participants to bring in needed information or include someone or `something' (such as a document) not currently in the meeting in order to fill gaps in knowledge.

Multitasking has historically been reviewed from the psychological perspective (Stephens, Cho & Ballard, 2012), and has looked into the extent to which people can

stay focused on two or more tasks at the same time in particular. In order to distinguish tasks that require full focus and those that are more routine-based, Bannister and Remenyi (2009) divide multitasking into conscious and subconscious. The conscious mind focuses on one task at a time, and the subconscious copes with `a number of simultaneous tasks'. For example, talking while driving includes the simultaneous execution of two tasks as long as they are routines, but cognitively, attention is focused on the non-routine task. Knowledge-sharing activities can be seen both as a routine activity, such as listening to a presentation while doing something else, and a non-routine activity, such as when you are engaged in a discussion. The latter does not combine well with other non-routine tasks due to the need to be focused.

Norms for the use of a new tool or the use of a tool in a new context might be limited if the norms have not been fully developed. Studies show that multitasking in meetings takes place more often in teleconferences than in face-to-face situations. This may be because people feel a level of social awkwardness when multitasking in a face-to-face meeting (Tang, 2005) or may be due to social concepts of awareness and accountability (Erickson & Kellogg, 2000).

Multi-communication is a concept that makes it possible to distinguish between doing tasks (ranging from writing up a report to communicating) and more `pure' communication activities. Reinsch, Turner and Tinsley (2008) distinguish between multi-communicating and multitasking, given that the act of maintaining an ongoing dialogue with two or more people can be more complex than just engaging in two or more tasks. Complementary users of communication technologies are gradually engaging more in simultaneous communication activities using a variety of distinctive technologies – a process that has been termed 'multi- communicating' (Reinsch et al., 2008). For example, an individual may be participating in a

conference call while simultaneously exchanging instant messages with a colleague or composing an e-mail. These activities might all be conducted on one device or could be spread across multiple devices. The important point is that there is likely to be a complex interaction among various technologies and tasks, as well as with users (Fulk & Gould, 2009).

Multi-communicating can be considered an especially complex form of multitasking, and some individuals might prefer multitasking but not multi-communicating. Multi-communication is defined as overlapping conversations – an ever more common event in the technology enriched workplace (Reinsch et al., 2008). Stephens et al. (2012) define multi-communication as communication practices involving technology, where people conduct multiple, nearly simultaneous conversations in a meeting. While multi-communicating requires people to switch roles and adjust to various audiences, multitasking might not require this consideration of others. Multi-communicating is simplified by technologies, particularly chat software (Reinsch et al., 2008).

3.8 The role of Social and organizational identity in Organizations

Shared identities, common knowledge and overlapping values create the social conditions helpful for knowledge sharing (Hislop, 2013). Social identity is:

> "…*that part of an individual's self-concept which derives from his knowledge of his membership of a social group (or groups) together with the value and emotional significance attached to that membership*." (Tajfel 1978: p.63)

Social identities are joint accomplishments created, negotiated and repaired through talk and the joint creation of symbolic resources (Schwalbe & Mason-Schrock, 1996). Identities are usually a mixture of the perceived characteristics of

the collective or role (e.g. values, goals, beliefs) and the perceived prototypical characteristics of its members (Haslam et al., 2006). Organizational identity appears when an organizational members ask themselves `Who are we?', `What business are we in?` or `What do we want to be?` – the central, distinctive and enduring features of an organization (Hatch & Schultz, 2004).

Individuals occupy multiple roles, and social identity theory is concerned with how the social embeddedness of roles in relational networks increases their chance of being activated and performed well in a given situation. The more valued the relationships, the more important the role of identity, and the more likely the person will try to affirm their identity (Burke & Reitzes, 1991). And the more identity perceptions are widely shared and densely articulated by a group, the stronger the identity (Cole & Bruch, 2006). Identification is strongest when members believe that preserving the organization`s identity also fulfills their own needs (Weick, 1995); consequently, the stronger the potential for identification (this is me!).

The role of social identity in organizations is normally seen from two perspectives (Willem et al. 2008). First, the coherent view where social identity facilitates collective action (like knowledge sharing) through cooperative behavior, shared values, trust and loyalty. Second, the fragmented view that underlines that employees will not associate with an organization-wide identity, but rather underlines negative aspects of social identity like in group bias, resistance to change, dominant logic and the dominance of sub-goals.

From a fragmentationist perspective, social identity is viewed as multiple, fragmented, processual and situational (Brown et al., 2005; Alvesson& Kärreman, 2001), which means that an identity can fuse multiple meanings and actions from situation to situation. Multiple social identities can be a source of power or conflict,

reducing potential beneficial effects of identity (Humphreys & Brown, 2002). Golden-Biddle and Roa (1997) found hybrid identities (volunteers and the family of friends), identity conflicts and conflicts of commitment in a study of a boardroom at a nonprofit organization. They underline that contradiction in identity calls for a leadership response to restore order and repair identity. Foreman and Whetten (2002) find a hybrid organizational identity (family and business) influencing commitment both in positive and negative ways depending on the situation. Pratt and Rafaeli (1997) illustrate how nurses used the symbol of dress to represent and negotiate the identities in their work units and the nursing profession. The latter raises the question of whether or not the participants in my study are able to negotiate their identity through the use of symbols in virtual contexts; but if so, how. More recent studies find multiple identities in workplaces (Johnson & Yang, 2010) and co-operatives (Jussila, Byrne & Tuominen, 2012).

What do we know about identification in distributed organizations, where the workers are more like virtual employees? Wiesenfeld, Raguram and Garud (2006) argue that organizational identification can be a critical factor holding virtual organizations together. However, in a virtual context, cues that traditionally created organizational identification are not available. They find that electronic communication (e-mail) creates organizational identification, but that phone communication is more important for traditional workers, while electronic communication may be more important for individuals who operate in a virtual work context. Bartel, Wrzesniewski and Wiesenfeld (2012) found in a recent quantitative study that physical isolation lowers organizational identification for both shorter- and longer-tenured virtual employees. They found that physical isolation diminishes organizational members' perception of the more physically isolated members' competence.

The literature on communities of practice offers a mutually constitutive account of social identity and knowledge sharing. One view is that it is a one-way, linear process; a movement from being an apprentice towards a master, like becoming a tailor or butcher (Lave & Wenger, 1991). The other view is that the construction of identity is a dual process, involving belonging and positioning in a discourse of negotiations, where the development of a new identity helps with accountability to others in the same activity (Wenger, 1998). People are seen as having a fundamental and powerful motivation to join some communities of practice and keep their distance from others. For example, people undergoing a career change often try to connect to new communities of practice, at the same time as withdrawing commitment to outdated identities and related communities, in order to perform identity experiments that bring sharper focus to the new professional identity (Murillo, 2011) and to the knowledge they need.

3.8.1 How can identity construction influence opportunity structures for knowledge sharing?

Opportunity structures for knowledge sharing can be described as incentives for collective action when knowledge interests are diverse and distributed (von Krogh, 2011). Empirical studies show that people tend to classify themselves and others in terms of cognitive categories (Tajfel, 1982), and people sense who they are in terms of some meaningful social categories which influence how they interact with those inside and outside a category (Roy & Parker-Gwin, 1999). The higher an identity's value (privileged access to knowledge, social relations, status reputation and so on) in the mind of the affiliates, the more effective identity construction can be as an incentive for participation in knowledge-sharing activities.

Through identity construction, members can learn cues for knowledge sharing, and motivate improvisations and rituals for knowledge sharing. An example of such a

cue is when a shake of the head urges affiliates to approach the master and learn what has gone wrong (von Krogh, 2011). Examples of improvisation are when colleagues share stories (Brown & Duguid, 1991), and rituals include when newcomers enter the community, the use of discussion platforms, lunch meetings, speakers corner and so on (von Krogh, 2011). In a community where there are plenty of opportunities for knowledge sharing, it is essential to know how to approach others who have the superior knowledge related to the tasks at hand. The social norm of authenticity can furthermore have positive effects on colleagues' appreciation of `better' knowledge within the opportunity structures for knowledge sharing supplied by a community. Mutual identity construction can mobilize the social norm `care' (von Krogh, 2011), which has a constructive influence on the affiliates' ability to suspend the immediate satisfaction of needs and to search for opportunities in spite of diverse knowledge interests.

3.8.2 The relationship between social identity and social capital

Social identity is of interest because it can facilitate collective action (such as knowledge sharing). But what is the link between identity and social capital? Putnam (1995) advocates that social capital enables cooperation for mutual benefit. Social capital has been defined as:

> "…*the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit*." (Nahapiet & Ghoshal 1998: p. 243)

Social capital and social identity are both examples of the social exchange theory that explains the motivation for knowledge sharing (Hall, 2003). Taking a network view on social capital, it consists of reciprocal relationships among individuals in a group or network (Willem & Scarbrough, 2006). In this view, there is no evident

relationship with the identification process of individuals in the group. However, taking a consummatory view, in which social capital is seen as a socialization process and where individuals develop shared norms and identification with the group, social identity and social capital coincides to some extent (Willem & Scarbrough, 2006). Social capital and social identity both create conditions for the social exchange of knowledge (Willem et al., 2008). In the broad conceptualization by Nahapiet and Ghoshal (1998), social capital consists of a structural, cognitive and relational dimension. The relational dimension is based on social identity among others. Hence, social identity can help in developing social capital, but the relationship is reciprocal. When members strongly identify with a group, a trustworthy and supportive climate motivates them. As trust can induce joint efforts, a trustworthy actor is likely to get other actors' support for achieving goals to an extent that would not be possible in a situation where trust does not exist. Social capital can also contribute to the development of social identity (Adler & Kwon, 2002). If a group of people invest in the development of their internal relations, they can strengthen their collective identity and enlarge their capacity for collective action. This means that social identity under some conditions is `constructible' through deliberate actions (Adler & Kwon, 2002).

Prusak and Cohen (2001) argue that social capital can be invested in via management. Managers invest in social capital when they treat workers as people – by giving them time and space to bond, facilitate conversations and knowledge share. The managers should also give the employees no reason to distrust them, by establishing clear rules and by giving people a common sense of purpose – be it through strategic communication and inspirational leadership.

3.8.3 Empirical research on identity formation and learning trajectories

Fuller and Unwin (2004) studied the relationship between apprentices and experienced workers at four private companies. In all companies, novices reported helping others (both novices and experienced workers) learn skills in spontaneous problem-solving sessions at work. As an example, many young apprentices were more familiar with information technology than their older, more experienced colleagues. The implication of this study is that neither novices nor experts are stable or uniform concepts, and that modern novices bring a wealth of previous learning experiences to the workplace (Murillo, 2011).

Goodwin et al. (2005) use Wenger's (1998) framework to study multidisciplinary communities of practice. This ethnographical account highlights how boundaries inside the community of practice are drawn and regularly enforced by the enactment of special professional practices and the identities of each practitioner. In addition it demonstrates how community legitimacy is stratified, as access and participation is contingent upon each member's professional identity, and that learning trajectories do not lead to all-encompassing mastery as it did in the work of Lave and Wenger (1991).

Campell (2009) uses Lave and Wenger's (1991) model of legitimate peripheral participation to examine the learning trajectory of a nurse unit manager who, at the age of fifty, made a career change to police officer. Her managing experience gave her the skills, respect for hierarchical authority and medical expertise valued by the policing community, where she was given respect much sooner than younger trainees. The case study demonstrates the relationship between prior experience, personal histories, participation and a sense of belonging in shaping the learning of early-career police officers. It suggests that in considering newcomers to the workplace, it is important to view the process of learning as being influenced by

these interconnected factors. This study contributes to the understanding that learners do not shed their former identity when striving to acquire a new one; rather the new identity is a composition of the previous one, enriched with new experiences.

Somewhat in contrast to Campell (2009), Boyd and Harris (2010) examined how expert schoolteachers reconstruct their pedagogy and identity. This qualitative case study contributes to our understanding of the tensions between abstract knowledge and work-based knowledge, where the departmental context encourages teachers to hold on to their existing identities as schoolteachers rather than embrace new identities as academics.

These empirical studies indicate to me that identity and knowledge construction can take different forms and paths than the more predefined learning trajectory from apprentice to master described by Lave and Wenger (1991).

3.9 My practice-based approach

The elaboration of emergent communities (communities of practice) seems to assume that members regularly work together, or at least meet during lunchtimes and at meetings in which they share their work experiences. However, some do not have the opportunity to work together directly, since they are spread around large geographical areas. Knowledge sharing in communities occurs by carrying out tasks together, observing what others do, sharing stories and in the practice of reflection. From a practice-based approach, collaborative tools can support all of these activities, but do not determine them. Different groups, with different practices and knowledge, might (most likely) use the same ICT in different ways for knowledge sharing. Viewing knowledge as a practice implies changing ICT's role in knowledge sharing: from repositories to a more collaborative use of ICT that facilitates

discussions and connections among practitioners, including arenas for collaboration and sharing of stories; that is to say, the social construction of knowledge and identity. Furthermore, ICT might assist multitasking and multi-communication, with potentially both positive and negative impacts on online knowledge sharing.

Putting together the practice-based ideas that technology uses and the belief that knowledge is socially constructed in practice suggests that the role of ICT can equally limit and facilitate knowledge sharing, hindering some knowledge types (experiences and their identities) in its construction while aiding the constructions of other knowledge types (experiences and their identities). Hence, new communities can arise out of online knowledge sharing and managed networks of competence. Some experiences will be included in the negotiation of knowledge while other might not. Figure 3 illustrates the relationships between key concepts in my study.

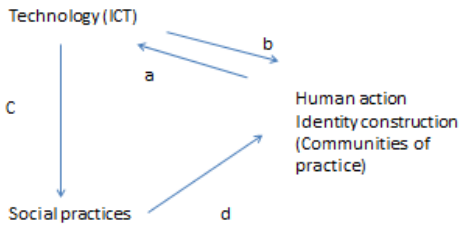

Figure 1 The Structurational model

Figure 1 illustrates several points:

A) Identities are joint accomplishments created, negotiated and repaired through talk and the joint creation of symbolic resources. People develop

their social network, engage in knowledge construction, develop norms for knowledge sharing and become members of a community of practice through mutual identity construction.

B) Technology influences identity construction to the extent that the embodied and emergent structures of the tool configure how people who wish to claim an identity are able to signify (and to be seen signifying as they wish) upon which their identities depend. From the perspective of communities of practice, expert roles, or `identities of mastery', need to be made known so as to promote mutual identity construction and knowledge sharing. But I do not propose a technology deterministic view; people (with identities) might choose to not use or to reinvent the tool to serve their purposes (emergent structures).

C) It emphasizes that participants using ICT are enacting online, re-enacting offline or developing new ways of sharing knowledge.

D) It illustrates how recurrent activities (social practices) contribute to the negotiation of identity among the participants.

Figure 1 underlines the duality of ICT, and the recursive relationship between the role of ICT and identity – processes which enable or disable knowledge sharing. The relationship is to some extent empirically revealed by Schwarz and Watson (2005), who found that social identity influences the perception of new ICT. On the other hand, Lamb and Davidson (2005) argue that within an online community of scientific researchers, the use of ICT to support collaboration has at least an indirect impact on participants' scientific identities.

To sum up, my perspective sees ICT as having fundamental duality and that identity is negotiated (see Table 9). This aligns with social constructivism and its focus on the intersubjective shared construction of meaning (see Chapter 2).

Table 9 Perspectives informing this study

Perspective	**Dualities**	**Structuring**	**Role of ICT**	**Related research**
ICTs have a fundamental duality (Rosenbaum & Shachaf, 2010)	Designed–emergent Participation–reification Identification–negotiability	Through interaction with ICT, people produce structures which they can enact	Shape interaction and following knowledge and identities	Orlikowski, 2000; 2002; Haythornthwaite & Hagar, 2005; Rosenbaum & Shachaf, 2010; Barrett & Oborn, 2010; Bartel et. al., 2012
Perspective	**Duality**	**Structuring**	**Rolf of Identity**	**Related research**
Participants negotiate and renegotiate identity (Wenger, 1998)	Identification–negotiability	Negotiation of experience of self in terms of participation and reification	Shape interaction and the role of ICT	Brown & Duguid, 1991; Orlikowski, 2002; Barab et al., 2003; Weisenfeld et al., 2006; Amin & Roberts, 2008

The first perspective – that ICT has a fundamental duality – means that the use of ICT for knowledge sharing not only shapes ICT use, but also the users' interactions and their social relations, knowledge construction, norms for knowledge sharing, sense making and identities. Knowledge sharing by the use of ICT might produce activities that revile several overlapping dualities (Barab et al., 2003). The actual use of the ICT might not be as planned (designed–emergent duality); the activities in the networks might facilitate knowledge sharing through the creation of concise representations of complex practice among the participants (participation–reification duality); and finally, ICT-based interaction might influence how individuals perceive themselves and others, and their opportunities for shaping their network or community (identification–negotiability duality) – activities and outcomes of

dualities that can potentially both facilitate and hamper knowledge sharing. The term 'reification' (structure) underlines how Wenger (1998) explicitly places his work within structuration theory in a footnote (p. 23).

The second perspective – that participants negotiate and renegotiate identity – focuses only on the identification–negotiability duality, and refers to how members of a community are able to assess the extent to which they can identify with the mutual enterprise, history and culture of a community; for example, the extent to which an individual can relate to other members or the mission of a network of competence, which in turn influences their role and engagement. A formal network where the participants are assigned to a role might create tensions due to the participants' lack of shared history, culture and meaning, and different expectations regarding participating and contributions in the network. However, shared understandings might develop, for example, regarding what their knowledge consists of and how to best use ICT for sharing their knowledge. In the next chapter (Chapter 4), I will present the social constructivist-grounded theory approach, whose strength is the ability to inductively uncover and contextualize shared meaning among a group of network members.

4 Research Methods

This chapter lays out the methodology I used to conduct this dissertation research project. I will first provide a review of the methodological issues related to viewing knowledge, ICT and identity from the social construction perspective of grounded theory, and then move on to the research design and the steps in my research process.

4.1 Grounded theory

Grounded theory has become one of the most preferred methods within qualitative studies due to the systematic research procedures the method offers for qualitative studies (Hallberg, 2006). Some use grounded theory as a research strategy and others only apply the techniques for data analysis (without claiming that they are generating a grounded theory). In general grounded theory offers means of studying human behavior and interaction, creating new perspectives, and understandings of common behavior (Blumer, 1969). Looking back over the years since Glaser and Strauss's seminal book *The Discovery of Grounded Theory* (1967), we can see the emergence of different methodologies (as outlined in Chapter 2). In the literature there are three dominant versions: classical grounded theory (Glaser & Strauss 1967; Glaser 1978), reformulated grounded theory (Strauss & Corbin, 1990) and constructivist grounded theory (Charmaz, 2006).

The Glasserian version defines grounded theory as a method of discovery. Data represent facts about the social reality and that meaning is inherent in the data, and the researcher's aim is to discover this meaning. Grounded theory emerges from careful application of the constant comparative method, where empirical incidents are compared with empirical incidents aiming to develop theories inductively. Glaser also warns the researcher against exploring the literature before entering the field,

in order to enter the field with openness and theoretical sensitivity and without preconceptions (Hallberg, 2006).

The Straussian version, the 'reformulated grounded theory', according to Strauss and Corbin is based on their own research experiences. They think that the researcher should be theoretically informed, but that the categories in the existing literature must not influence the data collection (Strauss & Corbin, 1990). Their version is best known for its detailed step-by-step development of grounded theory. They suggest also how researchers can code data, and they introduced the concept of axial coding (which is about relating categories to subcategories along the lines of their properties and dimensions (Strauss & Corbin, 1998)). The outcome of applying grounded theory is the development of a theory that can be useful in practice (Strauss & Corbin, 1990).

The constructivist version of Charmaz (2006) stresses that both data and analysis are socially constructed. In this interpretation of grounded theory, the role of storytelling is important. Storytelling (by the researched and the researcher) makes it possible to grasp and communicate the contextuality of a study situated in time, place, culture and the situation of a study. A solid grounded theory, in Charmaz's view, should be presented as a story, including categories, told by the researcher. Her argument is that much more context and understanding will be revealed if the categories developed are presented in the form of a story. Her advice is similar to the arguments behind the more general narrative turn in organizational studies (Czarniawska, 1998), where the use of stories and narratives is regarded as the way organizational researchers can communicate more easily with the actors in the organizational practice in which they conduct research.

The readers of a good story, a viable instrument for social negotiation (Bruner, 1990), can make up their minds whether or not the findings are relevant for their organization. Stories provide contextual information for categories and permit the making of nuanced comparison of studies (Charmaz, 2006). Charmaz's version of grounded theory is also definitely inspired by ethnography. She stresses that multiple visits over time combined with the intimacy of intensive interviewing provide a deeper view of a person's life than a single structured interview can offer. She writes that we need to learn from the inside. Charmaz further argues, not surprisingly, that grounded theory should focus on meaning, action and meaning, and process in the study of social context.

In my study the role of ICT and identity in knowledge sharing activities is in focus. Storytelling and identity are two sides of the same coin, so to speak (Giddens, 1996). When somebody is trying to explain who they are or who others are, they often do that by telling stories. In the following I will mainly tie my approach to the social constructivist approach.

4.2 Research Sampling, Participants and Sites

I looked for organizations where the participants were dispersed and mainly had to rely on ICT for their communication. Since my college had delivered training programs to The Taxation Authority and The Labor Inspection Authority, colleagues helped me to gain access to those organizations. Initially I targeted two networks; inspectors at the Norwegian Labor Inspection Authority (NLIA) assigned to the Accident Network in region 1, and taxation officers at the Norwegian Taxation Authority assigned to the Fishery Network. These two networks within two different organizations fulfilled my need to access managed knowledge-sharing processes at a distance and by the use of ICT. However, since no other networks were operating in

the Norwegian Taxation Authority, the further cases (networks) were selected within the NLIA.

These were the occupational network (chemistry) and the network for social and psychological well-being in region 1, networks with different knowledge orientations that might perceive knowledge sharing and ICT use differently. Furthermore I interviewed four people in region 2: three participants of a network for social and psychological well-being, and one inspector participating in The Accident Network in region 2. I would argue that even though the study was mainly conducted in one organization, the NLIA, the research design can also be seen as a multi-case study design, containing up to five cases, and not as a one-case design (Yin, 2003).

4.2.1 Initial sampling for ICT experience and diversity

This study started with the sampling procedures developed by Strauss and Corbin (1990, 1998) for conducting qualitative analysis. I sought data from a number of persons participating in networks of competence, figuring they could give me different insights into knowledge sharing and the role of ICT and the context. The contribution of multiple members of networks gave value in the form of different interpretations and meaning of the role of ICT across newcomers and veteran employees, and across managers and file-and-rank members, and across employees working from small district offices (where they often have to conduct inspections in several areas) or larger regional offices (where the inspectors can specialize more). This gave me insight into the different contexts, and thus enabled me to gain a better understanding of the way they perceive their knowledge-sharing and the role of ICT in the managed network of competence. This sampling technique, of choosing informants for their similarities as well as for their differences, follows that recommended by Glaser and Strauss (1967).

4.3 Data collection

Data collection took place over a period of three and a half years. This involved interviewing members of networks and managers in the organizations, as well as observing physical and online meetings and collecting documents (see table 10 for an overview). I observed fourteen online meetings, in a two-and-a-half year period, in two of the networks in this study. I was logged on to the same meetings as the participants, with access to what was happening via the telephone and the computer screen. This also made it possible for me to take snapshots of the screen-sharing activities, by the use of the print-screen function on the personal computer.

Table 10 Data Collection Methods

	Data collection	**Networks involved in NLIA**
Individual interviews	21 individual formal interviews (3 of them in the Taxation Authority)	Individual interviews in NLIA (18): Accident networks; region 1nine informants and region 2 one informant. Networks for psychological wellbeing; region 1 three informants and region 2 three informants. Network for occupational hygiene two informants (only region 1). See also appendix C
Group interview	One group interview	5 managers and advisers at NLIA headquarter
Follow-up conversations	Informal follow up interviews by phone or e-	All networks in region 1: The Accident

	mail. Questions asked by e-mail (19 e-mail responses received)	network, Occupational hygiene, Psychological well-being and Ergonomic.
Observations	14 online meetings, including snapshots of screen-sharing activities, and 3 face-to-face meetings.	Network of occupational hygiene), Network for psychological well-being and the Accident network (all region 1). See also appendix D
Archival	Agendas of meetings (25) Annual reports (5) Minutes of meetings (15) National Official evaluation (1)	Material mainly collected from networks in region 1

4.3.1 Interviews

Data was collected using semi-structured in-depth interviews, a method that allows for adaptation to each context and individual. My interview guide was rewritten several times, and in the appendix A I present three versions of it, illustrating how my focus evolved. It allowed me to seek a balance between necessary topics and informants' initiatives; it also provided me with appropriate data and a manageable direction (Strauss & Corbin, 1990). The interviews lasted from 40 minutes up to two hours. In addition I communicated with my informants on e-mail and by telephone (informal interviews and conversations).

Due to the long travelling distances, eleven of the twenty-one formal interviews were conducted by telephone. The group interview (N=5) was conducted face to face. Although phone interviews are deemed a second-best option for obtaining data where social cues are important (Opdenakker, 2006), my telephone interviews proved as elaborative as the ones conducted face to face. One reason for this may

have been the informants' familiarity with elaborating complex matters by telephone. Holt (2010) suggests that telephone interviews should be considered as a preferred alternative, or at least as equally good, to face-to-face interviews when collecting narrative data. This is due to the possibility in a phone interview to filter away disturbing social cues and stimulate full articulation in certain contexts, when collecting narrative data. My experience is similar to what Holt suggests. All of the interviews were recorded, transcribed and analyzed by the use of the Nvivo 8.0 tool.

4.3.2 Observational data

I have had access to both face-to-face meetings and online meetings, and I have taken notes from both settings. The meetings were conducted using GoToMeeting™. I wrote detailed minutes of the meetings, in particular when they discussed their work practices and experiences and when they evaluated their meetings. Since I did not want to delay their discussions with questions, I mainly played a silent observational role (Spradley, 1980) during the meetings. My participative role was limited to asking questions and making brief comments at the end of the meeting. Like commenting on their evaluation of the meeting or motivating them to reflect upon observations I had made. However, I also participated in the sense that I logged on to GoToMeeting™ and attended the meetings as the other participants did. When I presented something I had the personal experience of using the GoToMeeting™ tool. I experienced the effectiveness of being able to observe meetings from my home or where ever I was, but I also felt the `silence` and how it affected me, when I had asked a question or made a presentation. These personal experiences, I believe, have helped me to grasp my informants' point of view regarding knowledge sharing by the use of GoToMeeting™.

4.3.3 Archival data

Archival data consists of the official evaluation of the networks of competence that contained survey information from 133 respondents (Norwegian Labor Inspection Authority, 2008), yearly reports of specific networks and agendas and minutes of meetings. This data set has been used to supplement the findings from the interview data and observational data. This data also represents accounts of how the participants and the organization perceive their networks of competence and the minutes of meetings also represent traces of knowledge sharing activities in networks.

4.3.4 Strengths and weaknesses of the data collected

Having access to different types of data, as I have had, is in general regarded as strength for a study. Obtaining rich data means seeking `thick` description (Geertz, 1973) by writing field notes of observations, collecting written accounts and detailed narratives (transcribed interviews). Rich data are detailed and focused. They reveal participants' views, feelings, intentions and actions as well as the contexts and structures of their lives (Charmaz, 2006). To obtain rich data I used semi-structured interviews encouraging my informants to tell their stories, to reflect and give nuanced accounts of their views. In particular I encouraged them to tell their stories, asking open-ended questions and follow-up questions, as recommended by Charmaz (2006) to insure in-depth exploration. An example of an open-ended question is, "*Tell me about your experiences of knowledge sharing when using GoToMeeting™*" (see also appendix A and the three different interview guides).

Observational data gave further details on what is going on at the network meetings. And by asking the participants to reflect at the end of a meeting, I could add additional data on how they perceived what had happened. Official evaluation, agendas and minutes of meetings reflect ongoing debate, and agendas and minutes

gave me extra insights into the activities in more meetings than I personally observed. On the other hand, my data could have been more focused. If I had gained access to meetings before I conducted the interviews, the observations could have provided me with vital prior understanding when asking questions and listening to what informants talked about (Eide, 2007) during the first interviews. This was partly compensated by my informal follow-up interviews and re-reading of interview transcripts.

4.4 Data analysis

This study deployed the constant comparison method of analysis, the core category in grounded theory (Hallberg, 2006). Constant comparative analysis calls for a continual interplay between data collection and analysis (Bowen, 2006). First I compared the similarities and differences in interview statements (incidents) within and between interviews. Later on I compared interview data with new interview data, archival and observational data. In particular I found differences between what the informants told me regarding how they used GoToMeeting™, and what I experienced when observing their meetings. The first obvious explanation is that I have observed other online network meetings (psychological well-being and occupational hygiene) than the initial twelve informants participated in (Fishery network and Accident network). However, it became clear to me that my informants, when explaining how they shared their knowledge on GoToMeeting™ sometimes referred to knowledge-sharing activities during project work (while conducting joint tasks) or sharing between two people, and not the knowledge-sharing activities in the managed network of competence meetings.This interpretation helped me to compare knowledge sharing in the work context with the managed network context. However, the knowledge-sharing activities in the project work context, are activities they have tried to enact in the managed network of competence meetings, with varied results, giving also a more blurred impression

of the relationship between the use of GoToMeeting™ during work and the use of GoToMeeting™ in the network meetings.

4.4.1 The five main phases in this study

Phase 1: Getting an impression of what is going on

This phase started with telephone conversations with managers and network coordinators in NLIA and the Norwegian Taxation Authority. Interview data were collected from eight inspectors (one of whom was the coordinator of the network) and one manager in NLIA and three taxation officers (one of whom was the coordinator of the network). This approach was very open, looking for their use of ICT in knowledge sharing. In this phase I also participated in the annual face-to face regional meeting in NLIA (region 1) which took place over two days. I followed the group session for the Accident network and main sessions. This made it easier for me to get acquainted with the participants and listen to their conversations.

Opportunities for obtaining access and good `telling data` are dependent on the trust that emerges through establishing on-going relationships and reciprocities with members of the organization (Charmaz, 2006). I established relationships with one IT manager and one former regional manager in NLIA, who gave me access to informants, participation in face- to-face meetings, and later on online meetings in two networks and social gatherings. After one year I had on-going relationships, on e-mail, with two coordinators (the two networks I observed), and one former regional manager and a present regional manager in the NLIA. To repay their generosity, I produced brief reports on strengths and weakness regarding the current situation.

A grounded strategy (Glaser & Strauss, 1967) was used in the data analysis to ensure an inductive approach. From my analysis of the data I found that while

GoToMeeting™ was regarded as an effective tool for synchronous collaboration and writing, online knowledge sharing in their online network meetings was far from a success. Paper 1 is a product of this phase. Even though there were different opinions regarding the role of ICT for knowledge sharing, my impression was that it was more than the role of ICT that created problems for the networks in the study. This led me to seek further data and theories about knowledge sharing, knowledge types and the role of social identity.

Phase 2: Focusing on NLIA

From now on the focus was exclusively upon NLIA. I interviewed two people in the network for occupational hygiene (inspectors, one of whom was the coordinator of the network) and two in the network of psychological well-being (inspectors, one of whom was the coordinator of the network). I also conducted a group interview of five managers and advisors at the headquarters in Trondheim, to get their impressions and their feedback on my findings so far. The differences in knowledge orientation that I uncovered between the different networks and across junior and senior members of staff reoriented my research from the aspects of online knowledge sharing to the relationship between online knowledge sharing, managed context and the role of social identity.

Phase 3: Adding data from another region into my analysis

To increase the transferability of this study, I supplemented the data with interviews conducted with informants working in region 2. I interviewed two inspectors and one manager assigned to The Network of Psychological Wellbeing, as well as one member of The Accident Network in this region. This was done for critical examination of whether my findings in region 1 were a unique case or whether the findings of different knowledge culture and practice could be found in other regions. The findings here supported my findings in region 1, regarding the challenges the

competence networks faced, different knowledge types and culture, work role identities, and differences regarding the role of ICT in knowledge sharing across knowledge cultures and identity.

Phase 4: Comparing what they say and what they do

The previous phases enabled me to participate in the GoToMeeting™ meetings in two of the networks; a network for occupational hygiene and a network for psychological well-being in region 1. Access to their online meetings gave me the opportunity to look more deeply into the context of NLIA and to compare knowledge sharing and the role of ICT and identity in different networks. The observational data includes notes from what was said, snap-shots of screen-sharing activities (using the PC print-screen function), notes from the interaction, when I asked questions at meetings and minutes of meetings (sent to me by e-mail in the same week after the meeting). This new data was added into the analysis and made it possible for me to compare what the informants said in interviews and what is actually going on at their meetings. I repaid the favor of my access by giving lectures at regional meetings, and sometimes I gave feedback at the end of online meetings to the participating inspectors – fusing more conversations with the research subjects.

