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KNOWLEDGE SHARING IN VIRTUAL TEAMS:

ACTION RESEARCH

ABSTRACT

In this study we examine knowledge sharing in virtual team settings. Information technologies and groupware in particular can support knowledge sharing in virtual teams. The purpose of this study is to examine and identify the effects of groupware adoption on a virtual team's knowledge sharing. The research problem was twofold: Firstly, the effects experienced by the virtual team members of groupware deployment during their knowledge sharing, and secondly, social adaptation to groupware.

The field of the research problem is examined with a literature study. We present a selection of theories that support practical development of knowledge sharing in virtual teams. Fundamentally, this thesis has a practical approach. Action research was conducted within one of the virtual teams in Nokia Corporation by interviewing, observing and working together with the team members. Previewed theoretical frameworks are used to analyze the results.

The research shows that deployment of groupware can improve knowledge sharing in a virtual team. However, some problems occurred. Learning new virtual work methods takes extra effort and investment in time for training and motivation. This process can take a long time. Unlearning old work habits requires persistence on behalf of the virtual team members and the groupware promoter.

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1 INTRODUCTION

This study focuses on locating existing theories on knowledge sharing and advice on developing knowledge sharing for a distributed workgroup or virtual team. Secondly, we apply this information in practice in one specific action research and evaluate its effects.

1.1 Background

Urbanization brings national companies into cities where skilled personnel are available. Globalization creates multinational companies that are distributed over multiple sites. Organizations operating on these sites must communicate in many ways across various boundaries at different levels. Communicating individuals, teams, units and organizations often need to overcome their boundaries of locations, societies, countries, cultures and time. To succeed, companies must enable other methods besides the local vertical reporting in usual line-work. Researchers have used various concepts to describe this subject matter. Virtual team (henceforth VT) is an example of a way to organize for flexible communication over those boundaries. There are many definitions for VT, but the following is useful for our purposes. "*A virtual team* is a group of people who work interdependently with a shared purpose across space, time, and organizational boundaries using technology" (Lipnack & Stamps 2000, 18). One of the technologies that enable virtual teaming is groupware. "*Groupware* is technology designed to facilitate the work of groups" (Nielsen et al. 2000, 404).

Communities of practice emerge to enable lateral communication inside companies and even beyond organizations to achieve extended enterprise (Wenger et al. 2002, 6). "Communities of practice are groups of people who share a concern, 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 et al. 2002, 4).

These groups of people share information to achieve certain goals by doing certain tasks collaboratively. Efficiency of this activity is related to the ability to share meanings of data, information and eventually knowledge, as well as to build new knowledge, products or services through such activity. How effectively and efficiently a virtual

team can achieve its goals depends on many issues, but one of the most important factors is trust among the virtual team members.

The reasons why companies are shifting from traditional hierarchical work structures to enable virtual teams by supplying and supporting technologies that construct distributed work environments are purely rational; the globalization and growth of companies have made local work sometimes impractical according to Skyrme (1999, 98-99). When we study possibilities to support knowledge sharing in these virtual work environments, we have to look at previous research considering communities of practice, virtual teams and organizations.

Okkonen (2001), according to Savage (1996), argued that changing the business environment has created new managerial challenges. These challenges include fragmentation of companies, accountability in dynamic network organizations, coordination of cross-functional task teams, incorporation of continuous learning and responsiveness within an organization's structure. Increased flexibility by building co-operative networks in order to learn from each other and gaining positive network externalities are seen as a partial solution to these challenges. (Okkonen 2001.)

Davenport and Prusak (2000, viii) state that knowledge management has helped business leaders to learn that technology does not hold all the answers and that the business world is concerned with something other than data. The importance of knowledge has been understood after costly errors. Many firms struggle to understand what they know, what they need to know and what to do about it: How to do things and how to do them better? In addition, firms must use their knowledge efficiently and effectively to locate existing knowledge and distribute it to its right place in a geographically dispersed large organization. One can use new technologies as communication mediums when connecting people with knowledge to those desperately seeking it. (Davenport & Prusak 2000, 15-18.)

Companies and organizations in general have instituted technical and humane structures to nurture knowledge creation (generation), codification and coordination and transfer. Davenport and Prusak (2000, xv) clarified that: "knowledge management should become part of everything an organization does, and be part of everyone's job. If

companies are successful in managing knowledge, they may even forget that they are doing it."

1.2 Research Problem

The main objective of the study is to answer to following questions with the aid of existing research literature from the field. This study is divided into two main sections of literature research and action research.

The main research questions are:

1. How do members of a virtual team experience the effects of deploying groupware in their knowledge sharing?

2. How does a virtual team socially adapt to use groupware?

In order to answer to the first question, we have to find answers to other questions: What kinds of theories support practical development of knowledge sharing in a virtual team setting? What kinds of methodological or technical solutions are available to improve knowledge sharing? How to produce a working model that could be supported by information systems? How to improve knowledge sharing, especially with adapting groupware?

When a group of interacting people expands and evolves, it can reach a point when communicating with emails and phone calls are just not enough. Even on personal levels, email has reached levels that remind us daily about information overload. Saint-Onge and Wallace (2003, 108) claim that a strong "supportive technology is necessary for building effective communities of practice in any organization." However, the plain use of technology is still not an answer. Human factor needs to be recognized and "the technology must be based on socio-technical principles" (Saint-Onge & Wallace 2003, 108). This study will take a closer viewpoint of social adaptation of deployed technology.

1.3   Goals

This study aims to map theories that reveal how virtual teams share their knowledge and find ways to support knowledge sharing within the teams. The essential goal is to find out how groupware could evolve knowledge sharing of virtual teams. The result of the theoretical part of the study is a collection of theories from relevant fields of study to reach these goals. These results are used as guidelines in practice.

The empirical part of this study will draw results from the deployment of groupware in one virtual team. During the action research we will evaluate the target group's experiences of groupware's effects on its knowledge sharing. After our experiences we can comment on the previously presented guidelines and their relevance in our research setting.

1.4   Focus and Scope

This research focuses on investigating knowledge sharing development ideas from knowledge management, computer supported co-operative work (henceforth CSCW), communities of practice and virtual team literature. Because these research fields are broad, the study does not aim to examine knowledge management (henceforth KM) and virtual team fields in their depth. Instead, the most applicable theories in relation to knowledge sharing in virtual teams will be harvested and applied in practice. The idea is to find relevant issues, which make teamwork in virtual settings most feasible and beneficial for the team members.

The research is made in Finland and the majority of the interviewees are Finns. Many other nationalities are also represented. The cultural mixture of corporate culture and especially Scandinavian culture is remarkable factor in defining social context for the study.

1.5   Structure of the study

Chapter two will present the theoretical background for the study. It covers knowledge management, knowledge sharing and virtual teaming issues. Methodological choices

and the description of the target group are presented in chapter three. Chapter four presents the action research cycle. The results are discussed in chapter five and chapter six summarizes the entire study.

2 THEORETICAL BASIS

2.1 Knowledge Sharing

In this chapter knowledge management theories related to knowledge sharing are discussed and reviewed. Knowledge management and its roots form the conceptual basis of the study. Using existing knowledge on the subject can prevent falling into the usual pitfalls. We look at relevant earlier studies and findings, which are then utilized in the empirical part of the thesis.

Knowledge has frequently been perceived as an object defined as "justified true belief" (Audi 1998, 215; Boer et al. 2002, 1127). Knowledge sharing can be described as follows.

> "It is assumed that knowledge can be codified and separated from the minds of people. When adopting this perspective on knowledge, *knowledge sharing* is generally conceptualized as 'transferring knowledge-objects' in a similar way as information is being transferred in the conduit model (or sender-receiver model)." (Boer et al. 2002, 1127.)

2.1.1 Knowledge Management Concepts

The management of knowledge has always been taken care of without articulating it as knowledge management. After saying that, it is remarkable how focusing on it has raised an issue of the value saved with it or lost without it. *Knowledge management* is a discipline to systematically leverage expertise and information to improve organizational results as the following definitions frame it.

> "Knowledge Management is a discipline that promotes an integrated approach to identifying, managing, and sharing all of an enterprise's information or knowledge assets based on relationship among people and valued information. These assets may include databases, documents, policies, and procedures, as well as previously unarticulated expertise and experience resident in individual workers." (Gartner Group 1996)

"Knowledge Management is purposefully and systematically enhancing and exploiting the intellectual resources available to an organization, to increase the firm's value" (Zack 1999). Bukowitz and Williams (1999, 2) define knowledge management as "the

process by which the organization generates wealth from its intellectual or knowledge-based assets".

In 1989 Karl-Erik Sveiby (1989) defined KM as the management of knowledge work and knowledge intensive organizations. Currently his definition for KM is "the art of creating value by leveraging intangible assets" (Sveiby 2001). The KM field has different tracks – the information technology (henceforth IT) track and the people track. This study tries to take out the best of both worlds. We are building supporting IT system for groups of real people who have their inner talents and special knowledge. In this sense, this study may well avoid taking sides.

Ron Young (2002) defined KM to mean

> "…capabilities by which communities within an organization capture and identify knowledge that is critical and constantly improve it and make it available in the most effective manner to those who need it, so that they can exploit it creatively to add value as a normal part of their work." (ibid.)

KM is a fusion of strategy, people, processes, content and technology (ibid.).

2.1.2 Knowledge Hierarchy

Different views on the hierarchy of knowledge can be found from literature. Skyrme (1999, 47) has appended Amidon's (1997) definition for hierarchical division to data, information, knowledge and intelligence/wisdom. *Data* is facts and figures. It is codifiable, explicit and easily transferred. "Data is a set of discrete, objective facts about events" (Davenport & Prusak 2000, 2). *Information* is data with context. *Knowledge* is information with meaning. It is contextual, tacit and its transfer requires learning. (Skyrme 1999, 47.) Davenport and Prusak (2000) define knowledge with more complexity:

> "*Knowledge* is a fluid mix of framed experience, values, contextual information, and expert insights that provides a framework for evaluating and incorporating new experiences and information. It originates and in applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms." (ibid. p. 5)

Intelligence/wisdom is knowledge with insight. It is human and judgmental. (Skyrme 1999, 47.)

Two different types of knowledge have been identified. Nonaka and Takeuchi (1995, 59), according to Polanyi (1966), define that "*tacit knowledge* is personal, context-specific and therefore hard to formalize and communicate." *Explicit knowledge* is codifiable, "transmittable in formal, systematic language" (Nonaka & Takeuchi 1995, 59).

2.1.3   Organizational Memory

The roots of knowledge management are in the field of *organizational memory* (henceforth OM) (Stein 1995). Organizational memory continues to be an important feature of a learning organization. According to Ackerman and Halverson (2000), organizations should be able to retrieve traces of their past activities, but the form of this memory is unclear in the research literature. It can be considered as both object and process (Ackerman & Halverson 2000).

Stein (1995) defined OM as the means by which knowledge from the past is brought to bear on present activities, thus resulting in higher or lower levels of organizational effectiveness. The availability of OM does not always make organization effective; it may even lead to lower effectiveness and inflexibility. That is why "memories are time functions that have intended and unintended effects on receivers" (Stein 1995). OM can also be seen as a constraint that threatens the organization.

Walsh and Ungson (1991) state that OM is not centrally stored, but distributed in different parts of an organization in five retention facilities; individuals, organizational culture, transformations or processes, organizational structure and workplace ecology. Also, external archives form additional storage for memory. Individuals have a finite storage capacity of their memories and tend to "create cognitive heuristic to reduce the uncertainty and equivocality in the information environment they confront" (Walsh & Ungson 1991, 62).

When we talk about distributed memory, it means not to consider memory as a single, monolithic repository of some sort for the entire organization. The distributed cognitive view of a network of artifacts and people, of memory and of processing, all of which are bound by social arrangements, provides a deeper and ultimately more usable understanding of organizational life. It describes how memory as representational states can be both separated from organizational actors, and at the same time necessarily bound to their actions and understandings. (Ackerman & Halverson 2000.)

Organization must enable its memory with communication. Boundary objects can transfer memories in organization. For example, a document that can be sent from one person to another. A boundary object contains sufficient detail to be understandable by both parties. While the representation of the object is the same, the meaning can change along with its users. A boundary object usually holds decontextualized information and serves as some kind of vehicle for transferring memory or knowledge. As memory crosses between groups or even across time, it becomes a boundary object, attempting to serve the needs of both the creator and the reader but lacking the full context of either. (Ackerman & Halverson 2000.)

Ackerman and Halverson (2000) imply that the technological systems cannot outperform human activity in such a complex information work. Also the authenticity of the information is always an issue. If you have to trust some incomplete information, you better trust the source of the information.

In real life, multiple group and organizational processes are occurring simultaneously. This is called simultaneous embedding of processes. Sometimes the memory used is individual and private; sometimes it is group and public, which implies a mixed provenance of memories. In many cases, all these memories must be used seamlessly together to create an organizational product. (Ackerman & Halverson 2000.)

When using memories as processes we are simultaneously embedded within several processes. These memories have mixed provenance. Our work is socially organized. We are dependent on our groups and organizations, databases and the correctness of our information. When we deliver information over the telephone, the information acts as a boundary object which carries information to the other party's memory. Information is

decontextualized from its original context when transferred and neither party understands the full context of use by the other. To reuse the memory, the user must recontextualize that information for the current purposes. Inadequate decontextualization of OM causes inability to recontextualize it, which makes memory useless. Future use should be considered carefully when creating organizational memories. Decontextualization and recontextualization are required to effectively turn a memory "object" into a memory process. (Ackerman & Halverson 2000.)

2.1.4   Organizational Learning

Organizational memory enables organizational learning. Here are some definitions of learning. By the dictionary, individual learning means the acquiring of knowledge or skill. Kim (1993) defined, after Argyris and Schon (1978), that individual learning means new knowledge translated into different behavior that is replicable. Kim (1993, 38) continues, referring on Kolb (1984), that "learning is the process whereby knowledge is created through the transformation of experience", increasing one's capacity to take effective action. This capacity is twofold, operational and conceptual. 1) Operational learning is the acquisition of know-how, the ability to produce some action. 2) Conceptual learning is the acquisition of know-why. For example, the ability to articulate a conceptual understanding of an experience.

"Organizational learning is defined as increasing an organization's capacity to take effective action" (Kim 1993, 43). *Single-loop learning* is about finding solutions to problems within a given set of rules. These rules are not to be questioned. Kim (1993, 45) refers on Argyris and Schon (1978) that "*double-loop learning* involves surfacing and challenging deep-rooted assumptions and norms of an organization that have previously been inaccessible, either because they were unknown, or known but undiscussable."

Organizations should avoid the *competency trap*. It occurs when favorable results are achieved with an inferior procedure, thus preventing experience with a superior procedure to be gained. This may lead organizations to get stuck with procedures which are far from optimal (Levitt & March 1988).

2.1.5 Common problems in Knowledge Sharing

Nancy Dixon (2000) presented three myths pervading knowledge sharing, which seemed to be rational at first, but have been proven wrong. "The three myths are (1) build it and they [people] will come, (2) technology can replace face-to-face, and (3) first you have to create a learning culture" (Dixon 2000, 2). The first myth comes from the assumption that knowledge could be made available in a central database as if it was a large warehouse. Building such a warehouse of corporate knowledge was hoped to bring some control and manageability to knowledge which is so often amorphous. The lack of contribution and retrieval could be surprising after the initial excitement of building the database. Firms have tried to boost contribution by different means of rewards and incentive systems, but the answer lies elsewhere. It is the fundamental idea of the warehouse that should be changed. The originating idea should focus on reuse of knowledge, not on collecting and storing it. Hence, do not build a warehouse of knowledge, but instead try to deliver the means to support reuse of it. (Davenport & Prusak 1998/2000, 173; Dixon 2000, 2; Markus & Keil 1994.)

The second myth makes its mistake when it tries to totally computerize human interaction. While technology allows people to share knowledge without the constraints of time and place, people still build trust with each other by meeting in real life. Sharing knowledge via technical means becomes natural only after creating mutual trust in face-to-face meetings. That is why the most effective systems are hybrids of both—not trying to replace, but to enhance one another. (Dixon 2000, 3.)

The third myth of "creating a learning culture first" is seen as a solution for enabling knowledge sharing in an organization having a competitive culture. No one is willing to share precious knowledge with others in a competitive atmosphere, because it might help the other person get ahead. Therefore, cultural change to being either noncompetitive or collaborative has been claimed to be the answer. Dixon sees this issue the other way around. She thinks, "If people begin sharing ideas about issues they see as really important, the sharing itself creates a learning culture". Experiential understanding of the importance of knowledge sharing is creating a learning culture. (Dixon 2000, 5.)

2.2 Characteristics of Virtual Teams

The notable areas forming the conceptual basis for this study are communities of practice, virtual teams and organizations, groupware and the role of trust in knowledge sharing. Tuomi (1999) developed a theory of organizational knowing and learning, and discussed its practical applications. One proposal was to organize a combination of team and a community of practice constructs, which he called *organizational community*. This team-based community model would resolve problems of accountability in pure communities of practice and inter-team knowledge sharing problems. (Tuomi 1999, 399-400.)

In the following paragraphs we will discuss the concepts of virtual teams and look at the practical recommendations for evolving communities of practice.

2.2.1 Concepts of Virtual Teams and Organizations

Jarvenpaa and Leidner (1998) define "a global *virtual team* to be a temporary, culturally diverse, geographically dispersed, electronically communicating work group" (Jarvenpaa & Leidner 1998, 3). It should be noted that a virtual team can have face-to-face meetings and therefore need not be entirely virtual. *Virtual organization* can be described as follows:

> "The phrase 'virtual organization' stands for a task, project or permanent organization which is decentralized and independent of any spatial connection…
> The characteristics of a virtual organization are: dispersion, empowerment, restlessness and interdependence." (Okkonen 2001, 269.)

According to Okkonen (2001), work is shifting from place-centric to people-centric. Traditional organizational virtues of rigidity, technological determinism, differentiation and demarcation could be replaced by flexibility, non-differentiated, non-demarcated and multi-skilled counterparts of a virtual organization. (Okkonen 2001.)

Palmer and Speier (1997/2001) have framed a typology for virtual organizations, which is presented in table 1. According to them "the use of IT to support the virtual organization and virtual teams does differ." The question of IT being a key enabler of virtual organizations might be argued, because there are other issues to look at besides

the technologies and applications. The following typology demonstrates four types of virtual organizations and their varying properties. The use of groupware is proposed as suitable IT support for the most of the virtual organizations.

Table 1. Virtual Organization Types Comparison on Multiple Dimensions (Palmer & Speier 1997/2001)

	Virtual Teams	Virtual Projects	Temporary Virtual Organizations	Permanent Virtual Organizations
Range of Involvement	Internal to an organizational function or departmental unit	Across functions and organizations	Across organizations	Across organizations
Membership	Small, local	Indeterminate	Typically larger	Typically smaller, but scaleable
Mission	Teams on specific, ongoing tasks	Multiple organizational representatives working on specific projects	Multiple functions responding to a market opportunity	All functions and full functionality as a working organization
Length of project	Membership varies, but form is permanent	Temporary	Temporary	Permanent
Uses of IT	Connectivity, sharing embedded knowledge (e-mail, groupware)	Repository of shared data (databases, groupware)	Shared infrastructure (groupware, WANs, remote computing)	Channel for marketing and distribution, replacing physical infrastructure (Web, Intranet)

2.2.2 Communities of Practice

Organizations have developed loosely formed often-organic structures to deal with work-related problems. These groups are called *communities of practice* (or referred here as *communities,* for short). Kimble et al. (2000, 12-13) concludes that community of practice is one concept for overcoming the different boundaries of virtual teams. These boundaries of groups, organizations, cultures, nations and frictions of distance could be crossed by building trust and understanding. This is where communities of practice were seen as a way to share and leverage organizational knowledge. Writers claimed communities of practice to be "one vehicle for more effective virtual team working" (Kimble et al. 2000, 13). Tuomi (1999, 398-402) also supported this idea.

Communities of practice can take many forms according to Wenger et al. (2002, 24-27). They can have many attributes: small or big, long-lived or short-lived, co-located or distributed, homogeneous or heterogeneous, the ability to stretch inside and across boundaries, exist within business or reach across business units—even across organizational boundaries, spontaneous or intentional, unrecognized to institutionalized.

Wenger et al. (2002, 27-29) identify the structural elements of communities of practice as having three areas: Domain, Community, and Practice. Saint-Onge and Wallace (2003, 35) also present a table of different divisions, which is described below in table 2.

Table 2. Elements of Communities of Practice (Saint-Onge & Wallace 2003, 35)

AUTHOR & PERSPECTIVE	ELEMENTS		
Wenger, McDermott, Snyder (consultants and researchers)	Domain: the community's knowledge base and understanding of the field in which it resides	Community: the collection of people and their corresponding roles that form the community	Practice: the "work" of the community, its actions, learning activities, knowledge repositories, etc.

Lesser, Fontaine, and Slusher (consultants, IBM Institute for Knowledge Management)	People: those who interact on a regular basis around a common set of issues, interests, or needs	Places: gathering points, face-to-face or virtual, that provide a meeting ground for the community members	Things: the knowledge objects generated by individuals or collectively by the community
Saint-Onge & Wallace (KM Practitioners)	Practice: the knowledge base, processes, and procedures that inform a collection of actions in the delivery of a product or service	People: the community of practitioners who join together to find ways to rebuild capability required to realize business strategies	Capabilities: the knowledge base, skills, abilities, attitudes, brands, processes, and relationships that result in the ability to undertake actions within the practice. The "link" between strategy and performance

Because none of these three divisions were exactly applicable for this study, the following mixture of these elements presented in table 3 is used as a conceptual working model in the empirical part of the study.

Table 3. Conceptual Working Model for Thematic Processing of the Target Group Evaluation

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1.People, capabilities and community;
- Collection of people and their roles (Wenger et al.: *Community*)
- who regularly interact within common interests, needs (Lesser et al.: *People*) or *Domain* (Wenger et al.)
- as joined practitioners finding ways to rebuild capabilities needed to realize business strategies (Saint-Onge & Wallace: *People*)

These people possess capabilities of
- knowledge base, skills, abilities, brands, processes, and relationships that enable actions

within their practice (Saint-Onge & Wallace: *Capabilities*).

2.Practice (processes, tools);   • "The work of the community: its actions, learning activities, knowledge repositories, …" (Wenger et al.: *Practice*) knowledge base, processes and procedures (Saint-Onge & Wallace: *Practice*).   The practice includes handling of things: • "The knowledge objects generated by individuals or collectively by the community" (Leser et al.: *Things*).
3.Places (tools);   • "gathering points, face-to-face or virtual, that provide a meeting ground for the community members" (Leser et al.: *Places*)

Wenger et al. (2002, 51) propose seven principles for cultivating communities of practice, which are presented in the table 4. Often voluntary communities must create excitement, relevance and value enough to attract and engage enough members in order to be successful. This sense of aliveness has to be generated from within the community. It is paramount for communities. That is why communities should also be designed for aliveness. These principles are derived from the design needs of a natural, spontaneous and self-directed human institution. These represent a flexible guide for a community to realize itself and to become alive. Yet, they are not recipes to be taken literally. (Wenger et al. 2002, 49-51.)

Table 4. Seven Principles for Cultivating Communities of Practice to Success (Wenger et al. 2002, 51-63)

1. Design for evolution. Design elements should allow reflective redesign depending on community development stages, its environment, member cohesiveness, and the kinds of knowledge it shares.   **2. Open a dialogue between inside and outside perspectives.** Build a community design on collective experience. An outsider brings in new ideas and an insider provides understanding of the community issues and can also act as a change agent.   **3. Invite different levels of participation.** Members may shift between levels according to their interests in the group activities. Create "campfire" and opportunities to participate.   **4. Develop both public and private community spaces.** A public space consists of face-to-face or virtual meetings and events. Private space allows networking of private communication and relationships.

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5. Focus on value. A community of practice must create, harvest and provide value to its members. Raise awareness of value by communicating it.

6. Combine familiarity and excitement. Familiarity of regular activities deepens relationships and creates a common place to nurture consideration and reflection of ideas. Exciting happenings unite members spontaneously to share experiences and expertise.

7. Create a rhythm for the community. A regular meeting rhythm indicates movement and liveliness of a community. Find the right rhythm for each phase of community life cycle. Support large communities with small-group gatherings.

As Wenger et al. (2002, 50) put it, "communities, unlike teams and other structures, need to invite the interaction that makes them alive" (Wenger et al. 2002, 50). Maybe we could say that tools and applications designed for virtual teams could also benefit from such a lively interaction and development within them. Therefore, these principles deserve particular attention in our study and are described in detail for their wider applicability to our needs.

2.2.2.1 Design Communities of Practice for Evolution

Wenger et al. (2002, 51) claim that the primary role of community design is to catalyze evolution common to all communities. Because of their organic nature, designing communities of practice more closely resembles shepherding or life-long learning than traditional organizational design. Used design elements should be combined in a way that helps a community's natural evolution. "Alive communities reflect on and redesign elements of themselves throughout their existence" (Wenger et al. 2002, 53). Change is constant. Environmental changes in organization, core science or technology of the community constantly affect on it. Organizational changes may also have influence on the importance of the community or set demands for it. Communities usually develop on preexisting personal networks. A growing community welcomes new members that bring in new interests that may shift the focus of the community. (Even in virtual teams, where the mission statement may remain fixed, the substance in the agenda may change radically from time to time.) New technological advances may also change a community's working methods. "…Communities…evolve beyond any particular design, the purpose of a design is not to impose a structure but to help the community

develop" (Wenger et al. 2002, 53). The speed of a community's evolution depends on the functionality of social and organizational structures including community coordinators and problem solving meetings. The most important community design elements depend on their "stage of development, its environment, member cohesiveness, and the kinds of knowledge it shares" (Wenger et al. 2002, 54).

2.2.2.2 Open a Dialogue Between Inside and Outside Perspectives

Teams can be designed to meet their preexisting output requirements. But community design must build on its members' collective experience. An insider's perspective is a link to this collective experience required to know the community. Only an insider can provide understanding of the community issues in the heart of the domain, knowledge that needs to be shared, challenges of the field, and the latent potential in the faint signals of emerging new ideas and technologies. An insider also knows who the real players are and their relationships. Outside perspective helps members of the community to see the new possibilities of growth for their internal potential to develop their knowledge. Seeing examples of similar communities elsewhere could boost community building and leverage dormant capabilities. "Good community design brings information from outside the community into the dialogue about what the community could achieve" (Wenger et al. 2002, 54). This may involve educating community members about the role of community in other organizations. An "outsider" may also bring new ideas to the community leader and core members during a designing process. This dialogue results in the empowering of legitimated insiders (who are the experts of the subject matter) to see new possibilities (brought in by outsider) and to act effectively as change agents. (Wenger et al. 2002, 54-55.)

2.2.2.3 Invite Different Levels of Participation

A key leadership task that sustains a community's identity is maintaining clear, permeable, and meaningful boundaries around their communities (Stuckey & Smith 2004). Community architecture should allow and support members' different levels of interest in the community. We cannot assume that all members should participate equally because the reasons why people participate in the communities vary. Some

receive direct value from it, some value personal connections or opportunities to improve their skills. A community coordinator is an important person organizing events and connecting members. Three main levels of participation are seen in communities. The *Core* group is a small group (10 to 15 percent of the whole community) of active people–the heart of the community. They discuss on the public community forum, participate in task forces, direct the attention of the community to relevant topics, and further the community's learning process. The core group leads the community together with the assistance of its coordinator. The *active* group is the next level outside the core. Its members attend meetings and participate sporadically in the community forums, but not as passionately as the core group. It is about the same size as the core. The largest portion, *peripheral* community members rarely participate. They might feel they have a lack of authority, or think their observations are not appropriate for the whole community. They still watch the core and active members' interaction, may have private discussions on the public issues, and learn a lot from the community. The *outsiders* surround these three main levels. They are not members, but otherwise interested parties as customers, suppliers, and "intellectual neighbors." The following figure 1 illustrates the levels of participation. (Wenger et al. 2002, 55-58.)
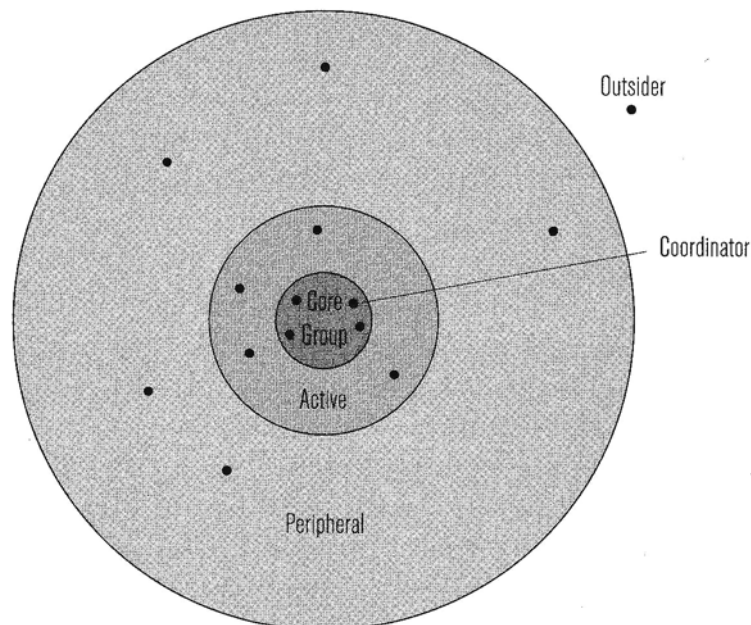
Figure 1. Degrees of Community Participation. (Wenger et al. 2002, 57)

Community members may shift between these levels according to relevance of current topics to their interests or expertise. "To draw members into more active participation, successful communities build a fire in the center of the community that will draw people to its heat" (Wenger et al. 2002, 58). Community activities should be designed to allow all levels to feel like full members. Instead of forcing participation, good communities build opportunities for semiprivate interaction for the peripheral group and limited leadership roles for active members. (Wenger et al. 2002, 55-58.)

2.2.2.4 Develop Both Public and Private Community Spaces

A dynamic community has rich connections both on public and private levels. Public places of such a community include events and meetings where all members of the community can meet face-to-face or virtually. These meetings can occasionally include outsiders. An agenda may consist of informal discussions of current issues and problems as well as formal presentations. A public community space has a substantive and ritualistic purpose. A community combines technical discussion, key principles and practice of the organization in a way that can influence the organization's further development. Events bring rhythm to a community, where members can feel that they belong to an active community together with other participating members. Still, we should not overestimate and concentrate solely on these public events. After all, the heart of a community is a network of relationships of its members. A community coordinator is needed to activate this net of private communication, where every conversation strengthens the relationships within the community. These one-on-one discussions are pivotal for creating successful public space meetings with lively dialogue. They form a channel for sharing information to smaller groups of people, with the coordinator's discretion acting as a gate. Interrelated public and private levels contribute to each other. Public meetings create an opportunity for private informal networking. "The key to designing community spaces is to orchestrate activities in both public and private spaces that use the strength of individual relationships to enrich events and use events to strengthen individual relationships." (Wenger et al. 2002, 58-59.)

2.2.2.5   Focus on Value

Because participation in communities is usually voluntary, it must provide value enough to community members, their teams and eventually the whole organization in order to thrive. The experienced value in a newly formed community may be unclear. At first value comes from problems tackled and the needs of the members. Later on, the grown up community accrues value from its easily accessed, systematic body of knowledge. Community members need to create their own potential value and develop proper ways to collect it. This can be done in the form of meetings, events, activities and relationships. Realization of value may take some time. Informal daily discussions leading to new ideas applied elsewhere may remain unnoticed until reported back. Community members should be encouraged to be explicit about the value in order to raise awareness of it. Discussing value makes the real impact of the community more visible to all stakeholders. Furthermore, apparent value attracts possible new members to the community. Communities need to create events, activities and relationships that help their potential value emerge and to enable them to discover new ways of harvesting it. (Wenger et al. 2002, 59-61.)

2.2.2.6   Combine Familiarity and Excitement

Ongoing regular activities of a community bring familiarity. Regular meetings deepen relationships between members. Members feel they belong together and become comfortable enough to ask candid advice, get involved in the discussions, share opinions and even test their unfinished ideas. This interaction happens without fear of becoming too deeply committed into rigorous action plans. The community becomes a common place to nurture consideration and reflection of ideas separate from daily work pressures of line work. A lively diversity of exiting new events, fairs, workshops and conferences attract new people to pop in to the community. These happenings also unite people's diverse experience and expertise spontaneously in the form of fruitful new relationships. Adventurous events spice up and complement the so often stagnant day-to-day activities. (Wenger et al. 2002, 61-62.)