In this phase I read the interview transcripts more as a whole, adding new or more 'correct' interpretations of my findings. My experience is that line-by-line coding (phase 1) sometimes removes the content from the context, resulting in different interpretations than if one reads the interview as a whole. This phase gave me the opportunity to grasp the knowledge-sharing activities from a more inside perspective – where observation of practices enables the simultaneous analysis of the reproduction and change of the social order in a study (Gherardi, 2012). **Paper 4** illustrates how the participants in the network of psychological well-being in region

1 are using stories and narration to share their experiences and at the same time they negotiate what their knowledge is and who they are.

Phase 5: Adding additional data into the analysis

In this phase I felt that I needed some extra information regarding how the network members, in order to figure out what kind of community the networks of competence are, when writing the conclusion of this dissertation. Hence I asked my informants some additional questions by e-mail (19 e-mail responses received) and by telephone (6 phone conversations). In this phase data have been compared with concepts derived from the literature on multi-tasking and authenticity in knowledge sharing.

4.4.2 A comment on the theoretical sampling of this study

Theoretical sampling starts with the data and constructing tentative ideas about the data, and then examining these ideas through further empirical inquiry (Charmaz, 2006). After having analyzed the first twelve interviews and publishing Paper 1, I reoriented my sampling from focusing on ICT use to pursuing the topics that my informants defined as crucial. In Paper 1 I described the Inspectors and Taxation Officers as very independent, used to learning in pairs and viewing experiences as their core knowledge assets. My findings as presented in Paper 1, together with my first interview with a newcomer in The Network of Occupational Hygiene, redirected my research towards exploring the role of different knowledge orientations and identity. This is due to the fact that this 'newcomer' informant stressed his positive experiences and interest in sharing the professional disciplinary knowledge (chemistry) using ICT, in much more positive terms than the informants in the previous analyzed material had expressed. A justification for this approach is offered by Charmaz (2006, p. 17):

> "*Grounded theorists evaluate the fit between their initial research interest and their emerging data. We do not form preconceived ideas and theories directly upon raw data. Rather we follow leads that we define in the data, or design another way of collecting data to pursue our initial interests*."

I followed the leads in the data and my guiding interest changed from a more narrow focus on ICT use to the role of identity, different learning modes, heterogeneous context – concepts that become central in my further sampling of informants, observations and documents in relation to knowledge sharing and existing theories. This theoretical sampling entails both what we commonly refer to as inductive reasoning and deductive reasoning. The particular reasoning invoked in grounded theory is reasoning about experience for making theoretical conjectures and checking them through further experience, starting with data, forming hypotheses and checking them empirically by examining data and pursuing the most plausible explanation (Charmaz, 2006).

4.4.3 My steps from open coding to focused coding

The analysis started by transcribing interviews and coding the material into the QSR Nvivo 8 tool. I followed the common steps in grounded theory for the first twelve interviews; I identified 226 incidents (sentences and paragraphs) in my open coding, for example: *"intranet is useful, but our network does not have one, but the projects have".* Through comparing data the focused coding developed. The second step, axial coding, involved combining and collapsing categories (into 34 categories, Paper 1 describes this process in detail). After writing up Paper 1, an additional nine interviews and one group interview (151 transcribed pages) and notes from observations (65 transcribed pages) were continuously added into the analysis for the following Papers 2–5. The coding in this phase was focused on the emergent idea of each paper, and consequently the material of the first twelve interviews

were re-read and re-coded for this purpose (in particular, the role of identity which emerged as a core issue (see appendix F for the 32 additional categories). Follow-up conversations and member-check activities were not coded into Nvivo 8, but used directly (as a quote) or in the interpretation of the data presented in papers.

4.4.4 Sensitizing

The researcher using a grounded theory approach does not enter the field *tabula rasa*, they make use of sensitizing concepts as a starting point for their analysis (Bowen, 2006; Padgett, 2004). Sensitizing concepts are tentative tools that provide a place to begin, not to end: helping us to develop our ideas, rather than limiting ideas (Charmaz, 2006). Blumer's point is that we should not force theory on the data but theory should suggest directions along which to look:

> "*a definitive concept refers precisely to what is common to a class of objects, by the aid of a clear definition in terms of attributes or fixed bench marks … A sensitizing concept lacks such specification of attributes or bench marks and consequently it does not enable the user to move directly to the instance and its relevant content. Instead, it gives the user a general sense of reference and guidance in approaching empirical instances. Whereas definitive concepts provide prescriptions of what to see, sensitizing concepts merely suggest directions along which to look*." (Blumer, 1954, p. 7)

Sensitizing concepts draw attention to important features of social interaction, but ultimately the survival of a sensitizing concept depends on where the data takes us – emergent concepts may supplement or displace them altogether (Bowen, 2006; Glaser, 1978; Padgett, 2004).

Using ICT and social identity as sensitizing concepts helped me to ask questions and form an emerging conceptual framework. These concepts were derived from a thorough review of the literature on ICT, online communities and the role of identity in communities of practice. From the practice-based approach I found that it is in particular of interest to investigate whether or not this tool is used in such a way that others can 'observe' the work of others in a way that facilitates the sharing of work and work-related stories (Ardichvili, 2006).

Furthermore, while mutual identity construction is seen as a facilitator for knowledge sharing (Wenger, 1998), I sought to investigate the problems or barriers related to identity construction. A problem that is not given emphasize in the three seminal works on communities of practice (see my literature review Chapter 3).
When using these concepts (ICT and identity) as sensitizing concepts I put on a specific code that represents (dimensions of) the sensitizing concepts on the data. Table 11 illustrates how I worked from my sensitizing concept towards generating theory inductively.

Table 11 ICT Use and Social Identity used as sensitizing concepts

Sensitizing concepts (Where I looked)	**Dimensions of knowledge sharing (What it led to)**	**Further dimensions (What it led to)**
Role of GoToMeeting™ a collaborative tool	Effective tool; e.g. gathering the participants and their documents	Using documents when sharing stories of communication with clients (paper 3, paper 4)
		Sharing inspection practice: Using documents to share the exact use of legislation and 'facts' in a case (paper 3)
		Sharing discretion and innovation by sharing pictures and stories (paper 3)
	Difficult to get to know each other and the knowledge of the other	Network context: Too many participants and not able to see each person (paper 1)
		Knowledge types: Some knowledge types are difficult to share online (paper 2, 4 and 5)
		Role of multitasking: Impression of lack of awareness and engagement (paper 1 and conclusion)
Role of social identity	The productive worker: Characteristics: Task handling prioritized over network meetings	Newcomers and old-timers may not see each other as peers with useful knowledge (paper 2, paper 5)
	Difficult to negotiate knowledge across work role identities	
	Identification with different	

	knowledge types creates problems	
	Top-down agenda Managerial control	

In Table 11 I have added references to the papers in which the findings are written up. This is to point out that analysis is not taking place only when using Nvivo 8.0, but also when writing up the individual papers and receiving comments and suggestions from reviewers. In writing up Paper 5 I constructed several concepts to guide my analysis, like 'newcomer perception', 'old-timer perception', 'negotiations', and 'identity'. In the axial coding I devised the categories of 'givers' and 'receivers' and 'negotiating identity' and 'role of manager' and 'online environment' to grasp better the context and process of identity construction in the network setting.

4.4.5 Preserving meaning in Nvivo codes

Grounded theorists talk about preserving participants' specialist terms as 'in vivo codes'. Their specialized terms provide a useful analytical point of departure for helping to highlight the participants' meanings in the coding itself (Charmaz, 2006). Examples of concepts I heard from several of my informants were: 'Inspection as a sales process' (Papers 1 and 2), meaning that inspection is not about control, but about communicating with the inspected workplace too promote health and safety. Another is 'practice must be traceable' (Paper 3), which means that when sharing how they use the legislation and their discretion, they need to present exactly how they argued for an order, with reference to the legislation in use, the facts collected and how it was written up in an order (letter).

4.5 The quality of qualitative research

Corbin and Strauss describe "quality" in qualitative research this way:

> "*Quality qualitative research is research that makes the reader, or listener, stand up and say things like "Wow", "I`m touched", "Now I understand", "That has power", "I feel like I've walked in those participants' shoes", "there is so much depth in the study … it covers detail that I never knew about this subject", "this is something I can use in my practice, in my life". In other words, quality qualitative research resonates with readers and participants' life experience.*" (Corbin & Strauss, 2008, p. 302)

However, these criteria's can be difficult to achieve when writing articles for a journal due to limited space. Within quantitative studies, the concepts of validity and reliability are used to evaluate the quality of the research. Others like Guba and Lincoln (1989) argue that qualitative studies must be evaluated by other criteria than quantitative studies. Some (Johannesen, Tufte & Kristoffersen, 2006) argue that sometimes the same criteria and sometimes different ones are useful, depending on the logic of the given qualitative research strategy. Sørnes (2004) has provided a table (adapted from Guba & Lincoln (1989); Miles & Huberman (1994) and Munkvold (1998)) to compare interpretative criteria for research quality with the conventional positivist criteria, which I have used in my dissertation.

Table 12 Criteria's for evaluating interpretative research (adapted from Sørnes, 2004, pp. 89)

Interpretivist Criteria	**Positivist Criteria**	**Goal**	**Tactic**
Credibility	Internal validity	Establishing the match between the constructed realities of respondents (or stakeholders) and those realities as represented by evaluator and attributed to various stakeholders	- Field work - Discussion of data and results with fellow researchers, external peers and informants (member checks)
Transferability	External validity	Presenting sufficiently detailed account of the findings to enable the reader to judge how they can be transferred to other contexts	- Thick description
Dependability	Reliability	Ensuring that methodological changes and the interpretative process are documented so that the reader can follow the process and the researcher's choices	- Making the process explicit - Making data available - Describing the logic used for moving from data to the final results

4.5.1 Credibility

Credibility has to do with authenticity and truth value. To insure authenticity and truth value, I have conducted extensive field work and I have discussed my findings

with colleagues and informants several times during the last few years. I have presented my findings to individuals in the NLIA and to large groups, face-to-face and online, on several occasions[2]. The activities I have undertaken range from sending PowerPoint™ presentations of key findings to presenting findings to a whole conference. During the data collection and analysis, 'member check' has been an integrated part of the research activities in this study. Sometimes my interpretations have been challenged or reformulated. Like when I point out that GoToMeeting™ , based on my interview data, had limited value for knowledge sharing, I got comments regarding how GoToMeeting™ make the sharing very concrete.

E-mail communication with informants has helped me to be in contact with my informants and 'test' my interpretations of the findings continuously. From the beginning, I sent e-mails containing a PowerPoint presentation of my findings to management and some key informants, helping me to confirm or redirect my research. This started as brief descriptions of the strengths and weaknesses of the current situation regarding ICT use and learning, to a whole draft of a research paper, presented in a PowerPoint™ document. In November 2009 I presented my findings to key informants, managers and advisers at the NLIA headquarters in Trondheim. Meeting face to face gave me more in-depth feedback, but also something else interesting happened. The group of managers and advisers started to discuss who amongst them knew about the situation as described in my findings. Some said yes, others said no. At the end the IT manager summed it up this way: *"You put the finger on issues we are aware of, but have not been able to put so clearly before".*

[2] For the data collected (three interviews, data used in Paper 1) in the Taxation Authority I was only able to conduct member-check of interpretations with a former employee in the Taxation Authority, now working at my college.

In January 2010 I presented my findings at the regular GoToMeeting™ monday morning meeting for one region in NLIA. Up to 50 participants were logged on to the presentation. The feedback was positive, they expressed explicitly that my findings and the conceptualization of them made sense and were familiar to them, but it also added something extra. Several commented that they had not seen any description of the professional, rule-oriented and inspector cultures in their organization so clearly before. One argued that the categories I had developed could be helpful for them 'as perspectives' in their work processes. Member-check has also been conducted while doing interviewing or observations. In the interviews I have shared my interpretations with my informants. On one occasion an informant spontaneously expressed, *"You really do understand us"* (Senior Inspector). Table 13 gives an overview of the member-check activity and responses.

Table 13 Member check activities

Member check activity and year	**Responses (with reference to individual paper in which the data is used)**
During interviews and follow-up question asked by e-mail or phone 2008–2012	Both supporting stories and alternative interpretations or clarifications (papers 1–5)
Presenting findings face to face to a group of managers 2009	My context model (paper 1) made sense to the managers. They also confirmed the lack of knowledge sharing across junior and senior members of staff (paper 5).
Presenting core findings to a regional GoToMeeting™ meeting 2010	Member checking proved that the main categories regarding inspector culture, knowledge culture and knowledge types in NLIA made sense to the organization members (paper 2 and 5)
Presenting findings to a regional meeting 2011	Examples of feedback that gave additional data: "The competence networks creates problems for our existing informal networks, since we are now supposed to direct our questions to a competence network." Individuals who approached me with their comments also sometimes gave feedback to me during lunch break. Example: *"Why can't you just clearly say that this* (networks of competence) *is a failure, since there is no common identity developed?"* (**paper 5**).

The core argument against member-checking is that it might challenge the idea of multiple truths (McConnell-Henry, Chapman & Francis, 2011). Who decides when the whole or real story has been revealed and will not interpretations alter depending on the context in which it is viewed? I think that these issues are challenging, but to me member-checking is not a means to say that I have reached one definite truth but rather a means to gain further insights, increase sensitivity to context and to check if the same interpretations are shared among a larger group of people or not.

4.5.2 Transferability

Transferability has to do with our conclusions and to which extent they can be generalized. This research does not present quantitative data, and therefore statistical generalization cannot be made. On the other hand; qualitative researchers operate with another form of transferability. In qualitative studies transferability is related to the interpretation (Thagaard, 1998) and not the patterns in the data sets. Interpretation can be captured and 'transferred' by the help of sensitizing concepts (Blumer, 1954), single narratives giving new insights, through reader recognition (Sørnes, 2004), selection of critical cases (Flybjerg, 2006) or systematical selection of cases to generate new theory (Glaser & Strauss, 1967). I have tried to ensure transferability through my selection of cases, by revealing my use of sensitizing concepts (role of ICT and social identity) and by 'thick description' when adding narrative accounts to incidents and/or categories throughout all of the individual papers.

4.5.3 Dependability

Reliability most often refers to whether a research technique will yield the same results if applied several times. This is not the case in interpretivistic research, where the researcher goes through a hermeneutical process; finding answers and interpretations, and raising new questions and discovering new knowledge needs at the same time. The goal of dependability, then, is to provide documentation of decisions and interpretations for readers to trace what actually has been done and how conclusions have been reached (Guba & Lincoln, 1989; Sørnes, 2004). Details of this documentation are provided in the previous sections 4.4.1 – 4.4.3.

4.6 Ethical issues

The stages of this research have involved ethical considerations in addition to scientific ones. I have tried to balance the need to give the reader of this research

enough information about the context without causing embarrassment to particular informants or the organizations. Protection of rights was handled by trying to use all the quotations from interviews and observations in such a way that the informant could not be directly identified. On the other hand, in this dissertation the organizations' names are disclosed. The benefits of disclosure are such as being able to provide much better contextual information, and enabling readers to validate the empirical work based on their own knowledge of the organization or type of organization (Walsham, 2006). For these public organizations, commercial confidentiality is not a problem area. Yet, how taxation officers and labor inspection officers' conduct their tasks might be something the individuals and organizations are not so interested in revealing.-I have tried to limit the disclosure of task handling processes to a minimum. In addition I have been careful about not revealing information about third parties (like information about the businesses the inspectors have inspected).

While the research participants were informed about the study, and agreed to participate, I had to take extra measures when observing GoToMeeting™ meetings to avoid ethical problems with hidden observation. In particular, the participants could not see me when I was observing them. The purpose of my study was explained to the participants before I started observing. Further my name was on the meeting notice and my name and e-mail were always visible for every participant on-screen during a meeting. At the beginning of each meeting everybody, including me, had to present themselves. All these activities helped me to let them know and remember that they were being observed by me. At one meeting I was not introduced at the beginning, and the data from this meeting has not been used in this dissertation. At another meeting the meeting changed character and moved from a competence network meeting to a project meeting. When I understood what had happened, I logged out of the meeting immediately.

4.7 Summary

My research strategy for this dissertation builds on a social constructivism that puts process and practice in the foreground. To ensure credibility (internal validity) I conducted extensive fieldwork and my findings were member-checked at several stages. I have also tried to promote transferability (external validity) by making my selection of cases explicit and by adding as much contextual information and narrative accounts as possible, while being conscious of the sensitivities of my informants. To ensure the dependability (reliability) of the findings, I have described my research process in five phases, explaining the choices made and when in the research process I wrote the individual papers.

5 Synthesis, Conclusions and Implications

This chapter presents a synthesis of the key contributions of my research into theory and practice. The main goal of this dissertation is to gain understanding of knowledge sharing through managed networks of competence in a distributed organization, and in particular the role of ICT and identity. A more detailed description and comparison of the networks in study is provided in this chapter, which is not provided in any of the five individual papers. Furthermore I offer an integration of the individual papers and integrate and extend structuration theory and the literature on communities of practice to online managed networks of competence. The chapter closes by highlighting the limitations of the study and my pleas for further research.

5.1 Why Target Managed Networks of Competence?

Normally, practice based studies target knowledge sharing in a real work setting. The setting in this study, however, is at least one step away from the kind of knowledge sharing which takes place during actual work practice. The participants in the managed networks of competence that I am focusing on here have more or less the same work orientations, but they do not conduct many tasks together. However, they are expected to share their individual experiences and expertise with colleagues in a managed online environment (GoToMeeting™), to which the participants are assigned and managers occasionally participate in the conversations. The formal networks being examined here do not represent a community or network of practice, but partly overlap and cut across preexisting relations between practitioners. They can be seen as a way of nurturing or developing new communities.

With regard to the practice based assumptions presented in chapter 2, it is not surprising that a study of online knowledge sharing within managed networks of

competence will reveal many accounts of how individuals and groups find knowledge-sharing in this context difficult. My informants report that it is hard to get to know each other using GoToMeeting™. Some are unwilling to share and some find that sharing is less useful for their own work and thus regard the whole idea of networks of competence as being without purpose or meaning. Thus, by focusing on these networks, and on the collection of interviews and observation data, has enabled me to define barriers based on the relational and practice-based nature of inspection knowledge. In particular, I have focused on how and when social identity creates barriers for knowledge sharing across emergent communities and how dependence on ICT and with few opportunities for face-to-face interactions can create barriers. However, I have also found that the participants tell stories and re-enact the knowledge sharing practices developed in their online project work settings through the use of GoToMeeting™.

In my study, the substantive (empirical) area of inquiry was knowledge sharing, whereas the formal (conceptual) area of inquiry was the role of ICT and social identity. As Glaser and Strauss (1967) have observed, most studies that generate substantive theory will ultimately generate and improve formal theory. This dissertation extends the process of theorizing on emergent, managed and online communities by offering some theorizing on the relationship between these communities. The practice-based approach highlights the fact that knowledge, or 'knowing', as some prefer to call it, is contained in practices, identities and narratives. I found that these managed communities and networks of competence consist of heterogenic participants, in terms of educational background, knowledge orientations, and work experiences that can create barriers to knowledge sharing. Firstly, however, it is necessary to take a step back and revisit my research question. My overarching research question is: *What are the main factors hampering and facilitating knowledge sharing through managed networks of competence?*

The study of managed networks of competence gave me an opportunity to investigate how these formalized networks were influenced by and had influenced existing communities. This has led me to try to say something about what kind of new communities emerge out of the networks being studied. Furthermore, I have addressed the gaps in the literature identified in Chapter 1 regarding how ICT can facilitate the observation of practice (Ardichvilli, 2006) and the often underestimated problems of identity in existing research on learning (Hong & Fiona, 2009 and Macpherson & Clarke, 2009) . The two research sub questions that have guided my inquiry are:

Sub question 1: What is the role of the GoToMeeting™ tool (ICT) when sharing knowledge in managed networks of competence?

Sub question 2: What is the role of identity construction for knowledge sharing in managed networks of competence?

As explained in the method chapter, these two questions have been used as sensitizing concepts (ICT use and identity) in my data collection and analysis. Data were collected from interviews, observations and archives from the Norwegian Labor Inspection Authority (NLIA (main research site) and The Norwegian Taxation Authority. In what follows I will address the different networks in a study of NLIA and the empirical base of each paper and I will identify the contribution it makes to theory and practice.

5.2 Discussion of Key findings in the Networks of Competence in NLIA

The purpose of the networks is to share knowledge between inspectors across geographical and organizational divisions (NLIA, 2008). However I find that this is difficult within each regional network, due to heterogeneity among the participants, a lack of concrete tasks the top-down issues dominating their meetings and managerial control (**see paper 1,2, 4 and 5**).

The formal organizing of the networks into four factors - occupational hygiene/chemistry, technical/accident, psychosocial wellbeing and ergonomics are not questioned (NLIA, 2008). However this study has uncovered the fact that some inspectors (in particular those who are more experienced) think that their core competence, interaction and communication with clients are being ignored in the formal organizing of the networks. What does this mean in relation to knowledge and knowledge sharing? Brown and Duguid (1991) make the general claim that reliance on canonical practice (espoused practice) can blind an organization's core to the actual and usually very valuable practices of its members (including non-canonical practices). This is likely to have happened here since the authority is leaving out what Inspectors think is their core competence. When facing the problems (like polluted air or stress) at an inspected place of work, the inspectors learn from each other and their clients by becoming engaged in a conversation with management and employees at the inspected site. This integrates the various facts of the situation and the knowledge produced that emerges out of a negotiation, which balances the need to fulfill the intentions of the legislation, motivating managers to make real change happen, and taking practicalities and costs into account. In this respect, the formal organization of managed networks of competence ignores important knowledge in practice (Orlikowski, 2002), which is important to the inspectors and their work.

5.2.1 The Accident networks

The main purpose of the accident networks is to ensure technical safety and prevent accidents. The accident networks in this study were staffed with engineers, a lawyer and others with degrees in social sciences and/or people who have had positions as safety representatives (Verneombud) in building and construction. Their work is about preventing accidents in the workplace. They carry out the online sharing of pictures of equipment in a way that takes into account the existing legislation, check-lists and texts with regard to how other inspectors write up a case. However, when an old-timer participates in these network recalls, he or she looks back on a master-apprentice relationship with a senior inspector who he or she had learned from during inspections and who had a strong relationship with an expert at the directorate who knew all the technical specifications of vehicles or machines consistent with the legislation. This is the 'old' way of organizing learning/expertise. After such reorganization, managed networks of competence are supposed to represent a 'new' way of organizing learning and expertise. However the Accident network in region 1 is not able offer the expert knowledge that the more experienced inspectors expect and appreciate.

5.2.2 The Network for Occupational hygiene/chemistry

Occupational hygiene is about using science and engineering to prevent ill health caused by the environment in which people work. As well as chemistry it includes heath and cold hazards at work. Occupational hygiene helps employers and employees to understand the risks and improve working conditions and working practices. The participants in this network who are focused on in this study (region 1) are relatively homogenous. Most of them have an education in engineering, which seems to be helpful due to shared language and standards.

Knowledge about how different chemical substances act together in the work place can be combined with their experiences of people's behavior. Paper 4 offer an example of the later (the construction of the farmer). This is a representative example of what kind of knowledge the participants find useful to share. This is the network who find knowledge sharing through GoToMeeting™ most useful (**see paper 4**). It seems like that many of the participants share a professional sub-identity that facilitate their knowledge sharing.

5.2.3 The Networks for psychological well-being

Knowledge of psychological well-being is characterized by complex forms of knowledge, which are more contextual, personal, tacit, intuitive and emotional (**paper 2 and 4**). The inspection authority distinguishes between level 1, 2 and 3 inspections. Within the area of psychological well-being, inspections are always at level 2 or 3, producing a great deal of material for the inspector which must be analyzed and interpreted in relation to their professional knowledge and the law, such as the negative effects of stress. It seems like the active participants in these networks share a strong sub- identity that facilitate their knowledge sharing, however they find that online interactions are hampering their sharing. While the online meetings are useful for obtaining information about what is going on in the organization, academic presentations and storytelling, they find face-to- face interactions much more useful for their knowledge sharing. They prefer sharing during an inspection or well prepared physical meetings were they can discuss a case in depth for more than the two hours an online meeting lasts (**paper 4**).

5.2.4 Comparison of The networks and discussion

My interpretation, based upon my interview data and observations, is that the participants in the accident networks (region 1&2) are holders of a task and craft identity compared to the more specialized and professional oriented identity of the

participants in the network of occupational hygiene. I find further support for this claim in the work of the historian Bjørnson (1993) who describes a development of a growing divide in the eighties and early nineties at the local district offices, between inspectors with a technical education who may also have experience as safety representatives (Verneombu) and Inspectors with a degree in engineering who specialize in occupational hygiene. This is an important dissimilarity when comparing how these two networks are viewed by their participants, which can explain the differences in participants' identification with their network and whether they find online knowledge sharing useful or not. My conclusion is that the participants in the accident networks studied need to develop greater identification with and trust in the knowledge of others through joint tasks. The networks of competence works better for the participants in the network of occupational hygiene, who have a longer and more similar educational background and who therefore can rely more on the presence of the professional identity and professional standards that they share. In my view this explains why the participants in the network of occupational hygiene find network and online knowledge sharing more useful than the participants (especially the older people) in the Accident network in region 1.

The participants in the two networks of psychological well-being (region 1 and 2) share a sub–identity in their organization. They are working with psychological and social issues, so they describe their job as being very different from other types of inspecting. Even though the participants are relatively heterogenic in terms of educational background (social scientists, priests social workers, police and so on), they share an interpretative view of knowledge. Therefore, my conclusion regarding what hampers their knowledge sharing is that a shared interpretation of an experience within the knowledge area of psychological wellbeing is difficult to construct online. The participants prefer knowledge sharing during joint inspections or well prepared face-to-face meetings.

5.3 Synthesis of The 5 individual papers

While the five papers are presented in an appendix and offer individual contributions, this section offers an integration of the papers in form of a cube, 'The identity - ICT interaction cube' which integrates my findings about the main factors hampering and facilitating knowledge sharing through managed networks of competence and in particular the role of ICT and identity construction.

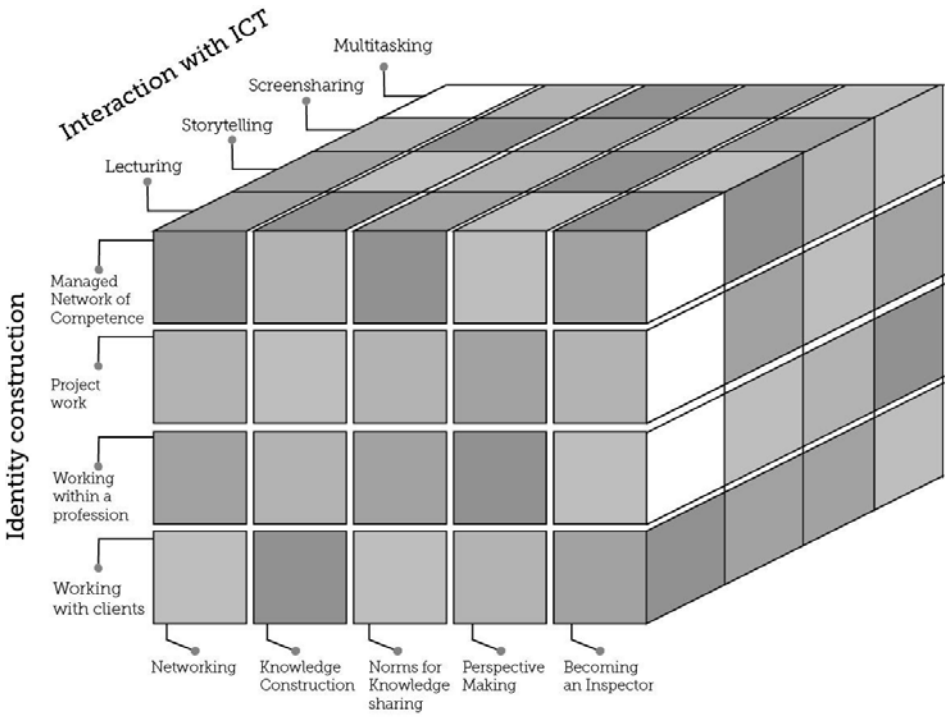

Figure 2 The identity - ICT interaction cube

The identity - ICT cube integrates my findings about social and technical factors from the perspective of communities of practice. The purpose of this cube is not to illustrate each cell in detail, but to illustrate the complexity of the role of ICT and identity - the aspects of knowledge sharing found in this study. The focal areas are key aspects of communities of practice – social networking, knowledge construction,

norms of knowledge sharing, knowledge construction and how to become an Inspector. This study has vertically identified settings where the participants' social identities are formed when interacting with clients, when developing expert knowledge within a profession (such as chemistry), during project work with other inspectors and during meetings in the managed networks of competence.

The papers (in particular paper 2 and 5) enhance an impression that the inspectors' identification with the networks is weak, and dependent on organizational identity and professional identity (paper 5). The inspectors (in particular the older ones) however, prefer knowledge sharing during real inspections, when interacting with their clients, in order to draw out their knowledge or to place them in the context of concrete problems, thereby affirming their shared identity as Inspectors.

The cube reports that the main use of GoToMeeting™ for knowledge sharing, in the form of lectures or PowerPoint™ presentations. Examples included a presentation of health risks in relation to biological factors and exposure to bio aerosols (including airborne viruses and viable organisms such as bacteria and fungi) in crab production, slaughter plants or pig farms or just a lecture about what oxygen is and what it can do. Additionally, the inspectors use stories to share their experiences online, and they use screen sharing to show pictures and documents when sharing their experiences through storytelling. And finally, the role of multitasking can have both a facilitating and a hampering impact on knowledge sharing, in that it may involve searching for additional information relevant to the discussion or multitasking and so paying less attention in the meetings.

Paper 1: Networking

Paper 1 presents a grounded theory analysis of the first 12 interviews collected in NLIA and the Taxation Authority. The paper addresses two questions: (1) How do

people combine different ICTs when they engage in a professional knowledge-sharing network? (2) How are combinations of ICTs used when people engage in frequent as opposed to infrequent relations? Our study reveals that people generally combine different ICTs all the time, but they do so relatively less often during a network of competence meetings. The paper supports the conclusions of much of the existing literature, which indicates that people who are engaged in frequent relations can rely on many communication channels for their interaction.

The contextual model that is developed in this paper describes the inspectors as being very independent workers who need to make their own decisions, and who are used to learning in pairs and by experience as their core knowledge asset.

The main barrier for knowledge sharing as regards NLIA is that it is too difficult to get to know each other and figure out who knows what during an online network meeting. My informants would argue that the problem is that there are too many participants, that they do not see each other when using GoToMeeting™, that many who are assigned to the network are not present or are multitasking during the meeting, and that they do not have many shared tasks or responsibilities.

The paper underlines the importance of the perceived knowledge of colleagues, which is relevant to one's own case handling, for developing knowledge-sharing relations. Since the participants find it hard get to know each other, with regard to who knows what - then what has already been done and what is known in the organization (Orlikowski, 2002) is not necessarily accessible to the participants assigned to the network. To help solve this problem, examining the experiences of the Fishery Network in the Taxation Authority might be useful. In that case the coordinator tries to engage the participants in projects and other activities, which

implies all kinds of interactions, face-to-face and online, that develop the relations among the members of the network.

This paper adds to our understanding of the structuring of networks of competence. We find that the participants enact GoToMeeting™ as a tool for collaborative writing, which is useful for co-creating answers to top-down hearings, but they struggle to share knowledge and have so far not developed new ways to get to know each other using GoToMeeting™, instead choosing to multitask.

When reading this paper 4 years later, what comes into my mind is that collaborations regarding giving feedback to a top-down hearing did not work as a way for individuals who were participating in the networks to negotiate and share meanings, because the issues were too abstract and were not directly relevant to their own work. From 2009 onwards, the NLIA have send fewer and fewer hearings to the networks in order to give more space (and time) for the networks to set the agenda themselves.

In this study this paper demonstrates a complex context that had to be investigated more in detail. In particular the role of identity was expressed as core concept for developing an understanding of what was going on, and I started to collect data empirically from networks with other knowledge orientations in NLIA.

Paper 2: Knowledge construction

Paper 2 explores the role of identity construction for knowledge sharing. Out of 18 in-depth interviews and observational data we constructed several ideal-type identities: (a) client oriented identity (via the inspector) involved tacit practice-based knowledge about how to interact with their clients, (b) professionally oriented identities which promoted the sharing of academic codified knowledge, and (c)

regulator identity, with regard to rule-based learners who prefer to wait for 'somebody at the top' or 'the court' to explain the proper interpretation of the law. These identities structured different learning modes, different knowledge types and different roles for ICT for knowledge sharing. In particular we found that participants holding a client-oriented identity regard face-to-face interactions as the better option for knowledge sharing. However, we also found that it is easier for inspectors who work with naturalistic knowledge types (engineering and chemistry) to share knowledge through GoToMeeting™ than their colleagues with an interpretative constructional knowledge view (Psychological well-being).

This paper supports Amin and Roberts' (2008) suggestion that the benefits of online communication in knowledge-transfer processes are higher for professional communities than for task and craft communities. Professional communities are communities that hold expert knowledge acquired through education and training. Amin and Roberts (2008) claim that the knowledge of professional communities is shared more easily online due to shared language and standards (with regard to people from the same educational background). However, our findings suggest that this claim is more relevant for the naturalistic professional communities than professional communities with an interpretative knowledge orientation. The network for occupational hygiene is an example of the first and the network of psychological well-being is an example of the latter.

This paper adds to our understanding of the structuring of organizations by emphasizing how inspectors engage with different inspection phenomena to construct different identities and emphasize different knowledge types that influence and are influenced by how they interact with ICTs. Some enact their sharing more via academic presentations and others do this more through storytelling with or without the use of screen sharing. This paper adds productivity

(the identity of being a productive worker) as an institutional condition that creates barriers for knowledge sharing among the participants in the networks of competence.

Paper 3: Norms for knowledge sharing

The purpose of this paper is to explore how inspectors find better ways to share their experiences online using GoToMeeting™. The paper explores how three inspectors Tor, Stein and Nils, think they should best share their experiences during their meetings. The three inspectors position themselves in terms of identity - Tor and Stein are more client-oriented while Nils is more professionally-oriented. These identities structure their interaction with ICTs. Tor stresses the importance of taking pictures during inspections, which when shared effectively can create a mutual understanding among the participants in a managed network of competence as well as with clients. Stein emphasizes that practices, when shared, must be traceable in real documents. Nils, a newcomer, emphasizes PowerPoint™ presentations, which can be printed and shared on the desk-top, since they contain names of people which can be use full for him as a newcomer. Nils also finds academic presentations useful, in particular if practitioners are engaged in a dialog related to the presentation (all facilitated by GoToMeeting™).

This paper supplements our understanding of the structuring of organizations, by emphasizing how ICTs influence the norms for knowledge sharing. My findings suggest that GoToMeeting™ facilitates knowledge sharing according to norms which emphasize that sharing of experiences should be as concrete and truthful as possible, and therefore traceable in real documents. Tor's story also illustrates how he could improvise with the purpose of sharing experiences. In this case Tor shares his PC desktop - 'his work-bench' as he labels it - and what he does there and how he uses screen sharing facilitated by GoToMeeting™.

The paper provides insights into how the network conference meetings are structured by an agenda- typically a presentation of a topic or experience followed up by a discussion and finally an evaluation of the meeting.

Paper 4: Perspective Making

Paper 4 offers findings from observations of online conference meetings and discusses the role of storytelling and narration in the meetings. In particular, client and professionally oriented identities are explored here. The paper highlights the role of artifacts important for them, such as check-lists from previous and planned projects that are used in the discussions. The paper illustrates that in the meetings, in the network for occupational hygiene and psychological well-being, the participants use narration to overcome learning barriers and to develop a mutual understanding. However, I found that top-down information dominates these meetings and leaves less time for sharing experiences through storytelling. Furthermore, I found that the participants in the network of psychological well-being need to express their emotions to be able to share and discuss what they experienced during an inspection, and to in order to do this face-to-face interaction is preferred.

This paper supplements our understanding of the structuring of knowledge in network of competence meetings, by emphasizing that creating a perspective in an online conference meeting can be structured by the use of narration and argumentation in combination, and by explicit and tacit types of knowledge when discussing a written checklist which is shared on the desk top, and codified knowledge when PowerPoint™ lectures are held.

Paper 5: Becoming an inspector

The last paper is a product of a reanalysis of the interview data collected in this study focusing on the role of identity. This paper extends its analysis of the role of identity by addressing the differences across generations regarding knowledge and knowledge orientation.

What Lave & Wenger (1991) describe is a theory of newcomer learning, whereby newcomers acquire knowledge and skills through interaction with experienced members. In this respect, the progression of gaining competence and membership in a community is linked to changing identity, involving newcomers gradually taking on more expert roles or 'identities of mastery'. In contrast, I found that the newcomers and experienced hands in the managed networks of competence are constructing different sub-identities which then create barriers for knowledge sharing from old-timers to newcomers and vice versa. The more experienced inspectors construct a client-oriented task or craft based identities and the newcomers construct professional identities.

The paper underlines the fact that the social categorization and the construction of identity have taken other paths apart from those that could have enhanced the mutual construction of identity and the transfer of knowledge. The more experienced inspectors in the NLIA tend to prefer knowledge sharing in dyadic relations, rather than knowledge sharing online with a large group when they are unsure that they have the competence they need.

While this paper focuses mainly on the social aspects, the paper also supplements our understanding of the social-technical structuring of the networks in study, by emphasizing that knowledge transfer is hampered by the old-timers lack of willingness and ability to share their knowledge by the use of ICTs.

5.4 Conclusion

My overarching research question for this dissertation was:

What are the main factors hampering and facilitating knowledge sharing through managed networks of competence? To answer this question I have focused on the role of ICT and the role of identity.

First, this study offers some deep insights into the role of the ICT tool GoToMeeting™ for knowledge sharing. The study underlines that online knowledge sharing, by the use of GoToMeeting™, was an unfamiliar way of sharing for the participants. Findings also underline that the tool has limitations regarding knowledge sharing, in particular for communities with a more interpretative knowledge orientation. However, the study demonstrates that GoToMeeting™ facilitate collaboration, since individuals negotiate and share meanings mediated by the tool.

On the one hand GoToMeeting™ facilitates knowledge sharing across the dispersed Inspectors – which in this study is sufficient for the sharing of explicit and technical knowledge. Closeness to actual work practice is also accomplished by the participants' use of actual documents, stories and pictures when sharing online, which supports the sharing of more tacit types of knowledge related to inspection and discretion within the more technical, positivist and natural science networks of competence (accident and occupational hygiene). The sharing of letters and orders makes it possible to some extent to observe how others conduct their writing of orders – with regard to which facts they collect and how they write up their use of the legislation. We could say that some inspection knowledge is contained in writing practice which can be shared through GoToMeeting™. Though, dependency on ICT as their main channel for interaction hampers their success in social networking. The participants find it hard to interact socially, to get to know each other and to

discover who knows what, which is very important for knowledge sharing. However, technology is not the only problem here. Other contextual factors – individualism, group size, mixed signals from management, managerial control and overload of top-down issues create problems for the networks.

Second, this thesis contributes to the role of identity construction by changing the focus from identity construction as a facilitator for knowledge sharing, as described in the literature on communities of practice, to fragmented identity constructions in managed networks of competence as a barrier which hamper knowledge sharing. The findings demonstrate that multiple and contradictory identities create barriers linked to knowledge interests and commitment. In particular, my study emphasizes the identity problems in the relationship between old-timers and the newcomers that may hamper the sharing of experiences from old-timers to newcomers, and the sharing of new perspectives from newcomers to old-timers.

Participants in the networks of competence negotiate their identities when engaging themselves in the discussions during the network of competence meetings, and knowledge sharing is effective when pictures makes a clear reification of a clear meaning regarding their practice or the participants engage themselves in the discussion, triggered by the experience in a narrative or the relevance of something shared for individual task handling. However, we should question to what extent the negotiation of knowledge and identity taking place is really having impact on the participant's behavior, their inspection practice. Most likely the discussions influence the newcomers' inspection practice more than the old-timers**.** Chapter 3 in this dissertation offers a review of the literature that underlines the relationship between social identity and social capital, and in particular identification and identities influence on reciprocity that is an important facilitator for knowledge sharing.

5.5 Theoretical Contributions

The main theoretical contribution of this work is the enlargement of structuration theory into knowledge sharing through online managed networks of competence. The substantive theory developed has analytical generalization potential to the extent the reader of this work can utilize the analytical perspectives developed in this study.

5.5.1 Extending structuration theory to online managed networks of competence

As an extension of Orlikowskis' theories of Duality of Technology (1992) and Knowing in action (2002), both that are extensions of Giddens (1984) Structuration Theory, I synthesized my grounded theory in figure 3.

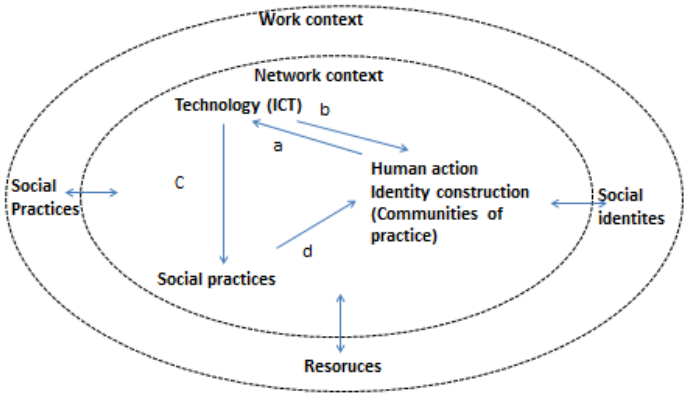

Figure 3 The structuration model of knowledge sharing through managed online networks of competence

The figure shows technology as a product of human action: (a), where participants' actions and interaction impact on the role of technology (ICT). Technology is viewed as a medium for identity construction (b) and when c) participants, as they use ICTs, are enacting social practices (e.g. here knowledge sharing practices) which (d)

develop, maintain and/or change their identities and their network. The model reveals aspects of ICT's fundamental duality (Rosenbaum & Shachaf, 2010), since the model illustrates how ICT use and identity construction are shaped and are shaped by each other.

My findings suggest that the role of ICT and identity is structured by the following:

a) Knowledge sharing is hampered when experienced inspectors find it hard to signify who they are without being situated at an inspection site, but situated in a network of competence online meeting. They need to share what they do (what they look for and how they approach management) and are achieving at the work place during an inspection – e.g. their competence. The exception here is experienced practitioners who are able (through their ICT skills) to re-tell their action through storytelling and the sharing of documents (written communication with the inspected organization) and pictures which illustrate what they have achieved in a specific work place; e.g. through their mastery as an inspector.

b) In my papers I have uncovered that different identities influence the role of ICT, but other findings imply that this might also work the other way around. For instance, there may be occasions when the participants are more able to signify their professional identities rather than their task or craft identities when using GoToMeeting™ (**paper 2 & 5**).

c) I found that the participants in the meetings enacted online knowledge sharing in the form of academic lectures, storytelling and/or deciding to multitask. This then again influenced identity construction and identification. As an example, an academic lecture about a topic was easily facilitated by GoToMeeting™, and could facilitate the construction of professional identities (d).

However, high dependence on online interactions and a lack of focus on joint tasks and responsibilities among the network members can hinder the construction of an inspector Identity and hence the sharing of practice based knowledge types (more tacit knowledge types and communicative skills) related to that identity. Listening to a more general lecture on topics like what oxygen is, might develop some conceptual common ground, but not concrete enough in relation to the inspections task the individual have at hand, to trigger in depth discussions regarding such tasks and practices.

This dissertation furthermore extended the negative impact of ICT mediated multitasking from work activities (Tang, 2005) to online networks of competence meetings. The actual or imaginary multitasking and multi-communication of other participants during their network meetings could have a negative impact on engagement in the meetings. I found that, since they do not see each other and many participants are not talking, the participants may be unsure as to whether or not some of the other participants are really listening to the conversations or may be engaging in other activities such as writing reports, answering e-mails, engaging in other phone conversations, or even having face-to-face conversations at their office with other people. Even though this might not be the case, participants sometimes assume or suspect that multitasking is going on, hence negatively influencing their engagement in the networks of competence meetings.

As emphasized in figure 3, the knowledge sharing activities in the managed network of competence meetings are structured by two contexts: the work context and the managed online context.

Historically knowledge sharing has been conducted in the field during inspections, whereby the participants have been taking part in or at least witnessing the same talks with management and employees at the work place that is being inspected. The arrows in figure 3 illustrate how the participants draw on resources from their work context (such as pictures and documents), identities (sub group identities like chemists, inspectors or network members or a more organizational wide identity which focuses on the mission of the authority) and knowledge sharing practice (such as telling stories accompanied by documents and pictures) that facilitate their sharing. However, as indicated by the dotted circle, it is difficult for the participants to re-enact these practices and identities in the online network meetings due the limitations of the tool GoToMeeting™. They are then unable to see each other and they are at least on step away from concrete tasks at an inspection site situated in a conference network meeting.

The role of online resources (with regard to important artifacts) found in this study needs to be highlighted. Access to online resources derived from the work context, like pictures or documents, is more important for some networks, and less for others. For example, it may be easy to capture a picture of equipment that solves a pollution problem in a factory (such as a network for occupational hygiene), but it can be difficult to capture a picture of a stressful situation (such as a network for psychological well-being). However, access to resources for knowledge sharing for example pictures can be limited if picture taking is not a common occurrence in their work.

5.6 Contributions to communities of practice research

While the seminal works on communities of practice literature describe face-to-face interactions, this dissertation is written from the perspective that ICTs have fundamental duality which potentially changes or creates new networks or

communities of practice. Fundamental duality means that technology is influencing several dualities at the same time and hence potentially changing networks and communities (Rosenbaum & Shachaf, 2010).

There is an emphasis in this dissertation on the fact that the tool in use, GoToMeeting™, does not seem to be a channel through which the inspectors can enact their traditional ways of sharing knowledge. However, I have also found other people who have established new ways to share their experiences and competence through the use of GoToMeeting™ by means of storytelling and the use of documents and pictures, which illustrate emergent ICT use (the duality of technology, the design-emergent duality (Orlikowski, 1993; 2000)).

Furthermore the use of pictures in **paper 3** represents the participation – reification duality (Wenger, 1998) found in this study, where knowledge sharing is accomplished by visual presentation of inspection practice. The sharing of a picture of equipment that is in line with the legislation can effectively contribute to the social production of meaning and at the same time the picture can represent that meaning in a concrete form.

On the other hand, a heavy dependency on ICT mediated interactions has, in my view, led to negative stereotyping (identification- negotiability duality, Wenger, 1998). This has produced a distinction between those who are listening and contributing (the worthy members of the network), and those who are doing other things (multitasking). In other words, the fundamental duality of technology creates tensions that hamper knowledge sharing.

Additionally this study offers the perspective that ICT has become such an important part of current work life that it can be used not only to share knowledge over

distance but also in face-to-face settings in order to illustrate and ensure the authenticity required for successful knowledge sharing, as illustrated in **paper 1**, where tax officers meet face-to-face on their lap tops at a specific location where they can access all their systems needed for their sharing. Also, this can be illustrated by actions of the Health and Safety Inspector Tor in paper 3**,** who picked out an accident – a file describing what happened at the site, pictures of it, and the letters he wrote and how the inspected work place responded to them, when sharing his experiences. These findings contribute to the idea that people can observe some of the practices of others by the use of ICT (Ardichvili, 2006). Stories accompanied with documents and pictures can describe processes such as writing practice, communication with a client and the use of legislation in detail. However, for building relationships (**paper 1**) and for craft and task oriented communities and interpretive knowledge types, ICT mediated knowledge sharing has limitations (**paper 2**). On the other hand, it seems like GoToMeeting™ promotes the sharing of professional academic knowledge and hence turns the networks into more discipline-oriented professional networks, rather than networks of competence.

While traditional forms of community or networks of practice memberships are voluntary, this study offers a number of insights into the implications of formalizing intra-organizational networks. A recent finding that I have not included in any of the papers is that managed networks of competence create problems for the informal knowledge sharing that inspectors benefit from. After the setting up of managed networks of competence, some participants (in particular the more experienced ones) report that it has become more awkward to ask another informally (to "bother" another person) because, as they put it, "*you are now supposed to put your questions to people in your own network*". This is a finding that suggests that the creation of managed networks of competence not only nurtures communities (Hislop, 2009), but also has a negative impact on pre-existing networks and

communities, since the introduction of a managed network of competence changes relations through the renegotiation of identity (the identification – negotiability duality, Wenger, 1998) followed by changes in the norms of informal interaction.

Another hampering factor for knowledge sharing which characterizes the networks of competence, in contrast to a community of practice, are that the networks of competence are too large and too small at the same time. On the one hand they are too many participants to get to know each other during their meetings, and on the other there are too few to cover the expertise they need. The participants complain that people with key expertise to their work are not assigned to their network. My interpretation of this is that effective identity construction as an incentive for participation in knowledge sharing activities in the networks of competence is partly hampered, at least in the first years, by a lack of privileged access to knowledge, social relations and status reputation (Roy & Parker-Gwin, 1999).

5.6.1 Contributions to research on identity formation and learning trajectories

This qualitative study contributes to our understanding of the tensions between organizational knowledge and professional knowledge that is nurtured by the networks of competence, and the more tacit work-based knowledge which is usually constructed in a master–apprentice relationship during work, which creates unclear learning trajectories for the newcomers. The Inspectors' 'old' learning trajectory can be described as a relationship between a senior inspector and a junior inspector conducting joint inspection, similar to the relationship between a master and apprentice as described by Lave and Wenger (1991). The managed networks of competence, on the other hand, have appeared to promote learning for the junior inspector which is more influenced by professional academic oriented knowledge with opportunities for specializing for the individual, and which is more oriented towards the organization than their clients (and may be also more controlled by the

organization) and towards learning in larger groups (networks and project teams) through the use of ICT.

5.7 Contributions to the study of social identities in organizations and organizational identity

While several studies have shown that organizational identity shapes individual involvement and commitment - in boardrooms (Golden-Biddle & Rao, 1997), at work (Johnson, Chang & Yang, 2010) and in co-operatives (Jussila, Byrne & Tuominen, 2012) this study extend these insights to individual involvement and commitment to formal intra organizational networks of competence. In particular this dissertation contributes to the fragmented view of organizational and social identity (Brown et al., 2005; Alvesson& Kärreman, 2001).

Firstly, a lack of identification with the organization causes lack of engagement in the networks of competence online meetings (**paper 1**). This is a finding that are in-line with the literature on virtual organizations which argue that organizational identification can be a critical factor for holding the organization together (Wiesenfeld et. al., 2006). However, many of the Inspectors do identify with the productivity goals of NLIA, but they do not identify with the network they are assigned to. My interpretation is that the Inspectors identify with the authority`s production goals (number of Inspections) since it fits well with their identity as inspectors. This illustrates that workers sometimes identify only with the aspects of the organization witch fulfill their own needs (Weick, 1995), for example to prioritize inspections before network of competence meetings (**paper 2**).

Secondly, I have found that NLIA has a hybrid companywide identity emphasizing NLIA's role as a controller and a supervisor (rule oriented and solution oriented

approach, **paper 5** page 12-13) in relation to their clients. These two perspectives (as the inspectors label them) facilitate in-depth discussions fused by these two orientations (**paper 5**) during the network meetings. And without the strong filter, as one clear common companywide identity might imply (Willem et. al, 2008), their discussion might go into depth and fuse the sharing of concrete stories of inspection activities and experience, and consequently facilitate the sharing of practice based knowledge or knowing. However, when the manager states during a meeting that the inspector role is 'only' control, the managers put an end to their discussion and hamper their sharing (**paper 5**).

Thirdly, I have found a client oriented identity (the inspector identity) that facilitates the sharing of affordable technical solutions. However this identity also creates barriers, in this managed context, since holders of the client oriented identity are unwilling to share what they really do (what they advise the client to do) to avoid new more stringent rules, which could reduce their flexibility when inspecting.

Fourthly, this study highlights conflicts of interests and commitment for the individual in relation to either being committed to effective production or to the network of competence, to the informal social network or to the network they are assigned to, or to show loyalty to NLIA or to their clients – which may hamper their knowledge sharing. It seems that the participants have difficulties in maintaining a coherent organizational identity, since it does not fulfill their needs (Weick, 1995) which are to find practical and workable solutions, bearing in mind different responsibilities – responsibilities regarding the use of the legislation, the health and safety of workers and the interests of the management or owners of an inspected workplace.

The findings of this study suggest that identification with NLIA to some extent produces pro-sharing norms that compensate for a low level of reciprocity (Wang & Noe, 2010), among the participants in the managed networks of competence. However, the distinction revealed between the 'givers' and 'receivers' proves that there is a lack of balance, which has made it difficult to motivate the more competent employees to contribute to the networks. At the end of the day, it does not seem like identification with the organization facilitate pro-sharing norms which compensate for the low level of reciprocity among the participants in the networks of competence, as Kankanhalli et al. (2005) and Wang & Noe (2010) suggest.

5.8 Implications For practice

The findings in this study might have useful practical implications for several organizations. However, based on the assumptions of the practice based perspective this research is built on, it is not possible to provide a straightforward 'one fits all' answer to the question of how networks of competence can be managed for knowledge sharing. However, other organizations can benefit from the analytical perspectives used developed in this dissertation. And furthermore the experiences of the Norwegian Labor Inspection Authority (NLIA) and the Taxation Authority can be useful for organizations with likeness - in particular other larger distributed public organizations, staffed with both task or craft and professional oriented employees.

Firstly, this dissertation offers a perspective on technology's (ICTs) fundamental impact on networks and communities of practice in organizations. This means that managers, by forcing ICT mediated interaction on a group, might re-direct their knowledge sharing processes, with unintended negative consequences for some communities. It seems like this has happened with the holders of 'the Inspector identity' found in this study, which in particular hamper knowledge-sharing for

practice based knowledge between those who are more experienced and newcomers in NLIA. To avoid this problem, managers need not only to identify the communities in their organization (Wenger, 2005), but also to gain an understanding of the processes the different communities (like task and craft or professional communities) are engaged in when constructing their knowledge, in order to better support further knowledge sharing in an online environment.

Secondly, while communities of practice are required to be tended and not controlled (Thompson, 2005), managed networks of competence in a distributed organization seem to need to be given a clearer purpose and to be cherished by management to develop. It seems that managers should take more of a leadership role and take part in their negotiation processes to clarify the purpose of networks. In the initial phase the unclear purpose created a great deal of frustration in NLIA that undermined the whole network idea among the inspectors. However, it is better not if managers take part in the network meetings, since it might hamper the sharing of authentic practice, as this study has revealed, put an end to discussions regarding contradictions and ambiguity in their practice which they need to reflect more upon to develop their knowledge and competence.

Thirdly, in order to create more interaction that facilitates knowledge sharing, specific work tasks are required. One way to facilitate interaction would be to allow the networks more to say in regard to which projects should be initiated and who should be assigned to them. While we did not mention this in paper 1, I would like to add here that the expertise of the Fishery Network is highly recognized by the Taxation Authority. One example is that they have written chapters about this in the Taxation Officers handbook. One plausible explanation (as mentioned in **paper 1**) for this success is that the coordinator of the Fishery Network deliberately initiates

projects to develop and maintain relationships with former members of the network through collaboration.

Fourthly, it seems like current organizations have to cope with the differences between generations within organizations which previously did not exist (Delcampo, 2011), and based on the findings in this study I would in particular emphasize the differences in length of education and ICT skills between the generations, which have an impact on learning in current organizations.

As mentioned in the methods chapter, in phase 5 of this study I have asked questions via e-mail in November 2010 (19 responses) to all of the networks in Region 1. One of the questions I asked was: *What should a newcomer do to get the most out of the networks of competence*? The responses were that newcomers ought to (with reference to a number of incidents):

• Be engaged & prepared (18)
• Read the minutes of earlier meetings and central documents for your respective network (like `the compendium of chemical health risks`) (12)
• Respect the knowledge of others, who are members of the network because they are competent (9)
• Avoid discussing management issues, plans or organizational structure (6)
• Present yourself in terms of knowledge (the network members should also present themselves to the newcomer) (5)
• Share experiences as concretely as possible (4)

These norms represent the experiences of the managed networks of competence in Region 1 in NLIA, which fits well with what I have presented in the five individual papers. I suggest that NILA should learn from these experiences. If these norms are

supported and nurtured by management and coordinators in NLIA, they can ensure a smoother introduction of the newcomers to the networks of competence, as well as developing the relationships and facilitating knowledge sharing within the managed networks of competence.

Furthermore, it seems that over the years the participants have started to identify themselves with the network they are assigned to. This is because the participants do not normally wish to change their assignment from one network of competence to another, and the few times that has happened has created a considerable amount of frustration for the individuals concerned. The NLIA has therefore ensured the continuity (Baumard, 1999) that is needed to nurture a network or a community, by not forcing new assignments onto other networks on the individual, which was initially the intention.

5.8.1 Methodological contribution

This work provides methodological contributions regarding on how to gain rich data when studying interaction in an online context. To reveal rich data - that is the participants' views, feelings, intentions and actions as well as context and structures (Charmaz, 2006), I have collected data from different sources. I have conducted individual interviews and been engaged in group conversations. While the first provided individual stories and insights into the individual's intentions in relation to their previous learning trajectories in the organization, the group conversations helped me to grasp important aspects of context and structures. Furthermore, I have both observed and participated in online meetings. I participated in the sense that I logged on to GoToMeeting™ and attended the meetings as the other participants did, experiences helpful for gaining an deeper understanding of interactions through GoToMeeting™. When I presented something I gained personal

experience of the `silence` and how it affected me, when I had asked a question or made a presentation.

Grounded theory approaches are extremely useful in developing context-based, process-oriented descriptions and explanations of a phenomenon (Orlikowski, 1993). However, practice based researchers using grounded theory often use interview data and documents, and thus their research based knowledge risks being removed from its social dimension and being seen as something which is constructed in isolation by the researcher (Petit & Huault, 2008, see also Orlikowski, 2002 as an example). My experience is that it is very useful to have interview data, observational data and the opportunity to discuss what happened at a meeting in order to better understand what is going on in the network meetings, such as the role of the manager in **paper 5**. My advice to other practice based researchers is to get access to observational data and to engage in conversations about the activities and what they mean to the subjects of the research.

5.9 The limitations of this study and further research

Although this research was carefully conducted, I am still aware of its limitations and shortcomings. Given the case design of the study the empirical generalizability of the discussed findings remains limited (Yin, 2009). Research in other arrangements of practice is therefore needed to further refine our understanding of the relationship between the role of ICT and organizational, professional, and craft and task based identities, and the unfolding knowledge sharing dynamics in formal intra organizational networks in distributed organizations.

Even though I have found similar roles of ICT and identity across accident networks and the networks of psychological wellbeing across region 1 and 2 (multi-case design, Yin 2003), the reader of this study must be aware that the composition of

industries and work life in the other 5 regions of NLIA might imply other roles of ICT and other identities which are not covered in this study.

While the strength of this dissertation is that I have collected data over a long period of time, it has also produced some bias. While my material has proven effective for constructing identities in an ideal-type form, most of the interviews were conducted in 2008-2009, when the purpose of the networks was still very unclear. This has left a very negative impression of the network I studied first, the accident network in region 1. The views gathered were representative at that time, but compared with newer interviews and observations (2009-2012) in other networks; this bias must be taken into account when interpreting my findings in the papers.

By addressing the fundamental duality of technology in organizations, researchers could gain a deeper understanding of how to target the cultivation of different communities of practice. In my view this calls for action research, which seeks to bring together action and reflection and theory and practice, in participation with others, in the pursuit of the development of practical solutions to issues of pressing concern to people, and more generally the success of individual people and their communities (Reason & Bradbury, 2001). Further studies could also employ Tuckman`s (1965) framework of developmental sequences in small groups (forming, storming, norming and performing), to better grasp how formal networks evolve over time.

It is certainly necessary to look more deeply into how ICT mediated knowledge sharing, personnel turnover and organizational change in current organizations can change communities in organization and in particular to look at the impact of the relationship between those who are experienced and newcomers. The differences between the generations are today seen as products of the society at the time a

generation grew up, but it is necessary to investigate the extent to which current organizations understand and add to or reduce these differences.

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Appendix A Interview guides

Interview guide used from interview 1-7

Norsk	English
Introduksjon Dette er ikke en evaluering, men jeg er opptatt av hvordan du opplever og husker arbeidet innenfor nettverket. En fiasko kan være like viktig, lærerikt og spennende for meg som gode resultater. Det som går galt kan vi lære mye av, uten å fokusere på hvem sin feil det er. Det jeg er opptatt av er IKT bruk i forhold til når: A. Skal holdet kontakten (intranett og e-post i ny og ne - telefon), B. Diskutere dere frem til en felles løsning på en utfordring.	Introduction This is not an evaluation, but I'm interested in how you perceive and remember the work within the network. A failure can be just as important, informative and exciting for me as good results. What goes wrong, we can learn a lot from, without focusing on whose fault it is. What I am concerned about is the ICT use in relation to: What I am concerned about the ICT use in relation to: A. When you shall keep in touch (intranet and e-mail now and then - telephone), B. Discuss towards a joint solution to a challenge.
Spørsmål	**Questions**
1. Fortell meg om ditt arbeid i fagnettverket / arbeidsgruppen	1. Tell me about your work in technical network / workgroup
2. Hvilken rolle har fagnettverket i organisasjonen?	2. What role does the network have within the organization?
3. Fortell meg på hvilke måter dere er avhengige av hverandre for å nå nettverkets målsettinger?	3. Tell me in what ways you are dependent on each other to reach the objectives of the networks?
4. Hvilke kommunikasjonsmedier/måter bruker fagnettverket? Eks ansikt-t-a; telefon, videokonferanse; email jobbrelasjoner)? Hyppighet fordelt på	4. What communication media / methods are used in the network? Face-to-face; phone, video conferencing, email job relationships)? Frequency divided

de ulike? 5. Når dere utvikler noe sammen i nettverket, hvordan er IKT bruken da, til forskjell fra vanlig kontakt i nettverket? Fortell gjerne litt fra oppgaver dere har gjort sammen i nettverket 6. I hvilken grad er dere avhengige av å dokumentere prosessene, og hvordan påvirker det IKT bruken? 7. Hva brukes når/til hva (jobboppgaver, nettverksoppgaver)	between the different? 5. When you develop something together in the network, how is ICT use then, unlike regular contact in the network? Tell me a bit from the tasks you have done together in the network 6. To what extent do you need to document processes, and how does it affect ICT use? 7. What are used when / what (job tasks, networking)

Interview guide used from interview 8-14

Norsk	English
Introduksjon Dette er ikke en evaluering, men jeg er opptatt av hvordan du opplever og husker arbeidet innenfor nettverket. En fiasko kan være like viktig, lærerikt og spennende for meg som gode resultater. Det som går galt kan vi lære mye av, uten å fokusere på hvem sin feil det er. Spørsmål 1. Fortell om arbeidet ditt i nettverket, hva driver du med der. 2. Hvilken rolle har nettverket i organisasjonen? 3. Fortell meg på hvilke måter dere er avhengige av hverandre for å nå nettverkets målsettinger? 4. Egner GoToMeeting™ seg for kunnskapsdeling?	Introduction This is not an evaluation, but I'm interested in how you perceive and remember the work within the network. A failure can be just as important, informative and exciting for me as good results. What goes wrong, we can learn a lot from, without focusing on whose fault it is. Questions 1. Tell me about your work in the network 2. What role does the network have within the organization? 3. Tell me in what ways you are dependent on each other to reach the objectives of the network? 4. Is GoToMeeting™ useful for knowledge sharing? 5. When you develop something

5. Når dere utvikler noe sammen i nettverket, hvordan er IKT bruken da, til forskjell fra vanlig kontakt i nettverket? Fortell gjerne litt fra oppgaver dere har gjort sammen i nettverket. 6. I hvilken grad bruker du bilder eller dokumenter når du skal dele dine erfaringer/kunnskaper? 7. Hva brukes når/til hva (jobboppgaver, nettverksoppgaver) 8. Når en alvorlig ulykke skjer, hvem snakker du med og hva slags IKT bruker du 9. Hvordan er det å forklare hvordan du løser oppgaver, via IKT?	together in the network, how is ICT use then, unlike regular contact in the network? Tell me a bit from the tasks you have done together in the network. 6. To what extent du you share your experiences/ knowledge by presenting documents and pictures? 7. What are used when / what (job tasks, tasks in the network) 8. When a serious accident occurs, who do you talk to and what ICT media are you using? 9. How is it to explain how you solve your tasks via ICT?

Interview guide used from interview 15-21

Norsk	English
Introduksjon Dette er ikke en evaluering, men jeg er opptatt av hvordan du opplever og husker arbeidet innenfor nettverket. En fiasko kan være like viktig, lærerikt og spennende for meg som gode resultater. Det som går galt kan vi lære mye av, uten å fokusere på hvem sin feil det er. Spørsmål 1. Fortell om arbeidet ditt i nettverket, hva driver du med der? 2. Hvilken rolle har nettverket i organisasjonen? 3. Når dere utvikler noe sammen i nettverket, hvordan er IKT bruken da, til forskjell fra vanlig kontakt i	Introduction This is not an evaluation, but I'm interested in how you perceive and remember the work within the network. A failure can be just as important, informative and exciting for me as good results. What goes wrong, we can learn a lot from, without focusing on whose fault it is. What I am concerned about the ICT use in relation to: **Questions** 1. *Tell me about your work in the network.* 2. What role does the network have within the organization? 3. When you develop something together in the network, how is ICT

nettverket? Fortell gjerne litt fra oppgaver dere har gjort sammen i nettverket. 4. I hvilken grad bruker du bilder eller dokumenter når du skal dele dine erfaringer/kunnskaper? 5. Egner GoToMeeting™ seg for kunnskapsdeling? 6. Hva brukes når/til hva (jobboppgaver, nettverksoppgaver) 7. Hvordan er det å forklare hvordan du løser oppgaver, via IKT? 8. Når dere møtes fysisk, hva prioriterer dere å gjøre da? 9. Er det slik at nyansatte deler mer med nyansatte, og erfarne med erfarne? 10. Når du møter folk fra andre nettverk, er de klar over at du er medlem av … nettverket?	use then, unlike regular contact in the network? Tell me a bit from the tasks you have done together in the network. 4. To what extent du you share your experiences/ knowledge by presenting documents and pictures? 5. Is GoToMeeting™useful for knowledge sharing? 6. What are used when / what (job tasks, tasks in the network) 7. How is it to explain how you solve your tasks via ICT? 8. When you meet face-to-face, what do you priority to do then? 9. Is it true that new employees share more with new employees and experienced with experienced? 10. When you meet people from other networks, are they aware that you are a member of the ... network?