2.2.2.7   Create a Rhythm for the Community

Rhythm exists in our personal life as well as in community activities. Regular meetings help to create that rhythm for a community but the pace of each community may vary greatly. An appropriate tempo of community events has a positive influence on community members' interactions. These interactions tend to increase around community events. Too fast a beat can suffocate participation by taking too much time and effort. Too slow an activity feels sluggish. The rhythm indicates the movement and liveliness of a community. Communities develop through different evolutionary phases. Finding the right rhythm in each phase is a key to successful development. A large community may also benefit from small group gatherings to match the abundance of ideas in the whole community with the comfortable intimacy of group work. (Wenger et al. 2002, 62-63.)

2.2.3   Distributed Communities of Practice

Stuckey (2004) presented a meta-analysis of combined good advice for designing, implementing and sustaining Internet-mediated communities of practice. This following table is divided to these three columns of influence and action categories. The elements are banded within each category about each of the shared definitional concepts of community they appeared most relevant to. These appear in descending order on following table as *common ties*, *people*, *social interaction* and *place or area*.

Table 5. Meta-analysis framework of elements, guidelines and principles relevant to Internet-mediated Communities of Practice development (Stuckey 2004, 188)

Design	Implement	Sustain
• Situatedness • Concentrate on communities that matter • Define and articulate your purpose	• Reinforce the community's focus • Focus on value	• Focus on topics important to the business and community members
• Design for a range of roles • Get key thought leaders involved. • Create Executive awareness • Make sure people have time and encouragement to participate • Collect and use feedback from members	• Find a well-respected community member to coordinate the community • Create meaningful and evolving member profiles history and context • Develop an active passionate core group • Develop a strong leadership program • Acknowledge the voluntary nature of participation	• Harness the power of a personal connection • Play on all motives for participation • Build personal relationships among community members • Don't be too strict in judging
• Develop interdependency • Create a rhythm • Integrate the rituals of community life • Combine familiarity and excitement • Keep it fresh (first in community)	• Invite different levels of participation • Create critical mass of functionality • Provide the materials that collaboration requires • Make it easy to contribute and access • Rely on the fun factor	• Actively generate content • Prime the pump with communication • Encourage appropriate etiquette • Create dialogue about cutting edge issues.
• Form communities around people, not applications • Create forums for thinking together as well as systems for sharing information • Design for evolution (flexible, extensible)	• Fit the tools to the community • Develop both public and private spaces • Open a dialogue between inside and outside	• Facilitate member-run subgroups

Wenger et al. (2002, 115-119) also described challenges related to distributed communities. Distributed communities of practice are defined to mean such communities that cannot rely on face-to-face meetings as the members' primary interactions. Connecting its members through global distances and over organizational boundaries in different cultures is not easily achieved. In designing distributed communities, one needs to tackle the challenges of distance, time, size, affiliation and culture.

Saint-Onge and Wallace (2003, 35) have made an overview of the different perspectives on the main elements of communities of practice. Their own version includes practice, people, and capabilities. Lesser, Fontaine and Slusher (2000) divide communities into people, places and things. According to Wenger et al. (2002, 27-29) these structural elements are; domain, community and practice. In a global setting these areas need even more effort, Wenger et al. (2002, 120) continue. Reconciling multiple agendas of

domain takes more time. So does building the relationship and trust between members. Robust practice with craft intimacy (close interaction around shared problems) and a sense of commonality is also hard to accomplish in a large distributed community. It requires a balance between standardizing practices everywhere and freedom to stretch them locally.

Designing distributed communities aim to achieve true globalization. We need to overcome the following four special challenges described by Wenger et al. (2002, 123-137), when applying communities of practice for that purpose. The following table presents the four additional challenges of distributed communities.

Table 6. Additional Design Principles for Distributed Communities (Wenger et al. 2002, 123)

1. Achieve stakeholder alignment.
2. Create a structure that promotes both local variations and global connections.
3. Build a rhythm strong enough to maintain community visibility.
4. Develop the private space of the community more systematically.

2.2.3.1 Stakeholder Alignment

Getting all the key players together right from the start is crucial. Communities take time and effort to build up. The first steps are the hardest in terms of getting first, the stakeholders' commitment and also actually building the first communities. When the value of knowledge sharing between business units becomes visible, communities are seen as an asset. The hungriest business unit in the domain for knowledge could be the best candidate for a host. By hosting the community it can set an example and build commitment. With a need for expanding its expertise, such a host is usually willing to invest on resources to facilitate the community. Usually this means investment in coordinators time. (Wenger et al. 2002, 124-125.) "Both the community and its leaders need resources to sustain the community's work, so drawing appropriate nourishment

(i.e., new topics or new blood and probably new money) from the environment is a key consideration for community leaders." (Stuckey & Smith 2004, 96) Environmental challenges must be creatively and constantly managed to keep the community alive.

2.2.3.2 Structure for Local and Global Connections

Wenger et al. (2002, 125-128) propose advice for the structure of a distributed community. A global community should not be treated as a giant monolith. Instead we should allow local variations in sub-communities. Cultural, language and organizational diversities can enrich a community, but they must not jeopardize the building of trust and connections between global members. The design of large communities can build on smaller divisions, which are interconnected on a global level. Division into sub-communities can be arranged in various ways. In a geographically organized structure, coordinators of local communities may form a global network of community coordinators. A sub-community may also be formed around specific topical issues of members' interest. Distributed communities must be designed to enable connection of these small groups. The local and global coordinators' task is to ensure the connections between sub-communities. They are to make sure that information requests are answered and, most importantly, the people behind them can find each other. Having connected, members have the flexibility to use whatever technical means appropriate to discuss and share. However, it requires strong relationships on both local and global levels to connect people worldwide. These relationships are often built during face-to-face meetings. Direct in-person relationships make the community more present and tangible to members. Therefore, coordinators should minimize hierarchy and encourage horizontal relationships. As Wenger et al. (2002, 128) coined it, "Coordinators connect people; they do not convey information. They broker relationships, not knowledge." After all, the community coordinator also has a responsibility to help "the community focus on its domain, maintain relationships and develop its practice" (Wenger et al. 2002, 80).

2.2.3.3   Rhythm to Maintain Community Visibility

Regular events build a rhythm that maintains the vital visibility of a distributed community. Wenger et al. (2002, 128-133) give us several tips to accomplish this. The Web is widely used for communication, together with asynchronous tools. Regular meetings remind people of the community's presence. Common events such as teleconferences create deadlines for interaction. In addition, they increase the feeling of members' social obligation to connect. Teleconferences are the most useable for smaller groups, but can also be applied for larger groups if they take the form of lecturing. Using conference software (such as Net Meeting or Same Time) during teleconferences can add a stronger sense of presence to a virtual meeting. Video broadcast might be useful for some meetings, but the telephone is usually adequate as a discussion tool. The coordinators role in managing teleconferences is important. Face-to-face meetings are needed to strengthen the ties between members and build trust. Rotating the locations of these meetings can increase effectiveness. So does organizing field trips with other practitioners, and empowering members from different locations to form meeting design teams to prepare the meetings. Threaded asynchronous discussions are used to connect members between common events. If the discussion is not ongoing, the community coordinator can stir it up with a provocative statement or irresistible question. Some controversy may sparkle the discussion and return the community to the awareness of its members. Different modes of communication should be provided by the community's Web site. Electronic communication—for example delivery of prepared materials before meetings, reviewing them during them, and commenting after meetings—feed the discussion. It also strengthens the visible dimension of the community and the relationships between members. Coordinators can judiciously send information broadcasts to members. Regular newsfeed, email notification subscriptions, and newsletters provide visibility for the community. (Wenger et al. 2002, 128-133.)

2.2.3.4   Private Space

Wenger et al. (2002, 133-135) claim that a distributed community proposes an increased need for private networking. This networking has a key role in developing trust over distances and cultural differences. Focusing on core practices and methodologies can

create common ground for sustaining cross-cultural connections. The community coordinator's activity in networking members is preferred over piling material on the Web site. "Although populating a database is useful, feeling related and responsible to other community members is a far stronger force for increasing participation and aliveness" (Wenger et al. 2002, 133). Coordinators create this network of trust by connecting people. The activity of a community depends on the time and energy their coordinators spend on networking. Coordinators can strengthen the personal network in several ways according to Wenger et al. (2002, 134). Personalized memberships for example, aided with pictures of the members can help members to know each other from a distance. Unfortunately, sometimes company policies may prevent using pictures of its employees on the Web site. Small clusters of community members can form small group projects and meetings across sites. Organized site visits unite distant members. Sometimes an improvised meeting of a member passing by can cheer you up. Being opportunistic about chances to interact can reveal surprising possibilities for connections. (Wenger et al. 2002, 133-135.)

2.2.4   Trust Building

"The basis for all social activity is trust" (Ståhle & Grönroos, 2000, 152). Saint-Onge and Wallace (2003, 107) state that an overall climate of trust and involvement is required for collaborative work. People should believe that their active participation in communities of practice serves a recognizable and productive purpose. Existing trust will boost involvement in the activity of a community. Trust is also related to the underlying motives of organization and management. Communities should be safe places to ask questions without having a sense of vulnerability. This allows learning and innovation through productive conversations in a constructive manner.

Virtual team researchers have agreed on the central role of trust and trust building in creating or maintaining virtual teams and organizations. According to Jarvenpaa and Shaw (1998) trust is the heartbeat, which allows geographical and organizational distances to be overcome. Only trust can assure members' commitment to common tasks within the team.

The absence of trust prevents knowledge sharing (Davenport & Prusak 2000, 100). Trust is created, maintained and reinforced by mutual collaboration. Face-to-face interactions are a quick way to deepen relationships and build trust among people. (Saint-Onge & Wallace 2003, 90; Skyrme 1999, 157.) However, this is not always practical or even possible. Valacich et al. (2002) have stated that computer mediated groups make riskier decisions than face-to-face groups. This increases the value of face-to-face meetings in virtual teams. There is also evidence against the importance of face-to-face meetings in trust building. According to Jarvenpaa and Leidner (1998) high levels of trust can be achieved in completely virtual teams even without a common past among the people, assuming there is focus on tasks, extensive and balanced communication and the ability to take initiative, manage uncertainty and expectations. In the event that trust is not presupposed, the first keystrokes of communication create or prevent an impression of trust (Jarvenpaa & Leidner 1998).

2.2.5 Social Adaptation

A virtual team is a type of social world (Mark & Poltrock 2003). Clarke (1991, 131) has defined social worlds as "groups with shared commitments to certain activities, sharing recourses of many kinds to achieve their goals, and building shared ideologies about how to go about their business". This indicates strong collective action.

Social worlds that exist within an organization and are interested in organizational work are defined as working spheres (Mark & Poltrock 2003). Mark and Poltrock (2003) had studied groupware adoption in different organizational contexts. They proposed that groupware adoption across distance in a virtual organization could be understood through the social worlds theory. The reasons for their argument are:

- "Social worlds have fluid boundaries." They may be geographically distributed, but connected by communication. Virtual teams can cross boundaries of organizational units. (Mark & Poltrock 2003)

- "Social world are diverse." Each working sphere is unique and thus requires different coordination and communication support. These differences eventually

have an effect on adoption decisions. Social worlds of varying cultures and practices form a virtual organization. (Mark & Poltrock 2003)

- "People belong to multiple social worlds." When people change activities and shift through different social worlds, they change their social context and reference groups. The estimated value of the groupware adaptation depends on each working sphere. (Mark & Poltrock 2003)

- "Communication channels can vary across social worlds." Different means and communication channels can be used to persuade working spheres to use new technology. Communication channels play an important role in adoption decisions. (Mark & Poltrock 2003)

- "Rate of diffusion can vary across social worlds." Technology can be adapted faster, when it is seen as more appropriate to work practices or conditions in a working sphere are more favorable. Adoption resistance can also vary in work groups within an organization. (Mark & Poltrock 2003)

- "Each social world has its own state of readiness for adopting technology." Many issues influence it, for example: Member's experiences, available infrastructure, resources and management policies. The same person may even adopt technology faster in one of his social worlds than in another (Mark & Poltrock 2003, 286).

Previous research clearly suggests that the characteristics, for example group dynamics, of a particular team and working sphere have an effect on technology adaptation. When virtual teams are supported by electronic communication and group technologies such as groupware, it also has an effect on team dynamics (Qureshi & Vogel 2000). Therefore, we can start to question social adaptivity. Social adaptation is described by Qureshi and Vogel (2000) as follows:

> "Social adaptation is the creation of patterns of interaction, including particular sets of rules and knowledge that the group members transfer social encounters on the electronic medium. The electronic media enable a social system to manifest itself. The identity of the group takes shape according to the social

norms that emerge on the electronic space, giving rise to particular sets of rules and knowledge that the group members bring with them.

A key issue to effective social adaptation is what sort of communication etiquette and norms of behaviour evolve on the electronic social space and which of these is most conducive to the creation of technology-supported learning environments." (ibid. 10)

Qureshi and Vogel (2000, 11) represent, in the table below, divisions of computer support issues for virtual teamwork into three categories: technological, work and social. Our focus will eventually be in the social processes although we cannot overlook other aspects.

Table 7. Issues in computer support for virtual teamwork. (Qureshi & Vogel 2000, 11)

Technological	Work	Social
Differences in speed and access to information.	Fit with existing work practice.	Sustaining informal communication without adulterating content.
Functionality: Learning how to use and cope with the constraints posed by the technology and how to modify its capabilities.	Performance measurement.	Trust and cohesiveness.
Ease of Use: Adapting to the technology.	Task orientation, sense of task goals.	Sustaining shared context – mechanisms.
Security and integrity considerations.	Individual initiative and accountability.	Develop organisational memory without stifling emergent ideas.
Communication protocols for facilitation, moderation and chairing.	Channels necessary to sustain coordination in virtual teams.	Adapting to an electronic social space while evolving different types of standard practices such as communication etiquette.
Communication confusion resulting from specialisation specific "languages".	Conflict management.	Learning environments to provide organisations with the flexibility and adaptability to changing environments.
Ambiguities in distributed interpersonal communication.	Accuracy of information: Conveying meaning and salience.	Conflict through rivalries, territorialism and resistance to change and/or outsiders.
Mechanisms for managing interdependencies and integrating specialised parts.	Level of content structuring.	
How message content is altered through the technology.	Sharing and accumulation of remote skill and expertise.	
Emerging patterns through use of the technology.	Mobilisation of dispersed resources.	
	Negotiation vs. fixed procedures.	
	Feedback mechanisms, checks and balances.	
	Support for knowledge work at different places and times.	
	Providing access to work specific information.	
	Level of experience and satisfaction.	

In the following table, Qureshi and Vogel (2000, 12) present issues in relation to organizational challenges.

Table 8. Adaptation and organizational challenges in computer support for virtual teamwork. (Qureshi & Vogel 2000, 12)

	Technological	Work	Social
Structure	Electronic communications network infrastructure enabling any time / any where connectivity.	Numerous, smaller decentralised units resulting from virtual teamwork.	Reporting, linking or control mechanisms for virtual teamwork.
Specialisation	Interoperability of different communication protocols.	Job mobility, reciprocal and sequential interdependencies.	Emergence of trust and virtual teamwork as a formal channel of communication.
Coordination	Collaborative technology, group support and/or electronic communications design and development.	Task allocation based on skill and expert knowledge.	Emerging conventions for content structuring and interpersonal communication.
Task	Tools for information storage and accessibility according to task requirements for information availability and access to relevant skill and expertise.	Facilitation of the content of virtual teamwork combined with moderation and chairing.	Communication etiquette and ability to exchange knowledge electronically.
Learning	Development and effective use of organisational memory and learning mechanisms.	Adaptiveness to new virtual team-working relations and continuous readjustment.	Responsiveness to change and creation of combined action.

Mark and Poltrock (2003) suggest that virtual team members must uniformly adopt technology in order to function effectively. However, groupware adoption studies have found resistance for varying reasons. Organizational sites may have conflicting views of the balance of benefits within a group. The lack of critical mass and unanticipated extra work for some group members are also identified as inhibitors for technology adoption (Grudin 1994; Mark & Poltrock 2003). Olson and Olson (2000) argued that individuals could resist or even abandon technologies supporting virtual teamwork if the organizational culture lacks common ground, collaboration readiness or collaboration technology readiness. Success stories of collaboration realization benefits include the adoption of electronic calendars (Mark & Poltrock 2003).

People can belong to many social worlds. They can also act as bridges to transfer ideas between these worlds. Technology promoters can act as innovators to provide new interpretations of technologies to fit their different social worlds. This process of adopting and adaptation of technologies may take many years. The need for distributed

collaboration motivates groupware technology to adapt, but sometimes management reaction to it and the decision to adopt could take years. (Mark & Poltrock 2003.)

2.2.6 Groupware as a Challenging Knowledge Sharing Solution

As seen above, groupware can be seen as one part of IT support virtual teams can use for their collaboration. Groupware and its CSCW roots can be defined as follows.

> "Groupware is technology designed to facilitate the work of groups. Although there are many classes of groupware, we are interested in the types of groupware that rely on computer networks to allow groups to communicate, cooperate, coordinate, solve problems, compete, or negotiate. Our field of study is called Computer-Supported Cooperative Work (CSCW), which examines the design, adoption, and use of groupware. It is, by necessity, a multidisciplinary field and typically attracts those interested in software design and social and organizational behavior, including business people, computer scientists, organizational psychologists, communications researchers, and anthropologists, among other specialties." (Nielsen et al. 2000, 404.)

According to Schmidt and Bannon (1992, 11) "CSCW should be conceived of as an endeavor to understand the nature and requirements of co-operative work arrangements".

Jonathan Grudin (1994) has written about eight challenges groupware developers face, which are explained here with proposed solutions to tackle each challenge. These major problems are said to stem from the social dynamics of groups. They call for better understanding of the work environment and the user's workplace, changes to the development process, and sensitivity to the introduction of groupware into the workplace. Each challenge also has a list of solutions for its proposed settlement. It is very important to describe these challenges in depth here, because these are common obstacles for successful groupware deployment.

Grudin (1994) presented the following guidelines, which are summarized in table 9, for software developers in creating and applying groupware applications. However, these instructions are also applicable to groupware deployment into teams in a slightly wider context, not just that of the software developers. The target organizations can also deploy applications off-the-shelf without direct contact with the original developers.

Groupware can offer a solution to the knowledge sharing needs of a virtual team (Grudin 1994, 97).

Table 9. Eight Challenges for Groupware Developers and the Proposed Solutions. (Grudin 1994)

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1. Disparity in work and benefit. Solution: Clear demonstration of benefits. Design to create benefits to all members and to diminish the work required from non-beneficiaries.

2. Critical mass and prisoner's dilemma problems. Solution: Managerial forcing, data entry personnel, reducing work required from users, developing advantageous work process.

3. Disruption of social processes. Solution: Careful observations of the target group activities and dynamics to understand its needs for prospective groupware system. Using participatory methods to reveal special characteristics of the target group before altering the way people communicate.

4. Exception handling. Solution: Balance flexibility of exceptions and rigidity of workflow procedures.

5. Unobtrusive accessibility. Solution: Adding groupware features to existing applications, designing easy to use access, providing awareness, education.

6. Difficulty of evaluation. Solution: Interviewing users for their perceptions, opinions and feelings about the system. Development managers must enlist the appropriate skills, provide the resources, and disseminate results.

7. Failure of intuition. Solution: Understanding the balance of groupware benefits with participatory design. Recognizing risks, intricacies and intuitive failures may lead to fewer, but successful groupware projects.

8. The adoption process. Solution: Delicate introduction. Understanding the target environment, identify and meet the real needs of the group, selecting targeted pilot groups, demonstrate mature use with instructions and illustrated positive effects to group's work, assure management attitude, quick handling of early problems, provide long-term support.

2.2.6.1 Disparity in Work and Benefit

The use of a groupware application requires additional work and this work does not benefit everyone equally. Some group members benefit more from the use of the groupware application than others. This may hinder the acceptance of groupware products. Solution: The groupware system's indirect and collective benefits should be clearly demonstrated. Designing to create benefits for all group members and also to reduce the work of non-beneficiaries without diminishing the value to principal beneficiaries could help. (Grudin 1994.) According to Herrmann et al. (2000) understanding the benefits increases motivation to learn to how to use groupware.

2.2.6.2 Critical Mass and Prisoner's Dilemma Problems

A groupware solution becomes really useful when it has a critical mass of users. It should be to the users advantage to use the applied groupware system. A disastrous situation might develop where everyone tries to further his or her own best interests, resulting in a worse overall situation for everyone in the group and also on personal levels. This is also called the tragedy of the commons. In the case of an occasional database, one's strategy may be to freeload, but if everyone became freeloaders, the system will not work. Solution: The critical mass of the users could be achieved by force from the top management, at least in expensive corporate systems. The prisoner's dilemma could be resolved organizationally by hiring data entry personnel, but not all groups can afford it. Participation could increase if designers can address the issues of keeping the amount of the users' extra work minimal, using incentives and proposing processes that focus on both collective and individual advantages. (Grudin 1994.)

2.2.6.3 Disruption of Social Processes

Providing groupware may violate complex social group dynamics, such as implicitly accepted inbuilt norms unable to be codified into a computer system. Members could have unofficial roles hard to recognize. Those are easily ignored when developers bring in new means for group communication. New streamlined, rational, but partially unauthorized working methods may cause resistance, and even end up with members sabotaging the new system. Decision processes are not easy to model either. If the system records all oppositions in a group that values consensus, it will be politically unacceptable. Solution: This problem and the extent of it should be recognized. Many important values are interacting during human group work behavior, such as; trust, autonomy, privacy, reciprocity, accountability, responsibility, democracy, security and efficiency. Developers should not make hasty assumptions about the rationality of a work environment. It takes time and effort to study the target group activities and its dynamics. Those observations are essential for forming an understanding of the prospective groupware system. After all, this is about creating a communication system and perhaps radically altering the ways in which a group of people communicate with

each other. This is why working with the target group and using participatory methods is necessary to deepen the understanding of the unique target group. (Grudin 1994.)

2.2.6.4 Exception Handling

Work in organizations has often been expected to be done by the book, using standard operating procedures, for example. In the real world, these rational work descriptions are rarely met without exceptions, conflicts or shortcuts invented by the staff executing them. Therefore, implementing workflow systems for workgroups would be a challenge, especially when rational standard operating procedures are used as specifications for a new implementation of groupware. Good customer service could also constitute a threat to a formal and inflexible system if better service means more exceptions to please individual customers. Indeed, computers may unintentionally favor rigid procedures. Some have also seen virtue in rigid computer systems that may teach users about their organization. Solution: It is necessary to study and capture the real essence of the work done at the workplace. Then one should design for tailored flexibility, but still the range of variation will be difficult to predict. Making changes is a challenge, for they may affect many people's work and their attitudes. Trial and error testing methods of learning and forming one's own work patterns are harder and more public. Negotiations are necessary for establishing group-wide practices. Designing organizational controls over group work could propose an unnecessary straitjacket, creating a lack of autonomy and trust within the group. (Grudin 1994.)

2.2.6.5 Unobtrusive Accessibility

Groupware designers may overestimate communication and coordination support needs, because it is their specific area of focus. The same exaggeration applies to the importance of our own objects (for example the documents we handle) and events (the meetings we attend). An organization's increasing size could lead to inefficient coordination and communication. That is why organizations try to structure and divide responsibilities to minimize the communication needs and social interdependencies through specialization. Although social intercommunication within workgroups could use some support, groupware will be used less actively than single-user features and

applications. Therefore, it would be better to integrate group work support with features of personal activity. A stand-alone groupware system may be a failure even if it is appropriately, but infrequently used. Possible high costs of the system could make the investment seem unjust. Solution: Adding groupware features to existing successful applications were preferred to launching a new application with great expectations of heavy use. Support for group work should be designed to be unobtrusive yet accessible. Infrequent groupware use should be made easy without blocking more frequent personal activities. Providing awareness of groupware is also a delicate matter of avoiding clutter and not over-doing it. Computers may be increasingly used to educate users over time. Some have tried to resolve the problem of communicating and coordinating with organizational level high-frequency transaction processing rather than at the group level. This may be a way to justify high costs. (Grudin 1994.)

2.2.6.6 Difficulty of Evaluation

Groupware development proposes more challenges than development of a single user application. Task analysis, design and evaluation are harder to accomplish. Under-laying factors influencing groupware development include personalities, backgrounds, different and often altering user roles and preferences. Laboratory testing of these factors would be a laborious and challenging task, taking days and weeks of studying group interaction. Yet, lab conditions cannot reliably reveal a group's social, motivational, economic and political dynamics. "Additionally, groupware evaluation methods are less precise" (Grudin 1994, 100). Field observations are challenged by the constant change of group composition and its environment. The humanistic side (of social psychology and anthropology) is often overlooked in development environments. Evaluation of success and failure of a system built for one organization might be easy, or even obvious, but understanding the reasons behind it might not. Nor is it easy to prove that system benefits outweigh its costs, or vice versa. Solution: "Development managers must enlist the appropriate skills, provide the resources, and disseminate results" (Grudin, 1994, 100). One should not build on generalizations from previous studies because groups are different. Generally some successes and failures are expected from each groupware evaluation. Holistically the system includes humans and technology in their organizational setting—which makes evaluation even more

complicated. One way to evaluate and measure would be to interview users for their perceptions, opinions and feelings about the system. (Grudin 1994.)

2.2.6.7 Failure of Intuition

"Decisions to develop unworkable applications are widespread" (Grudin 1994, 100). Intuitive decision-making has its problems regarding the conception of complex groupware applications. Compared to a single-user application, groupware possesses intricate requirements involving multi-user participation. Managers often expect their own use of features to be automatically built in without costs and disadvantages. As beneficiaries, managers tend to underestimate the extra work an application requires from other users, which may cause resistance and neglect. After all, users are seldom required to produce the extra effort to achieve success. Similarly, managers can fail to appreciate difficulties in the development and evaluation of groupware. Some confident ones may even push failing development processes even harder in order to prevent their failed intuition from unfolding. (Grudin 1994.)

During the groupware development or deployment project, researchers and developers usually rely on feedback from a few potential users, typically beneficiaries. This may have an unbalancing impact on the resulting functionality of the groupware. Sponsoring managers are usually among those beneficiaries and already motivated to use the product. Minimizing the workload (such as information entry effort) of the principal beneficiaries could increase the amount of extra work for other users: customers, colleagues or subordinates. Intuition failure could also happen in reverse if additional work is expected from managers. "A decision maker does not recognize the value of an application that primarily benefits non-managers, even when it would provide a collective benefit to the group or organization" (Grudin 1994, 101). Solution: There are remedies for systems developed inside an organization: hiring and re-training personnel. Unfortunately, these options are out of the question in wider contexts of an extended organization including external workers and customers. For example, using participatory techniques (e.g. user involvement in a sociotechnical approach) during the design process does help to understand context better, and therefore results in better decisions. Through recognizing these risks, intricacies and intuitive failures,

development management might start fewer groupware projects, but have more realistic design goals and resources in order to succeed in those few. (Grudin 1994.)

2.2.6.8   The Adoption Process

Groupware has to be introduced to the workplace more carefully than a single-user application, thus leaving less to chance. Application developers and users may have intermediaries that stand between the two, isolating the important matter of acceptance into "no mans land" from their point of view. Application developers have marketing, customer support, documentation and training developers facing users, who for their part might have costly consultants, internal developers, and trainers to cope with the adoption process, including supplementing and tailoring of the product. Even with these support strategies, the delicate introduction of groupware may fail. There are other things than just utility and usability affecting the acceptance or rejection of a product. Acceptance is also an important issue in the field of information systems research. In comparison, the groupware adoption process must address the acceptance problems amplified by lower visibility and less managerial support than traditional, large information systems development processes. (Grudin 1994.)

Solution: By embedding groupware features into existing applications the problem may be avoided. If a separate new application is necessary, it must be designed to meet the real needs of the target group. Understanding the work environment of the group provides better opportunities to succeed in designing the application, and its adoption. Concrete instructions given by Grudin include: 1) Identification of the group's problems and matching technological solutions to it. This is related, for example, to the use of synchronous or asynchronous connections. 2) Identification of structured and unstructured work processes. Avoid strict workflow when supporting ad hoc processes. 3) Selecting pilot groups and individuals right on target—those really using the application. 4) Mature use of the application should be demonstrated to the adopting group, possibly with site visits, which reduce uncertainty. Education should give step-by-step instructions and illustrate the positive impact on the group's daily work. 5) "Management attitude is critical to acceptance" (Grudin 1994, 102) especially for organizationally smaller investment applications. 6) Early problems should be expected

and dealt with quickly to prevent premature rejection of the application. Support must be provided for long-term application use. (Grudin 1994.)

Without tackling these issues adoption would probably fail. Taking care of these steps is not taken for granted with an application purchase. Someone should look after the proper adoption process, if consultancy is not included in the deal. One way to improve the product, for that matter, is involving the developers in the adoption process. They can make adjustments to the product to suit the needs of the users and build in the support for adoption. Unfortunately, this is not always possible with widely used software packages. Some groupware development companies have decided to bundle the consulting support with the product as a solution to the acceptance challenge. (Grudin 1994).

2.3   Summary

Previously reviewed theories formed the basic concepts of knowledge management and its roots in organizational memory and learning. The presented theories supporting distributed work groups gave a background on how to create and support such groups. This selection of theories provided remarkable tools for processing the case.

Globalization has increased the need for teams to become distributed because they cannot use face-to-face meetings as their primary form of interaction. That brings additional challenges to collaboration. The amount of trust among group members is seen as an important factor in overcoming the barriers of communication.

Knowledge sharing is a mediating link between knowledge creation and knowledge use. Lack of adequate knowledge sharing can cause problems in the efficiency and effectiveness of work in virtual teams. Fortunately, knowledge sharing can be supported with different means. Groupware, and computer-mediated communication in general, can provide technical knowledge sharing solutions for virtual teams. Especially Jonathan Grudin's (1994) challenges are seen as a remarkable contribution in identifying essential issues on developing and adopting groupware. As we have seen,

technical systems are not a complete answer to this problem. Virtual teams are not the same. Subtle nuances of social interdependencies need to be taken into account in each team when applying new solutions for knowledge sharing in a distributed work setting.

Communities of practice are important vehicles for sharing knowledge. Their internal aliveness and other virtues are valuable ingredients to be gained not only in virtual teams, but also as a knowledge sharing exercise. It is important to examine the social interactions of the team members, especially when intervention evolves existing patterns of knowledge sharing and interaction within the virtual team. Noticing these theories and applying them in practice can promote knowledge sharing in virtual teams.

3 METHODOLOGICAL RESEARCH SETTINGS AND DESCRIPTION OF THE CASE

Applied research method is a combination of various methods. This action research is performed together with interviews, observations and participatory collaborative techniques. These combined methods support each other and make research more robust.

3.1 Research Method

The subject is examined with an action research paradigm. The definition of Action Research by Kock (1997, 66) is: "A general term to refer to research methodologies and projects where the researcher(s) tries to directly improve the participant organization(s) and, at the same time, to generate scientific knowledge".

An essential feature of action research is the researchers role in close collaboration with the subject organization that has the problem (Järvinen & Järvinen 2000, 130). The researcher makes initiatives and has an influence on the subject organization (Heikkinen 2001). Also, in this case the researcher was the change agent conducting the change intervention, which was not done by imposing, but rather by stimulating people to change. In action research the researcher is more like a resource person, consultant or facilitator that helps group members to define their problems and support them to resolve the problems that concern them. (Stringer 1999, 25.)

In general, an action research aims to achieve change. Essential basic elements include action, its analysis and development. An action research views people as cultivators of their own environment. (Heikkinen, Huttunen & Moilanen 1999, 55.) The researcher participates in the activities of the examined group and tries to solve a specific problem together with members of the group (Heikkinen, Huttunen & Moilanen 1999, 64-65). In the participatory action research, members of the target group participate in the research process as co-researchers, alongside the actual researcher during the research period (Heikkinen, Huttunen & Moilanen 1999, 51).

User involvement was seen important in the system design of the target group's new knowledge sharing technology. During the action research study we used a cooperative design method similar to one described by Kyng (1991). It brings together the competence of system designers and users in cooperative action, using evolutionary prototypes (Kyng 1991). The designers are represented in the action research by the change agent with the ability to demonstrate different technology prototypes to users. These technology candidates are developed together in the spirit of participatory design.

According to Heikkinen (2001), there are various viewpoints within the action research field, each having a different emphasis on the subject. One of the central features has been communality of the process. Actors are seen participating in research collaboratively. Ernest Stringer (1999, 17) has written about community-based action research, which is one guideline for this research, sharing an interest in communities, whether they are virtual or not. Cunningham (1993, 4) researched organizations and wrote that action research features the group members' commitment to research.