Appendix B Sample Transcripts of Interview

Norsk	English
Inge: Kunne du fortell meg litt om arbeidet ditt i det her XXX nettverket, og hva driver du med der?	Inge: Could you tell me a little about your work in the XXX network, and what are you doing there?
Mr.X: Ja, det var et godt spørsmål. Nei, jeg er jo en person som er veldig interessert i faget mitt da, og går ofte i dybden av regelverk og forsker for å finne ut av ting og tang, hvis det er juridiske gråsoner.	Mr. X: Yes, this was a good question. No, I am a person who is very interested in my field, and often go in depth on regulations and search to figure out the bits and bobs, if there are any juridical gray areas.
Inge: Ja	Inge: Yes
Mr. X: Så… og så jobber jeg jo da spesielt med arbeidsulykker og det å lese igjennom politidokumenter og skrive tilordninger. Og kan jo godt si at jeg er veldig, har vært veldig aktiv, og er vel for så vidt veldig aktiv fortsatt, i nettverket med å prøve å ta opp ting, prøve å få… få… ja, få forståelse for ting, og likeledes få spredt litt informasjon i forhold til viktige, prinsipielle saker, det være seg ulykker og andre ting da. Så jeg kan vel godt si at jeg er vel kanskje, på godt og ondt, den mest aktive i… sitter… i ulykkesnettverket. Så har du selvfølgelig en leder (koordinator) som er ennå mer aktiv der, som skal være aktiv…	Mr. X: So ... and I work in particular with workplace accidents and read through police records and write assignments… And you can just as well say that I am very, has been very active, and well for that matter very active still, in the network trying to bring things up, try to get ... get ... yes, get an understanding of things, and likewise getting scattered some information in relation to important, fundamental issues, be it accidents and other things then. So I guess I could say that I am well, perhaps, for better and for worse, the most active ... sitting ... in the accident network. Then of course you have a leader (coordinator) who is even more active there, which must be active…
Inge: Så du er en uformell ledertype der, altså?	Inge: So you are an informal leader type there, then?
Mr. X: Det kan godt hende at jeg har det litt i blodet, fordi jeg har vært leder i mange år, og har pedagogisk utdannelse og vært lærer i mange år, så det kan godt være at det ligger litt inne i ryggen det der med å være aktiv.	Mr. X: It may well be that I have a bit of it in my blood, because I've been a manager for many years and have educational training and been a teacher for many years, so it may well be that there is something in my back bounds about being active
Mr. X: Så skal det jo være en arena for kreativitet, men… det er noen som driver, og så har du en gjeng som bare følger med. Men det kan være… det er ikke noe feil med personene, når det er sånn. Det kan vel kanskje være på grunn av at.. at folk er jo plassert i et nettverk, og… ja delvis plassert… og så har du det at kompetansen deres ikke	Mr. X: Then it is supposed to be an arena for creativity, but ... there are some that push forward, and you have a band that just goes with it. But it may be ... there is nothing wrong with the people, when it it's like that. It may perhaps be due to the fact that ... that the people are assigned to a network, and ... yes partially assigned…and then their

passer i forhold til å være i det nettverket	competence might not fit in terms of being in the network
Mr. X: og da vil du normalt sett ikke kunne bli en aktiv person i nettverket. Så det er klart, at har de en fagtilhørighet i forhold til nettverket, så vil de jo… så vil de spille på lag, og da vil de jo være kreative også. Det er jo sånn det er altså. Kreativitet, det kommer med interessen…	Mr. X: and then you will normally not become an active person in the network. So it is clear that if they their professional belonging in relation to the network, then they will play along, and then they will be creative too. That's the way it is. Creativity, it comes with interest…
Inge: Jeg forstår av en del andre, at det er særlig når man deltar i prosjekter at kunnskapsdeling skjer?	Inge: From some others I have understood that it is during projects knowledge sharing to takes place?
Mr. X: Ja. Ja, det er klart at det.. .siden vi er et sånt nettverk hvor du har en såpass mange personer, så er det vel også litt sånn at det alltid vil være sånn at noen er aktive, … ja, jeg vet ikke, det er mange årsaker til det. Men jeg tror det går på dette med interessen for å ha fagtilhørighet, altså så det.. det er det viktigste som kan være med på å drive et nettverk.	Mr. X: Yes. Yes, it is clear that it … since we have this kind of network where you have so many people, so it's probably also a little bit so that it will always be like that that some are active,... well, I do not know, there are many reasons for that. But I think it is about interest to a professional field, that is so... that's the main thing that can help to run a network.

Appendix C Interviews

– 21 individual and 1 group interview

2008	Interviewees	
	Inspectors	7 (includes one coordinator)
	Lawyer	2
	Taxation Officers	3 (includes one coordinator)
2009	Inspectors	7 (includes two coordinators)
	Managers (participating in the meetings)	2
	Group interview at the headquarter in Trondheim	2 managers and 3 advisers
Total		26 people

Appendix D Observations

Duration of GoToMeeting™ conference meetings were 1-2 hours

Year and month	Where	Who	Nr
November 2008	3 days, physical meeting	Regional conference region 1, and followed the stream for The Accident Network	1
November 2009	2 days, physical meeting	National conference, NLIA	2
November 2009	GoToMeeting™	Network for Occupational Hygiene	3
November 2009	GoToMeeting™	Network for Psychological well-being	4
January 2010	GoToMeeting™	Regional Conference, Region 1	5
January 2010	GoToMeeting™	Network for Psychological well-being	6
February 2010	GoToMeeting™	Network for Occupational Hygiene	7
February 2010	GoToMeeting™	Network for Psychological well-being	8
April 2010	GoToMeeting™	Network for Psychological well-being	9
May 2010	GoToMeeting™	Network for Psychological well-being	10
June 2010	GoToMeeting™	Network for Occupational Hygiene	11
August 2010	GoToMeeting™	Network for Psychological well-being	12
December 2010	2 days, physical meeting	Region conference, which includes all the networks in one region	13
January 2011	GoToMeeting™	Network for Occupational Hygiene	14
February 2011	GoToMeeting™	Network for Psychological well-being	15
March 2012	GoToMeeting™	Network for Psychological well-being	16
April 2012	GoToMeeting™	Network for Psychological well-being	17

Appendix E Sample of GT Codes

Category	Code	Network	Source
9	` *We are struggling to get new employees to understand that Inspection is a distinct subject* `	Accident	I6
7	`The most important knowledge is experience, to be sensible and to behave`	Accident	I8
3	` *It is difficult enough to get over the culture and expertise barriers. Technical error decreases quickly* the *belief* in the *medium*`	Manager	M5

I= Interview number

M= Meeting number

Appendix F 32 Categories

These categories supplement the categories presented in paper 1.

Data consist of the 18 individual interviews in NLIA and observational data

Category	Description	# of codes
1	**Identity** – Describes who they are in terms of education, job description, experience, skills and knowledge orientation	75
2	**The Network** – Describes the knowledge orientation of their network. Discuss similarities and differences among the participants within the network. Discuss barriers in terms of language and interests	55
3	**The GoToMeeting™ network meeting** – Descriptions of their network meetings. Discuss problems related to meeting management, technical problems, multi-tasking and multi- communication	38
4	**Norms for Unity in task handling** - Describes and discuss the need for unity in their discretion	22
5	**Goals-** Describes the purpose of the networks as unclear	14
6	**Using GoToMeeting to share practice**– Describes how this tool is used for sharing their work practice and knowledge. Discusses norms for authenticity	13
7	**How management influences engagement in the networks**– Describes what is measured and discusses what managers value	13
8	**Role of the network coordinator**– Describes the role of the coordinator as limited in terms of formal authority. Discusses expectations regarding the coordinators expertise	12
9	**Inspection as a distinct subject** – Describes and discusses the knowledge and skills associated with health and safety inspections	11
10	**Hearings** - Describes how they perceive hearings and how the work with them is organized in the networks of competence	11
11	**Project vs. network** – Describes how projects influence their knowledge orientation	10

12	**Useful discussions** – Describes positive experiences from the network meetings	10
13	**Project work** – Describes the different types of projects they are engaged in	9
14	**Exchange of experience** – Explains that the exchange of experiences creates mutual engagement	6
15	**Pragmatic approach** – Describes how Inspectors have to balance the legislation with reasonable and practical actions	6
16	**Too many participants** – Describes online meetings were they are unable to get to know each other and have a useful discussion, since they are too many	6
17	**Physical meeting** – Describes why they need to meet face-to-face	6
18	**Generalist or specialist** – Describe and discuss what they are and what the organization needs	6
19	**Learning in the field** – Describes learning in the field as the preferred situation	6
20	**Know – who** - Describes that Inspectors contact people they know from experience have the know-how they need	5
21	**Interdisciplinarity** - Describes interdisciplinarity as a problem for the networks	5
22	**Heterogeneity in academic orientation** – Describes and discuss that some participants do not have an academic orientation at all and are not engaged	5
23	**Importance of External Experts** – Describes the role and practice of inviting external experts to their meetings (face-to-face as well as online)	4
24	**Being a Lawyer**- Describes how it is to be a Lawyer participating in the networks	4
25	**Community** - Describes that they have developed a community in the network	3
26	**In-depth knowledge** – Describes that in depth knowledge is necessary	3
27	**Change of assignment** – Describes that only a few have been reassigned to another network	3
28	**New silos** – Describes how the networks contribute to new silos in the organization	3
29	**Desired future** – Describes that they would like more concrete tasks	3
30	**A must at face-to-face meetings** – Includes in- depth discussions, external experts and visits to an actual work	3

	place	
31	**Lack of ICT skills** – Offers an explanation to why people don`t share online	3
32	**Creativity** – Describes how knowledge interest and innovation is linked	2

Appendix G The Five individual papers

Paper	Title	Status
Paper 1 P. 163	ICT Use and Network Relations: Exploring Knowledge-sharing Networks in Distributed Organizations (Hermanrud & Sørnes, 2009)	This paper is published in the Journal of Issues in Informing Science and Information Technology after a double blind review process. Journal of Issues in Informing Science and Information Technology 2009, Volume 6, pp. 25-44.
Paper 2 P. 183	`We do not have time for Online Knowledge Sharing': Identities and their Barriers to Organizational Learning in Managed Networks of Practice in a Distributed Organization (Hermanrud & Eide, 2010)	This paper is accepted and presented at the European Conference of Knowledge Management in 2010 (ECKM) and published in the conference proceedings after a double blind review process. Proceedings of the 11th

		European Conference on Knowledge Management, page 463 - 470. Edited by Eduardo Tomè.
Paper 3 P. 193	Sharing Work Practice in the Distributed Organization (Hermanrud, 2012)	This paper is published in the Journal of Cases in Information Technology after a Quadruple blind review process. Journal of Cases on Information Technology, 14(1), 46-60, January-March 2012
Paper 4 P. 209	From Narration to a conclusion in online competence network meetings (Hermanrud, 2012)	This paper is accepted and presented at the European Conference of Knowledge Management in 2012 (ECKM) and published in the conference proceedings after a double blind review process. Proceedings of the 13th

		European Conference on Knowledge Management page 458-465. Edited by Juan Gabriel Cegarra.
Paper 5 P. 217	The transfer of knowledge and the problems of identity in a managed and online context (Hermanrud, 2012)	This paper is published in The Nordic Journal of Social Research after a double blind review process. NJSR – Nordic Journal of Social Research Vol. 3, 2012

ICT Use and Network Relations: Exploring Knowledge-sharing Networks in Distributed Organizations

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Abstract

This study of media use and knowledge sharing within distributed organizations addresses two questions: (1) How do people combine different ICTs (information and communication technologies) when they engage in a professional knowledge-sharing network? (2) How are combinations of ICTs used when people engage in frequent as opposed to infrequent relations? Existing research exploring the role of ICTs in distributed organizational settings has tended to focus on single media use and the importance of social capital. As a result, the characteristics and consequences of multiple media use have been largely ignored.

Our study reveals that people combine different ICTs all the time, but they do so relatively less often in the knowledge-sharing network, where they rely more on official channels. We also found that frequent and successful knowledge sharing correlates with each individual's willingness, and ability, to communicate their knowledge assets freely.

Keywords: ICT, professional network, knowledge sharing, multiple media use, GoToMeeting, Outlook groups.

GoToMeeting is a highly rated (*PC Magazine*, 2 July 2007) Web-based tool that allows everyone in a group meeting to share whatever is on each participant's computer. See http://www.gotomeeting.com. Outlook groups are a feature within the e-mail program of Microsoft Office Outlook. They enable e-mail discussions on a topic within a group of people. See http://office.microsoft.com/outlook.

Introduction

Distributed organizations are ones whose internal activities are geographically dispersed (see Duarte & Snyder, 2006). Increasingly, such organizations are attempting to unify their scattered units into one integrated unit via ICTs (information and communication technologies) as well as via professional networks for knowledge sharing and coordination. Indeed, ICT has become an integral part of the work processes in these organizations. It helps them collect information, process and analyze it, transfer it, and store and present it. It also helps them manage and control equipment and work processes, and

connect people, functions, and units within distributed organizations. The reflexive relationship between actors (people) and the ICTs they use is of particular interest in this paper.

Over the past two decades the field of network analysis within and outside organizational communication studies has grown substantially. But work is still needed in this field regarding theory building (Monge & Contractor, 2003), especially work focusing on organizations that tend to be more collectively oriented with respect to their organization and management (Yuan, Fulk, Shumate, Monge, Bryant, & Matsaganis, 2005). Most research in organizational communication networks has primarily drawn on theories of social capital and trust in connection with media richness and/or virtuality (Dutton, Kahin, O'Callaghan, & Wyckoff 2005; Huysman & Volker, 2004; Jarvenpaa & Leidner, 1999; Kanawattanachi & Youngjin, 2002; Zolin, Hinds, Fruchter, & Levitt, 2004). But that perspective neglects important aspects related to how networks evolve and how they are maintained via ICTs in combination or in multiple media use. While the term "combination of ICTs" refers to the notion of ICTs as a toolbox to accomplish conversations, "multiple media use" refers to the use of ICTs in the context of activities. Sequential use of ICTs, such as e-mail followed up by phone, or vice versa, is an example of planning or persuading activities (Watson, Manheim, & Belanger, 2007).

This paper offers a deeper understanding of the role that media use plays in distributed organizations, especially in networking and knowledge sharing. While a substantial amount of research on network analysis draws on structural arguments and quantitative measures (Shaw, 2006), we sought to address this topic by examining the content of formal and emergent professional networks within a distributed organization. We used an inductive research approach, collecting our data by interviewing members of professional networks in two public distributed organizations in Norway. Thus, this article, which presents the fruits of our research, focuses on public organizations—a contextual area where few studies have been conducted (Munkvold & Akselsen, 2003).

Several researchers have argued for the study of ICTs used in combination (Boczkowski & Orlikowski, 2004; Hesse, Werner & Altman, 1988; Walther & Parks, 2002) instead of the study of media choices as immediate incidents or structuration processes around media (Stephens, Sørnes, Rice, Browning, & Sætre, 2008). In our study we will focus on how ICTs are used in combination or in sequence, or in both combination and sequence, and link this perspective to (1) how these networks evolve, and (2) how they are maintained. One overarching research question prompted this study:

What is the role of ICTs in network relations in distributed organizations?

With the current body of literature on ICTs used in combination in mind we will address the following questions:

a) How do people combine different ICTs when they are engaged in a professional knowledge-sharing network?

b) How are combinations of ICTs used when people engage in frequent relations vs. infrequent relations?

These research questions explore the link between contemporary ICT-use research and research into virtual networks, and networks in distributed organizations and virtual teams in general. The context for this study is an organization that possess the following - formal structures: (1) formal traditional lines; (2) project work and teamwork; and (3) professional knowledge-sharing networks. The latter is the main focus of our own research. So, while research into networks and ICTs in organizations has mainly focused on virtual teams (see Gibson & Cohen, 2003, for an overview), we will focus on ICT use and professional networks for knowledge sharing and coordination—networks with more people and with more undefined goals and tasks (formally) than

the virtual team literature has described so far. Thus, our effort should add useful insights into the complexity of the development and maintenance of knowledge sharing and coordination relations in distributed organizations.

"Combinations of ICT use" can be categorized as multiple media use that occurs either simultaneously (multi-tasking) or sequentially (Stephens et al., 2008). "Simultaneous use" means multiple ICT use at the same time (Stephens et al., 2008), whereas "sequential ICT use" occurs when people communicate an activity or project over time. "Accumulation" provides a third dimension. It occurs when documents (on the intranet, e-mail, or paper) or records on a topic add up over time (Østerlund, 2007), becoming a source of evolving information and knowledge accessible to the individual or to the entire professional network. Since our research questions focus on combined ICT use and frequent vs. infrequent relations, in the next section we will present the theory of ICT use in the workplace and previous research on the relations relevant to our research question.

Theory

The role of theory in inductive and qualitative research has been vigorously debated. According to Glaser and Strauss (1967) and their Grounded Theory approach, prior literature review is unnecessary, but it's definitely required during the final stages of the data analysis and for delimiting the theory (Corbin & Strauss, 2008; Glaser & Straus, 1967), plus it helps the researcher develop a problem statement and remain focused on the theory-generation process. However, when developing theory inductively, it's important that researchers identify what body of knowledge they hope to contribute to. In addition, abstract classical sociological theories can increase one's ability to reflect on the inductive data in the theory-generating process (Layder, 1998). Accordingly, this study will draw on Giddens' (1984) general sociological theory, the Structuration Theory, which has been used for decades now in qualitative technology studies as a tool for reflecting on ICT use in the workplace (see Pozzebon & Pinsonneault, 2005, for an overview). Grounded Theory is a common approach for such technology studies, but often in combination with other sensitizing devices (van den Hoonard, 1997)—e.g., narratives, visual mapping, and bracketing. Our own research is aligned with this qualitative tradition.

Traditional research into ICT use has regarded each ICT as a discrete medium, meaning that research has focused on the pros and cons—the individual characteristics—of each ICT (Daft & Lengel, 1984, 1986; Daft, Lengel, & Trevino, 1987; Rice, 1993). Over the past two decades, however, the concept of "genre" has generated new insights into sequential ICT use. This body of research draws on a practice-oriented view. Yates and Orlikowski (1992) define "genre" as a typified communicative action invoked in response to a recurrent situation. Genres can have either a task-oriented purpose or a social purpose. While Orlikowski (2000) focuses on the structuration processes around a single ICT, others have focused on the combinations of ICT use (Belanger & Watson-Manheim, 2007; Munkejord, 2007; Østerlund, 2007; Stephens et al., 2008).

Network studies, meanwhile, have drawn on the pioneering work of Mark Granovetter (1973) and his notion of the strength of weak ties. "Tie strength," as he defined it, is "a combination of the amount of time, emotional intensity, the intimacy and reciprocal services which characterize the tie" (p. 1361). We aim to contribute to this research area, but our focus will be on conceptualizing the ICT-mediated tie-strengthening activities in the networking process within a formal top-down designed professional network, and especially in what has been labeled coordination by mutual adjustment (Mintzberg, 1979; Thompson, 1967) or relational coordination (Gittel, 2002).

Like us, Haythornwaite (2002) has done work on ICT and network ties and offers insights relevant to our research. She invokes Granovetter's concepts of weak and strong ties in her study of how different qualities of network relations influence ICT use, and of how new ICTs have influ-

enced the development of social networks among researchers and students. She concludes that new ICTs have created challenges for those relations that are weak, since communicators must then depend on common, organizationally established means of communication and protocols established by others. But, she says, any new ICT (both formal and informal) will create new opportunities for making new and stronger ties. In other words, she has articulated the connection between ICT and the development and maintenance of network relations.

The literature on sequential ICT use is pertinent to us, as such use occurs when people communicate during any group activity or project. Researchers have examined the sequencing of message content (Falbe & Yukle, 1992) and decision-making strategies (Pool, 1983; Saunders & Jones, 1990), and also the role of ICT sequences where connecting with others and synchronicity are the underlying attributes (Stephens et al., 2008). The latest work within this research area has developed theories about how people use ICTs in combination (Watson-Manheim & Belanger, 2007), in sequence (Stephens et al., 2008), and accumulation (Østerlund, 2007), adding more insights into the structuration processes in organizations regarding media use in practice in the workplace —that is, working on tasks and in relations. Thus, the study of sequences and accumulation adds to the insights into structuration processes around ICT use in combination—and also enhances our understanding of the complexity of ICT media user, because it sheds new light on how different work conditions influence multiple ICT use.

Since our research questions are explorative, the next section will discuss the qualitative methodology we chose for this study.

Methodology

Grounded Theory (GT) provided our methodological approach here, primarily due to its ability to facilitate and offer explanations and descriptions of complex organizational practice (Sørnes, 2004). Within ICT research, GT has become increasingly popular during the last 10–15 years (e.g., Carlson & Davis, 1998; Orlikowski, 1993). But GT has actually been popular in organizational studies for the last 30 years (Locke, 2001). According to Locke, GT has proved especially useful to researchers investigating organizational topics like decision-making, networks, socialization, and change. In organizational studies in particular, the focus is on group and individual behavior, and this focus captures the initial locus and interactionist tradition of GT (Fardal & Sørnes, 2008; Glaser, 1992; Locke, 2001). This, combined with its analytical and structural properties, helps explain its popularity in organizational research. It also helps us grasp how people structure the way they communicate with each other, which offers useful insights into understanding communication processes and networking.

Research Domain and Participants

Our current study is part of a larger study of distributed organizations in Norway and their professional networks for knowledge sharing and coordination. For our present research domain, we targeted two groups: inspectors at The Norwegian Labor Inspection Authority and taxation officers at The Norwegian Taxation Authority. We targeted them for three reasons. First, both groups of people face complex tasks during the course of inspecting many different organizations. Their mission is to help solve problems ranging from all types of accidents (due to falls, chemicals, misuse of tools, etc.), matters of social and psychological well-being, the prevention of back problems, and so on. Their duties involve inspecting work locations in nearly all sectors of work life within their geographically defined area. It is fair to say, then, that their tasks are very complex and constantly changing. Second, they are distributed both nationally and regionally, with inspectors throughout the country, all of them operating with high autonomy. This is of special interest, because when tasks are complex, uncertainty increases, so more interaction and communication are typically needed (Gittel, 2002). Third, they use ICTs, and have done so for a long

time, to ensure the transfer of knowledge and to coordinate and systematize inspections all over the country, which are intended by law to be "equal."

The locus of our study is the Accident Network (The Norwegian Labor Inspection Authority) in the Northern Norway Region and the Fishery Network (The Norwegian Taxation Authority) in Norway. Members of these networks are regarded as advanced users of ICTs, possibly due to their long success with ICT use, which itself may be due, indirectly, to the daunting size of the region and country.

Sampling Procedure

This study employed the theoretical sampling procedures developed by Strauss and Corbin (1990, 1994) for conducting qualitative analysis. Our chosen respondents have been with their organization for one to 20 years, and all use ICTs to communicate during their workday. We sought data from multiple members of the networks, figuring they could give us different insights into our topic. Newcomers were of special interest to us because presumably they could give us fresh insights into ICT use and networking. More tenured workers, on the other hand, would presumably depend more on previous contacts and the way knowledge sharing and coordination had been conducted before ICTs came on the scene. In this way we hoped to understand the entire evolving picture, not just what is labelled as successful at the outset.

We also emphasized interviewing persons having leadership roles in the networks, not just the rank-and-file members. Our sampling technique mixed wide and narrow sampling (Cutcliffe, 2000). Our sample consisted of participants with plenty of knowledge within a given area, which is characteristic of a narrow sample (Sørnes, 2004). Proponents of this technique argue that one cannot remark on the investigated processes if one doesn't share similar experiences. Conversely, in a wide sample, the respondents might have varied experiences and skills. Such a sampling technique argues for maximum variety in the data (Resnik & Moran, 2002). In this study we employed both techniques to ensure participation from different organizations (wide), but also participants sharing a certain experience related to ICT use (narrow). This sampling technique, of choosing respondents for their similarities as well as for their differences, follows the one recommended by Glaser and Strauss (1967) and Sørnes (2004).

Data Collection

Prior to the data collection, our first author conducted preliminary conversations, from May to September 2008, with the groups' four national and regional managers and also with the four coordinators of knowledge-sharing networks in their respective organizations. The idea was to get a quick first impression of their activities and ICT use. The Fishery Network and the Accident Network were then selected, because for more than four years both networks have been leaders in ICT use and have experienced notable success with it, according to managers in the headquarters of the organization.

Data was collected using semi-structured in-depth interviews, a method that allows for adaptation to each context and individual. The field was not entered with a blank slate— that is, without prior knowledge and preconceptions related to the area under investigation. The semi-structured interviews allowed us to seek a balance between necessary topics and respondents' initiatives; it also provided us with appropriate data and a manageable direction (Strauss & Corbin, 1990). Our research project followed Spradley's (1979) "grand tour guide," with data collection taking place over a period of five months (November 2008 to March 2009). Imitating Spradley's method, our own approach encouraged the interviewees to tell their story—about knowledge sharing, ICT use, and processes in their organizations. Furthermore, the interviewees were well briefed as to our study's aim, and were also given ample time to adjust to the situation. Our first few questions

served as warm-ups so as to make the interviewees comfortable with the interview setting. A total of 13 interviews were conducted with bureaucrats and coordinators in both organizations. Each one lasted 40–95 minutes and was audio-recorded for accuracy and further analysis. Even when some of the interviews lasted up to 95 minutes, we found that the informants remained focused and elaborative.

Due to the long travel distances, 8 of the 12 interviews were conducted by telephone. Although phone interviews are thought a second-best option for obtaining data where social cues are important (Opdenakker, 2006), our phone interviews proved as elaborative as the ones we conducted face to face. One reason for this may have been the informants' familiarity with presenting and elaborating complex matters via the phone, as we will uncover in the data analysis that follows.

Data Analysis

In our study, we used QSR Nvivo 8, a popular tool for organizing qualitative data, and then subjected our data to a Grounded-Theory analysis (Glaser & Strauss, 1967). Following each interview, we read a transcript of it to deepen our understanding of the work conditions, ICT use, and relations. Equally helpful, we also consulted the notes we had taken at initial talks, in between interviews, and at observations of both FTF meetings and virtual meetings.

Then we followed the common steps of Grounded Theory. First, we identified those sentences and paragraphs known as "incidents" in our open coding. This initial process of labeling, conducted in NVivo 8, simplified our synthesizing of the many interviews and provided us insights into our own research questions (see Table 1). The second step, axial coding, involved our combining and collapsing categories. Several times incidents were moved from one category to another. We conducted this process in various ways—in NVivo 8, on paper, on a whiteboard, and in discussions with colleagues. Further on, when the Grounded Theory emerged, we initiated a focused coding (Glaser, 1978) by sorting the incidents into 4 categories and 13 subcategories (Table 2). We then discussed these final categories with representatives of both organizations in the study.

Table 1: Total category listing

1. Telephone meetings	18. Storing
2. Distance in the network	19. Learning with Outlook
3. Experience	20. Management
4. Improvements	21. Equal handling of similar matters
5. GoToMeeting web 2.0 tool	22. Location
6. Input to the network	23. Learning in the field
7. Frequent relations	24. Learning in the network
8. Good old days	25. Learning in projects
9. Intranet	26. Learning with documents
10. Connect people with e-mail	27. Learning with pictures (visualization)
11. Combinations of ICT use	28. Learning via ICT
12. Communication channels in general	29. Mistakes
13. Knowledge	30. Goal
14. The network arena	31. Resources
15. Environment	32. Top-down steering
16. Transfer of knowledge	33. ICT used in sequence
17. Social aspects	34. Combination telephone and e-mail

These categories were further reduced to thirteen and then to four core categories elaborated in our model on context factors for what is going on in the knowledge sharing network (see Figure 1).

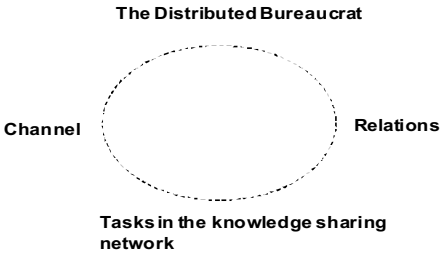

Figure 1. Model on Context Factors

Using Structuration Theory as a Theoretical Framework

To develop theories out of our empirical findings, we use Structuration Theory (Giddens, 1979, 1984), which helped us grasp how relations are handled through the use of old and new ICTs within a knowledge-sharing network. Structuration theory, as a metatheory, provides a way to deepen one's understanding of a given phenomenon (Orlikowski, 1999). In our case, it encouraged us to avoid clear dichotomies like rich vs. poor media channels, strong vs. weak ties, or know-how vs. know-who, and encouraged us instead to look for the intervening relations between them, such as how reduced cues of a medium were compensated by the development of genres within a given medium or by combinations. Likewise, how weak ties could influence strong ties, and how know-how could influence the importance of whom to ask for further information (know-who).

Structuration Theory has been applied for myriad purposes in organizational communication (see Browning et al., 2005, for an overview). A network in this perspective is often on optional pathway for communication and knowledge sharing which an actor can choose to use or not to use (Bø & Schiefloe, 2007). While ICT researchers using Structuration Theory solve the problem with structural determinism by focusing on appropriation (Poole & DeSantics, 1990) or practice (Orlikowski, 2000), network researchers focus on the personal relations (Wellman, 1996). Social structures such as appropriate media use, existing work processes, and existing relations make social action possible, and at the same time social action creates those very structures.

Using Structuration Theory as a metatheoretical framework helps one to grasp the contextual and emergent structure of relations in the professional network one studies. Based on what we have elaborated until now, Structuration Theory creates awareness of:

1) The role of applying structures embedded in the organization, such as existing communication channels, personal relations, organizational culture, professional norms, and knowledge. Since the two organizations we selected are "old" and staffed by professionals, several structures may or may not come into play. Since many of our informants have worked in their organization for as much as 20 years, represent different professions, and refer to them frequently, we regard data on these structures to be present in our findings.

2) The fact that new formal entities, like a distributed professional formal-knowledge network, are open-ended regarding ICT use, development of personal relations, and content

of the communication. The role of this entity will be subjected to an unwrapping process (Røvik, 2007), where the roles of the work in the traditional line or projects may also come more or less into play. "Unwrapping" means that when the bureaucrats start to work within the knowledge-sharing network, their adaptation to this new way of working will be influenced by how similar tasks have been conducted before. From our informants we often found that they would compare how they typically communicate and relate to others in their daily routines or other projects with what occurs in their knowledge-sharing network. Since GoToMeeting and Outlook groups are also the respective official channels and regularly used, we have data where the unwrapping processes of ICT-mediated and distributed knowledge sharing are occurring.

3) The fact that people give meaning and add value to relations and ICT use within the knowledge-sharing network. The experience regarding what is happening now is often mentioned by our informants and how they try to promote it or solve problems. In other words, we regard data on emergent structure to be present in our findings.

The Theoretical Context Factor Model Presented

Our model presents relations between major nodes, including categories within and across nodes. They are interdependent and mutually causal. Any single category, even with few incidents, may influence other categories and nodes. The 4 categories uncovered in our Grounded-Theory analysis represent a synthesis of 13 categories, themselves a synthesis of our initial 34 categories (Table 1). They represent the different nodes on our model for knowledge sharing in distributed organizations. With our research questions in mind, 4 nodes and 13 subcategories emerged from our data affecting media use and relations in the knowledge-sharing network within the distributed organization.

Table 2: Content of Context Factor Presented

Total number of incidents: 226

The distributed bureaucrat (44 incidents)

Independent work (15)

Describes work conditions as individual task handling and independent decision making at small district offices and home offices. For example, describes the inspection situation or taxation-handling processes. Describes also dilemmas regarding helping businesses and equal handling of similar matters.

Learning two by two (24)

Describes inspectors working in pairs, communicating with a colleague in the region, or communicating with an expert at national level.

Experience as core asset (5)

Describes how experienced inspectors or taxation officers work with their environment—e.g., collaborating with businesses, branch organizations, or the police after an accident.

Relations (48 incidents)

Frequent relations in the network (12)

Presents people who are in frequent touch within the knowledge-sharing network, such as people with similar tasks, who have been called before, working on a joint project or campaign and/or with useful knowledge.

Infrequent relations in the network (7)

Discusses people whom they don't contact and why—perhaps because they're too busy, too old, or too inexperienced.

Engaging activities (15)

Describes and discusses activities involving people in the knowledge-sharing network, by using e-mail, FTF meetings, involving them in projects and seminars, asking formally for resources (of person's time), and keeping in contact with former members of the network.