This action research is also a learning process of learning by doing. It will view knowledge management as organizational development. While it demonstrates one case of applying a certain tool to a certain group, it will be about demonstrating the putting in place of a system into a learning organization. The actual work method will be one described by Susman and Evered (1978), as an ongoing cyclic process consisting of diagnosing, planning, deployment (implementation), evaluation and learning.
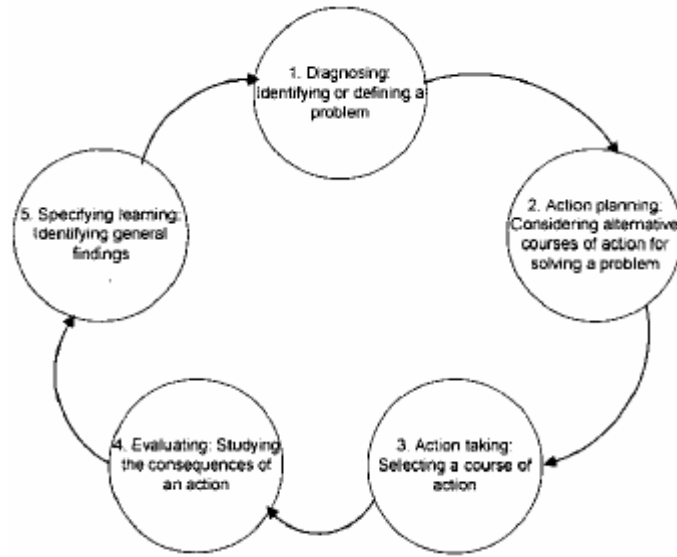
Figure 2. Cyclical Approach to Action Research According to Susman and Evered (1978).

The findings of this study are collected from the target group by semi-structured questionnaires in the form of interviews. The size, purpose and experience of the target group are described in the following chapter 3.2. Interviews were guided by research themes, and also predetermined questions were asked from all interviewees. Persons interviewed were considered to have the best knowledge of their subject area and chosen by the secretariat of the target group. Semi-structured interviews were chosen because they reveal the viewpoints of the subject better, and not the pre-selected possible answers of the researcher. Participatory observation of the target group activity was also used as a data acquisition method during the research process. The results of the interviews are discussed, given that the limitations of the group are noted. The present process of subject organization will be examined by interviews and exploration of the material found from the target groups secretariat, corporate intranet and databases. The empirical part of the study consists of action research done together with the special focus group.

3.2   Description of the Focus Group

This chapter describes how abovementioned theories were implemented to action research in practice.

This chapter portrays the target environment of the study. A holistic view of the action research case and the purpose of the focus group are demonstrated. The target of our action research is one business environment issue group (henceforth *the group*) within Nokia. It has a focal point with a community of experts concentrating on specific issues on a corporate level. The domain of their tasks relate to identifying the topics that require closer studying, and Nokia positioning within their domain. In practice, this is accomplished by setting up ad hoc task forces to carry out these studies or to prepare Nokia positions. The main findings and results are reported and discussed with top executive management when necessary. Accepted positions and discussed issues are distributed back to the business units and spokespersons.

The group can be described as a virtual team according to the typology presented by Palmer and Speier (1997/2001) in table 1. Members of the group are globally distributed. They belong to different social worlds in their home organizations, but form this group as a working sphere (Mark & Poltrock 2003). Their meetings are important happenings for gathering all members several times a year. Communication is alive and active between the meetings when needed. This virtual teamwork and collaboration is to be supported by groupware during this research. Knowledge sharing is an important knowledge management challenge for the group. Each member brings ones own expertise and broad networks of personal relations to the table. The group blends these complementary skills into its assets. The group members are also representing Nokia in various external bodies, such as international standardization organizations.

The group members have different levels of participation in the group activities. The key members form the core group, which consists of the chairman, the secretariat and the key issue owners. The actively participating members may change according to the group's agenda and current expertise needs. The extended team broadly covers the business units and experts of various fields. These members follow the discussion and participate in group activity when they are needed, or interested in the current topic. The

external network of peripheral members consists of regular contacts and visiting experts or information recipients. The following figure describes the rings of involvement of virtual teams according to Lipnack and Stamps (2000).
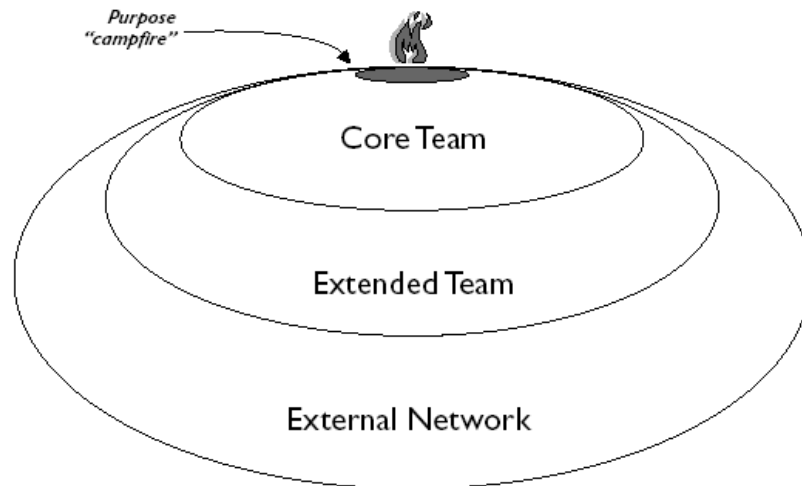
Figure 3. Rings of Involvement. (Lipnack & Stamps 2000, 181)

In comparison, Wenger et al. (2002) have identified similar degrees of participation among the communities of practice as seen in figure 1.

Further development of the group's knowledge sharing was initiated as a sample case of knowledge management activity within the company. This action research project was set up to carry out this work in practice by deploying a pilot information system (groupware) for this focus area and its knowledge sharing needs. The mission of the action research is to provide means to support the target group's collaborative activities according to its specific needs, revealed by interviewing its members. The newly deployed system is used to concentrate the target group's documents and discussions into one place instead of being spread among different members' mailboxes, etc.

3.3   Data Collection Methods

The action research method and user participation provided a way to collect valuable inside knowledge from the target group members. Interviews and observations were used as main data collection methods.

3.3.1 Interviews

Two interview rounds were made for this study. The purpose of the first interview was to diagnose the current knowledge-sharing situation of the target group, its possible problems and needs for improvement. The second interview was conducted to evaluate the group members' experience on how deployed groupware affects their knowledge sharing. The results of the interview were also used to estimate needs for further improvement.

Empirical material from the first interview consisted of 6 interviewees, who were also members of the target group. The interviewees were selected with purposive sampling from this larger group of approximately 30 members. The select members were proposed by the administration and the secretariat of the group because they were considered experts of their fields. The interviewees were located in four different sites, while most were working at the company head office in Espoo, Finland. Interviews were based on a semi-structured inquiry form (attached as appendix 1). All of the answers were edited as memos, which were later personally revised and approved by the interviewees. The first interview round was held in April 2001.

In order to acquire the group members' general insight on the deployed QP application after two years of use, they were interviewed for the second time. According to these interviews, we created an evaluation of the new knowledge-sharing situation. The second round of interviews (questions attached as appendices 2 and 3) consisted of 17 interviewees from the target group. The chairman of the group was also interviewed (questions attached as appendix 4). All interviewees were selected by using purposive sampling. The preliminary interview was held for three group members to revise the questions. Most of the interviews were recorded and completely transcripted for later analysis. The recording equipment suffered from technical problems, but comprehensive notes were made from all interviews. Permission for recording was asked from the interviewees. The second interview round was held during summer-autumn 2003.

3.3.2   Observations

Another important data collection method was observation of the target group. This allowed the researcher to gain a clearer and more reliable picture of the reality. The study was not only based on the answers of the interviewees. Observations were made during the daily work of the group as a part of the system development teamwork.

The researcher participated many times in the pre-meeting discussions about groupware deployment, and also once in a face-to-face group meeting. Training was organized for the group members by the researcher according to the most urgent needs. Also, technical groupware support was offered to the users, and that gave the researcher a primary point of view of user experiences.

Objectivity may be reduced if the researcher commits emotionally to the observed group. This is a problem with the action research method in general. However, action research does not necessarily aim at high objectivity. Quite the contrary, it is acceptable to participate and gain deep knowledge from the target group, as the researcher is one of the key actors and a team player in the intended event of change. The researcher had a chance to work with the group for a long time and the group members became acquainted with him.

Observations were made during the collaborative group work to verify the results of the interviews. It increased the reliability of the results and understanding of the target group and its work. Observations were sometimes directly discussed with the core group members and were used as raw material for continuous improvement of the target group.

4   ACTION RESEARCH IN PRACTICE

This chapter illustrates the procedure of the action research, phase by phase. The action research process is divided into five phases: Diagnosis, planning, deployment (action taking), evaluation, and learning (Susman & Evered 1978). The different phases and their outcomes are presented and analyzed below.

4.1   Diagnosis

The purpose of the diagnostic phase was to identify or define possible knowledge sharing problems. The group took the initiative to investigate possibilities to improve its work and knowledge sharing. This chapter describes the initial state of the target group based on the interviews before the intervention. Findings of the first interview round are summarized here. The primary condition of the group is presented here as themes. Each theme, having a need for change, develops a requirement for further improvement. Finally, all requirements are collected under the following categories:

- A set of requirements that could be solved by deploying groupware
- Requirements, which could be solved with Intranet publishing tools
- Social issues, including participation and cohesion of the group that could be solved with developing the group as a community of practice. Additional support for group decision-making.

4.1.1   The Group's Initial Knowledge Sharing Methods

Connections within the group were ongoing and informal. Email, phone and face-to-face meetings were used for communication. Email was used mostly, then phone calls and other interpersonal communication. Members seldom communicated with the whole group. Some preferred group wide distribution, while others used more focused communication methods. One person emailed specific domain reports while another presented short regional issues. Usually, members tried to manage business affairs in face-to-face meetings. There was a core group of 6-12 of the most active knowledge-sharing people.

Knowledge sharing methods

Knowledge sharing methods of the group and its ways of working were mainly:

1) Information and knowledge sharing. Within the group its issues were brought forward and information was shared and discussed. The group often formed position statements or shared policies among the members. The group made actions to create opinions, and decide which to put forward. Group meetings were held infrequently. It would be a slow process if decisions were only made in meetings.

2) Networking. Knowledge was shared within personal networks. Therefore, the group's work enabled networking of the focus area. It gave an opportunity to meet the people in its field of work. The group formed a forum and a network in which sub-areas had a lot of internal interaction. It was also a channel through which important issues were brought to the attention of the executive management of the company.

Some criticised whether much more sharing was actually needed. Sharing was also perceived to be a time-consuming phase in group work and communication. Involving information management technologies was proposed by interviewees to make knowledge sharing easier. **Requirement 1**: The group needed to use more virtual teaming and online meeting applications, for example teleconferencing, videoconferencing and NetMeeting. This was considered important to facilitate virtual teaming and to cut down time consuming global travelling and its expenses.

Document sharing

There was no centralized database for documents. The group's documentation consisted of personal storages of emails, presentations, and memos from face-to-face meetings. Global policy messages were documented and shared, as well as timely issue papers. Documents were mainly stored and delivered by the secretariat. They archived documents in their personal computers, email system and some as paper copies. The secretariat wrote minutes from the group meetings. Case-specific slide presentations and other documents were attached to the minutes and delivered to members as email attachments. Sometimes the size of the distributed material caused problems with

recipients' mailboxes. **Requirement 2**: The size of distributed materials should be decreased. Distribution of the group's documents could be done as links to documents, instead of sending the actual documents.

Documents went through many versions while under construction. Sometimes these versions had been hard to handle. Issues managed by the group were polymorphous; therefore, fixed formal documents could limit its functionality. The group and its sub-teams needed an ability to save documents online. The current solution could lead into trouble. **Requirement 3**: Document version control needs to be improved.

Discussed topics could start with an email and end up consisting of numerous emails. These discussions were scattered over members' mailboxes. **Requirement 4**: Support for group discussion should be provided.

Information sharing

Better availability of the subject materials was proposed. Therefore, an Intranet site should be prepared for the group. Position papers, issue contacts and opinions on certain issues could be shared there. Plans for the group's Intranet home page had been talked over earlier. **Requirement 5**: The company's confidential messages, opinions, and support materials could be distributed in the Intranet. Information for the Intranet could be added with centralized updates.

Requirement 6: The group's work papers, including agendas, minutes and unfinished documents, could be shared within the group. Members should be able to publish their own contribution within the group. Both requirements 5 and 6 should be provided with easy tools and training according to the members' needs. **Requirement 7**: Easy access to the group's knowledge was seen as a good target for development.

Need to expand group's focus globally

The group was not necessarily well known outside of its domain within the company. If no previous connections existed, it could be left isolated from other similar efforts of the company. For example, the company might receive regional contacts asking its position

on some issue and it should be prepared to answer uniformly every time. **Requirement 8**: Better regional coverage was required because there are areas where the group should act, but it was not currently doing so. The group needed to build a better network on some of the uncovered areas. The group should also find people from the target areas who would take care of such tasks. The group should focus more globally. This involves supporting the sharing of regional and functional expertise of its members.

Visibility

Some of the issues had enough visibility within the group and the company. But ensuring overall visibility to all relevant issues was considered useful. It usually demands a database where those people who are not usually dealing with these issues within the company can be referred to. Updating could be painful, but it should not get into high levels of details. **Requirement 9**: An address book of contact persons for each issue could be made available. Maintenance could be a challenge because personnel are constantly changing. Actually, there had been such a contact list before, but it was outdated. The list should contain issue contacts in various parts of the world and details of the issue owners and the domain contacts in different countries. Enhancing visibility of the group should be considered, for example via internal marketing.

Sharing tacit knowledge

There was also verbal output that was not documented anywhere, such as: informal networking, phone calls and face-to-face discussions. Information had always been found somehow, even though the group worked on an ad hoc basis. People had to remember who were involved with each issue under consideration. **Requirement 10**: A list of issue owners could be made available company wide. Instead of finding the actual information written down somewhere, one could find the person who knows the subject. This should allow definition of a personal area of responsibility.

4.1.2 Social Aspects of the Group

Half the target group members were involved in the group's action frequently and the other half infrequently. The members participated in the group meetings three to four times a year. The members seemed to trust each other although there were changes

among the members. **Requirement 11**: The members should be encouraged to participate more in the group's activities. Cohesion of the group could be increased.

The group's action was considered reactive. **Requirement 12**: Operation of the group should develop into a more proactive direction. The group should make more initiatives of its own.

Currently, the group had managed to cover a wide area of issues. The group has a flat organizational structure and a living process where issues are evolving in different phases. The group meetings were led firmly with topical timely presentations. Scheduling had not been a problem, although it was hard to influence because of its dependency on outside factors. Schedules had been realistic. Thick reports were avoided and issues were presented briefly. Some issues needed to be taken care of instantly. Many issues were left without attention, but it had not brought down the business. **Requirement 13**: The efficiency of the group's work and decision-making should be improved. This should be achieved with limited resources.

The group's actions have long-term effects on the company, and even on the business environment of the telecommunication business. The group should continuously learn from its experiences. However, the current work mode of the group may prevent it from developing its work processes further. Old work habits will eventually lead to a *competency trap* if the group could not progress in order to meet and overcome organizational challenges of virtual teamwork. **Requirement 14**: The group should find ways to improve its organizational memory and learning to overcome old work habits, which hinder its future progress.

Comments were often asked for, but there was not always time to comment enough. The group members were willing to support others more when it was possible within the context. **Requirement 15**: Possibilities to support the members' work by commenting other peers should be explored. Members should be able to give constructive comments to each other. Improvements in the knowledge sharing culture are needed.

The group did not have a common database but some of the members thought that it had not been a problem. Actual outputs of the group might be hard to document and save to such a place, because they were informal by nature and usually written as email. **Requirement 16**: It could be useful to increase visibility by having a place in the intranet where important issues, position papers and messages could be shared.

Many members thought that communication within the group was fluent and email was considered a good tool. Still, interviewees thought that the group needed new opportunities to complement face-to-face meetings with a living, virtual process. "The group has an identity, it should have an online environment to support it." **Requirement 17**: Knowledge sharing of the group could be improved. "If the information management technology is on the shelf, why not use it for the group's activities?"