Communication Channels (56 incidents)

The use of discrete media (10)

Describes and discusses the use of a single medium, such as e-mail or the phone.

The use of ICT in combination (19)

Describes and discusses the use of ICTs in combination. Most frequently mentioned is the combination of phone and e-mail.

Fixed ICT for the knowledge-sharing network (20)

Describes and discusses the use of GoToMeeting tool (Accident network) or Outlook groups (Fishery Network).

Intranet and databases (7)

Describes and discusses the use of the intranet and databases. Also discusses problems with search engines.

Tasks in the knowledge-sharing network (78 incidents)

Top-down meeting bottom-up (31)

Describes the role of the network in the organization. Like knowledge sharing and development, answers formal top-down questions and giving input into organizational policy. Discusses conflict between initiating own policy vs. implementing top-down policy. Formal documents are also added here as data.

Learning activities in the network (30)

Describes the learning processes regarding change of routines, case handling, storing data, and branch knowledge. Includes the combination of knowledge of legislation and branch knowledge in use.

Desired future (17)

Discusses how the knowledge-sharing network should have been conducted, such as better management of meetings, more concrete projects, and more resources (time). Also discusses dilemmas regarding too many participants in the network vs. the fact that many case handlers aren't members or aren't participating in the network.

The distributed bureaucrat

Our first category, "The distributed bureaucrat," comprises 44 incidents. Under this category, the various subcategories are elaborated under the rubrics "Experience," "Good old days," "Knowledge," "Location," "Learning in the field," and "Resources" (Table 1). The interviews coded within this category elaborate on the work conditions facing the distributed bureaucrat. Briefly,

those conditions include distributed independent work-task handling that is often conducted alone; facing dilemmas regarding case handling, such as combining juridical assessment, professional knowledge, local knowledge, and/or changing branch knowledge; and ensuring equal handling of the same or similar matters nationwide.

Older inspectors within the National Labor Inspection Authority told us that, in earlier years, they had worked alone in their district. Eventually, district offices were set up in areas to which at least 5-6 people could commute. While case handlers at the Norwegian Taxation Authority work mainly from distributed Taxation Offices, the inspectors in The National Labor Inspection Authority often work several days a week from their home office. The first author also experienced an effect of this phenomenon while observing a virtual meeting (GoToMeeting Web 2.0 tool) in the Accident Network. That day, too many people were working from home, making it impossible for everyone to join the meeting. Its organizer had expected several people to be participating directly from the district offices and so hadn't ordered enough lines for the meeting. This experience illustrates the independent and solitary actions of the inspectors. On the other hand, even though many are working from home, the organizer, a manager who had worked in the organization for only a few months, assumed that the staff (or at least some staff) commute to, and work from, the district offices every day. This obviously wasn't true that day, so the meeting had to be postponed for a month.

The nodes labeled "Experience," "Knowledge," and "Learning in the field" (Table 1) elaborate on formal knowledge (of the law, accounting, engineering), the help of mentors and colleagues in conducting inspections, the sharing of knowledge of local conditions, branch knowledge, and the experience of collaboration with other authorities. They also address how best to conduct case-handling processes within the mother organization and in collaboration with businesses and other authorities. While inspectors sometimes work in pairs when conducting inspections, taxation officers handle cases alone, relying on reported figures and written documents regarding each case, as well as on branch knowledge, taxation legislation, and branch legislation. Both inspectors and taxation officers collect and make their own case-handling decisions, doing so as correctly as possible according to legislation and the precedent of similar cases, and also sometimes after conferring with colleagues.

Since both inspectors and taxation officers collect the facts and make their own case-handling decisions, direct relational coordination isn't needed for each case. Coordination efforts tend to emerge, though, whenever businesses (users), colleagues, or the mass media point out unequal handling of similar cases. Then the inspectors and taxation officers communicate about it a lot on e-mail. If necessary, further discussions will take place face to face on how to address the problem, which might involve creating policy, fresh guidelines, or a new routine.

Equitable case handling is challenging for both inspectors and taxation officers alike. Sometimes it's hard owing to different interpretations of legislation or whatever context information is at hand (local knowledge, branch knowledge, the type of business, technical questions, etc.). For the inspectors it's also hard to apply all the formal rules and instructions and, at same time, conduct inspections that are helpful for the business. The inspectors' role, one must understand, is to promote improvements in the organization, not control it. The following comment by an inspector illustrates this well:

> *This discipline—inspections, the whole process—is very similar to a sales process. Once upon a time we made a questionnaire—one of the best in Norway regarding chemistry. We were asked to use it—ask question number one first and so on (of course with a presentation first)—but nobody had followed up the new legislation. Therefore we had to ask them what they are doing now to take care of the working conditions. Then the commu-*

> *nication picks up … You can't ask the first question regarding if they have evaluated risk in their business because then they get defensive and ashamed.*

The category "Resources" (Table 1) elaborates on the lack of time for knowledge sharing. The distributed bureaucrat has to conduct as many inspections as possible in an area or as many taxations as possible within a year—and sometimes contribute to projects, too. Resources (time) for knowledge sharing are limited for the distributed bureaucrat. Members of the knowledge-sharing network have earmarked some time (around 10% in the National Labor Authority), but very often these people are busily engaged in many activities, so the real time spent can vary. The category "Good old days" (Table 1) represents the view of the older men in the Accident Network who look back to an era when they could call on experts in Oslo and ask them about legislation and specifications regarding technical issues and equipment. But now, after reorganization, each region is supposed to have this expertise covered locally.

Relations

The second category, "Relations," comprises 48 incidents. Under the category "Relations," the following subcategories are elaborated: "Frequent relations," "Learning with documents," "Learning in projects," "Connect people with e-mail," "Distance in the network," and "Transfer of knowledge" (Table 1). The interviews here elaborate on relations defined by the tasks that the bureaucrats must handle. People relate to each other on the basis of what they perceive others can and are willing to contribute to their work—that is, to their handling of inspections or taxations. The category "distance in the network" (Table 1) presents variables that reduce the probability of strong ties. These include a lack of engagement, age difference, different professions (making communication more difficult), and same profession (same knowledge).

In the interviews, knowledge is described as an important factor for keeping people in touch. The distributed bureaucrat is driven by his need for advice as to the proper process to use, and what facts are needed, to handle a given case properly. This tie, the knowledge tie, is what keeps some people in frequent contact, and others in more infrequent contact.

In our data, informants who were formal members of a knowledge-sharing network elaborated on "Frequent relations," "Learning with documents," "Learning in projects," "Connect people with e-mail," and "Transfer of knowledge" (Table 1). According to them a knowledge tie can be defined by these factors:

1) People handling similar cases.
2) People who have or have had a formal role in the knowledge-sharing network.
3) People who've participated in joint projects, seminars, or campaigns.
4) People who are engaged in the core group of the formal knowledge-sharing network.

If you're handling similar cases, you're interested in exchanging information about them for several reasons. You seek information about which facts are needed to process your case and what solution or outcome is possible for it. You look for help from your colleagues, hoping to locate them in databases. Since these databases are often not as user-friendly as you'd like, you exchange case numbers (so you can find them yourself) or whole documents that may be similar to the case others are working on. People who have participated in the knowledge-sharing network previously are also regarded as an asset. Projects, seminars, or campaigns are also bonding activities, and are used deliberately to involve and engage people.

"On-and-off relations" crop up often in our interviews. People will from time to time be engaged in the same projects and campaigns. In each of the knowledge-sharing networks we studied, there existed a core group. One inspector explained: "*Yes, we are three to four people who are more*

active than the others. This means that I participate at most of the meetings and contribute with questions and solutions to the coordinator."

While knowledge is the most frequently mentioned tie factor, social aspects get mentioned four times—for example, the sorrow felt when people leave the network after a reorganization, the fun of seeing colleagues at physical meetings, and the effort some people make to remember each other's birthdays. One also talked about being a mentor for another over a distance: "*Then I learned that there is no impossibility to meet each other without seeing each other. With technology in our ear [a phone] ... and my legs on the table ... the conversation further develops the social and the fact that we are helping each other*."

The category "Mistakes" (Table 1) elaborates the need to know colleagues well enough to discuss and learn from their personal mistakes. During the early period of the "Fishery Network" they could do this, but today, due to reorganization and an influx of new people, this isn't possible, at least yet. Under the category of distance, the category "Frequent and infrequent relations" (Table 1) is further elaborated upon. Experienced people tend not to contact others. Said one network member: "*Do you cope with the job by yourself? Then you don't contact other people. Some are in touch more often ... due to that it isn't their profession*." Others noted that their older and more experienced colleagues are less interested in contributing, because they don't get as much out of the knowledge-sharing network.

"Other networks" (Table 1) are important for the lawyers, their own network "lawyers' forum," and other lawyers in general in both organizations. Inspectors and taxations officers often mention people they have contacted before, including people at the national level or county level, and other groupings like "The minding group," and the Chemistry Network, people with the relevant knowledge to accomplish their tasks.

The important insights into relations here add up to the individualistic nature of the distributed bureaucrat elaborated in our category by that same name. While ICTs reduce distance and contribute to knowledge-sharing relations for some, the exchange relations of knowledge are often related to case handing. Bureaucrats already possessing the necessary knowledge don't see the benefit of contributing to the knowledge-sharing network, since they don't get anything personally useful for case handling out of it. This category also underlines the importance of the perceived knowledge of colleagues, relevant to one's own case handling, for developing knowledge-sharing relations.

Channels

The third category, "Communication Channels," comprises 56 incidents. The interviews within this category elaborate on several communication channels more or less defined by the tasks that the bureaucrat has to handle linked to his or her work and to the work in the knowledge-sharing network.

Under the category "Communication Channels" we have the following subcategories: "Media use in combination," "Telephone and e-mail," and "Telephone meetings" (Table 1). Here, the multiple uses of media are elaborated. The communication channels mentioned are GotoMeeting, e-mail, telephone, face to face (FTF), archives, and intranet. While Go-to- Meeting is the main channel in The Accident Network, phone meetings, FTF and Outlook groups are the dominant channels within the Fishery Network.

Individual giving and receiving preferences for media use. Telephone plus e-mail is the combination used in both organizations in their ongoing task handling. Often they'll e-mail a document and then pick up the phone to discuss it. People in both organizations use both mediums all the time. Phones are regarded as suitable when documentation isn't needed and when there is a sense of urgency, or if the question requires more elaboration and discussion. Those who have

worked in the organization for several decades say that the phone is used less these days due to e-mail. If the distributed bureaucrat has time to wait for an answer, then e-mail is regarded as the proper communication channel, because people are often very busy and require a convenient opportunity to respond. This leads us to another interesting finding. People sometimes like to be asked a question via one channel and then answer it via another channel. One respondent put it this way:

> *"The fastest [method] for me is to explain at the office [i.e., FtF or via the phone]. Then you can ask control questions as well. E-mail takes more time [because it involves writing]. In writing is a large process, but it is hard for people to recall all the details [which is why they prefer e-mail]… [for their convenience] I ask them to take notes …*"

Others, on the other hand, say that they prefer to ask questions via e-mail, where they can attach relevant documents and refer to them. This adds an insight into the communication process in general. While classical communication theory focuses on communication problems due to coding and decoding errors of the messages, here the sender decides the channel, for his own convenience, and so the receivers must ensure that their response to the communication is made even if this is a less suitable channel for them. In this case, the sender helps the receiver in this process. While one lawyer helps the receiver to take notes, others use attachments to place the question at issue in context. These actions are used to fulfill the purpose of the communication and to communicate efficiently, to help each other to get it correct the first time or to contextualize the question.

GoToMeeting as a fixed combination. GoToMeeting is a Web-based conference tool that allows a whole group to communicate via phone and screen (to present documents) collectively, simultaneously. "Same-time chat" is used to bring up questions while somebody else is talking; it's similar to raising your hand at a FTF meeting. GoToMeeting is a fixed combination of voice and screen, so to speak. The tool opens up everyone's PC for sharing documents, PowerPoint presentations, archives, or whatever else needs accessing and discussion.

The category GoToMeeting elaborates on how this tool is used in the knowledge-sharing network. One Inspector tells us what is going on:

> *Most of it [communication] is by GoToMeeting … We discuss the assessment of accidents … when we are at the site, afterwards, and when we get police cases, and so forth …. And we can have a GoToMeeting meeting and correct a routine …*

Another Inspector could not be happier with the tool:

> *… in my view, this tool is the same as a FTF meeting … except to look each other in the eyes … when we have met before we didn't need the Id which covers a part of the screen … a good loudspeaker on the phone … nothing hot and irritating … is also very important. It is better than face to face (FTF) because at an FTF meeting you can't that easily present documents and pictures.*

But are they listening? Within this category there are also several critical voices. One Inspector elaborates on this:

> *The problem is that we don't know what people are really doing. Somebody sits maybe by a private telephone while sitting in a conference [GoToMeeting], they have turned off the mic, there is an incoming phonecall and they pick it up. So … there are so many factors influencing on our GoToMeeting meetings … but at a FTF meeting [we are more focused*].

Another Inspector elaborates on this from another point of view:

> *"I do not at all think that this is working. Suddenly we get a direct question, then we think, wow, do they know that we are here?"*

These quotations represent two different stories. While the GoToMeeting tool offers a fixed platform for the combination of several ICT mediums—phone, PowerPoint, archive, and databases, which are very useful for learning purposes—multitasking is also taking place. When people are connected but doing other things, such as answering other phone calls, they don't feel that they are "seen." This in turn reduces the feeling of being there together for a joint purpose.

"Outlook" groups. While the Accident Network has GoToMeeting as their main channel, the Fishery Network uses Outlook groups. In the Fishery Network, when somebody has a general question or has to produce a policy declaration, they'll send the question by e-mail to the whole group for further discussion. If it proves difficult to reach a conclusion via e-mail, the discussion is moved onto the phone or an FTF meeting. This is an example of groups using media in sequence at the group level to solve a question.

But when will they answer? One problem often mentioned is the asynchronicity of participation in the discussions. People will often not join in the discussion until the eleventh hour, so to speak. Discussions tend to fall into several phases, with some people contributing their thoughts early on and others waiting until near the end to chime in. Then it can be hard to end the discussion, for new points of view need to be debated.

Often e-mail discussions can seem endless, too. A man in the Fishery Network comments on this:

> *It can take many rounds; to me it can be difficult to follow it up. Somebody else took my role ... the emails can go ten times around. (I do not exaggerate.)*

While the problem in the Accident Network is to keep the network members' attention at the GoToMeeting meetings, the problem with Outlook discussions is that they can seem interminable. In both organizations they have the same solution for the two different challenges. In the Fishery Network often 3 or 4 people have an initial discussion either by phone or by e-mail, or in combination, and they present their consensus view to the rest of the group for further elaboration. In other words, group size is here regarded as the core of the problem, even though both the medium in use and the organizational context are different. Another combination is the combination of FTF and access, and sharing of documents. Every year the Fishery Network meets by FTF and works together on their computers, sharing screens, and with access to all databases and archives.

Tasks in the knowledge-sharing network

Under the category "Tasks in the knowledge-sharing network" we have the following subcategories: "The network arena," "Learning with Outlook", "Equal handling of similar matters," "Learning in the network," "Learning with pictures," "Mistakes," and "Top-down steering."

In both networks there are many similarities, such as similar agendas for knowledge sharing. These agendas might include discussing concrete examples of inspections or cases, focusing on equal handling of similar matters, answering top-down questions and hearings, creating guidelines, and inputting to the policy of the organization as a whole. But while cases are presented and experiences are shared, it can be difficult to share. One Inspector complained:

> *There is not always any point to address the question. We are too rigid in our case handling. The legislation is there. We can have our view about the interpretation of the legislation ... It can be difficult to address the question.*

In this context of top-down initiated tasks and people who hesitate to address questions that might illuminate the gap between saying and doing, the knowledge-sharing network turns out to be more a tool for top-down steering than for knowledge sharing in the organization.

People often commented on how the knowledge-sharing network should have been conducted, mentioning such things as better management of meetings, more concrete projects to discuss, and more resources (e.g., time). They also mentioned problems arising from having too many participants in the network, plus other problems arising from the fact that many case handlers either aren't members or aren't participating in the network. These topics were addressed in both networks.

Discussion

The first research question raised here is, "How do people combine different ICTs when they engage in a professional knowledge-sharing network?"

Our research has found that distributed bureaucrats use different combinations daily for particular purposes. They'll use the phone to convey urgent messages, to discuss case handling, and to engage people. They'll often use e-mail to confirm or sum up what has been agreed upon. (This is an example of sequencing of message content related to media choice.) While the combinations in the Accident Network were a fixed combination in itself, involving phone and screen sharing and a platform for further combination, the Fishery Network used e-mail and Outlook groups as platforms for their knowledge-sharing network.

The GoToMeeting tool seems to serve several purposes and deepens our understanding both of this ICT and of combinations in knowledge sharing in general. Its purposes include the following:

1) To gather the whole distributed network at the same time, on phone and on screen.

While the Accident Network has these features built into the tool, the participants within the Fishery Network have created similar work conditions by meeting face to face in Oslo and bringing along their own PCs, which lets them jointly access all the same documents, databases, and archives during a meeting.

2) To discuss topics ranging from equal handling for similar matters to responding to top-down hearings.

In both networks these are the main points of the knowledge-sharing network besides knowledge sharing in itself. While these discussions were conducted on the GoToMeeting tool in the Accident Network, the Fishery Network conducted them at FTF meetings or in Outlook groups.

3) Learning from case-handling processes: Present the whole case-handling process, visualized with pictures of accident sites and communication that had taken place (access to formal letters, questions, and answers) with various actors in process (e.g., the business where the accident took place, the police and various others who were involved, etc.).

4) ICT learning: To help or guide each other—to show where to find similar cases in the archives or databases, etc.

In the Accident Network this is achieved by showing others how to access different sources, using the GoToMeeting tool. In the Fishery Network, they relied on an old and often informal activity—the exchange of case numbers by e-mail or e-mail attachments. Within the knowledge-sharing network, Outlook groups were set up to store relevant fishery-handling cases. Outlook group discussions in this study provide insight into combinations labeled "accumulation" (Østerlund 2007), because the purpose of the activities in the media includes both discussion and storing of arguments and also what has been agreed upon. These e-mails are also sometimes used further when the discussions within them prove relevant to categories of cases.

While the GoToMeeting tool affords several options, success is not yet achieved. A reason for this is that there are no incentives to store the information gathered. The Intranet is rarely used, and the Accident Network doesn't have any intranet for the network. Everything is dependent on dispersed written materials and on members' ability to recall. One explanation is that since everyone has to document stuff all the time, any new documenting tasks would contribute to overload.

The second research question addressed here is, "How are combinations of ICTs used when people engage in frequent relations compared with the infrequent relations?"

In the knowledge-sharing network, each person's knowledge assets are seen as the main motivation for engaging in frequent relations. Haythornwaite (2002) concludes that new media have created challenges for those relations that are weak, due to the dependence of an organizationally established means of communication and protocols established by others. Our research adds to this insight by addressing contextual factors reducing the GoToMeeting tool's ability to help network participants gain an understanding of each individual's knowledge assets. These factors include:

a) Independent work conditions, two-by-two learning tradition, and experience (sticky and tacit knowledge) as the core competence.

b) Infrequent relations in the network. Some people don't communicate other than at a formal meeting. Even there, they are often silent, and a meeting may lack engaging activities (e.g., joint project work). So their knowledge assets prove difficult for others to measure or learn from; at the same time, they may also have difficulty grasping the knowledge of others. The emergent "multi-tasking" that characterizes a typical GoToMeeting meeting can add to a vicious circle of reduced engagement in the network.

c) Activities and people in the network often seem irrelevant to the ongoing task handling confronting each bureaucrat.

On the other hand, involving people in ongoing work is a prime way to increase their engagement. When participating in a project or planning a seminar, various ICTs might be used, such as phone calls, phone meetings, e-mails, GoToMeeting, and ties to former members of the knowledge-sharing network, and a sense of engagement is maintained by such activities. While Gittel (2002) argues that complex tasks encourage networking activities and relational coordination, we found the very opposite to be true here, a result of participants' rigidity or desire for autonomy and their wish to avoid addressing certain questions, and also a result of individual bureaucrats preferring to solve their own problems independently. On the other hand, joint tasks such as projects contribute to networking within the network, and such strategies are used to involve everyone who is present.

Conclusion

To combine ICTs—for example, to be able to talk, read and write at the same time—is important for knowledge sharing in the public organizations we studied. The ability to combine ICTs may be built into the actual tools used (e.g., GoToMeeting), or accomplished by face to face meetings, or be as simple as when two or more people pick up the phone and read and correct the same document at the same time.

In a knowledge-sharing network, frequent and infrequent relations are relevant to the know-who aspect. Frequent relations are defined here as relations with more contact than the formal meetings. In a distributed knowledge-sharing network, each member's knowledge has to be communicated freely for true knowledge sharing. Due to several factors, including consequences of multitasking, this does not work in the Accident Network. Our research shows that group size is per-

ceived as the real core of the problem, even though the medium in use is different and the organizational context is different. While ICTs reduce the distance and, for some people, contribute to knowledge-sharing relations, the exchange relations of knowledge are often related to case handling. Bureaucrats with the necessary knowledge often don't see the benefit of contributing to the knowledge-sharing network, since they don't get out of it anything personally useful for case handling. This also underlines the importance of the perceived knowledge of colleagues, relevant for one's own case handling, for developing knowledge-sharing relations. So all of this calls for not one single medium or a fixed platform of combinations, but for joint tasks and engagement where several ICTs are in use. It is primarily in project work or in task handling that people get to know each other and learn from each other.

Prior research has found that the success of knowledge-sharing networks depends on having good management, a narrow topic, few participants, more pay-back than contribution, an updated intranet, new topics, and reasonably regular face to face meetings (Lave and Wenger, 1991; Ulven et al., 2008). Our research would add to this list the following essentials: the ability of participants to write, read, and talk at the same time; the ability (and desire) of each participant to communicate his or her knowledge freely to the group; and somehow getting present and former members involved in an ongoing project so as to create a feeling of togetherness.

New research on knowledge sharing, in a media use perspective, should further investigate how sequential and parallel use of multiple media influences people's ability and willingness to share knowledge, considering different preferences by senders and receivers. Testable propositions on media use and relations we suggest: 1) As the relations are frequent, several combinations of ICT are used for knowledge sharing, 2) As the relation is "on and off", the perception of the other`s knowledge assets are more dependent on the media used conducting joint tasks.

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‘We do not have time for Online Knowledge Sharing’: Identities and their Barriers to Organizational Learning in Managed Networks of Practice in a Distributed Organization

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Abstract

In this study, using social identity as a point of departure, we explore barriers to knowledge integration and organizational learning in (through) top-down-initiated managed networks of practice (MNoP). This article examines knowledge sharing and integration in two different settings – online and face-to-face (f2f) discussions – and in particular how these settings structure the knowledge processes, with consequences for the cultivation of networks of practice (NoP). Our empirical context is a distributed public organization in Norway. We find a complex context where barriers are related to lack of engagement, conflicting learning modes and identities related to different knowledge types. First, the identity of being a ‘productive worker’ creates barriers to organizational learning in the online setting, since the online meetings interrupt task handling, which is measured and rewarded by management. Second, three ideal types of work-role identities (professional, regulator and inspector) are observed among the employees, which originate from and structure different learning modes. Inspectors are experience-based learners who prefer to work (f2f) in pairs and learn from each other in work contexts. Professionals look for opportunities to reflect on and discuss their practice either face to face or online. Regulators are rule-based learners who prefer to wait for ‘somebody at the top’ or ‘the court’ to tell them what the proper interpretation of the law is. Three, the study reveals the dominance of two main types of knowledge, i.e. more natural science and positivistic based versus more social science and interpretive based. These knowledge cultures structure different learning opportunities and barriers; the former fits better with online tools. The potential of MNoP and online contexts seems greater than has been obtained so far; however, it also seems clear that the potential and barriers vary and depend upon both identity and knowledge cultures.

Key words: Identities, public organization, barriers, online context, GoToMeeting.

1. Introduction

Participation in and identification with a community are seen as essential to understanding work-based learning (Gherardi et al, 1998). Others argue that scholars have failed to address the critical meaning of situated learning in the more heterogeneous work contexts regarding relations and geography (Amin & Roberts, 2008; Macpherson & Clark, 2009).

While a lot of research has been carried out on how private dispersed businesses are integrating knowledge to ensure increased value creation (Foss & Pedersen, 2004), we have studied a dispersed public organization that needs to integrate dispersed knowledge to ensure professional and ‘equal’ task handling all over the country. Theory on networks of practice (NOP) argues that NoPs might be able to integrate and coordinate dispersed knowledge (Brown & Duguid, 2001; Agterberg et al, 2010). It is often argued that learning within a community tends to be easier than learning across communities due to similar languages, identities and experiences. However, across learning seems necessary for daily running and innovations, but it seems more difficult (Wenger, 1998, 2003). One obstacle is identity, which often creates tension in interactions across communities (Macpherson & Clark, 2009). The focus on the role of identity has until now been understudied (Willem et al, 2008), and the same can be argued about the role of the online environment (Noe & Wang, 2009).

In our study we seek to contribute to an increased understanding of learning across geography but within similar work specializations. The organization tries to facilitate such learning through organizing networks of practice as a vital learning arena and the use of online media as a main tool. The main research question is: What are the main barriers to learning in such networks, and in particular how can identity generate barriers? The paper discusses the interplay between face-to-face and online settings and elaborates particularly on the learning barriers related to identity. While existing theories argue that the work context or practices help people to construct shared identities and a social context where knowledge is easily shared due to shared identities (Brown & Duguid, 2001), we focus on the co-existence of identities, which creates barriers to the top-down-initiated managed networks of practice (MNoP) in online context.

2. Theoretical frame

Ashforth and Mael (1989) describe social identity as the perception of oneness with a group of persons. Communities of practice (CoP) (Lave & Wenger, 1991; Wenger, 1998) were originally defined as closely connected persons who are engaged in frequent, social, face-to-face interactions working side by side in a shared common context of practice (Wenger, 1998). Networks of practice (NoP) have been defined as self-organized groups of members who share the same practice, but who are geographically dispersed and often rely more on online channels for communication (Brown & Duguid, 2001).

Employees do what they regard as appropriate (March and Olsen, 1989), using cultural norms as a guideline to match the situation they are in with an identity. *What is the situation? Which identity is most important for me and my organization in this situation? What am I supposed to do (as a holder of this identity)? What do others in my organization do in this situation?* The answers to these questions in the given context influence action in March and Olsen's view. In our view Goffman's (1959) dramaturgical perspective adds insights into the role of the actor in the constant remaking of identity, performance and impression management. Identity is not a stable phenomenon, but open to contextual variations and interactional construction of meaning. Talking about identity is therefore more in terms of 'doing' identity than identity as something more or less defined once and for all.

From sociocultural perspectives (Lave & Wenger, 1991; Wenger, 1998) it is proposed that individual learning is a product of participation in social practices, sometimes conceptualized by researchers as situated, workplace or organizational learning. It is practices that first of all shape individual and collective actors' identities (Wenger, 1998, 2002). What is it when actors are distributed? According to Macpherson and Clark (2009), the lack of a common face-to-face community can reduce the opportunities for knowledge sharing, because it is more difficult to remake shared identities collectively.

Researchers describe learning and the construction of identity as intervening processes, but describe different learning processes and modes in relation to different identities, such as:

1) A linear process: the movement from newcomer to old-timer (Lave & Wenger, 1991; Wenger 1998);

2) A dual process: the belonging and positioning in a discourse, in negotiations, where the development of a new identity helps to be accountable to others in the same activity (Gherardi & Nicolini, 1998).

3) A local process: the development of local practice among people who share a concern or a set of problems and who deepen their knowledge and expertise in this area and develop a unique perspective or a common body of knowledge and identity (Wenger et al, 2002);

4) Through the processes of knowing (Amin & Roberts, 2008) and identities like: 1) the apprentice (craft-/task-based learning), 2) the expert (learning a profession), 3) the innovator (creative work) and 4) the virtual learner (innovation-seeking project groups or closed interest groups).

Learning in interactions can be hampered by coexisting identities. The culturally appropriate behavior in a professional context can be different from the practice-based correct answer, giving outcomes like buffering, ordering and separating identities (Mael & Ashforth, 1989).

3. Case overview and research method

The empirical study takes place in two regions of the Norwegian Labor Inspection. The regions are selected due to the long geographic distance between the employees in these regions.

Historically the employees were recruited on the basis of some years of experience from branches like building and construction. Newcomers were hooked up with an experienced employee and the learning mode therefore was the process of becoming an experienced inspector. In their respective districts the employees had to conduct inspections regarding different kinds of areas ranging from preventing accidents to psychological well-being. During the last six years this has changed: the employees are supposed to be more specialized professionals assigned to projects (where the production takes place) and competence networks (where organizational learning is supposed to be nurtured).

The employees work from small regional offices, others from a home office and all of them are often on the move undertaking inspections all over their district. All of the networks are staffed with around eight to fourteen people with a very heterogeneous background. Examples of backgrounds are different professions such as: sociologists, priests, physiotherapists, geographers, former police, social workers, staff with MBA qualifications or people who have work experience from different branches like building and construction, or who were promoted internally, for example from secretary to inspector.

The study involves a comparative study of five managed networks: two networks set up for preventing accidents, one for occupational hygiene and two within the area of psychological well-being. One can argue that even though the study has taken place in one organization, the research design can also be seen as a multi-case study design, containing five cases, and not only as a one-case design (Yin, 2003). Each network can be studied and compared as a case, which means data gathering and data analysis within and across networks (cases). Still, all the cases are situated within the broader context of one organization. The complexity of the organization is high due to coexisting factors: the geographical distribution; a rather radical organizational innovation toward increased decentralization of knowledge development and learning since the earlier specialized and centralized knowledge centers were closed down; and the coexistence of different and partly incompatible logics of practice (or rhetoric) nurtured not least by the management. The tool used in the networks is GoToMeeting™, a highly rated (*PC Magazine*, July 2, 2007) web-based tool that allows everyone in a group meeting to share whatever is on each participant's computer (see *http://www.gotomeeting.com*).

The data consist of 18 in-depth interviews with members, coordinators and line managers, from five different networks for organizational learning, as well as 20 hours of observations of online meetings in 2 of the networks. Member checks (discussing findings and interpretations with informants) were conducted f2f and using the GoToMeeting™ tool several times, to obtain feedback on the interpretations of findings and to ensure accuracy. The interviews were recorded and transcribed, and we also transcribed notes from our observations. In the data analysis we used QSR Nvivo 8, a popular tool for organizing qualitative data. While the data have been compared to create categories, theory has been used in the interpretation of our findings.

4. Barriers: Findings and discussion

The findings reveal a complex situation of several identities creating barriers: the 'productive worker,' work-related identities (Table 1) and identification with different epistemic knowledge cultures (Table 2).

4.1. Online meetings 'interrupting the productive worker'

When we asked our informants to compare what is going on face to face (f2f) and online, they all tended to value f2f as the best way to share knowledge.

> All the learning takes place at inspections or when we meet face to face at a seminar.
>
> f2f meetings are qualitatively better than GoToMeeting™ meetings.

This is in contrast to the online sharing meetings, described as:

> There is nothing there for me, it is too specific or too general and it is not an effective way of learning. (Experienced inspector)
>
> To be honest I have too much to do to contribute. (Experienced inspector)
>
> People are silent, doing other things. (Experienced inspector)
>
> People are arriving late, leaving early, complaining they have other things to do. (Notes from observation of GoToMeeting™ meetings)

Existing research (Cramton, 2001) suggests that silence in the online sharing situation is often interpreted by the participants as a lack of engagement of the other party, since people do not see each other or what they are doing, leading to a (further) lack of engagement and hampering the development of shared identities. With reference to our data, we suggest that a lack of engagement also relates to the identity of being a 'productive worker' and the ill-structured setting around GoToMeeting™ offered as a 'front stage' for making this identity (Goffman, 1959). It seems that the online setting compared with the face-to-face setting hampers engagement due to the lack of experienced meaning, and the identification as a 'productive worker' seems to be one of the main structuring factors in this.

The setting of the online meeting is 1–2 hours on an ordinary day. The participants are working with their task handling on the move, always with a lot to do, and very often they are behind: inspections should have been performed; something should have been written up or followed up. People are silent, not eager to participate or carry out small tasks like writing minutes of the meetings. They prepare for other activities where their identity as productive workers can be presented, which leads to multitasking at meetings and hence reduced attention and engagement, in addition to members entering late or leaving early. Here the lack of proximity of the technology, GoToMeeting™, makes these 'back stage' (Goffman, 1959) activities possible, because you can`t see or hear if the employees are doing something else. On one hand the online setting is a barrier here, but the competition between time spent on networking versus task handling is also a vital barrier. Task handling is often regarded as more meaningful; one main reason is that inspections are what are focused on and valued since inspections are what the organization measures and rewards. On a stressful day online knowledge-sharing meetings in the MNoP become a negative interruption.

4.2 Three work-role identities creating barriers online

The study reveals three main work-role identities among the employees carrying out inspections in the organization, i.e. 'professional,' 'regulator' and 'inspector.' The identities seem to exist more or less in all the networks, and each individual can identify more or less with each of them. These identities rely on the following knowledge areas: professional knowledge (like chemistry, engineering or workplace psychology/sociology), knowledge about the use of legislation and knowledge about different industries, what you can expect in inspections and how to handle the communication with clients constructively.

We argue that the identities represent learning lenses structuring what the network members experience and value as important, and not least how they interpret and negotiate experiences, their own role and how to act. Some start with their professional lens and read the legislation through that, others look at how stress is defined in the law or use their experience to find practical solutions to a specific case. Table 1 sums up our findings on social identities and how they structure learning in the organization.

Table 1. Three ideal types of work identities and consequences for learning

	Professional	**Regulator**	**Inspector**
Central sources	Disciplines like chemistry, engineering, social science	The mission of the organization	Being an experienced old-timer in a craft
Learner mode	Learner of a professional subject	The rule-based learner	The experience-based learner
Knowledge type	Professional knowledge	External and internal regulations and rules	Practice-based knowledge
Main learning goal and attitude	Consider, use and develop the professional knowledge, which might change or support existing task handling	Clarify (interpret) and follow the legislation, secure shared and 'objective' practices	Co-develop acceptable solutions for both clients and the inspector/organization

How these identities create barriers to knowledge sharing and integration is illustrated below:

1. The experience-based learner to the professional learner:

   I am so annoyed that the older inspectors do not share their experience online. (Professional learner)

2. The experience-based learner to the rule-based learner:

   I do not bring up how I conduct my inspections, it could turn into new rules. (Experienced based learner)

3. The learner of a professional subject to the experience-based or rule-based learner:

   Not everybody is interested in the professional subject and drops out. (Coordinator of one of the networks)

4. Among the professional learners:

   We have not focused on our professional subject enough. (Professional learner)

5. Among the experience based learners:

   Our management does not understand that inspections are a separate professional field. (Experience-based learner)

6. Among the rule-based learners:

   We should have focused more on the interpretation on the legislation.

As we interpret it neither the inspector nor the professional identity are functioning well in the top-down-initiated networks.

One can argue that the inspector identity has overlaps with a craft/task identity in Amin and Roberts's (2008) terminology; they argue that this identity tends to hamper the cultivation of a network of practice. This mode of learning relies on newcomers identifying with the apprentice (old-timer) and personal relations, and where newcomers seek to learn from and become like the old-timer. That is a learning mode that seems far from the negotiations taking place in the MNoPs, where newcomers often hold a

professional identity, relying more on institutionalized norms and morals about sharing with any member of the organization.

The employees characterized by the inspector identity prefer to work (f2f) in pairs and learn from each other when working, i.e. action and learning are highly overlapping in regard to time and context. The professional learners prefer to look for opportunities to reflect on action and discuss their professional subject either face to face or online, i.e. there are modes of reflection in action and reflection on action. The regulators, on the other hand, seem to prefer to wait for 'somebody at the top' or 'the court' to tell them what the proper knowledge (e.g. rule) or interpretation of the law is, like the earlier centralized experts did. This latter seems to represent a stronger division between action and learning, doers and learners. All three identities make the MNoP into, at best, the second-best arena for learning. The managers' intentions with NoP (e.g. to share experiences, to construct knowledge and to bring both adaptive and innovative collective learning) call upon learning goals and attitudes that do not fit well enough with the established identities and learning modes. There are always other work situations (joint inspections) or closer colleagues or better experts elsewhere where their preferred learning mode is more accessible. Learning in a MNoP is a compromise where none are fully satisfied. The management practices are incompatible with the new learning tool, since performing inspections and writing reports are still what really counts. Different coexisting logics of practice (or rhetoric) seem to be communicated by the management, and these hamper the new preferred (at least espoused by the management) learning practice of MNoP.

4.3 Differences in identification with knowledge types

In this subsection the findings from the five different networks are grouped into two ideal types of epistemic knowledge cultures. Group 1 represents the main pattern found in the two 'accident networks' and the occupational hygiene network and group 2 the main pattern in the two networks on the psychosocial work environment. The two different groups work with different kinds of phenomena, which not only influence their identity but also their knowledge types and preferred ways of communicating and learning, as shown in Table 2.

Table 2. Barriers related to identification with appropriate knowledge types and ICT use

	Group 1	**Group 2**
Knowledge retrieved from work site	Observable and measurable data: use of equipment, e.g. measurements of noise, bacteria and other 'objectified' criteria.	'Subjective' and inter-subjective data/experience from complex phenomena. Action–reaction, interactions are central 'tools.' Emotions are often part of the phenomenon and how employees orient, know and cope.
Ontology	The reality is 'out there' and possible to control.	The reality and not least the perception of reality are complex, versatile, multileveled, dynamic and situated.
Knowledge preferences	Positivistic knowledge view, mainly within areas of natural science.	Interpretive constructional knowledge view, mainly within social science.
Communication online (GoToMeeting)	Very effective, in particular the ability to show pictures and drawings.	Difficult since the phenomena focused on are often complex and dynamic, and not easy to show or tell through ICT or tools like pictures.

Group 1 seems embedded in, and identifying with, natural science and positivistic knowledge (i.e. knowledge as objective, general, explicit, theoretical, often technical and preferably expressed in numbers, see e.g. Burrell & Morgan, 1979). Group 2 shares a knowledge view more in line with interpretive, social constructionist and multidimensional knowledge types (i.e. knowledge as situated, relational, contextual, embodied, tacit and explicit, narrative and competent action, see e.g. Polanyi, 1966). While emotions may be included in the latter (Von Krogh et al, 2000), emotions tend to be seen as an opposite or bias to knowledge in the former (Eide, 2005).

The two ideal types of knowledge cultures structure what and how the employees learn or do not learn in the networks in different ways. Group 1 has more positive experiences from communicating through the GoToMeeting™ tool, but also acknowledges the important role of face-to-face interactions:

> GoToMeeting™ is very useful, we can go through an accident … talk on the phone and present pictures of carelessness … and text … it illustrates the risks. (Group 1)
>
> It is important to see illustrations and pictures. (Group 1)
>
> It could be illustrations of well-placed ventilation facilities. (Group 1)
>
> But face to face meetings are always the best. (Group 1)
>
> GoToMeeting™ is effective on a busy day. (Group 1)

One of the two networks in group 2 does not use GoToMeeting™ at all. The members regard it as an unsuitable media for discussing the complex and dynamic subjects of psychological well-being. The other network shares the opinion that there are important limitations, but tries to use the time on GoToMeeting™ to organize and finance joint inspections that they could learn better from. One can argue that the role of the tool partly changes from learning tool to planning tool in the latter network. What are seen as the main limitations of the tool in regard to learning for group 2? Some quotes illustrate the main findings:

> There is an old attitude among us that our subject only can be discussed face to face. (Group 2)
>
> GoToMeeting™ is no more like looking at a piece of paper. (Group 2)
>
> Too much text is boring; we could have an ordinary phone meeting. (Group 2)

One can argue that the barriers may be due to at least two interrelated issues. First, we showed in Table 1 how one prefers to communicate and learn influence. Such preferences can be due to what functions best, or they can be due to the lack of will or ability to explore and learn how to use a new tool and how to understand self. Secondly, the nature of the phenomenon of group 2 is often very complex, dynamic and situated, and seems to call upon practices, including learning and knowing, that are more complex, dynamic and situated. The networks for psychological well-being are characterized by complex forms of knowledge, which are more contextual, personal, tacit, intuitive and emotional. Their phenomena seem harder to share in an online setting. The sharing in the online context can be argued as too thin; real learning seems to depend upon richer contexts (this has been shown in practice-based studies of learning, e.g. Cook & Yanow, 1996). The knowledge forms dominating in group 1 are more numerical, objective and explicit, and seem easier to share, interpret and discuss with the use of pictures, illustrations and small stories, i.e. the online tool is more suitable for learning within such a knowledge culture.

5. Reflections and conclusions

In this study, heterogeneous work-related identities have manifested themselves as barriers to knowledge sharing and integration. The identities identified are 'productive worker' and three work-role identities: 'the professional', 'the regulator' and the 'experienced employee.' In addition we have suggested two ideal types of knowledge cultures across the five networks in the study, i.e. the more naturalistic and the social.

Below we summarize the main contribution of the study.

Firstly, the identity of a being a 'productive worker' creates barriers to knowledge sharing and integration, in particular in the online setting. Cramton (2001) suggested that silence at online meetings is often interpreted, sometimes misleadingly, by the participants as a lack of engagement. We suggest that the lack of engagement is of substance since the online meetings take place on a normal work day and hence interrupt the 'productive worker.' The MNoPs were supposed to take over the knowledge-constructing role and secure collective learning and practice. This implies that the employees are expected to become not only capable doers (i.e. adaptive learners), but they are also expected to become learners on behalf of the organization (i.e. to take part in more innovative learning constructing knowledge/practice). This can be seen as a rather radical expectation of change in identity and learning mode, which the old identities seem to hamper. Gherardi et al (1998) stress the role of identification with a community to understand work-based learning. It seems that the online context does not work as a sufficient shared community, and identities supporting the use of MNoPs as important learning arenas are missing. Existing identities hamper the development of the new. The organization, including the management, has however not cultivated the new preferred community and identity, since the only real work measured and valued is the number of inspections conducted. The top management thereby communicate strongly that inspections are the most important, and their vague signals about knowledge sharing and construction to secure organizational learning have less real impact. They do not seem to 'walk their talk.'

Secondly, we have shown that different identities are structured by, and structure, different learning modes, which create different kinds of learning barriers when using MNoPs. This is consistent with theory suggesting that different learning processes exist related to different learning communities and their identities (Amin & Roberts, 2008). The experience-based learners (inspector identity) prefer to learn from each other in work contexts and experience the online context as little use. The professional learners (professional identity) prefer to discuss their professional subject either face to face or online. The rule-based learners (regulator identity) prefer to wait for 'somebody at the top' or 'the court' to tell them the 'truth'; one can argue that their main barrier is how they see themselves, i.e. mainly as reactive adapters in learning, rather than actors constructing knowledge. The latter was argued as an important purpose of the MNoP by the management, but these employees are not ready for such an important learning role – with or without a MNoP, online or face to face. However, an MNoP might in a longer perspective alter that. Based upon the elaboration of all three identities in Table 1, we conclude that MNoPs – with or without online tools – if they are to be useful, have to be better integrated into the larger whole of the organization, and thereby related to other communities and learning modes so that they complement each other in positive ways.

Thirdly, work identities also operate within knowledge cultures, which increase the complexity and do not give a straightforward answer regarding the benefits of and barriers to learning through MNoPs and/or online contexts. The knowledge cultures represent a side of their practice and identity at work that structures how they learn and how they experience online learning.

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Sharing Work Practice in the Distributed Organization

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EXECUTIVE SUMMARY

Organizations today are looking for new ways to support knowledge-sharing and learning activities among their employees by the use of IT. The case describes how inspectors share their work experiences, reflect upon them, and learn from each other at a distance by using stories, pictures, and documents, which is made possible by the GoToMeeting™ tool. In this case the GoToMeeting™ tool supports learning activities across geographical and organizational boundaries and contributes to efficient conditions for sharing inspection practices. The issues covered are learning activities facilitated by IT as well as the limitations of the tool in use.

Keywords: *Communities of Practice, Competence Networks, Distributed Organization, GoToMeeting™, Knowledge Sharing, Learning, Pictures, Public Administration, Traceable Practice*

ORGANIZATIONAL BACKGROUND

The inspection authority (herein referred to as the authority) discussed is a large distributed health and safety inspection authority in a Nordic country. The main task of the authority is to ensure that the work environment in the country is in accordance with the statutory requirements. The employees are based at several locations and they are given a high degree of individual autonomy. The employees in this organization often work alone at small district offices or home offices. Over the years the inspectors have developed individual inspection practices, making it difficult to promote sharing and learning in the organization. Different districts involve different industries, which have also influenced inspection practices and created variations in competences among the distributed inspectors.

The authority is challenged by rapid changes within the domain for which it is responsible, such as changes regarding how clients behave and new insights from research – all of which might change the use of the legislation it oversees and with which its clients have to comply. The region 1 unit, 1 of 7 in the authority, has around 50 employees and of these around 40 are inspectors. The budget is approximately 40 million kroner (equal to US$6.6 million). The networks' mission is to ensure organizational learning in the authority on the topic area for which they are set up. The organizational culture among the inspectors can be described as a very independent work culture, in which the inspectors are used to working alone or in pairs and making their

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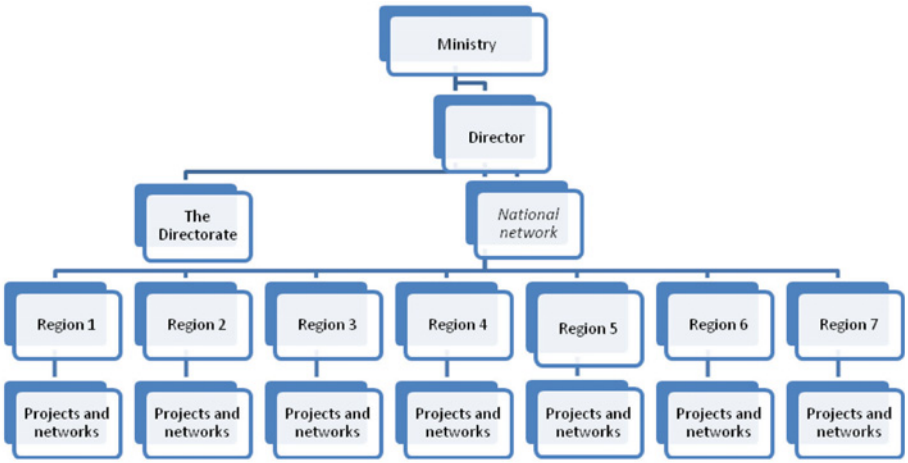
Figure 1. The organizational chart of the inspection authority



own decisions; they often work with their clients more than with their colleagues. Even though they often work alone and have few colleagues at the office, a sense of identity with a group and identity with the organization has been developed by telephone calls to colleagues conducting similar tasks or experts at the core of the organization (the directorate, see the organizational chart in Figure 1).

The inspectors conduct inspections of the use and storing of chemicals, installed ventilation facilities, and measures taken to prevent accidents at work. Usually they are at their office or home office when communicating with each other in the competence network meetings. This case focuses on the ability of GoToMeeting™ to promote knowledge sharing by the representation of inspection practice online. In this context knowledge about chemistry or engineering, experiences, and the legislation has to be integrated. The IT infrastructure consists of many applications and newer and very old software. Sometimes the same information has to be reported in several systems.

Organizational Structure and Management Responsibilities

The organization has a long history that extends back more than a hundred years. The authority's mission is to encourage its clients to work systematically towards compliance with the laws and regulations. The organization has undergone substantial changes in the last seven years. The core of the organization, the directorate, has had its number of employees reduced, and responsibilities have been handed over to the seven regions in the authority. An organizational chart is presented in Figure 1.

The conducting of inspections by this authority is meant to take place in projects and organizational learning in the networks. The purpose of the national networks is to ensure knowledge sharing and learning across the regions. These networks are set up with coordinators from the regional networks. In Mintzberg's (1983) terminology the organization has reduced its technostructure and moved towards more flexible forms of organizing using more project work and networking, much in line with the current trend in organizational design. The organization-specific

argument for this design is that the inspectors are individually very knowledgeable, but very independent; they need to collaborate more in projects and networks to meet the challenges of the organization. The networks have so far meant a more or less permanent assignment to a specific competence network for the individual. Projects, on the other hand, run from one to three years.

The mode of learning that has dominated the organization until now comprises an apprentice conducting inspections with a senior inspector: in other words, face to face learning, in which the apprentice observes the senior inspector conducting inspections. While this organization used to have experts at its core, the expert knowledge now has to be developed in the regions – among dispersed inspectors in the intra-organizational networks set up by the management. They are now supposed to become experts collectively. This is to be achieved by setting up competence networks of inspectors. The inspectors within each region are assigned to one of four different networks, more or less based on their professional orientation or interest.

Inspectors work from regional headquarters, from one of the different local offices, or from home offices distributed all over their region. The distance between the different members in this region can be as much as 1,300 km, and owing to the limited budget they may only see each other face to face twice a year for 2 days. In addition, the inspectors are often on the move as they perform their tasks. The members of the network have different professional backgrounds, ranging from engineering and social science to law, some with lengthier professional education, like lawyers, to others with work experience from relevant industries. The organization employs a total of 500 inspectors, of whom approximately 40 work in region 1. The 40 inspectors in this region are assigned to 1 of 4 different competence networks. Each network is set up with a coordinator, but this assigned person has no formal authority or formal sanctions towards the network members. Each coordinator for each region is represented in national networks. The management responsibility in this context is to support the networks so that they develop the necessary knowledge and expertise to be able to conduct their tasks.

SETTING THE STAGE

External consultants suggested that the authority should set up competence networks in which the inspectors could develop their individual and collective competencies by reflecting upon their experiences and practices, and give input to the organization. The authority implemented competence network structures in 2005. The experiences in this case were collected in 2009 and 2010 through interviews and observations of actual meetings. GoToMeeting™™ has been the selected collaborative IT for the teams since 2006, as well as for the competence networks in the organization. At the time the alternative tools for synchronic communication were:

a) Ordinary phone conferences (without screen sharing);
b) Videoconferencing (studio);
c) GoToMeeting™ (teleconferencing, screen sharing, and chat).

The competence networks have used the GoToMeeting™ tool. Since there were no video-conferencing studio facilities available at every district office and since many of the inspectors work from home offices, videoconferencing has rarely been used. Many of the participants would have to travel anyway. The selected tool, GoToMeeting™, we can argue, also had an advantage since the participants in the competence networks did not need to learn an extra tool: it was already in use.

Using Collaborative Tools to Nurture Communities of Practice

Research on the social aspects of learning has found that communities of practice (CoP) enable learning in organizations (Wenger, 1998). A community of practice is an emergent social collective that self-organizes in order for the participants to help each other and share perspectives about work, enabling learning within the community (Brown & Duguid, 1991; Lave & Wenger, 1991; Wenger, 1998, 2003). CoPs were previously conceptualized as a phenomenon emerging spontaneously in organizations; now it is believed that organizations may play a critical role in nurturing these communities (Newell, Robertson, Scarborough, & Swan, 2009). Communities of practice are viewed in the field of knowledge management as a means to deal with tacit knowledge, or the know-how that is not so easily articulated and transferable (Orlikowski, 2002; Galliers & Newell, 2003; Tsoukas, 2003). The role of collaborative IT in nurturing CoPs is to promote more interaction, sharing of artifacts, social networking, and collaboration among the organizational members.

In this view, knowledge is localized in social situations and the practices that people actually perform (Newell et al., 2009). Learning in communities occurs by carrying out tasks together, observing what others do, or sharing stories and practice reflection. Collaborative tools can in theory support all of these activities. The major tasks in knowledge management are to nurture or build communities of practice – sometimes across organizational or geographical boundaries – in which practitioners can learn from each other. The outcome of such knowledge-sharing processes could be the representation of individual practices and a collective diffusion of innovative work practices across space and time. CoPs are often seen as informal, organic, self-organized units of activity: "produced by its members through their mutual engagement … that tend to escape formal descriptions and control" (Wenger, 1998, p. 118) and "who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Wenger, McDermott, & Snyder, 2002, p. 4). The elaboration of CoPs seems to assume that the members regularly work together, or as described by Orr (1996), regularly meet during lunchtimes and at meetings in which they share their work experiences. Some, however, do not have the opportunity to work together directly or meet regularly (daily, weekly) in other ways, since they are spread around large geographical areas. One alternative then can be to increase the interactions through the use of other media than face to face meetings, such as phone, email, videoconferences, and interactive Information and Communication Technology (ICT), as well as to try to create a community in which such a common focus and experiences can be shared. In a CoP members need to share information about:

1) Work activities so that they recognize that they are engaged in the same practice;
2) The artifacts, defined as objects or actions, to which the participants attach meaning;
3) Themselves and who knows what: who is the expert within an area or the members of specialized sub-groups of the community (Wenger, 1998).

Collaborative IT tools like GoToMeeting™ are particularly interesting because they combine access to whatever is stored in systems and each participant's PC and facilitate conversations about it. The tool might support the construction of collective meaning, an important feature of a CoP.

Varieties of Groups, Networks, Communities, and IT

Communities of practice have existed since individual craftsmen gathered to share issues, ideas, and solutions. Today technology acts as an enabler, linking dispersed individuals in terms of time

Table 1 . Varieties of groups and networks from Wasko and Teigland (2006, p. 139), except the last column on the right, which describes the key features of the competence networks in this case

Macrostructural property	Work groups	Virtual team	Communities of practice	Electronic networks of practice	Competence networks
Control	Formal control, not voluntary	Formal control, not voluntary	No formal control, voluntary	No formal control, voluntary	Some formal control, e.g., managerial participation, evaluations, but not possible to force anyone to contribute
Communication channel	Face to face	Text-based computer-mediated (e-mail, intranet, can benefit from interactions face to face or on video)	Face to face	Text-based computer-mediated (like blogs, bulletin boards, and e-mail lists)	Screen sharing and telephone conferencing, e.g., text-, picture-, and voice-based, computer-mediated, and occasionally face to face

and place and facilitating their interaction. Brown and Duguid (2000, p. 143) describe a continuum of networks from communities of practice defined as: "relatively tight-knit groups of people who know each other and work together directly ... typically face to face communities that continually negotiate with, communicate with, and coordinate with each other directly in the course of their work" to electronic networks of practice consisting of weak ties in which individuals may never get to know each other or meet face to face. A relatively new aspect of this phenomenon is the managerial ambition to integrate geographically spread units into one integrated unit using ICT and networks aiming to develop communication, collaboration, and learning horizontally in the organization (Newell et al., 2009), of which this case is an example (Table 1).

The competence networks in this case are somewhat controlled by the management since one manager (sometimes) participates in the meetings and the networks are evaluated by the organization. On the other hand, the assigned coordinator of each network cannot force anyone to contribute. While the participants in the competence networks perceive face to face interaction as the best setting for sharing practices, sharing via technology is seen as a good alternative due to long travel distances. The tool GoToMeeting™ is a highly rated (Lipschutz, 2007) web-based tool that allows everyone in a group meeting to share whatever is on each participant's computer. The tool contains features such as screen sharing, sharing of keyboard and mouse controls, web chat, and phone conferencing, and the tool is also integrated with e-mail and calendar (Outlook™) book meetings efficiently (http://www.gotomeeting.com). While it is possible to share everything you have on your computer and have a telephone meeting, the contenders do not see each other. When the networks are given tasks by the organization, such as answering hearings, these activities resemble a virtual team (Table 1), and the strength of GoToMeeting™ perceived in these activities is the ability to talk, read, and write together simultaneously.

The network size (Table 2) of the competence networks is small, since they are staffed with eight to fourteen members, but as they are linked to other networks in other regions by the national network, experiences could potentially be shared among hundreds of people (Figure 1). The members of each network are assigned by management, but the individual can suggest

Table 2. Varieties of groups and networks from Wasko and Teigland (2006, p. 139) continues, except the last column on the right, which describes the key features of the competence networks in this case

Macrostructural property	Work groups	Virtual team	Communities of practice	Electronic networks of practice	Competence networks
Network size	Small	Small	Small	Large	Small, potentially large
Access	Restricted, assigned by formal control	Restricted, assigned by formal control	Restricted, locally bounded, limited to co-location	Open	Restricted, assigned by formal control, distributed participants
Participation	Jointly determined, specific task outcomes	Jointly determined, specific task outcomes	Jointly determined	Individually determined	Jointly and individually determined, a few times with some specific task outcomes

were to be assigned. Participation in communities of practice is regarded as jointly determined, since individuals generally approach specific others for help. In electronic networks of practice, participation is individually determined; knowledge seekers have no control over who responds to their questions or the quality of the responses. In turn, knowledge contributors have no guarantee that the seekers will understand the answer provided or be willing to reciprocate the favor. The competence networks can, since they are not fully developed communities, therefore be described as a mixed participation context – both jointly and individually determined – and also sometimes with specific task outcomes (like answering a hearing). Access and participation are restricted and structured by the management, since the inspectors are assigned to a specific competence network, but ultimately the participation is dependent on mutual engagement. All in all the competence networks offer a mixed context.

Evolution of Communities and ICT Needs

An ICT perspective on communities of practice relates to how people use ICT to organize the social world to be able to learn. It is about how ICT enables the establishment and maintenance of ongoing relationships between people who have the potential to help each other. A tool is not a community of practice in itself, but it might enable people to share their experience and learn from others. Organizations use ICT to accommodate knowledge work and learning. However, the impact of ICT on sharing and learning is influenced by human agency, the physical properties of a particular ICT, and the context in which it is used (Newell et al., 2009). To develop communities of practice, according to Wenger et al. (2002), there is a need in the early stages to share information about individual competencies – sharing experiences to develop a sense of shared meaning, identity, and knowledge. In later stages the ICT can facilitate ongoing collaboration and the storing of experiences relevant to the community. A more detailed description of the needs in different stages is presented in Table 3.

The role of management in this approach, according to Wenger (2004, 2005) is to coach managers, fund activities, and supply the network with technology, facilitating arenas in which

Table 3. Wenger's communities evolution model (adapted from Dotiska, 2006, p. 259)

Stages	Main functions	IT enabling technologies
1	Connect, plan, commit	E-mail, e-conferencing (see, hear, text chat, present, and share information in a collaborative manner), listservers, online forums, Internet, corporate intranets
2	Form framework, create context	As above, plus remote login facilities, file transfer, information repositories
3	Operate, collaborate, grow, improve, mature	As above, plus online directories, analytical and decision-making tools, intelligent agents, e-surveying, and feedback facilities as well as portals
4	Sustain, renew, maintain, wind down	
5	Shut down	Knowledge repositories may remain for use by future communities

people can talk about their work and their practices. On the other hand, heavy reliance on ICT may be a burden on the community members, especially when they are not used to interacting with technology. A lack of competence, lack of self-confidence, and/or resistance to technology may reduce members' participation in the community (Dubé, Bourhis, & Jacob, 2006).

Mature communities of practice are often regarded as skilful in putting all kinds of tools to good use, regardless of their designer's intention (Wenger, White, & Smith, 2009). Wenger et al. (2009) describe several strategies for communities in their effort to build a community ICT structure. Strategies range from setting up a unique platform for the community to using existing internal and/or external tools. This case describes groups that build on and use what the organization offers. The ICT in use in the competence networks comprises e-mail, intranet, and the GoToMeeting™ tool. Web 2.0 applications in terms of wikis, blogs, and other social networking features are not part of any of the official applications in use so far, and freeware is forbidden due to virus problems and the potential leaking of sensitive information.

CASE DESCRIPTION

The main objective of this case is to explore the experience in a distributed organization, a public inspectorate, of using the GoToMeeting™ tool to facilitate knowledge-sharing activities. In this organization, which is often the case with older organizations, old and newer ICT tools and systems co-exist, but not all of them are used daily or by everybody. I can list as examples intranet, Internet, e-mail, and GoToMeeting™, as well as old and newer systems related to task handling, registration, and time management. The GoToMeeting™ tool was introduced into the organization at the same time as the competence networks were established; it has become an important tool in the inspectors' daily tasks in project work and is the main channel for the networks, which meet once a month online but only once or twice a year face to face. Five to ten participants attend the GoToMeeting™ meetings and the duration of the meeting is from one to two hours. GoToMeeting™ can be labelled as an audio-conferencing tool with web-based conference services, in which active and reflexive listening (like rephrasing participants' statements) is needed for smooth and effective communication (Munkvold & Akselsen, 2003). Screen sharing and the use of text, illustrations, or pictures have further positive effects in this respect. The activities in an average meeting in the competence networks are described in Tables 4 and 5.

Table 4. Examples of activities taking place in the an average meeting in the competence networks

Activity	ICT in use
Logon sequence The individual logs onto the Web and teleconferencing (phone). All the necessary information regarding how and when to log on is provided by Outlook™.	Outlook e-mail and calendar, Web, and teleconferencing (phone)
Initial small talk ... … about the weather or similar and sometimes rumours about what is going on in the organization are shared (3–4 minutes) among those who are online.	Phone
Who is here? The coordinator asks who is present, such as "Are you there Hans?", "I can see you are logged onto Elin!", and "Svein is sick". All of the participants say something in turn, like "yes, I am here". "Here, but I have to leave this meeting early, due to ...".	Phone/Web
Coordinator introduces the agenda for the meeting Word document presented (also sent by e-mail before the meeting)	Screen sharing
Change of screen control Coordinator lets the presenter (network participant or external expert) of the day control the screen	Screen sharing

Table 5. Examples of activities taking place further in the an average meeting in the competence networks

Activity	ICT in use
SHARING PART 1 **Experiences shared** PowerPoint™ presentations take place. Conversations are triggered by the help of stories, documents, and pictures.	Screen sharing: documents and pictures from PC and/or ePhorte or Vyr
SHARING PART 2 **Discussion, questions raised and answered** Sharing of experience, opinions, and ideas. Construction of meaning. What does the new information mean?	Teleconferencing. Sometimes participants during the meeting search the World Wide Web or intranet for answers to questions
Evaluation of the meeting Everyone is "forced" to say something. Comments are very short like: "it was okay", "I have nothing to say", "interesting topic", "well-organized meeting", "two hours without a break is too long", "remember to turn off the microphone when you are not talking – your noises disturb the others", "it is so sad that only a few took part in the discussion".	Phone

Figure 2. Snapshots 1 and 2

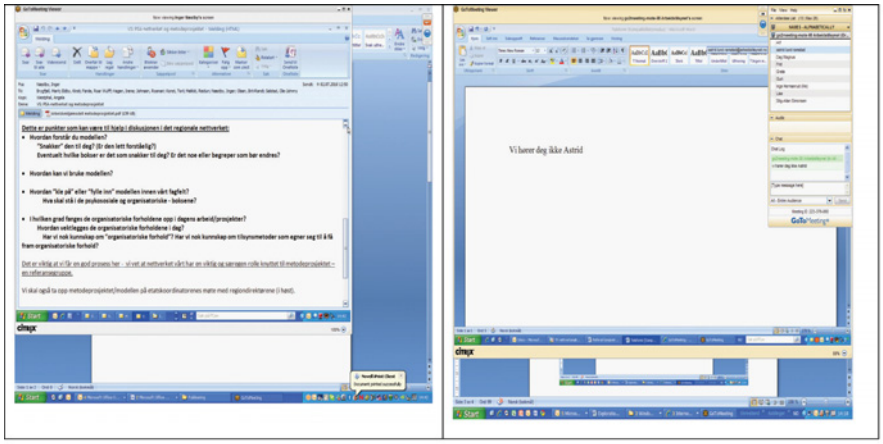


Figure 3. Example of what is shared and discussed in GoToMeeting™

- **ePhorte™**: A task-handling system, which includes a powerful search engine that makes it possible for the inspectors to search by case number and in free text.
- **Vyr™**: The authority records the reported damage to a business and occupational injuries in a register called Vyr™. The authority and the competence networks use Vyr™ to analyse the registered data to monitor the situation within different branches. Figure 2 gives examples of what GoToMeeting™ looks like on screen.

The two snapshots are examples of text in an e-mail (snapshot 1) and a word document (snapshot 2) shared on GoToMeeting™. The participants just open their personal e-mail and share the content. On snapshot 2, on the right-hand side, note that the participants can also see who is logged on. The picture on the text page (Figure 3) is an example or what is shared and discussed in GoToMeeting™.

In the conversation and storytelling regarding this picture, the participants focus on the work processes related to this job, the problem of dust in work processes, and experiences regarding risk prevention efforts. These are then reflected on and made sense of. The picture illustrates how polluted air is taken out of the production hall through a point extraction, put onto the machine that produces the dust. The picture illustrates a solution to a more general problem situation for the inspectors. They often struggle to find effective solutions to fulfill the requirements of the legislation in a cost-efficient way for the inspected workplace, i.e., finding solutions that can work for both parties. When talking about these pictures, the presenter addresses attention to certain areas of the picture to illustrate how the problem can be solved or to show the problem to help in solving the problem.

So, what occurs at the face to face meetings that take place once or twice a year? The participants often visit a business as a group and later on discuss what they experienced there, or they invite an external expert lecturer or practitioner, or both, to talk about a topic.

GOTOMEETING™ FACILITATES LEARNING ACTIVITIES ACROSS BOUNDARIES

An ICT perspective on communities or networks of practice implies that we describe them by their ICT use. In the following I describe and discuss the competence networks through three different narratives. The experience is related by three inspectors: two senior members of staff, Tor and Stein, and one newcomer, Nils.

GoToMeeting™ Facilitates the Sharing of Tor's "Workbench"

Tor has worked in the authority for 20 years, within different issues but mainly within engineering. He has also worked part-time as a lecturer at a university. He regards himself as very open-minded towards ICT. From the early days he has worked from his home office, where his boss has allowed him to try out the new technology. Tor is an early adopter of ICT. Today he has a fully equipped office at home, the same technology as at the office. He sees many opportunities for ICT-based sharing of knowledge related to his work, and he has used it on several projects. Additionally, he has been an assigned mentor and a union man online. He is assigned to a competence network for technical expertise.