The prevailing information sharing of the group meetings had its benefits, but the outcome could remain minor. More operative action would require another kind of meeting frequency, because of members' various expertise, and it could take too much time. **Requirement 18**: Establishing new sub-task forces to work orderly for some specific subject matters should be taken into consideration. The face-to-face group meeting frequency should not be tightened with existing objectives, as it is adequate for the present information sharing functionality.

4.2   Planning

The second phase in the action research was planning. During the action planning we considered alternative courses of action for solving previously identified problems. The primary architects of the plan and members of the change organization were the researcher and a steering group of two people. Active participants during the planning also included the secretariat of the target group. They were especially valuable for clarifying and exemplifying the situation of the group, providing necessary user involvement during the whole action research process, along with another power user. After all, the work done for the group was basically organized as a knowledge management project. During the whole process of research and intervention, we tried to

follow the identified guidelines of the existing theories and also avoid the known pitfalls of such activity.

As a result of the previous diagnostic phase, we formed the requirements for further action. The requirements were analysed and formed as following key requirements. These were planned to improve the group's knowledge sharing activity. Despite the fact that some of the requirements were quite technical, solutions to most of the requirements involved a strong social aspect. Therefore, when we propose a technical application as a solution, we must understand that it really holds a lot of social issues as well. For example, the adoption of the groupware application is greatly dependent on the social activities related to its deployment process and eventually the target group members' abilities to socialize with each other through it (Qureshi and Vogel 2000; Mark & Poltrock 2003).

In the diagnostic phase, the requirements were divided into three categories. This first category of requirements were the ones that could possibly be solved by deploying groupware application to the target group:

- Virtual teaming and meeting applications (Req. 1, 17),
- Document management and versioning (Req. 2, 3, 6),
- Discussion support (Req. 4, 15),
- Easy access to group's knowledge with easy tools (Req. 7), and
- Need to improve organizational learning and overcome old work habits (Req. 14).

The following table summarizes the requirements and possible solutions.

Table 10. Requirements and Possible Solutions.

Description of requirement	Requirement #	Possible solution
Need for virtual teaming and meeting applications	Req. 1, Req. 17	Groupware, meeting applications
Need for document management and versioning	Req. 2, Req. 3, Req. 6	Groupware
Need for discussion support	Req. 4, Req. 15	Groupware
Need for Intranet distribution of the publications	Req. 5, Req. 16	Intranet publishing tools

Need for easy access to group's knowledge with easy tools	Req. 7	Groupware, Intranet publishing tools
Need for better global coverage (all regions)	Req. 8	Increase awareness, Intranet publishing tools
Need for a list of the issue contacts (enable networking and "knowledge brokers")	Req. 9, Req. 10	Intranet publishing tools
Increasing proactive participation and cohesion of the group	Req. 11, Req. 12, Req. 18	Supporting Communities of Practice
Support for efficient group decision-making	Req. 13	Making background information available
Need to improve organizational learning and overcome old work habits	Req. 14	E-Learning, Supporting Communities of Practice, Groupware

Many of the remaining requirements (the second category), which involved company-wide communication of the issues within the group's domain, could be solved with Intranet publishing tools:

- Intranet distribution of the publications (Req. 5, 16),
- Better global coverage of all regions (Req. 8),
- List of the issue contacts to enable networking and "knowledge brokers" (Req. 9, 10)

The third category was the requirements of the social issues. Increasing proactive participation and cohesion of the group (Req. 11, 12, 18) could possibly be solved by developing the group as a community of practice. Support was also needed for efficient group decision-making (Req. 13).

The nature of the group's ad hoc tasks and subgroups did not need a strict workflow. Therefore, we did not plan or implement any. On the contrary, we allowed flexibility for work methods to develop.

Because the group did not have such applications in use that could embed a required group work support, we chose to deploy a new groupware application. Therefore, we

decided to focus more on the requirements that could be solved with groupware. Alternative applications for the solution were studied. The final two candidate groupware applications were presented to the core group, who decided to choose Lotus QuickPlace (henceforth QP). The reasons for selecting the QP tool were the fact that it;

1) featured required groupware functionalities,

2) was already supported by the company,

3) users were not required to hold previous knowledge of Lotus Notes client use or database maintenance, and

4) utilized Web browser interface and did not require installation of any new application.

A new model for the knowledge sharing activity was designed from the requirements. The deployment of the groupware was decided. The QP application was selected as the groupware platform.

Description of the QuickPlace groupware application

Here is a description of the QuickPlace groupware application provided by the producer. IBM Lotus QuickPlace (Currently renamed to IBM Lotus Team Workplace) is the Web-based solution for creating team workspaces for collaboration.

> "With IBM Lotus Team Workplace, companies give users a way to securely work with colleagues, suppliers, partners and customers. IBM Lotus Team Workplace provides teams with workspaces where they can reach consensus through discussions, collaborate on documents and coordinate plans, tasks and resources." (IBM Lotus 2004a.)

> "With QuickPlace, non-technical professionals can instantly create an electronic shared workspace to support a task, project, or initiative. With browser access to an intranet or the Internet, authorized team members can access the workspace to communicate, share knowledge and ideas, maintain a project calendar, organize team information, and more." (IBM Lotus 2004b.)

> "IBM Lotus Team Workplace integrates an enterprise's with existing applications, such as Lotus Notes 6 and Notes R5, Lotus Sametime and Microsoft Office XP to help users schedule meetings, manage tasks, communicate in realtime, present ideas and create and edit documents using familiar tools. IBM Lotus Team Workplace is a self-service application so once administrators install the software on the server, users can take responsibility for

creating a new team workspace and managing users for the workspace." (IBM Lotus 2004c.)

The mock-up screen of the deployed QuickPlace application is attached as appendix 5.

4.3 Deployment

The third phase of the action research is action taking. Our selection of the course of action was deployment of the QuickPlace groupware application. The deployment plan was executed to meet the selected requirements formed during the diagnostic and planning phases. The proposed solution was designed and discussed in close interaction with the target group.

The developed model of the new knowledge sharing system and its technical solution, the QP groupware application, was deployed for the target group.

The QP was "furnished" to hold the structure of the group's information (for example the document hierarchy). This was done with active user participation, especially by the secretariat of the group. The key users and content providers started publishing content in the beginning of the QP deployment. After these actions, the first pilot group of core group members was informed and welcomed to test the newly deployed QP application.

Access to the QP was shortly given to all group members and their secretaries. Brief introductory instructions for the deployed system were distributed to all group members by email. E-learning material had already been made available and the members were advised to train themselves according to their personal needs. Step-by-step instructions of QP use were presented for the core group. Primarily collective benefits of the QP were demonstrated. Members were also reminded during group meetings how to use the QP. Training and support for the QP application was made available on demand. Early problems with the QP were dealt with as the deployment went along. There were some technical problems with the QP, mostly with servers, passwords and browser settings.

Incentives were not planned or implemented on the QP use. Many of the group processes were made possible with QP, but those were not made mandatory. Previously existing communication and collaboration methods were left available.

4.4 Evaluation

Evaluation is the fourth phase of the action research. During the evaluation the consequences of QP groupware deployment action was studied. Our intention was to explore how members of the group experienced the effects of deployed QP application for their knowledge sharing. Adaptation of the QP was perceived to be dependent on the social issues within the group. The opinions of the interviewees were often inconsistent. However, the answers to the second interview clarified how the group adapted socially to QP use.

Below is the thematic processing of the evaluation.

- People, capabilities and community; (Chapters 4.4.1-4.4.2)
- Practice (processes, tools); (Chapters 4.4.3-4.4.5)
- Places (tools); (Chapters 4.4.6-4.4.9)

4.4.1 Cohesion and Trust in the Group

Cohesion of the Group

Interviewees knew some members of the group better than others. Well-known members were usually those who had worked in the same field of expertise for a long time, even before joining the group. Just as frequently, members knew others well who worked actively in the same work community, or were dealing with similar issues within the group, and in their own line work besides the group. Those members who were able to have more time for discussion together both physically and communicating face-to-face, were more familiar to each other. The core members of the group had an on going active dialogue and therefore knew each other well.

Reasons why people did not know some other members were diverse. New and infrequently participating members of the group were least well known. Tightly scheduled group meetings left no time for getting to know other members, even if they participated in the same physical meetings. This is a shame, because members would have a chance to get to know each other during the meetings. The group was considered big, broad, and dispersed in issues managed by issue owners. Active communication

was missing between different issue owners because of differences in their substance matter. In such cases, it was not seen as a big problem.

Active use could be increased with participation from other area organizations. Currently there were only two areas actively involved with QP use: The chairman's office and the secretariat, plus one creditably active area organization. The members' activity as spontaneous contributors could be improved. Fortunately, there were some good examples of excellent member activity. Publishing recent reports regularly in different issue areas as well as commenting and debating on open issues would greatly further the group's process of reaching its goals. The members could achieve more by entering the virtual workplace. For some, that step still needs additional encouragement or motivation.

Relationships, trust and group dynamics

Members had high levels of trust amongst each other. Usually relationships were strong among those who knew each other well, for example the core group members. One reason for high levels of trust and strong relationships was that there had been quite little membership turnover during the last few years. Relationships were mostly channelled through one's position and expertise in a specific field. Generally, all members were regarded as experts in their own fields. Trust was even seen as a precondition for invitation to the group. If the chairman invited someone to the group, it was already an expression of one's complete trustworthyness.

Also an interesting issue was the opinion towards the least known fellow group members. This tells a great deal about people's real attitudes to this group in general. Some were very positive about unknown members, saying that if they had a chance, they would have a good relationship with each one. Some felt that if a member changes, they would not consider a relationship to the new replacing person strong.

According to group members, specific substance matters of the group were discussed more freely in this group than in other contexts. Communication and collaboration was open, confidential, and people were willing to voice their different views on the

subjects. The group aims to conformity in presenting and delivering its results. When the company says something in public, it has to be well grounded in broad expertise that really speaks uniformly according to the company's best interests.

There were very little controversies; different views were seen as existing knowledge of differing perceptions. People felt that they were responsible for bringing in differing views, existing perceptions of their fields or business units. The reasons for very few controversies were lack of time for discussions, high trust in each other and the information sharing work mode of the group. If the group had more time for discussions, there would be more reactions to presented materials. "Discussion was active in terms of allowed time." Usually meetings have active members who use the time for questions and passive members do not say much.

People had different views and everyone was comfortable in expressing them. They dared to voice their different views. However, they never ended up in a deadlock situation. The aim of the group was is, among other things, to form a company wide common view, or understanding of timely issues. Sometimes this led to consensual thinking. Still, members could have slightly different interests that fuel the discussion with added value. There was no stiffness that could possibly be found from some other groups in the company. One of the reasons for the low level of discussion and controversies was partly due to the structure of the group; members were mainly experts in their fields, and as such they were not eager to challenge experts in other fields. Presenting differing views did not show much in the group work. It was not as obvious as it was in other groups that make business decisions. The nature of the discussed issues did not necessarily require forming one solid, common view. The size of the group was considered appropriate; a larger group size would have hurt the discussion.

Communication was periodical. Typically, personal homework was done according to action points delivered in the meetings. Communication with other members was also considered as one of the things to do between meetings, when needed. In order to work out bigger assignments, members formed small task forces to form a view around such issues. That could have allowed working sessions with more topical discussions better.

During these occasional ad hoc subgroups, communication between participating members was intensive. The connection may have disappeared for a while after completion of the task force.

According to some members, group dynamics did not work because it had not been invested in. There have not been efforts to increase cohesiveness of the group. There have not been any campfires with sausages.

Group members were divided into those who had more communication with others working on the domain issues or daily problems, and into people from business units who were dealing with these issues only partially. Any discussion happened mostly among the former group of members, who had a "common language" of discussion. When speaking to the latter group of members one had to take this into account. When members are experts in different fields, it is hard to challenge their views.

Generally, members felt they belonged to the group, but it was not a strong or primary determinant. The same people could have had business with each other in other, similar contexts. The company has many overlapping networks, this group being one of them. Physical meetings were held between four and six times a year. Participation in meetings was seen as important, but some distant members felt participation was difficult because of the long distances. If one could not participate in two consecutive meetings, it could mean half a year without face-to-face time with other members. This could increase alienation from the group if absent members do not participate virtually in the group activities.

The domain issues and affairs were common to all members. At some point they all influence specific business environment issues. The group has to identify what the forthcoming questions are that need to be prepared or involved by the company. Those usually concern broadscale questions at policy level. Members represent a wide range of expertise in areas where the company tries to influence in different ways; for example by lobbying.

People did not have any big problems in general with trust and relationships. There were no obvious division into charmed circles. Information was easily received from other members, when asked. Nobody was being stingy.

Members were motivated towards group work. They were willing to identify problems, they wanted to discuss, and solve problems. Presented materials were well prepared before meetings. The group meeting was not considered a working session, but merely an information sharing session, although they formed opinions and common understandings on various issues.

Trust was built on expertise. Trust was built in this group as it was between experts in their fields; people trusted that others understood what one was saying and each were able to bring in something extra. Members felt there were several issues increasing trust: facilitation of regular face-to-face meetings, collaboration over time, shared experiences and knowledge sharing. "Once the trust had been built with physical meetings, it is easier to interact virtually," said one of the interviewees. Without these face-to-face meetings, relationships would not be as strong as they are. There is no way it could be.

The very limited membership with select, trusted participants also maintained a highly trusting atmosphere between members. Trust was built while working together, helping each other, and receiving information or help, and being able to discuss openly even sensitive or unfinished issues. Sometimes agreeing with others increased trust. Of course, members' personal connections, relationships and knowing each other greatly advanced mutual trust.

4.4.2 Communication Etiquette and Ability to Exchange Knowledge Electronically

Communication habits

Most of the interviewees used personal computers for communication and knowledge sharing. 42 % of all communication was done, for example, with emails, scheduling, NetMeeting, WebCasting, using interactive Web pages and groupware use. This communication form mostly included the sharing of explicit knowledge.

The other three forms of communication enabled sharing of tacit knowledge. The second largest communication form was face-to-face meetings and discussions, 32 %. A typical example was speaking in events, or consulting with an assistant.

One-on-one business telephone conversations had a 16 % utilization rate. The telephone was used especially when issues needed to be settled fast.

The smallest portion of these communication methods was used on distant connections to workgroups. About 10 % was allocated to teleconferencing and videoconferencing. The people interviewed preferred teleconferencing to videoconferencing, because of immature technology and the needlessness of video information.

Table 11. Usual communication and collaboration habits.

Communication Method	Percentage
Communication with personal computer	42 %
Face-to-face meetings and discussions	32 %
Business telephone conversations	16 %
Distant connections to workgroups	10 %

Previous use of groupware applications

Members were divided into two main subgroups: Those who had used groupware before and those who had not. 75 % of the sample group had used groupware.

Some of the group members had used various groupware applications but most members recalled using Lotus (Notes & Domino) and its web-enabled applications. Previously, groupware was used for the needs of a virtual library on most relevant and recent information. Some had experience of simple file sharing (FTP servers) and Intranet distribution methods. Groupware was perceived more useful in a dense and intensive group or project. People will use groupware within their work, if they feel that it saves time. This is more likely to come true when the application itself is developed

according to the real needs and working efficiency of its intended users. Some members truly believed that groupware is the way to do work in the future. Efficiency, and even the fun of working together remotely, and finding information, results from common contribution. This requires much from people themselves to build their own knowledge-sharing environment. For groupware's value is no more than the people's willingness to contribute to it and receive from it.

Distributing news and fresh materials was one of the proposed applications for groupware. NetMeeting was widely used for assisting telepresence (remote attendance to meetings).

The people who had not previously used groupware, 25 % of the interviewees, explained few reasons for not doing so. Requesting a Lotus Notes password (or id) was considered too complicated. Therefore, users might have neglected the Lotus Notes (and web password) adoption process – some did not even bother starting up.

The members' locations and distances between each other varied. Co-located members have the ease of meeting each other face-to-face, diminishing the use of groupware as a mediator. Some members preferred to use traditional methods of email and telephone, insisting that they were more efficient than virtual work methods.

People had used the QP as a limited extension. One reason for the limited use of groupware or QP was that it lacked the notion of urgency. If the message was urgent or needed some action from member, it would have come via email or telephone.