Tor likes to use PowerPoint™ presentations when using the GoToMeeting™ tool, and he also likes to pick up files from his PC or intranet and present them as the discussion moves on. His intentions are threefold:

1. To enrich the discussion with cases presented orally, accompanied by the use of pictures and documents.
2. To help others to view and exploit the possibilities that the GoToMeeting™ tool offers.
3. To help others to look up and put together relevant information from the different systems that they have: intranet, Vyr™, and ePhorte™.

When using the GoToMeeting™ tool Tor can access rich illustrations regarding content and processes on inspected enterprises while he is elaborating on a given topic. To illustrate his work he uses his own "workbench" – his computer with access to everything he needs stored on it or available online. He shares the legislation he uses, how he interprets it, how he writes letters to inspected businesses, and their answers. He does this by presenting documents from the task-handling register, cases with which he has previously worked. He picks out an accident – a file describing what happened at the site, pictures of it, and the letters he wrote and how the business responded to them. He moves around between different applications to underline and illustrate his key points, as well as showing the others how to use the GoToMeeting™ tool. He stresses the importance of taking and attaching pictures to the case before putting it into the archive, which will be useful for task handling and for later sharing online on GoToMeeting™ in the competence network setting. This informs us that work activities and learning activities are dependent on each other. Taking pictures in the work context provides the means for later online knowledge sharing and learning. Several times Tor has run through accidents, sometimes the whole process, and at other times only what happened. Tor regards the tool as very efficient:

"If the legislation is changing, pictures on screen can easily create a mutual understanding of the new legislation. Like when I present machines and equipment that are in line with the new rules." (Tor, senior member of staff)

In his view they are not ready for video-conferencing, but they may be in the future if the organization becomes more specialized and the need for communication and interaction internally within the organization increases.

Insight

GoToMeeting ™ enables Tor to share his work practices as well as his ICT skills. Efficient online learning activities are dependent on resources created in work activities (like pictures).

Tor's story tells us that GoToMeeting™ can be a very useful tool for enhancing conversation sharing. It has the ability to gather people and their artifacts (documents and pictures) and the participants have conversations about the artifacts. For this purpose GoToMeeting™ is more efficient than face to face meetings, since the participants in GoToMeeting™ meetings, compared with those in face to face meetings, have easier access to documents. The results of the activity are justification, mutual understanding of the practice of others, and more collective practice. In other words, the processes and outcome promote a community. However, the sharing of documents and their conversations depends upon how open the participants are, and that differs. Some are more reluctant to disclose too much about what they actually do, as they are afraid of losing some of their flexibility when "in action", since new routines to increase the standardization can then be forced upon them.

Tor addresses a problem when using the GoToMeeting™ tool. The problem is the emergent "multitasking" during the GoToMeeting™ meetings in the competence network. The engagement in the discussions varies from participant to participant. Not everybody is interested in every issue all the time. They do not work with the issue discussed, or they have other opinions. Since nobody sees the individual, some are tempted to do other things while being logged on to the conference. This might not be true all the time, but the impression of a "lack of engagement" among some can turn into a vicious circle of "reduced engagement" in the network, hindering the participants from creating a community. To reduce this problem the coordinator is asked to involve everybody at the meetings, by addressing each and every participant directly.

GoToMeeting™ Enables Stein to Share his Practices, which are Traceable in Documents

Stein is an experienced member of staff with more than 10 years' experience working with the authority. Previously, he worked for more than 10 years as a teacher. He is assigned to a competence network for technical expertise. He works from a regional office and has taken a university course about ICT use in the distributed environment, which addressed how to work together while not being together physically. On the course he learnt the importance of ensuring that everybody is heard and addressed during a GoToMeeting™ meeting. He speaks very highly of the GoToMeeting™ tool for sharing experiences. He puts it this way:

"We are discussing something. I say, yes, but I have something on my PC, just give me the screen and I'll look up, and so I find it, and I find statements, pictures, or any other orders given before. So screen sharing is very useful. It is flexible." (Stein, senior member of staff)

Stein regards it as too cumbersome to meet face to face often. Instead, he points out that by using the GoToMeeting™ tool the participants can share the documents needed if he runs into a similar case. He puts his point in this way:

"We can't share by referring to what we remember, we need to find the case; our sharing must be traceable." (Stein, senior member of staff)

In bureaucracies, such as this authority, action is taken on the basis of and recorded in written rules (Weber, 1971). This is also true regarding sharing and learning, as pointed out by Stein. Sharing and learning start with the recorded cases and the written rules in use. This implies that the sharing of documents is necessary to inform people about the legislation they use and how they use it when sharing their experience and knowledge.

Insight

Learning in bureaucracies occurs on the basis of and recorded in written rules.

The use of documents is a necessary resource for learning activities in a bureaucratically organizational context. In addition, to achieve "equal handling", documents are needed to understand the practice of others, and work as the window into it and contribute to the shared meaning and community.

GoToMeeting™ Enables Nils to Discuss and Learn from Practice Across the Organizational Boundary

Nils has worked for three years in the authority, from a regional office and mainly with industries. This is his first job after finishing college. Around half of his tasks are related to chemistry – the area for which the competence network to which he is assigned is set up. He thinks the meetings in his competence network have improved lately, since they are now are increasingly discussing professional issues – recent developments in research and the experiences of colleagues and other practitioners. For Nils, GoToMeeting™ is the best they have so far:

"GoToMeeting™ is the best we have; you can invite external experts and practitioners – to develop a dialog between our authority, researchers, and our businesses." (Nils, newcomer)

This use of GoToMeeting™ reveals networking outside and across the boundaries of the organization. Bringing different people together using GoToMeeting™ is possible. Everyone has access to a phone and to the World Wide Web, and that is all that is needed. When people with different backgrounds who are engaged in similar work start to have discussions, there is an extra "spin-off" effect, according to Nils. Practitioners and researchers start to share and discover solutions together. This is best achieved face to face, but is also possible using GoTo-Meeting™. Like Tor, Nils stresses the role of pictures and documents in sharing and learning using GoToMeeting™. Shared pictures can be of well-placed ventilation facilities in a welding shop to show why they are well placed. Sharing documents can be very useful because they give many ideas about what to look for when conducting inspections, according to Nils. Nils also argues for storing PowerPoint™ presentations presented at the network meetings on the intranet for later use. As he puts it:

"When you need ideas and names of people to contact about a special issue, then the PowerPoint presentations can be very useful." (Nils, newcomer)

Nils reveals an insight to us here. Useful informal contacts across the organizational boundaries are not only made up of people you know, but also names stored on your computer or intranet, accessible when needed in your work. These names and contact information contribute to access to a larger network of practice for the individual.

Insight

PowerPoint™ presentations contain names, which are useful for newcomers. Even though Go-ToMeeting™ has several strengths, there are also limitations according to Nils. One dilemma exists between time and cost-efficient knowledge sharing and relation building. Nils states:

"Face-to-face meetings are important, when you are using the phone, not seeing each other, then you don't get to know each other." (Nils, newcomer)

Not getting to know each other means that the social network and the ties might not develop as strongly as they could. GoToMeeting™ seems not to be a sufficient tool to develop the stronger ties and the mutual recognition that define a fully developed community of practice. Since face to face meetings take time and travel costs are high over long distances, the participants need to find other ways to develop their relations, and, in particular, to develop the "know-who" – the experts among them within particular areas. One way is to select a richer media when sharing (like videoconferencing or more face to face interactions) or engage others (in particular people you do not know) in your project.

CURRENT CHALLENGES/PROBLEMS FACING THE ORGANIZATION

In this case GoToMeeting™ enables the sharing of work practices across distances through its ability to gather the inspectors, their documents, and their pictures – the objects and artefacts to which they attach meaning in their practice. By presenting accounts, documents, and pictures the inspectors are able to represent and reflect upon their work practices. GoToMeeting™ is regarded by Tor, Nils, and Stein (three engaged and dedicated network members) as a very useful tool for

sharing and learning. GoToMeeting™ enables efficient sharing and learning activities across distances. Tor's sharing of ICT skills also seems to be a good practice, which the organization could look into for developing the use of GoToMeeting™ for further sharing and learning. The narratives highlight that collaborative IT can enhance "sharing conversations" when collaborating and when representing work practices.

On the other hand, pictures and documents that are useful when sharing knowledge are more or less stored "by chance" by the individual on a PC or the intranet, and are not very accessible for everyone. For some, often the case for experienced veteran employees, who are not so skilled in IT use, it is too difficult to import documents from the systems and into PowerPoint™ presentations for sharing on GoToMeeting™. Another serious problem is that it is hard to become acquainted with each other on GoToMeeting™. Participants who are not that interested or outspoken and who do not engage themselves in discussions are not well known among the rest of the network participants, making it difficult for the individual to work out who is the expert within an area, an important aspect of a community for advice seeking and learning. GoToMeeting™ facilitates the sharing of documents, but does not sufficiently support the development of social relations. Tools like Skype™ have video as well as screen sharing and could be a substitute for GoToMeeting™.

There is also a lack of sharing and learning across the seven regions in the authority. While experiences and practices are shared and reflected upon among a few people, the members of a regional competence network, experiences and practices are almost never shared across the different regions. The network members of a chemistry network in one region do not know what the chemistry network in another region has experienced, discussed, or learned. The situation is the same for other competence areas as well. To move forward, management and researchers should consider how to develop sharing and learning across networks and regions, supported by IT, to develop larger networks of practice for the individuals and for the competence networks.

Videoconferencing is suggested by the organization's IT department to replace GoToMeeting™ in the coming years. This is mainly due to the fact more daily interaction is needed since the planning and conducting of inspections is increasingly supposed to take place in projects and in collaboration with other authorities. This suggested IT change, if implemented, might have consequences for the competence networks, consequences that should also be considered by the management.

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From Narration to a Conclusion in Online Competence Network Meetings

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Abstract: Information technology (IT) is no longer regarded only as a repository within knowledge management, but also as a collaborative tool where work-related artifacts, like documents, can be shared accompanied by stories for knowledge sharing. This article examines knowledge sharing in two different settings – online and face-to-face discussions – and in particular how these settings structure the knowledge processes. This paper extends our understanding of knowledge sharing and the use of narratives and collaborative technology in combination. My empirical context is a distributed public organization in Norway. The competence networks in the study are an opportunity to explore how the participants use narratives to overcome learning barriers when sharing complex practices and experiences situated in their local context across distance in an online environment. In particular I explore how health and safety inspectors share stories, arguments, documents, and emotions, when constructing and interpreting knowledge regarding how to conduct inspections. I find that the use of narratives helps the participants to overcome barriers related to different interpretations of the same by a `narrative add on approach' in the online meetings observed. This is useful for the participants when trying to develop a consistent proposition regarding how to conduct health and safety inspections among the participants in the online GoToMeeting™ meeting. By the `narrative add on approach` - the participants share how they perceive their clients, what they should look for when inspecting, and who they are as inspectors (identity). They also address contradictions in their practice and share how to conduct discretion. Interview data on the other hand reveals a very interesting 'testing discretion by a narrative approach'. This approach is seen as more effective done face-to-face, since they have to capture complex experiences and in particular share what the inspector felt (emotions) when conducting the inspection.

Keywords: Knowledge sharing, GoToMeeting™, managed competence networks, narratives, communities of knowing, Interpretative barriers.

1. Introduction

A practice-based perspective of knowledge management has been developed as a response to the criticism of information technology (IT)-based approaches to knowledge management and their treatment of knowledge as an object (storable, transferable and exploitable), thereby neglecting the social complexity and situational and practice-based nature of knowledge (Geiger, 2010). This perspective stresses that that all knowledge or knowing is personal, not something one has but something one does (Hislop, 2009). Research in this area has focused on 'natural' knowledge sharing in everyday practice in work situations. Orr`s (1990) widely referenced study of photocopier engineers emphasizes how knowledge is developed informally through dialogue and improvisation to adapt existing knowledge to new situations. In particular, there is an interest among researchers in the following: how practice connects knowing with doing (Gherardi, 2000); how knowledge is constructed (Brown & Duguid, 1991); how sense-making between members of organizations takes place (Patriotta, 2003); how knowledge is negotiated (Gherardi & Nicolini, 2000); and how communication systems can support communities of knowing (Boland & Tenkasi, 1995). Within this perspective it is commonly accepted that the narratives that individuals share in everyday activities are a superior medium for knowledge transfer (Patriotta, 2003).

There are limits to an organisation's ability to access previous experiences through informal storytelling and personal networks alone. In particular, knowledge developed in projects sometimes goes no further than the project itself (Swan, Scarbrough & Newell, 2010), and there may be good reasons to develop more formal means of linking individuals across an organization to fuse conversations. Lindkvist (2005) argues for the deployment of what he terms 'competence networks'. While 'lessons learned' from projects stored in databases are not widely used (Newell, Bresnen, Edelman, Scarbrough & Swan, 2006), collaborative information and communication technology (ICT) tools could offer new opportunities for knowledge sharing because they enable dialogue, and

documents stored on computers used in combination with narration might be used as a 'tool for knowing' in the setting of a competence network.

My research question is as follows: how do the participants in competence networks use a narrative mode of communication to reach a conclusion? By conclusion I mean the final stage of a knowledge-sharing dialogue, which offers a more or less consistent proposition on how to conduct health and safety inspections in practice. My proposition is that this can be very challenging due to the different interpretation of the same in organizations and maybe more so in this online context. On the other hand, the participants might also have found ways to overcome this barrier. The paper discuss the role of narratives in this formal online context in study.

2. Theoretical background

The social constructed nature of knowledge applies both to its production and interpretation (Hislop, 2009). To illustrate this, Boland and Tenkasi (1995) use the terms perspective making and perspective taking, namely the social construction of knowledge and the interpretation of existing knowledge interfered by existing cultures. Orlikowksi (2002) from a practice based perspective, offer an alternative view. In her view knowledge is not effectively understood as 'stuck' in culture or practice– knowledge or knowing according to Orlikowksi *is* practice. The sharing of narratives can in this perspective be helpful for others if it develops the others' ability to enact the know-how presented in the narrative. It must be useful in practice.

The term 'narrative' is here used to refer to the ways people talk about their experiences as a set of events, and this includes the contextual details that surround the occurrence of the event (Bruner, 1986). The interpretation of these events are shaped by the values and assumptions of the social and cultural context where the people live and work (Hislop, 2009). Stories and narratives are two separate concepts: a story is a description of what has happened, while a narrative is a story that offers a particular point of view of the situation (Bruner, 1986), like a lesson learned. Narratives provide a way for people to share their knowledge with one another to solve collective problems (Brown & Duguid, 1991).This perspective taking might fail if the participants interpret and understand their work differently (Dougherty, 1992). The use of narratives might solve this problem when it helps the participants to understand the perspective of the other and integrate it with his or her existing perspective. Perspective making is a learning activity at the individual level and developing a technical paper or documenting lessons learned from a project are examples of perspective making.

Narrative and argumentative modes of communication can be characterized as different ways of persuading and communicating a good story and a sound argument in different socially constructed ways of persuasion and sense-making (Geiger, 2010). In contrast to the narrative mode of communication, the argumentative mode has the potential to reduce incoherence in the interpretation process, since its underlying assumptions are (more I would say) explicit (Geiger, 2010). Narratives are judged to be good if they are interesting, as well as plausible and believable; good arguments are logical, coherent, consistent and non-contradictory (Boland & Tenkasi, 1995). Narration is seen as effective since it captures complex experiences that combine sense, reason, imagination and emotion (Weick & Browning, 1986).

3. Methodology

The Labor Inspection Authority was selected for this interpretative case study due to two interesting aspects. First, its tasks are complex and changing. Second, the inspectors are distributed both nationally and regionally. The competence networks in the study are therefore an opportunity to explore how the participants use narratives to overcome learning barriers when sharing complex practices and experiences situated in their local context across distance in an online environment.

Thirteen online meetings were observed in the area of occupational hygiene (six meetings) and in the area of psychological well-being (seven meetings), all adding variety to this study. A moderate participative role was adopted during observations (Spradley, 1980), involving asking questions, giving some feedback, and interacting socially. The technology used in the competence network settings was the GoToMeeting™ tool, a web-based tool that allows every participant in a group meeting to share whatever is on each other's computer. The tool contains features such as the sharing of screen,

keyboard and mouse control, chat, and phone, and it is also integrated with email and the Outlook calendar for the efficient booking of meetings. While it is possible to share everything on each person's computer and to conduct a conference call, the participants do not see each other. This tool is the main channel for the organization's networks, which meet once a month online (but only once or twice a year face-to-face). In addition, I have interview data that covers two networks set up for the prevention of accidents, one for occupational hygiene, and two within the area of psychological well-being: in total 18 qualitative interviews. The informants were selected to ensure variety to the study regarding experience and knowledge types.

The interviews were recorded and transcribed, and we I transcribed notes from my observations. In the data analysis I used QSR Nvivo 8, a popular tool for organizing qualitative data. While the data have been compared to create categories, theory has been used in the interpretation of my findings.

4. Findings

The first step was to investigate the diversity of the 13 observed meetings in these networks, which ranged from academic lectures, information meetings to meetings were experience based narratives were shared. In the second step four networks meetings were selected (see table 1). These were selected because they give insights into how the inspectors use narration in these online meetings. In the third step, interview data were added to enable me to explore further why and when sharing by narratives sometimes are more dependent on face-to-face interaction.

Table 1 Activities in the GoToMeeting™ meetings

Meetings:	1 Occupational hygiene (2009)	2 Occupational hygiene (2011)	3 Psychological well-being (2009)	4 Psychological well-being (2011)
On the agenda	1. Health risks in agriculture. 2. Checklist of agriculture projects 2009.	1. Technical lecture about ventilation (one hour). 2. Discussion around five questions (one hour).	1. Information from national network meeting. 2.Information from manager (postponed). 3. Reflection.	1. Academic presentation (postponed). 2. Information from manager (postponed). 3. Hearing competence plan. 4. Reflection.
Narration	'The farmer'.	'Knowing why and how to conduct discretion` .	'The paralysed business story'.	'Are we, generalists or specialists?'.
Conclusion	Focus on the health and safety of the individual farmer.	Mechanical ventilation is often not necessary.	We cannot contribute to this issue.	'We should walk more together'.
Evaluated as	Useful and interesting.	Useful and interesting.	Too much information.	Interesting.

In the following sections 4.1- 4.4 each meeting will be presented in detail.

4.1 The construction of 'the farmer'

In the first meeting a narration of 'the farmer' took place. It took the form of individuals adding to the description of what farmers are like and how farmers perceive the world. Insights that added to their written checklists were shared on the screen.

Inspector 1: Farmers think that if the food authority conducts an inspection at their farm, everything is in place.
Inspector 2: Could 'barns' underline that there is no working environment thinking in farming.
Inspector 3: We have a challenge here.
Inspector 4: We should be aware that the farmers probably store chemicals in a similar way that sea farmers do – with all the hazards that it might imply.

The first statement (inspector 1) in this conversation is taken from experience and underlines that farmers relate to different authorities and are more focused on animal welfare than human welfare, which is something that the inspectors have to take into account when conducting their inspections, particularly with regard to how they should communicate with farmers. The second quote (inspector 2) enlarges on this problem in the agriculture sector by supporting the conclusion that they have a challenge regarding communications with farmers. Inspector 4 – the comment on the storing of chemicals – trigged a discussion regarding how farmers use different chemicals and how they probably handle it. Here, the conversation, through a narrative mode, reveals elements which it is important to consider when communicating with farmers, which the checklists do not contain. By adding similar experiences of the farmers the participants simultaneously make sense of and confirm how they have understood the other.

4.2 Knowing why and how to conduct discretion

In the second meeting the inspectors discussed why and how discretion must be used. Each participant commented on why or how to conduct discretion in practice. This meeting had an argumentative opening by reporting on the legislative background and the need for discretion, but also a narrative backing as revealed by a discussion of the function of the legislation in relation to different situations and circumstances of their inspections (see Table 2, items 2, 3 and 5).

Table 2 How and why we conduct discretion in practice (meeting 2)

Activity in task handling process	Observational data from the meeting	Mode of communication
1. Applying the legislation.	'Since we have a function-based legislation, we have to use discretion'.	Argumentative mode.
2. Writing reports and orders.	'We always use discretion regarding what we shall assess, and on what grounds'.	Narrative mode.
3. Measuring air quality is also about discretion.	'The production (in the inspected business) is going up and down'. 'The polluting production processes takes place rarely'.	Narrative mode.
4. Balancing the need and the cost.	'Mechanical ventilation facilities are expensive, too expensive for the business'.	Argumentative mode.
5. Handling different situations.	'There are many types of businesses; I often quickly find that a large ventilation facility is not needed'.	Narrative mode.
Conclusion	'The business can try whatever is necessary to solve the problem, before we order a mechanical ventilation system'.	

The individual perspective making is here intertwined with perspective taking, since the individual makes sense of the argument or narrative of the other by producing his or her own narrative out of his or her experience. A clear point is shared in the conversation, and the meeting was evaluated as useful (Table 1, meeting 2), but the narratives could have provided more to help the listeners enact the know-how shared in their practice. For example, sharing how reports and orders are written up and why, something which in my interview data is thought of as a very useful way to share knowledge, but something I have not seen done in the 13 online meetings I have observed.

4.3 `The paralysed business story'

The paralysed business narrative (Table 1, meeting 3) is an example that questions the underlying logic of the inspection practice, but sadly enough this was not reflected upon by the participants. This was a very interesting and maybe a very challenging experience from an inspection where an accident happened. It was presented at the end of the meeting by one inspector and the core argument is contained in this quote:

> The business had all the routines and documents in place, but they were unable to act when we by chance witnessed an emergency while inspecting their documents. (Inspector)

The only one who responded was the participating lawyer who responded that she should focus on emphasizing the implementation of safety in her report to the inspected business. The narrative challenges the idea that documents are a sufficient basis for inspecting readiness for handling an accident. If this issue had been raised earlier in the meeting, it could have fuelled a debate, but at the end of this meeting it seemed as though everybody was more interested in ending the conversation. They had already been on the phone for nearly two hours and the meeting was evaluated as being loaded with too much information from management (Table 1, meeting 3).

4.4 Are we generalists or specialists?

In the fourth meeting, when discussing the proposed competence plan, the narratives revealed conflicting identities (Table 3). Are health and safety inspectors people who have some knowledge in all areas (i.e. a jack of all trades) or should they be more specialized? (Table 3).

Table 3 Are we generalists or specialists?

Arguing for	Observational data from the meeting	Mode of communication
For generalist role.	'If you do not answer a question, they [whom you inspect] can get the impression that you are less competent' (inspector 1).	Argumentative mode.
For generalist role.	'We should know more than the areas we conduct inspections in, since they will ask us' (inspector 1).	Narrative mode.
Against generalist role.	'When I began we were generalists . . . very glad it is over' (inspector 2).	Narrative mode.
A problem.	'The experienced employees are not mentioned in the competence policy plan . . . everything in the policy is targeting new employees' (inspector 2).	Narrative mode.
A problem.	'We must not become two groups; the experienced and the new employees' (inspector 2).	Argumentative mode.
A problem.	'There are less resources targeting training of groups' (inspector 3).	Narrative mode.
Conclusion.	'We should walk more together' (inspector 2).	

The meeting was evaluated as interesting, but the word useful was not mentioned here (see Table 1, meeting 4). The reflection on who they are becoming and human resource policies in the organisation were regarded as interesting, but maybe not directly useful for their inspection practice. The meeting had a relatively clear conclusion, which says that they should walk more together, meaning that they with their different individual competences could benefit from doing more inspections together and not alone.

4.5 'Did I conduct the inspection correctly?' – The use of emotions when sharing knowledge by narration

My interview data, on the other hand, reveal that the use of narratives when sharing inspection practice often relates to the question: did I conduct my case-handling correctly? Here the person who

has the question also shares the story. The activity is closely related to the norms for objective case-handling in that it requires awareness of the personal and subjective perceptions and judgments of protagonists as they work towards more 'objective' handling through socially shared, controlled and negotiated solutions within their network. The inspection authority distinguishes between level 1, 2 and 3 inspections. Level 1 is the most basic, where the inspector conducts unannounced inspections using a simple questionnaire, and by interviewing some of the people they meet at the work site. Levels 2 and 3 are more advanced inspections, involving announced inspections and separate interviews with management and employees, individually or in groups. Within the area of psychological well-being, inspections are always at level 2 or 3, producing a great deal of material for the inspector which must be analyzed and interpreted in relation to their professional knowledge, particularly with regard to the negative effects of stress in relation to the law.

Due to the complexity of the material and the role played by the inspector's personal likes and dislikes, social cues are important for sharing. Face-to-face meetings are preferred, although online discussions are possible. This activity shares some similarities with the traditional learning mode where the apprentice follows the experienced inspector on inspections and learns by observing, sharing and discussing the experience. However, by sharing a story, this learning occurs without joint inspections. Instead, notes, stories and emotions from inspections are shared in order to recreate some of the richness and complexity:

> We have so much data after level 2 or level 3 inspections. It is hard to sum up the best solution. If somebody is unsure about if he or she has done it correctly, we can do a 'test'. Go through his or her case and discuss it. Very often it turns out that he or she was not very wrong in their thinking. We discuss if it is acceptable that a manager is moody; one day he gives everybody a hug, the next day he does not look at you at all – and the employees tell us that they feel unsafe. Then *we use our own emotions to conduct our judgments*. This is an important role of our network, to discuss with colleagues the judgments in our work, our use of our personal emotions. Like: what is too much and what is acceptable moody behaviour?
>
> (Coordinator of a network for psychosocial well-being, my italics)

Sharing the story about handling a case reveals a previously 'hidden' or 'tacit' level of attention and attunement, in addition to the more formal checklists used, and judgments made, by inspectors who work within the area of psychosocial well-being. One can argue it involves intimacy and 'know-how', largely based on personal knowledge but also distributed across inspectors. To share their own more tacit 'checklist' (what they felt at the inspection) inspectors first have to find a way to express their own emotions about the case, including the emotions experienced during inspections. Previous personal and shared experiences will have contributed to forming their emotions and prior understandings, which the inspectors then use when they have to assess whether, for example, the behavior of the manager (in the case above) was foreseeable or not, and whether the work environment is or is not a risk. This sharing practice supports individual decision-making and dispersed authority through confirming or adjusting individual subjective judgments within collective processes.

5. Discussion

In this article I set out to investigate how the participants in competence networks use narratives to reach a conclusion. I found that the participants use two different approaches when using narratives for knowledge sharing.

Out of my observations of online meetings I found within both competence areas in this study (physiological well-being and occupational hygiene) the use of a 'narrative add on approach', where several similar stories that offers more or less the same point of view of the situation are shared. On the other hand, in my interview data within the competence area of physiological well-being, I found the 'testing discretion by a narrative approach'. These approaches give us insights into the intertwined process of individual perspective making and group perspective taking in knowledge sharing, which here are structured by the sharing of similar narratives or by sharing many details ranging from documents to what the inspector felt and critical examination.

When the participants add similar narratives of the farmer or narratives regarding how they conduct discretion, they simultaneously make sense of (perspective making) and share how they have interpreted the perspective in the previous narrative (perspective taking). In this way, they might have reduced the problem of failed perspective taking due to different interpretations and understandings, a problem described by Dougherty (1992). My findings also suggest that it is not only the argumentative mode which has the potential to reduce incoherence in the interpretation process, as suggested by Geiger (2010), the sharing of narratives can also reduce the incoherence in the interpretation of a previous narrative in the conversation or underline the importance of an argument. These aspects underline that knowledge sharing is a continuous flow of interaction between the narrative and argumentative modes of communication which pervade each other, as suggested by Geiger (2010).

Additionally, it is interesting to emphasis that, in meeting 1 (the farmer), the participants, when evaluating the meeting, expressed that their use of narratives at that meeting were similar to how they used narratives in the field. By sharing narratives and `facts` they all contributed to the question what to do - similar to how they do it when conducting joint inspections. The narratives therefore do not only function as a way for people to share their knowledge with one another to solve collective problems, as suggested by Brown and Duguid (1991) or enact the knowing in practice (Orlikowski, 2002), the sharing of narratives also enable the participants to enact some of their (informal) collaborative culture in this formal online context which promotes the sharing itself. On the other hand, these formal online meetings are sometimes too short for in-depth discussions and too loaded with top–down information and debates regarding policy, the later are interesting for the participants, but not seen as so useful for developing their inspection practices.

While the 'narrative add on approach' is used in the online meetings observed, interview data from two networks of psychological well-being reveals a very interesting ''testing discretion by a narrative approach', where the participants have to go in-depth and critically examine whether or not the task handling of the narrator was within the norms for good task handling. In this activity the participants read documents in advance related to one case handling process and the inspector reveals his/hers emotions during the inspection to inform the others about his/her 'tacit' checklist, which the discussants make sense of in relation to norms for task handling. In this process the inspectors need to express emotions through the telling of rich stories to communicate and understand each other's inspection practice. This is a learning process that goes beyond exchanging a few sentences or anecdotes in a phone meeting. Individuals in the networks for psychological well-being relate to others by using their experiences and 'gut feelings'; that is, there is intimacy and awareness when communicating in order to accurately represent practices, so that others can use their own experiences and prior knowledge when trying to interpret and understand what the first person is communicating. In this sense, emotions bring resonance, as they tend to generate memories and a more tacit type of knowledge. Having reached a level of understanding of a case through more intuitive approaches, the inspectors are able to start 'testing' the retold situation and activity through reflections and sense making. Such activities open up the opportunity for collective elaboration, support and verification, or critical rethinking about what is appropriate and preferable. The interpretation of events are not directly shaped by the values and assumptions as stated in the literature (Hislop, 2009), but through the use of emotions to inform the listeners about what they experienced when inspecting, so that the listeners can judge whether it is within the norms for good task handling or not. This finding underlines that narration is effective since it captures complex experiences (Weick & Browning, 1986), and in this competence area, psychological well-being, narratives are particular effective when emotions are shared when telling the narrative. The sharing of emotions informs on what grounds an order was made. When sharing these emotions, social cues are important and face-to-face interaction is, unsurprisingly, the preferred situation.

6. Conclusion

In this paper, a study of the use of narratives in knowledge sharing among health and safety inspectors, has provided support for the important role of narratives. Even though it is challenging to reach a conclusion in this online context, as my proposition suggested, the participant's by the use of a `narrative add on approach` overcome knowledge sharing barriers related to different interpretations of the same. The participants simultaneously make sense of and construct narratives in relation to the

first narrative or argument presented in the dialog. Like the characteristic of their clients, what to look for when inspecting or share how to conduct discretion. This is useful when trying to develop a consistent proposition regarding how to conduct health and safety inspections among the participants in the online GoToMeeting™ meeting. On the other hand, narration is seen as more effective face-to-face, in particular when the purpose is to `test` individual discretion, since they then have to capture more complex experiences – experiences that combine sense, reason, imagination and emotions. There are several plausible reasons for this. The online meetings observed are short, a lot of time is spent on top-down information and the online context offers fewer social cues. Researchers should investigate further the various forms and functions of narratives in formal and or online contexts. Certainly, further research is needed to explore the role of trust in relation to the sharing of narratives in formal online contexts, an issue which has not been investigated here.

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The transfer of knowledge and the problems of identity in a managed and online context

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Abstract

The purpose of this article is to look into the social aspect of learning, and in particular how the construction of identity influences the transfer of knowledge in a managed and online context. The relationship between the 'old-timer' and the 'newcomer' is given special consideration through a qualitative study of the Norwegian Labour Inspection Authority. The study shows that inspectors construct their identity and categorize others in a way that creates barriers to the transfer of knowledge, constructions that are influenced by managerial participation. This article contributes to our understanding of how social aspects influence the transfer of knowledge between old-timers and newcomers in a managed and online context.

Keywords: managed networks, communities of practice, knowledge transfer, identity construction, public inspectorate, online context

Introduction

This article illustrates how the construction of conflicting identities creates problems for the transfer of knowledge between dispersed old-timers and newcomers in a managed and online context. Two central concepts that this

issue relates to are 'managed networks' and 'communities of practice'. Managed networks are formally initiated arrangements that organizations use to try to exploit the advantages of communities of practice (Lave & Wenger, 1991; Wenger, 1998) in order to enhance organizational learning. Communities of practice are groups of people who regard themselves as practitioners in the same area of work and therefore share an interest in the same knowledge, since they conduct the same tasks (Wenger, 1998). This article seeks to increase the understanding of managed networks for the sharing of knowledge. Specifically, I contribute to the management of communities of practice by describing the managerial dilemma in relation to the construction of identity.

This study focuses on experiences of the implementation of networks of competence in the Norwegian Labour Inspection Authority (NLIA). Historically NLIA recruited its employees on the basis of their years of experience from branches like building and construction. Newcomers were assigned to an experienced employee and therefore the process of becoming an experienced inspector was the mode of learning. In their respective districts the employees had to conduct inspections regarding different areas of health and safety, ranging from the prevention of accidents to psychological well-being. During the last years this has changed: NLIA now expects the employees to be more specialized professionals who to be assigned both to projects (where the production takes place) and to managed networks of competence (where organizational learning is supposed to take place).