Receiving initial QP instructions

Members of the group gave the following answers when asked about the amount of instructions they had received regarding QP instructions. According to interviewees, well over half had received enough instructions for QP use. Besides email introductions, many of the core group members had received instructions in a few additional demonstrations interlinked with pre-meetings held the day before group meetings. Many would still like to receive more instructions. Clear instructions were required for

successful learning by themselves. Some had tried the e-learning material provided for the self-education purposes. Still, that kind of training would not suffice for this group, because many members did not have the required time or capabilities.

Less than half of the sample group felt that they had received no or very little distributed instructions. A few did not remember receiving any instructions. Some needed more instructions, while others did not. Most would welcome additional personal training. Some persons indicated being very busy, having no time for additional training from their day-to-day routines. The ability to get instructions through may be problematic for group members. They may simply ignore such messages if they were busy with high priority issues. Those who thought that the application is quite straightforward, questioned the need for any additional training. Features of the application were considered remarkably similar to those of other solutions used in the company. A few members had used the QP in other projects or contexts after it was published in this group. Spontaneous trial of QP applications was admirably high and that could provide confidence to learn more.

When group members were asked about their interest in learning to use QP, many welcomed personal training. One preferred a short classroom style introduction by someone who knows the application and explains how to use it. One was not interested in further instructions due to having had very bad experiences with previous groupware applications (Lotus Notes). Generally, members expected these applications to be user-friendlier, having no need for any instructions. If personal training were required for use, people would not commit to so complicated an application. Maybe a two-pager would suffice as instructions. The application itself should guide the user enough on the current screen. That would be sufficient for most users. Some active users were pleased to have step-by-step instructions within the QP, and the possibility to call somebody when they needed help. Manuals were sometimes considered too thick and used unfamiliar vocabulary. Only a few were aware of the existence and whereabouts of QP manuals; even fewer bothered to read them. Instructions were most needed when someone was publishing documents within the QP. This was because it usually happened in intervals of a few months. Advanced use, for example reconfiguring the

structure of the content, also required good support. Personally ensuring that people really do visit the groupware application in the beginning of the deployment may be even more important than distributing instructions. The visit would provide an example of its use, and the excitement of finding relevant information. After that people would be prepared to visit next time.

Received QP training and training needs

About half of the interviewees thought that the QP was introduced to the group quite well. It was deployed smoothly without investing exceptionally visible efforts in launching the tool. Few email instructions were delivered to members. There was a short presentation about QP in a group meeting, multiple demonstrations for the pre-meeting core team and personal trainings for power users. One of the core team members answered: "The manner in which the QP was introduced and deployed was appropriate. The group was introduced to it. Together as a group we were given multiple opportunities to learn how QP works and what the benefits of QP will be. We had multiple training opportunities. I can not imagine any better way to do it." Received training had helped some to start using QP. Without a chance to interrupt daily routines and managing urgent issues in order to just think about it, people were not necessarily prepared to adapt to the new working methods. Most did not feel any resistance to change. Most people learned to retrieve information from QP effortlessly and saw its benefits.

Some people were active and some passive with this tool. Passive members were aware that others were using it. A few members wondered why those documents were not delivered by email anymore, or in an easier way. Often ones work role dictated how actively group members used their QP. When deploying a groupware application, it was reasonable to choose among tools that were supported by the company.

User activity had not achieved the expected level. Measurement for user activity was based on the amount of published documents. The QP lacked a counter for visitors, which made automatic measurement of its user frequency impossible. The number of active users who had published materials with the QP, were still quite low. The reason

for this could have been the composition of the group. Typically, group members were senior managers of the older generation. Maybe deployment itself could have been done differently. There was a lack of commitment to the deployment project within the users and management. This was most likely because of the partial stakeholder alignment.

One of the reasons for low user activity was the coarse meeting rhythm. People were mostly using QP around the meetings. In between there was a passive time allowing one to forget it. One member said: "If you do not use it daily or weekly, it slips from your mind." Notification emails were seen as important in reminding members and giving the link to current information in QP. It was not clear, however, if QP was optimally and efficiently used for knowledge sharing. Reflective discussion in QP regarding active work around common projects or documents was still missing. At least this kind of communication had not been channelled through QP. Two reasons were proposed to explain this lack of discussion.

1)   Adequate rhythm of group meetings

2)   Old habits

The best pattern for effective use had not yet emerged. Some active users should have provided an example to others—saying this is how we should use QP from now on, starting with one case that would involve all users and forcing them to participate and learn to use most of the basic features of groupware.

Deployment of the QP was communicated to group members by email. This method was chosen because it could efficiently reach all members. In addition, the QP deployment was briefly discussed and introduced in the group meeting. Global personal, face-to-face introduction and training were considered too hard to manage. Some interviewees preferred a face-to-face introduction. Organizing an event for members to see the application, comment on it, and have a chance to ask questions was deemed important. It could also give feedback to develop the application further. People who did not have a chance to participate in demonstrations at pre-meetings asked for such a presentation, and those who saw the presentation mostly liked the idea. Personal

training could also be made available with online meeting technologies for interested and capable members.

The problem with the online groupware application was that that user had to have an online connection to the company network in order to have an access to stored documents. This particular problem was solved in the QP application with an off-line feature. It allowed the user to have his own copy of the whole content of the groupware. The only drawback was the constant scheduled synchronizing between the on-line and off-line versions.

In this group, email had communicational advantages when compared to QP. Distribution from the QP was really seen to be useful when used strictly between members. Email can easily reach people beyond group boundaries. It provides better support for live discussions, with the ability to involve anyone having an email account. QP cannot compete in this respect. It has its strengths elsewhere. When discussions evolve to documents or decisions, those are easily captured and recorded in the QP for further study and reuse. With a mail-in feature, QP can also receive emails as well as send them. It would be creative to learn to combine the use of these medias to support each other. This requires agreement on how information is delivered within the group.

Generally, the decision to deploy QP for the group was seen as a reasonable act of logic. Three quarters (75 %) of the interviewees thought so. Although a few non- core group members felt that they were not listened to regarding this matter. Some were not sure if the selected tool was most appropriate. There were other competing tools available for the same purpose. These tools had developed a lot since the initial decision was made in the core group. The intention of the deployment decision was to get a better communication method for the group besides email. Some members felt that the chairman of the group had not motivated the group members enough to use the QP and thus had not emphasized its importance.

Many were sure that there was a clear need for groupware. Members were aware of more efficient ways of sharing knowledge between them. Groupware was considered as

a solution to several problems. It managed their substance material files in one centralized and secure place. Members did not need to store all the common materials in their hard drives anymore. It also lifted a load off of email. One important section of members' work documents was no longer filling their inboxes. Only links to documents were distributed instead of actual files. The QP was considered as a good place for both distributing information and as an archive. Groupware allows work without paper copies and it supports organizational memory. "For this kind of forum, it is a must!"

One active subgroup had prepared a lot of material for a forthcoming chance to publish it in any suitable occasion that would not require maintenance of the Web site on their behalf.

The group had confronted an idea of wider distribution of its information. Creation of a central home page to the Intranet was proposed. The group's home page would contain links to various sites within its domain and lists of contacts as well as link to its QP. If company wide materials were to be distributed in the Intranet, some members suggested using the same QP application to do it. Others preferred separate standard publishing tools. This was explained by its familiar structure and the user interface having a typical Intranet look and feel. An Intranet distribution decision calls for allocation of dedicated maintenance resources to carry out constant updates.

4.4.3 Work Habits

Work methods of the group

Members used the group to deliver, or to forward information to other members and the chairman, who reports to the executive board. This was conceived more like a reactive group to report and follow up issues. It was not seen as much as a group for proactive thinking.

Besides regular meetings there were no firmly established norms or methods for group work. The work consisted of ad hoc tasks, information reporting, but not much linking between members. One interviewee perceived the group's work as one to "warn people about the main threats we have, or are going to face in the future, and how can we act

against this threat, or how can we be prepared to oppose or prepare some material against this threat."

The most important work methods were:

1) Knowledge sharing in quarterly meetings with pre-meetings with core members, as well as some additional face-to-face meetings

2) Email exchange and phone calls

3) QuickPlace as a virtual library, distribution of meeting materials

4) Action Points: Preparing papers and statements in person or small group projects, task forces

5) Reporting to the group, for example regional updates

6) Linking with other members. Group members form an expert network for information retrieval and inquiry also between meetings

7) A forum that offers a general view on its domain issues, part of internal knowledge sharing within the company

Frequency of personal contacts

The need for contacting other members varied. Interaction ranged from weekly to quarterly held discussions. The group's information was considered useful background to understand the overall context of the environment in which all members are working. Clearly the need for contact with others was mostly ad hoc, occurring case by case as important issues emerged. When members needed to contact other members, they did so. Actions and task forces from meetings resulted in quite frequent periodical communication, with daily interaction until the issues were taken care of.

Some members were more dependent on information from others. Some may have had only very limited needs from others. The network of group contacts were considered important. One could contact peers to ask for, or to provide help.

Communication polarized personally to ones usual contacts. The most active members typically discussed matters with few others, either core group or within a specific field of experts or issue owners. Some had regular reporting between each other, when it was

part of their job to disseminate information to this field of experts. Some had met others during their occasional visits to a member's site, or while having business at that specific region.

The members with minimum communication were limited to participation, reporting to, or follow-up of the group meetings. Seemingly inactive members could just be on the receiving end, gaining remarkably from the information sharing aspect of the group's work, knowing what was going on at these matters.

The secretariat and the core group had increased communication around meetings. Before the meeting they had sessions to outline the agenda and objectives for the group meeting. After the meeting, presented documents and detailed minutes were delivered through the QP.

The media for personal interaction and reasons for its use are, in order of importance and frequency of use:

1)   Email

Efficient and works well. Does not guarantee response immediately. Not personal. It is useful when contacting members over long distances – for example the other side of the earth and within different time zones.

2)   Telephone

Rapid way to take care of urgent issues. Instant response.

3)   Face-to-face meetings

It is a personal way to communicate. Used when starting new issues, and in working sessions (task forces). Visiting a member while travelling to one's site or region anyway.

4)   Teleconference

Considered as a reasonable way to participate in meetings over long distances.

5)   SMS (Short Message System)

Receiver should already know the context of the issue. One could not start a big new issue with SMS.

The QP discussion database was not yet taken into active use. As long as it does not have a critical mass of users it does not work as a discussion tool. One of the interviewees said that, "If I need to contact others, I know how to do it. I do not need any new tools or anything else to do it."

There is no single best medium for communication within the group. All media have their own applicability with each having its own set of strengths and weaknesses. Adoption of the QP application has increased the selection of knowledge sharing methods available. Eventually, respective need should guide the choosing of the most appropriate medium for sharing knowledge.

Working with QP

Members divided in two categories according to their activity of QP use. "Active" users had published documents in the QP, while "passive" users had not. The percentage of the active users was 25 % of the interviewees. Active members were used to publishing documents, depending on their role in the team. The secretariat had the role of publishing meeting agendas and minutes. They also published presentations and documents received from other members who did not publish any of their own materials in the QP.

The active members knew how to use the basic features of the QP. They had seen demonstrations of mature use of the QP with step-by-step instructions and examples. Learning to use more advanced features would require additional instruction. Some active users were already quite capable of handling the QP application management, including development of content structure and updating member information and access rights.

A positive impact on the group's daily work was illustrated by gradually proceeded core group demonstrations and personal trainings. These were considered successful in introducing and learning to master QP use. Methods for group wide introductory demonstrations must be decided upon, based on the results of this study or an additional survey of needs.

The group had not yet established, nor accepted its own specific code of practice for groupware use. It emerged as one of groups' knowledge-sharing channels. Its main purpose was to ensure the availability of meeting documents and other relevant information. Mostly, QP use was still passive follow-up, rather than active publishing of common knowledge.

Active members were aware of the current information structure within the QP. They were also quite satisfied with it. Sometimes, finding the proper place to publish certain material was seen as problematic. The groups' QP had been implemented with two categories. First, there was an overall content structure for all general substance issues. Secondly, there was a more detailed substructure for one specific issue and area organization. Unification of these partially overlapping structures was proposed. At least some clarification for content management was asked for.

4.4.4   Work Processes

Necessity of groupware use in members' work

Active members valued the QP as a useful and necessary common knowledge sharing application. Generally they were pleased with it. The QP was becoming more important but they did not yet regard it as obligatory. It had not reached a critical mass of user activity, thus becoming indispensable.

Groupware was considered to be at the appropriate level to manage group documents. It supported collective memory of the group. It offered a place to systematically share documents within a certain time frame, allowing members to check the current status of any common issue. Without deployed groupware application, these documents would be scattered in different places.

Members did have materials that they could have published in the QP, but this kind of habit had not become common to all members. There were exceptionally active members who published most of the materials.

According to interviewee responses in the two interviews, some kind of groupware or document management was inevitably needed for the group. There were alternative applications to choose from for this group. According to a few interviewees, the proposed applications could still have better usability. Especially content management within the applications could be easier. However, many did not have previous experience on groupware tools.

Restricting the QP access to group members only was seen as important during preparation of common documents. The selection of publishable documents could be shared in the Intranet at a company wide level. But then again, Intranet access could also be restricted to certain group. Intranet publishing would require frequent updates anyway. The decision to publish the group's documents in the Intranet requires further consideration and the chairman's approval. Some saw that a separate Intranet solution would react slower, as it would be a more passive tool.

Necessity of QuickPlace to work in the group

The passive group members thought that the QP was not required for the group's work, but it can make it easier. Some had doubt about its necessity because the benefits were not clearly communicated to all members. The passive members needed encouragement in using the QP to exchange their views. Some acknowledged the QP as a potentially good tool to develop ideas that the group can force into development. They also required the added value of fresh information from the QP.

Proposed alternatives for knowledge sharing with the QP were email or groupware implementation with other tools, but those were not considered reasonable. We should not forget that the critically important information was shared in group meetings. Any groupware implementation should be based on the needs of the group. Work processes of the group should be defined before increasing the QP use to serve those purposes. Some groups need and use groupware more than others. Some did not think that this particular group would need the additional document management or group editing offered by the QP. It had been used to distributing products and sharing with each other.

4.4.5 QuickPlace as a Groupware Solution for the Target Group

Active members' QP use

The percentage of active members was one quarter of the interviewees. When active users published documents in the QP, they did it sporadically and intensively during a short period of time to make certain part of the substance matter was ready and available to others. This was supported with occasional updates. The active members published documents to make issues easily accessible to other members. Large amounts of documents were published in the QP without sending notifications to all members. Automatic weekly newsletters were sent to core members. Making certain theme issues available to all members with notification was also proposed. This method would be suitable for asking comments on common issues.

Diversity of the QP use

The members were divided into two categories according to their activity of QP use. These two categories were defined for this study according to their knowledge sharing activity as follows: Active users had published documents in the QP, while passive users had not. The percentage of active users was 25 % of the interviewees. Active members were used to publishing documents depending on their role in the team. The secretariat had the role of publishing meeting agendas and minutes. They also published presentations and documents received from other members who did not publish any of their own materials in the QP.

The secretariat also published any other relevant information when inspired or needed. They notified the group members about their new documents with the email notification feature. The active members were interested in viewing newly published documents after receiving notification email from the QP. Automatic notification emails were only sent to core members. Automatic weekly news notifications were not perceived as humane. Maybe it could have a more appealing outline or phrasing to captivate interest. While the notification claimed to be "personalized" for the user, it still lacked a personal touch. Notification email had no direct links to newly published material. Instead there was a link to a similar page in the QP, where the actual links were.

Easy posting of material to the QP with a mail-in function had not yet found its audience among group members. It was not yet advertised, though. Active mailing to the QP inbox would support a news feed function.

User activity increased as group meetings approached, reaching the highest activity level just around the meetings. Between the meetings, members could have occasional periods of no activity at all. Few interviewees admitted to having partially forgotten how to use some QP features because of irregular use.

The active people used QP to

a)   Browse and print documents to read.

b)   Publish documents and presentations for others to see, and notify members about newly posted material.

c)   Edit previously published documents.

d)   Link materials together

e)   Some had used other QPs within the company. The QP had become a standard tool in the company.

f)   Maintenance of structure: Create, update, and delete pages, folders, and rooms.

g)   Classifying: Finding the most logical place in the content structure where each document should be published.

h)   Update member information and access rights.

Many specific functions of the QP were still unfamiliar, or not used by active members. Basic use was well understood. Discussion was not yet used for group discussion. This group had many other communication means. The members of the group were used to other communication and collaboration methods. They had the more traditional business communication habits of meetings and telephone calls.