In general, managed networks sometimes overlap with existing communities of practice and serve to enhance current identities and learning practices. Some managed networks are attempts by the organizations themselves as a means of developing new communities of practice (Newell, Robertson, Scarbrough & Swan, 2009). While social identity is a core concept in the literature on communities of practice (Brown & Duguid, 1991; Lave & Wenger, 1991; Wenger, 1998), problems of identity have often been underestimated (Hong & Fiona, 2009). The research concerning managerial efforts to oversee the communities in and between organizations is also in its early stages (Newell et al., 2009). One issue that requires further study is the problem of the use of communities of practice as a proxy for situated learning for present-day heterogeneous workspaces (Macpherson & Clarke, 2009). Because situated learning takes place in the same context in which is it is applied, heterogeneous workspaces might limit the value of sharing knowledge, since the experiences are generated and interpreted in different contexts.

In this article, I address this gap in the literature by examining networks of competence established by management, and how the members of these managed networks struggle to transfer knowledge among themselves. In particular the relationship between 'newcomers' and 'old-timers' is investigated. The central problem I consider is the constructions of identity that create barriers to the transfer of knowledge in designed organizational learning processes. In particular I discuss how a managed and online context contributes to identity-construction problems. This is an interesting issue because research on networks of practice (Brown & Duguid, 1991; Brown & Duguid, 2000) and communities of practice (Lave & Wenger, 1991; Wenger, 1998) suggests that different forms of constructions of identity might be related to the cultivation of and access to resources of knowledge. A relatively new aspect of this phenomenon is the managerial ambition to integrate

geographically spread units into one integrated unit by using Information and communication technology (ICT) and networks aiming to develop communication, collaboration, and learning horizontally in the organization (Newell et al., 2009). This study has examined an instance of this development.

This article is structured as follows. First, the concept of the transfer of knowledge and the trade-off between old-timers and newcomers is elaborated. Secondly, the role of identity-construction in the transfer of knowledge is defined and the role of managed and online context is discussed. Thirdly, the research setting and research method and analysis of the study are explained, the multidisciplinary context is emphasized here, which only a few studies on learning across communities of practice has addressed (Oborn & Dawson, 2010), followed by the empirical section of this article. Finally, findings are discussed and concluding remarks articulated.

Theoretical framework

The transfer of knowledge and the trade-off between old-timers and newcomers

Carlile (2004) has developed a useful framework for reflecting upon the management of the transfer of knowledge when the participants have not yet formed a homogenous community. This framework identifies three types of circumstances. The first type describes a continuum with, on one end, a situation where differences and dependencies are known and, on the other, unfamiliarity generates a less clear situation. The second covers those circumstances when there are different interpretations of the same experience (or other types of knowledge). The third occurs when different interests regarding what knowledge is are generated.

In the first circumstance a common lexicon is needed for the transfer of knowledge; in the second, a common meaning has to be developed; and in the third, a common interest must be developed – all to ensure the sharing and assessing of knowledge. Østerlund and Carlile (2005) suggest that newcomers and old-timers have different interests at stake in the sharing of knowledge. There are power issues related to the identification and ownership of meaning, and tensions between canonical and non-canonical practices. Viewed from a practice-based perspective, the transfer of knowledge is simultaneously the transformation of work practice (Gherardi & Nicolini, 2000), since the transfer of knowledge implies that it transforms what you do, your interpretations and interests, and at the same time how you view yourself and others.

March (1991) suggests that the turnover of personnel between old-timers and newcomers in organizations produces a trade-off in the distribution of knowledge. Experienced members on average know more, but what they know is made redundant by the knowledge already reflected in the organizational code, and they are less likely to contribute new knowledge. On the other hand, new recruits are less knowledgeable (i.e., less experienced in this organizational context) than the individuals they replace, but what they know is less redundant in respect of the organizational code, and they are

more likely to deviate from it. According to March, old-timers induce exploitation, that is, production, efficiency, and implementation. Newcomers, on the other hand, increase exploration, namely, search, discovery, and innovation. Exploitation and exploration are about negotiating the experience-based 'best practices' and developing new practices. Hence, the trade-off between old-timers and newcomers is enabled by constructions of social identity that empower the participants to identify themselves with these negotiated work practices.

The role of the construction of identity in the transfer of knowledge

Researchers currently make use of the term 'Communities of Practice' to analyse and facilitate the transfer of knowledge in a wide range of organizational environments (Roberts, 2006). The literature on communities of practice offers a mutually constitutive account of social identity and the transfer of knowledge. Learning is seen as the process of negotiating identity (Jørgensen & Keller, 2008). Lave and Wenger's (1991) early account of communities of practice is based on apprentice styles of learning, a theory of newcomer learning whereby novices or newcomers acquire knowledge and skills through interaction with experienced members. Thus the process of gaining competence and membership in a community is linked to changing identities, involving newcomers gradually taking on more expert roles or 'identities of mastery', as Lave and Wenger denote it. In communities of practice a shared sense of identity is seen as an enabler for the transformation of identity and an outcome of the transfer of knowledge (Wenger, 1998). Wenger (p. 149) argues that identity is characterized as:

- Being a negotiated experience;
- Established through membership of the community;
- Connected to our learning trajectory; and
- Reconciling our memberships in different communities

Negotiating experience contributes to the broadening of meaning and the development of identity. Lave and Wenger (1991) view learning as the process of becoming a member of a specific community through participation, and Wenger (1998) refers to the unique history of the individual who has multiple memberships and identifies with different communities of practice, and takes part in different learning trajectories. As Wenger explains:

> … we all belong to many communities of practice: some past, some current; some as full members, some in more peripheral ways. Some may be central to our identities while others are more incidental. Whatever their nature, all these various forms of participation contribute in some way to the production of our identities. (1998, p. 158)

Hence, the construction of identity with respect to the transfer of knowledge has been described in two ways. One view is that it is a one-way, linear process, the movement from apprentice to master, like becoming a tailor or butcher (Lave & Wenger, 1991). The other view is that the construction of identity is a dual process, involving the belonging and positioning in a discourse in negotiations, where the development of a new identity helps in accountability to others in the same activity (Wenger, 1998).

In the organizational context, social categorizations regarding being a member of the organization or sub-groups, or both, produce prototype-based depersonalizations of self and others responsible for the social identities in organizations (Hogg & Terry, 2000). Social-identity theories focus on how social categorizations and participation in groups form who you are. Newcomers enter the organization with one social identity which will influence their learning and their construction of other social identities. Social identities can, therefore, both enable and constrain the transfer of knowledge between newcomers and old-timers.

In the literature on identity in organizations there are two competing views regarding the role of social identity. The integrationist view emphasizes the coherent characteristics of organizations, stressing that the transfer of knowledge can be supported by the development of organizational identity, through trust, loyalty, and shared values and implicit norms, for example (Willem, Scarbrough & Bulens, 2008). This integrationist view proposes a positive relationship between organizational identity and the transfer of knowledge (Haslam, Postmes & Ellemers, 2003; Kane, Argot & Levine, 2005). In this view, through the de-personalization in social identity, spontaneous and unconditional willingness to transfer knowledge and transformation of practice can occur. The fragmentationalist view, in contrast, regards social identities as being multiple and fragmented, and are thus more unpredictable (Albert, Ashforth & Dutton, 2000; Alvesson, 2000; Willem et al., 2008). Willem et al. (2008, p. 374) identify three scenarios for forms of social-identity construction in organizations:

1) There is a dominant company-wide social identity, without or with a weak sub-group social identity;

2) There are multiple social identities, different social identities in each unit or community of practice, and possibly coexisting with a non-dominant company-wide identity.

3) Organizational members do not primarily identify with the organization or sub-groups, but with external groups, such as professional associations.

It is interesting to note that the employees, both newcomers and old-timers in scenarios 2 and 3, do not need to identify with the organization at all. This gives us a complex, less straightforward, and less optimistic answer to the positive role of 'managed' identity-construction in the transfer of knowledge between old-timers and newcomers in managed networks.

The role of managed and online contexts for the construction of identity and the transfer of knowledge

The establishment of managed networks supported with ICT is an intervention by the organization to constitute the necessary conditions for their employees to connect and transfer knowledge. Regarding the content, some researchers advise that management should support peer-to-peer-based learning methods instead of classrooms, and avoid privileged and formally objectified knowledge, because it neglects the tacit practice-based knowledge and allows the participants to decide and control which components of knowledge are important to them (Hislop, 2009).

Managed networks for the transfer of knowledge imply two contradictory managerial roles. Managerial interventions are sometimes required because organizations primarily use these networks to integrate dispersed knowledge, which reflects organizational value. Distributed networks require also some form of managerial control because the members are dispersed, which makes social learning less likely to take place than in a community of practice, whose members are typically co-located. Then again, the literature describes networks and communities of practice as being strongly emergent in nature, self-organizing, informal, and free from influence from management, or even negatively influenced by interventions by management. Managerial control will, therefore, likely frustrate members' desire to share their geographically dispersed practice-related knowledge (Agterberg, Hoof, Huysman & Soekijad, 2010; Alvesson, Kärreman, & Swan, 2002; Thompson, 2005;).

It is widely accepted in the literature on virtual communities of practice that ICT is not a perfect substitute for face-to-face encounters or meetings and most virtual communities of practice need some face-to-face time to be most effective (Dubé, Bourhis & Jacob, 2006). Deprived of an abundance of face-to-face contacts, especially at the beginning, virtual communities of practice may have problems or take longer to establish a sense of identity, or both (Cramton, 2001; Dubé et al., 2006). There can be several explanations for these challenges. On the personal level, identification with others can be related to those who are helpful and those who are not. In face-to-face settings, reciprocity appears to be critical for sustaining supportive relationships and collective action (Putnam, 1995). On the other hand, in electronic networks of practice – web-based forums in which anyone can access and participate (Wasko & Faraj, 2005) – findings have shown that the norm of reciprocity is not a significant predictor for helpfulness of knowledge contribution. Wasko and Faraj's explanation is that online-based interactions may be generalized rather than dyadic, and direct reciprocity is not necessary for sustaining collective action. At the level of community Amin and Roberts (2008) point out that benefits of online communication in knowledge-transfer processes are higher for professional communities (whereby you become a clinician through individual academic study, teamwork, and virtual interaction) than communities of task or craft (whereby you become a midwife, tailor or flute maker through apprenticeship in a close-knit, face-to-face community), since once individuals have mastered a body of professional knowledge, they appear to benefit from exchanges of knowledge facilitated by online communications with dispersed members of their profession. Their explanation is that the presence of professional standards and identity ensures the circulation of knowledge.

Methodology

Research setting

The NLIA has undergone a process of organizational change, from a hierarchical rule-based bureaucracy towards a more professional, knowledge-based bureaucracy (Mintzberg, 1983). The organization has also moved towards a heterarchy, relying increasingly on collaboration and cooperation and making it a more decentralized network-based organization. One can

argue that the NLIA is a hybrid organization, consisting of the following coexisting elements: user-oriented logic (we inspectors know how to help the business), control-oriented logic (we inspectors know the legislation), and emerging professional logic (we inspectors know when stress is unacceptable).

The NLIA is a geographically distributed public organization, with employees dispersed around the country. The inspectors conduct inspections of the use and storage of chemicals, installed ventilation facilities, measures taken to prevent accidents at work or psycho-social well-being at work, or some or all of these. Some work within one area (like occupational hygiene or the psycho-social well-being at work). Others (in particular, inspectors in remote areas) have to conduct many different kinds of inspections. The inspectors in this organization have a range of backgrounds. Historically speaking, people with years of experience have been recruited from industries in the building and construction sectors. Others moved up from working as clerks to becoming inspectors, often after gaining college qualifications. More recently, people have entered the organization with a fuller and more extensive professional college degree or a university degree (bachelor's or master's).

While the NLIA used to keep its experts at its central core, it now has to develop their expertise in different regions, among the geographically dispersed inspectors. These people are now expected to be collective experts, experts for their region, but not national experts. Attempts have been made to achieve this aim by setting up the networks of competence among inspectors. The networks of competence are managed networks, aimed to promote the sharing and learning of knowledge in the organization. The name of these networks has been debated. Some argue that these networks are not 'networks of competence', as management labels them, but 'professional networks', stressing the development of academic knowledge within the networks. Others use the broader concept of a 'network of competence', emphasizing the mix of professional and experience-based knowledge which needs to be developed. The inspectors within each region are assigned to one of four different networks, usually on the basis of their professional orientation or area of interest.

The geographical distance between the different members can be as much as 1300 km, and, owing to their limited budget, they may only see each other face-to-face twice a year for two days at a time. The sharing and learning of knowledge are therefore supposed to take place via the use of ICT. The networks meet up around once a month for one to two hours. The tool used in the network setting is GoToMeeting™, a highly rated web-based tool that allows everyone in a group meeting to share whatever is on their computers (Lipschutz, 2007). This tool contains features that enable screen, keyboard, and mouse sharing, as well as web chat and telephone conversations. It is also integrated with email and an Outlook™ calendar to allow meetings to be booked effectively (see http://www.gotomeeting.com). While they are able to share everything they have on their computers and engage in meetings over the telephone, the participants do not actually see each other. At face-to-face meetings, which take place once or twice a year, they visit a business as a group and discuss what they have experienced there. Or they invite an external expert lecturer or practitioner to give a talk on a particular topic.

Sampling procedure

This study involves data from five networks of competence: two networks set up for the prevention of accidents, one for occupational hygiene and two within the area of psychological well-being. All of the networks were staffed with around eight to 14 people. The networks were selected on the basis of the following criteria: they all offered a distributed context (as they were networks from the two largest regions), and they represented different areas of knowledge, thereby adding variation to the study. In the two networks of psychological and social well-being there were no psychologists, but instead people with degrees in human geography and sociology, priests, former police constables, social workers, and others. The two networks for the prevention of accidents were staffed with both engineers and social scientists. The most homogeneous network was the network for occupational hygiene, in which at the time of the study nearly all of the participants had some type of degree in engineering. All of the networks, as well as the inspectors, included one or two lawyers. This study therefore represents a context including multiple pre-existing identities. Since the networks of competence had not been functioning very well, one manager had taken part in the discussions to ensure that everybody was polite and respectful, and to encourage further participation through acknowledging the importance of their attendance.

The collection and analysis of data

The collection of data took place over a three-year period. This involved interviewing network members and managers in the organization, as well as observing physical and online meetings and documents (see table 1 for an overview). I sought the data from multiple members, newcomers and old-timers, inspectors and managers, from different networks, figuring that they could provide different insights into my topic. I was logged in to the same meetings as the participants, with access to what was happening via the telephone and the computer. Sometimes, at the end of the meetings, when the participants were making evaluations, I asked questions regarding what had taken place.

Table 1. The methods of collecting data in this study.

Interviews	18 individual interviews One group interview of five managers Questions asked during observations
Observations	2.5 years of observation of face-to-face and online meetings in two networks
Archival material	Agendas of meetings Minutes of meetings Official evaluation

This study defined newcomers as participants in the networks of competence with work experience of less than seven years in the organization. Among the 18 interviewed I had four informants with less than three years of experience, four with four to seven years' experience and ten with seven up to 30 years of experience in the Authority.

The individual interviews lasted between 45 minutes and two hours. The group interview lasted for two hours. Owing to the long distances I had to travel, nine of the 18 individual interviews were conducted via telephone. Although telephone interviews are thought to be the second-best option for obtaining data in situations where social cues are important (Opdenakker, 2006), the telephone interviews proved to be just as elaborative as the ones conducted face-to-face. One reason for this may have been the informants' familiarity with presenting and elaborating on complex matters via the telephone.

All of the interviews were recorded, transcribed and analysed by the use of the NVivo 8.0 tool. The interviews were coded around sensitizing concepts (Blumer, 1954; Hoonaard, 1997), such as 'newcomer perception', 'old-timer perception', 'negotiations', and 'identity'. In the axial coding I devised the categories of 'givers' and 'receivers' and 'negotiating identity' and 'role of manager' and 'online environment'. In this final stage, notes from observations and archival data were used to develop the categories further.

Findings

The overall findings indicate that there are problems in the relationship between newcomers and old-timers situated in the managed-network context. I shall report and discuss my detailed findings in the following sections.

How newcomers and old-timers perceive each other in the context of networks of competence

Judging from the viewpoints of the newcomers and the old-timers (Table 2), we can see that it is evident that both parties were constructing sub-identities. The findings also suggest that the NLIA was lacking a strong organizational-wide identity which could provide the spontaneity and willingness to transfer knowledge from old-timers to newcomers. There are also differences in inward and outward orientations between newcomers and old-timers, respectively. This I have already reviewed in my second interview in this study. One old-timer put it in this way: '*Many of the inspectors are not interested in what's going on in the organization at all; they spend their time out in the field inspecting'*. Newcomers, on the one hand, are eager to learn about their organization, but the old-timers spend more time interacting with others in the field than they do with their colleagues in the organization. While the newcomers regarded the networks as an opportunity to learn about their organization and to nurture their professionalism, many old-timers regarded the networks as a scheme which does not work for them. These contrasting images have created tensions and a lack of engagement (e.g., no-shows at meetings).

Table 2. Conflicts of identity between newcomers and old-timers in networks of competence in the NLIA

Newcomers' perceptions	Old-timers' perceptions
We are becoming specialized experts. *'For the NLIA, it is very important that we have people with in-depth expertise and professional expertise in different fields, nurtured by activities in the networks.'* (male inspector, three years of experience at the NLIA)	We are inspectors, and inspecting is a separate professional field. *'This … inspection … is about communication skills … communication with the managers of the inspected business to ensure that change happens there. But sadly our management doesn't understand that inspection is a separate professional field.'* (male inspector, seven years of experience at the NLIA)
We think that the network is a good idea. *'I think the intention behind it is very good, as we need a place where we can get professional input.'* (female lawyer, one year of experience at the NLIA)	We miss the national experts. *'Now there are a lot more employees in the Labour Inspectorate, and we are divided into networks, and it is not so easy. Previously we had contact with those who were specialists in the Directorate. I would call the expert at the Directorate on the phone, and talk to him directly. We don't have this anymore, and I miss it.'* (male inspector, more than 30 years of experience at the NLIA)
We relate to other newcomers. '*I relate, when I have questions, to other young people; I think it is the age dimension*' (female inspector, one year of experience at the NLIA.)	
I am often alone with my questions in my office. '*I miss having somebody to talk to, as there are only two of us at my office, and the other one is a lawyer.*' (female inspector, one year of experience at the NLIA)	We use our informal network. *'I know from experience who is a specialist regarding certain types of accidents.'* (male inspector, more than 30 years of experience at the NLIA).
The old-timers are a problem. '*They are not willing to share their experience.*' (female inspector, one year of experience at the NLIA)	We learn while doing inspections. *'All of the learning takes place when conducting inspections together, in twos.'* (male inspector, more than 20 years of experience at the NLIA)
	Newcomers are a problem. *'When "newcomers" enter the network, the discussions are brought back to level one.'* (Norwegian Labour Inspection Authority, 2008 Official Evaluation, p. 10)

The construction of the 'givers' and the 'receivers'

The inspectors view the exploitation of experience-based knowledge as problematic, as there are members who become 'givers' who always share with others but rarely receive anything in return. The newcomers are the 'receivers', who then benefit from the network. One senior inspector expressed his views in this way:

> [The networks of competence] are most useful for the less experienced members, and less so for the more knowledgeable and experienced. Your role as a giver is larger than that of a receiver.

These networks are supposed to play the role of a collective, to whom individual inspectors can ask questions. It seems to be less useful for those with the highest competences, as reflected upon by this manager, with more than 30 years of experience in the organization:

> Many feel that they do not receive as much in the networks ... it seems to me that those with the highest competence get little out of it ... and this is just because they are supposed to give to the others

This unbalance has made it difficult to motivate the more competent employees to contribute to the network. For an outsider to this organization it might be obvious that the participants should have expected that the contributions from the older ones would be larger than those of the newcomers. In this organization however, the old-timers compare what they had before the networks of competence, when they had a national expert and an informal network of peers with special expertise to whom they could turn.

Negotiating identity and the role of the manager

What is an inspector in the Labour Inspectorate? As presented in Table 2, the old-timers refer to what they do in the field. They often describe how they work with their clients to instigate real changes in the inspected businesses as communicative or pedagogic skills. At the network meetings information from management is given, inspectors or invited external lecturers conduct academic lectures, and experiences are shared in form of stories and Powerpoint™ presentations. For example, in the network for occupational hygiene, academic lectures are held on the hazards involved when different chemical substances are stored together, and what might happen and what they should look for when inspecting. Another example is what takes place in meetings in the area of psychological well-being. Here by reviewing research they try to determine what causes stress by and how this can affect individuals in a negative way, and how they can become aware of unhealthy stress when carrying out inspections and writing orders on it. These activities are good examples of how an exploration of implications of academic knowledge and new research can be integrated with existing experiences and inspecting practices.

On the other hand, several of my respondents reported problems. First, the inspectors emphasized differences in professional orientation as a major problem that made it difficult to integrate different areas or perspectives of knowledge. Like when they stressed that the language of some of the other participants in the network was too full of unknown terms. Several of my respondents emphasized that some of these problems were related to the differences between newcomers and old-timers. At a regional meeting, a former district manager, who is now an adviser, voiced an emerging problem:

> I think we have encouraged new employees to believe that they should be able to immerse themselves in their field. Companies have now begun to complain that the inspectors are academically strong but that they are difficult to communicate with (notes from a regional meeting).

This quotation reveals a conflict which exists within the organization regarding knowledge and which path should be followed, for both the individual and the organization. For many of the experienced old-timers, inspections are about engaging in a dialogue with clients and making real changes in the workplace under inspection. Some newcomers, in contrast, have formed another picture, as noted by one inspector: '*The business has hired the best experts; we need to develop the same [expertise] to be able to carry out inspections there'* (notes from a regional meeting). To me this reveals two different and conflicting orientations of knowledge: one towards the inspected business from the perspective of finding practical solutions (through communication), and the other towards mobilizing expertise to match the highly competent organizations that offer company health and safety services, which are hired by the inspected business. The latter orientation indicates a movement towards a greater degree of specialization in the NLIA. The networks of competence seem to have participants who advocate competing orientations of knowledge with different learning trajectories and practices.

Secondly, newcomers expressed their frustration about how they sometimes do not know where to go with their questions regarding policy. They asked their managers and colleagues, addressed the problem in the network of competence meetings, and sent letters to the head office of the directorate, and they did not get any answers. Some old-timers, on the other hand, said that they are unwilling to share their experiences or to reveal their practices in the setting of the network of competence because this might result in new formal directives regarding how they should do their work in accordance with policy. Old-timers were also more accustomed to stronger dyadic relationships:

> I think the old boys probably do not think that the network is the right venue for learning ... they come from another time ... before the organization was reorganized … [they] miss [having] one key expert to deal with. They are used to a much stronger personal relationship with the expert. I can understand that they do not have the same trust in a network (newcomer).

The expert in this quotation pointed to the time some years back when the inspectors could call an expert at the directorate in Oslo and get answers there. Old-timers, when describing their early days in the inspectorate, also referred to the importance of learning from one experienced inspector and from the national expert. Two old–timer inspectors talked positively about the networks of competence. Both of them had developed ICT skills over the year and seemed to be very out-spoken.

Thirdly, the role of the participating manager is of interest here. Many of my informants said that to have a manager present was very helpful since he or she contributed useful information about the organization and was often very experienced. On the other hand, this study has also revealed another role. One female inspector reflected upon this situation in one meeting when the manager was not present:

> Ever since you asked us, I have started to reflect upon it, and I think the manager, through engagement, controls us. The manager reduces the number of perspectives in the discussions, and the discussions end

earlier compared to when the manager does not participate (notes taken from conversations after a GoToMeeting™ meeting).

Examples of different perspectives are current policies and rules and the needs of the client or findings in recent research. In one meeting a manager expressed this when discussing whether or not this group should learn about the solutions-oriented approach, and use it as a tool to reflect on their work practices: '*We must not create new uncertainty around the policy… in a way the learning must not give mixed signals regarding our role…'.* Learning this framework would promote the role of problem-solver that the Inspectors have often taken. In my interview data some old-timers stressed that this was their role. This manager was not sure, however, that they should adopt this role of helping inspected businesses to solve their problems, and thought that their role should be limited to control. To summarize, I would say that the newcomers relate the transfer of knowledge to a professional field and policy, while the old-timers are more likely to relate it to activities in the field that make a positive impact there by finding workable solutions and by problem-solving in the field.

Discussion

The newcomers and the old-timers situated in the managed and online network seem to have experienced problems in establishing a common identity, as envisioned in the theory of communities of practice (Wenger, 1998). I can point to several reasons for this situation. There have been a number of organizational changes and there are many new employees in the organization with different backgrounds. They rarely meet face-to-face, they work in different localities and with different clients, and it seems that there are very few strong interpersonal ties between the self-managed, independent, and dispersed inspectors.

Both the social categorization and the construction of identity have taken other paths than ones that could have enhanced a mutual construction of identity and the transfer of knowledge. As a result, these developments have created unclear learning trajectories for the newcomers and problems regarding the negotiation of experience and meaning across old-timers and newcomers.

First, the categorization of each other as 'givers' and 'receivers' is counter-productive in making the old-timers and newcomers accountable to each other in a way that promotes a good balance between exploitation of existing knowledge and exploration of new knowledge (March, 1991). The narratives behind these two social categories communicate an uneven contribution from individuals, reducing the willingness of those who see themselves as 'givers' to contribute. This categorization of self and others reduces the generalized reciprocity and also hampers the development of the sub-group identity and reciprocity which could have been useful for the transfer of knowledge in this context. Since the members do not know when or if they can benefit from the networks of competence, nearly only general norms for reciprocity and loyalty to the organization move them to contribute. In the long run this is not enough to develop the supportive relationships needed for transfers of knowledge. The distinction between the 'givers' and the 'receivers' resembles the distinction between the 'worthy' and the 'unworthy' in other contexts, giving in this context the 'givers' (often experienced old-timers) a legitimate reason to stop contributing, since they get so little out of it. This is an example of a creation of

a self-identity where non-participation becomes socially acceptable among a group, in this case, the old-timers. This construction resolves tensions among the old-timers regarding what they should do (i.e., organizational norms) and what they are willing to do. It is counter-productive for the transfer of knowledge between newcomers and old-timers, however.

Table 3. Negotiating identities in a context of managed networks

Negotiating identities	Problem	What causes the problem?	Consequences
Problems when negotiating experience	It is difficult to integrate different perspectives.	There are conflicts in the orientation of knowledge. There are also a lack of a common lexicon, different interpretations of the same issue, and interest invested in practices.	Experiences are viewed from very different perspectives.
	The old-timers leave questions unanswered.	The old-timers are not able (ICT environment) or willing (managed environment), or both, to give an answer to the newcomers' questions	It is unclear who the experts are, who can give an answer regarding what to do. It is unclear how to become an expert.
	Discussions end early.	Managers actively put an end to discussion since it might threaten a unified interpretation of the policy.	It hampers the negotiation of experience from different perspectives, i.e., hinders the mutual construction of identity.

Secondly, due to different knowledge orientations and interests, and sometimes due to the role of the manager (Table 3), it is difficult to negotiate experiences towards a mutual understanding, which is, according to Wenger (1998), important in the identity-construction process. The lack of joint tasks and shared responsibilities contributes also to too few opportunities for developing mutual interests of knowledge. The role of management and online context will be discussed more in depth in the following sections.

The role of the managed context for the mutual construction of identity and the transfer of knowledge

Old-timers and newcomers might have different interests at stake regarding access and control over resources of knowledge (Østerlund & Carlile, 2005). The old-timers in my study have an interest in conducting their work in a way that is consistent with their own preferences, or, put differently, in the practices of inspection they have invested in. In this context of managed networks of competence, old-timers seek to guard this interest by not disclosing

everything, since disclosure might turn into new formal rules which could reduce flexibility in the field. The old-timers prefer learning in twos, face-to-face, during inspections or on the phone with people they know and trust. Their key asset of knowledge is the experiences and communicative skills they have developed through their relations to their clients, an area of knowledge that they feel is not acknowledged by management (table 2).

Others, often newcomers, put their professional identity in the foreground and are eager to discuss their professional field online as well as face-to-face. Nurturing the professional identity can also be seen as a strategy to avoid managerial control and to increase the inspectors' individual freedom to handle tasks. But it is also an orientation of knowledge that creates many barriers related to language, interpretation, and interest (Carlile, 2004), which influence negatively the negotiation of experience and the mutual construction of identity among the participants.

The old-timers and newcomers are not the only ones with interests at stake in the context of managed networks: the participating manager also has interests. Agterberg et al. (2010) state that online intra-organizational networks of practice require some form of managerial control and support to develop their social learning. My findings similarly suggest that managers contribute positively through their engagement, their experiences or just by their presence. But managers also contribute negatively when their direct involvement cuts short the sharing of experiences and the exploration of new ideas (table 3). When the manager states that the inspector role is 'only' control, the manager also denies the participants the discretion to decide what aspect of knowledge is important in their practice. This relives the dilemma: on the one hand, managers are supposed to focus their employees towards organizational goals and to end debates, one the other hand, much of the tacit knowledge here is embedded in a user-oriented role. Management hesitates to acknowledge this user-orientated role, but it is a core component of the old-timers' practice, identity, and knowledge. The exploitation of existing practice threatens the fragile 'impression' of consensus around the interpretation of the existing policy, and this threatens managers' ability to control their employees and to implement policy effectively.

When all three groups – newcomers, old-timers and managers – have these different interests at stake, it is hard to negotiate freely and to develop the mutual identity needed to enhance the transfer of knowledge among the participants. These findings support the idea that learning processes can be assisted, but also that interventions by management negatively influence them (Agterberg et al., 2010; Alvesson et al., 2002; Thompson, 2005). When writing about managing communities, Newell et al. (2009) emphasize that they only can be successful if managers limit their tendency to control and find new ways of managing, like supporting new expert roles, creating events, and documenting work practices. The management should, therefore, be more thoroughly informed about how the inspectors actually work if a managed transfer of knowledge is to succeed. One way forward could be for managers to support and acknowledge the user-oriented practices and knowledge, and to promote the roles of the old-timers as experts in order to motivate the transfer of knowledge from old-timers to the newcomers.

The role of online relations for the construction of identity and the transfer of knowledge

The online encounters in these managed networks of competence do not seem to be supported by the same generalized reciprocity, which, according to Wasko and Faraj (2005), facilitates collective action in the case of electronic networks of practice (web forums). Instead it seems that the transfer of knowledge across the inspectors is more dependent on direct reciprocity, which is difficult to develop in this group-oriented online environment. In my findings I can see several reasons for this situation:

1) There are too many participants in the GoToMeeting™ meetings, as many as 15, and many are silent.

2) The participants do not see each other (GoToMeeting™), and it is difficult to get to know each other.

3) The old-timers were used to a dyadic relationship with a 'master' (when they were newcomers) and a national expert (later on) when learning.

The third reason implies an interesting finding in relation to the role of reciprocity in these managed networks. Maybe the reason why the experienced old-timer creates problems is due to his or her familiarity with dyadic relations rather than the generalized types of reciprocity a managed network can provide. When the old-timer reminisces, he or she looks back on a master-apprentice relationship and a strong association with an expert at the directorate. Offering and receiving generalized reciprocity by a larger managed network seems to be an unfamiliar source for the transfer of knowledge for these dispersed inspectors. This offers a complementary explanation besides the role of professional standards (Amin & Roberts, 2008) regarding why online communication in knowledge-transfer processes is easier for professional communities than this task or craft community that these veteran inspectors seem to belong to. The old-timers appear to represent a task community where dyadic relationships are important – in contrast to the more academically oriented newcomers who rely on other newcomers or groups of the same profession.

Conclusion

For more than two decades, learning theorists have studied the social aspects of the transfer of knowledge. The literature on communities of practice regard the forms of constructions of identity as being related to the cultivation of, and access to, resources of knowledge. Novices learn from masters and are becoming central members in the community (Lave & Wenger, 1991; Wenger, 1998). However, I have found that the newcomers and old-timers in this managed and online network context often do not regard each other as peers who possess useful knowledge and practices. The role of managed and online context contributes to complementary explanations for why they struggle to construct a mutual identity that facilitates the transfer of knowledge.

While managerial intervention is needed to integrate dispersed knowledge (Newell et al., 2009), and more is required in online contexts (Agterberg et al., 2010), it also creates problems of identity. My study reveals that the

negotiations of experience and the broadening of meaning, that is, the mutual construction of identity and the transfer of knowledge between newcomers and old-timers, is hampered by a lack of willingness or ability to share and by managers who control what knowledge is. On the other hand, there is need for some managerial effort to formulate goals for the networks of competence and to negotiate and communicate with and to motivate the members.

I also suggest that online communication is easier for professional communities than it is for this task or craft community that the old-timers appear to belong to, not only due to a lack of shared professional standards (Amin & Roberts, 2008), but also due to a lack of familiarity with generalized reciprocity among the old-timers. Further studies should look into whether veterans and more academically oriented newcomers in present organizations rely on different forms of reciprocity. If old-timers in craft- or task-based communities in general mostly rely on dyadic relationships, and the aim is to transfer knowledge to more academically oriented newcomers and vice versa, managers should promote dyadic relationships in addition to networks in order to promote the mutual construction of identity for the transfer of knowledge.

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