Using incentives to motivate QP use

The members thought that groupware use could not be motivated by incentives. Instead, they might encourage content providers if the information had actual demand and was useful.

Sustaining many overlapping systems to manage matters or documents would not work. Members called for a clear code of practice. The group should make a decision on how its documents are produced and managed.

Not having the groupware would create the risk of omitting distribution of the group's knowledge sharing. If people were actively using the QP within the group, then passive users would feel left out of group work. The current utilization rate was low enough to not cause this kind of digital divide. Many of the passive members were eager for training in order to be able to participate more.

4.4.6 Knowledge Sharing Places

Communication and knowledge sharing between group meetings

People had varying opinions on the amount of mutual discussions between physical meetings. Generally there was not much active discussion between average members besides regular reporting to physical meetings, but more amongst core members and members within the same field of profession and expertise. The role of a member also determined how active one's conversations were. Communication links were created between group members on demand, based on tasks and issues. If issue owners had to make an inquiry according to an action point from the meeting, they could organize small projects to deal with it.

The methods of communicating and sharing knowledge, in order of popularity, were: email, phone and face-to-face meetings. Physical meetings were considered necessary for consolidating the opinions of multiple people in difficult issues. If a physical meeting was not possible, it could be substituted with a teleconference or electronic time-delayed methods such as emails. Traveling is still necessary for important big meetings, but it is minimized for economical reasons. Face-to-face meetings were also easily arranged among people who knew each other.

What would be the most efficient ways of sharing knowledge within this group?

Web solutions like QP or Intranet workplaces were seen as a valuable way to exchange static information. If something is ongoing, evolving and needs immediate attention, then email and telephone have been more useful in the past. The group has not been taking advantage of the QP as much as it could have done. The members were beginning to see their own role as a critical success factor in the adoption process.

There are several knowledge sharing methods already in use by the group. The members felt that it is efficient to have someone speaking and presenting each of the substance issues in the *physical group meetings*, and having the possibility for discussion. It is valuable in getting the participants' complete attention and to ease remembering. People leave meetings with a recent update in their minds. The group meetings are especially fruitful in receiving information from different fields of expertise, when the subject is not of personal priorities. The group works often by setting *action points* to members or small groups of members. Meetings could be more efficient and they may be improved. The chairman proposed that a better way to share more knowledge between the members would be to increase the amount of *direct contacts* between the group members, and by establishing ad hoc projects on demand.

The interviewees had the following opinions about knowledge sharing methods within the group:

> *"Face-to-face* meetings are efficient in delivering messages and suitable for problematic issues, teleconferencing and NetMeeting to others. Face-to-face meetings are hard to arrange."

> "There could be a demand for *teleconferencing* between meetings."

> *"The telephone* is suitable for fast information distribution or questioning."

> Email: *"Not as much information distribution in emails as before QP adoption. Ease of use, if one bothers to read them. Some important email messages are easily overlooked in a flooding inbox."

Usually members receive so much information in many ways (emails, big attachments, web links) that it is difficult to concentrate on the specific message in the information overflow. This problem may express itself as an inability to penetrate personal filters and an inability

to get a message through to the intended receiver. Still, some members felt that email is the most efficient way of sharing knowledge within this group. Specifically, email was utilized for distributing specific information to a small group of people. People use email by force of habit. Fax and snail mail are almost faced with extinction.

Each method still has its sides. Efficient communication uses a balanced combination of all these methods. All are needed. The objective would be to learn how to choose the right method for each communication need. The present mode of sharing was seen to be nearly as effective as needed. Utilization rate of the groupware could be higher and the tool itself could have a few enhancements. The main thing is the group meeting. Other elements only support it. According to members, this kind of virtual team would not survive without meetings and reasonably frequent discussion.

QP and other Web solutions

Some members noticed that recently the focus had been increasingly directed to Web enabled solutions. "If people feel that it has something for each and every member, it could increase the QP's efficiency as their knowledge sharing tool." According to members, the QP cannot entirely replace face-to-face meetings, email or telephone as the group's knowledge sharing method—it does not need to. The QP was considered as a good solution for sharing knowledge to the whole group, providing that it works flawlessly. The QP offers proper tools for more analytical and substance based conversations, where presented materials could be commented on. This would also take a load off of email. The QP is the proper forum for organizing bigger entities because the group's materials are well organized. Web tools should be easy to use and user-friendly. This means having easy and quick access for every member, and enabling comments to proposed documents to result in conclusion.

Attitude towards QP

The most active users did not feel they were doing extra work while using groupware. They felt its advantages outweighed the disadvantages. One regarded it as any other work routine, but eliminating the email load of small details. Others admitted feeling they had extra work because of its sporadic use. If it was utilized daily, it would be

more handy. Unfortunately, there would probably not be enough issues for daily frequency of action.

Groupware presented a new work method and a new habit for this group's members. Learning to use QP can be interpreted as extra work. Terminologies of some features were deemed strange. For example, the difference between save and publish actions. The most active user had felt an increase in his workload, when disseminating a large amount of information on behalf of another member. Without being able to gain advantageous information from other content providers one interprets QP dissemination as extra work. Sometimes problems with QP or the inability to use QP had created extra work for the secretariat. Especially when they needed to email materials already published to the QP.

A clear advantage of the QP was the availability of all domain information managed in one place. Previously the group's information was scattered amongst email and hard drives. This is one of the main reasons why active members were satisfied with the QP. When compared to the standard Intranet publishing solution of the company, the QP offers the comfort of publishing documents with ease. Yet there were members who resisted groupware tools.

Quality of QP

Most of the active users estimated the quality of the QP as being quite good and at least useful. The QP was considered a modern and quite reliable tool. Some described it as a solid system. Its usability could be improved to better serve the group. Those, who had no experience of other groupware applications were not capable of its evaluation. Still they were pleased with the QP.

The QP had basic group-work elements and hierarchical levels of pages, folders and rooms. Yet it allowed a lot of possibilities as the users' capabilities evolved in applying them. Some considered it quite simplified. It did not require learning of Lotus Notes client or any coding. There were some navigation difficulties with the linking of new rooms and folders. Sometimes the application suffered from slow response time. This

was especially harmful to those who routinely published large amounts of information at once. The QP had suffered from server problems that could be caused by software quality problems. These problems were observed in the early stages of the QP use.

Publishing documents to the QP was not considered difficult. The only difficulty members were probably facing was finding the proper place to publish each piece of information. One of the active members suspected that other members just feared they would fuss with, or mess up the application. Creating a more complex structure would make it too laborious to update.

The quality of applied knowledge sharing experienced, depends somewhat on the quality of its content. The utilization rate of the application determines how useful it is. If it is comprehensive on one issue, it can serve users seeking that information. If some issue areas are not covered (no content available) within the QP, it could not serve any user's need of finding it there.

QP Usability and Access

The passive users' opinions about QP usability varied. One thought that the QP layout was slightly stiff, boring or archive-like. Others considered that "It (QP) is now as user-friendly as possible." A personally sent and targeted notification link to a certain new addition was seen as especially valuable. The QP was criticized for not being as fast as expected. Especially over long physical network distances from the server. Many users did not regard the QP as having any usability problems, nor did it require extra work. "Those (documents in QP) are easy and fun to read." "Before they were in email and now there are a couple of clicks, there is no problem with it."

Table 12. Usability Observations According to QP Users.

Areas of satisfaction	Areas of dissatisfaction
• Ease of use • Materials well organized • Diversified teamwork support tools • Simple and instructive user interface	• Extra work • Occasional server problems • Sometimes "SlowPlace" • Stiff or archive-like layout • Content management

4.4.7 Benefits of the QP

The active members were most satisfied with the following areas. Basic QP features were regarded as easy to use. All domain information was processed and managed in one common place. Therefore excessive emails were avoided. People were pleased with the distribution of meeting documents with notifications. The meeting documents were easy to find by using minutes that had links to presentations. Weekly newsletters about new materials were also appreciated. Some active members proposed the distribution of a weekly newsletter to the rest of the group members also. Personalization of automatic information retrieval was seen as useful.

Knowledge sharing benefits observed from QP

According to passive members, properly implemented groupware is an excellent tool which helps the group to achieve its common goal. However, its perceived benefits are hard to measure. In information distribution, the group has transferred slightly from push mode (email) to pull mode (QP). Before the QP deployment, information was distributed automatically to all members with email (push mode). Now information is retrieved from the QP based on personal needs (pull mode).

The QP was considered a useful tool for assuring knowledge sharing, accessibility and communication in a group work. The QP could further improve the group's internal knowledge sharing, communication and collaboration in the future. The members could possibly use the QP for discussions and communication, depending on the activity of other participants of the member network. The more people who would use QP, the better benefits could be expected. Many hoped the QP would reduce email flow and become a standardized practice to share knowledge.

With the aid of the QP, people knew where to find and retrieve the group's materials. There was no need to store the group's documents on a personal computer, or to fill mailboxes. With help from the QP, members have guaranteed access to group documents, regardless of the availability of any person. The web-based online system allows members to work whenever and wherever they like. Information in the QP was

clearly and orderly segmented. However, publishing documents to a folder structure constructed by someone else requires a bit of orientation.

Within a shared workspace, it is easier to follow what others are up to. One could intervene and ask for specification if something dangerous was noticed. The community of group members become closer as members understand each other's sectors better due to increased knowledge sharing. The QP could advance team building and it could be a good place to identify internal contacts. Maybe a current list of domain issues could be also be explained and presented company-wide. Such a site should be regularly updated. Group dynamics reflects the group's QP use. According to one member, utilization of the QP reaches the level which group members feel is necessary.

Table 13. QP Benefits According to Users.

• Domain information centrally managed in one shared workspace
• Rational distribution of materials: notifications with links to actual documents and automatically sent regular newsletter updates to members
• Virtual teamwork enabling tool for knowledge sharing, accessibility and communication

4.4.8 Problems of the QP

There were some problematic areas that active members were discontented with. Different areas had a slightly different layout of categories. Sometimes information was hard to categorize when publishing documents. Similarly, finding certain information from a supposed category was not always successful. Advanced document management could be even more user friendly. The structuring of the QP was seen as difficult or requiring experience when making additional changes to categories. Information in weekly notification newsletters tended to become obsolete after a longer period of time. The QP sometimes worked too slowly, or suffered from server problems. Creating front pages for thematic issues were considered more complicated than normal pages. Linking especially was time-consuming if URL addresses were fetched manually. Early problems with the QP were solved quickly. Users were generally aware of what to do if possible problems occurred.

The terminology for publishing and saving documents was considered a bit confusing. When a page in the QP was "saved", it did not become visible to other group members. It was more like saving a tentative draft before actually publishing the page. The "publish" option simply published the page with a default setting to the QP for others to see that page. "Publish as" gave a set of options, for example, adding editors or making notifications simultaneously when publishing the page.

Table 14. Problems and Causes for Dissatisfaction with QP

- Challenges of maintaining domain categories, taxonomy, and content management
- Occasional server problems and slow operation
- Terminological ambiguity in some QP functions

Awareness of QP support

The passive members were asked whether they knew what to do if possible problems occurred. About 50 % would call or email someone who would know how to resolve the problem. Help was asked from personal networks, typically other group members, especially secretariat and deployment project members. Around 30 % would contact the service desk. The rest would try to solve the problem by themselves, probably with the aid of instructions. One would circumvent the application altogether and contact the information source directly. None were at an absolute loss for what to do next. In general, passive members did not know where to find the QP instructions (manuals, online help, e-learning material). Instead, they knew whom to ask for help or instructions when needed.

Reasons for passive use

The amount of passive users, i.e. users that had not published any documents, was 75 % of the interviewees. Even the most passive users still used the QP for retrieving information.

Table 15. The Main Reasons for Passive QP use.

Passive members …

- were not able to participate in QP demonstration event

- had not received step-by-step instructions

- did not deem QP necessary for their work

- experienced some technical problems with QP

Mature use of the QP was demonstrated by 25 % of passive users. Accordingly, these step-by-step instructions were not received by 75 % of the users. This was clearly one of the reasons for the low utilization rate of the QP. Half the passive members did not feel the need to attend a new presentation if it was organized. Still, a few of them would attend, if there were clear benefits available from the event, or there was a substantial change in the use. The other half had already participated, or would participate in such an event. For example, the demonstration could be a 20 to 30 minutes workshop for interested members after the group meeting.

Many of the passive users thought that QP use had not been made necessary. It was not necessitated by managerial decision. Some did not actively use the QP because it was not made necessary, prioritised, and therefore not expected from users. Briefing to new members could have been more comprehensive to encourage them to use the QP right from the start. The introduction was inadequate for some passive members who did not participate in core team pre-meetings.

Some did not need to use the QP because they felt that the work of other members would not relate to their specific field of expertise. The members would use the QP if they felt it immediately beneficial. For example, a passive user did not expect to see valuable information available from the QP because of being certain that such information would already be received from other communication channels.

Several passive members pleaded their role in the group for being at the receiving end. They did not consider themselves as active contributors. They were merely following the domain issues, as the meeting was an appropriate place to get updates from. Some passive users thought that active users would gain more from QP use. The group's work was seen as strategically important for some members whose operational work was not necessarily linked directly to it.

Some did not feel necessary to personally put their documents into the QP because they thought it was the secretariats job. Many had used the secretariat as a "human interface" to publish their documents to the QP. This misconception of the essence of groupware alienated many users from active subjective participation. A clear code of practice was called for. A few managers had a so called "positive problem" with the QP use. When assistants could use groupware on their behalf, they did not need to use it by themselves. The assistant handled all the materials of the QP for them. Because of its general nature, this problem could appear with any other computer program or information system.

Old communication habits were still strong among members. Email and telephone were still primary working environments for many passive users. The QP was often mistakenly seen as a static information warehouse, not as an interactive place to do group work. Some regarded other members as the kind of people who would not be interested in discussing matters within this kind of application. According to one member, the group was ready for knowledge sharing, but the culture had not yet matured enough to comment on other people's work.

According to interviewees, the QP didn't have much reusable information. Issues dealt within the group were more current by nature. The group had to formulate new policies, statements and positions, although they needed to revise previous ones. The group is mostly facing the emergent information.

One member thought that the problem with groupware systems is that these are generally pull systems, not push systems, as email is. They require the user to do

something to get information. The QP notification might come to members automatically, but it had a feeling of not being as important as personal email. "If it was critically important it would have been emailed to me." There was no imperative to use the QP.

Some members, who had never used a company Intranet password, had problems with access rights. One member felt that applying for access rights was too complicated, and asked for plain Intranet distribution of all the materials, including meeting documents. One manager felt he was not being aware enough of groupware applications in general. Therefore, it could be experienced as a psychological barrier preventing use of the QP. Even if groupware use was perceived as useful, it could take too much time to orientate oneself to its use. The requirement of logging in to the QP was seen as a hindrance.

Generally, there were not many early technical problems reducing use at the start. Still, it was possible that some had temporarily stopped using the application because of a technical problem. Problems of that magnitude were typically the inability to open stored documents, or access problems in general. One member had a wrong, or too old a web browser version for accessing the QP. Sometimes there were technical problems with accessing documents within the QP. The passive users had problems with any diversified use of the QP. Some lacked confidence in their abilities to use any other than basic functions. That is why they required more training. Some thought that editing documents in the QP was complicated.

4.4.9   Acceptance of the QP

Active users

All active users accepted the QP as the groupware tool for the team's activity. However, the members did not know groupware applications extensively and thus could not bring out any better alternatives for it. For active collaboration, groupware was required to be as plain and simple as the QP. The members admitted that it allowed for personal working methods. In the further development calendar reminders could be sent and picked up to remind one of personally important issues. Advanced email and

notification features could be taken into better use. The group should launch a concrete case to use the QP to work together efficiently. It could be reporting on an action point or other follow-up issue. Maybe some issue that constantly needs policymaking. Although the QP was slow or unstable at times in the start, it had improved over time with version upgrades and in-house development.

Passive users

The QP was accepted as the group's groupware tool by 92 % of the passive users. Only one member hesitated to accept its use. Some asked for training or an introduction to improve their use in a more active direction. The passive users had used the QP mostly for reviewing following meeting documents, or other materials posted to it.

"The QP is easy to use". It was enough to know the right address, username and password. Passwords were generic, not requiring different passwords, especially for this application. It was considered easier, for example when compared to Lotus Notes. "The QP is good, but it can be improved." We have to follow the mainstream of technologies and keep up with it. Otherwise we could be left out of progressive development in the mainstream and may have to deal with extra costs or efforts.

"Is there an alternative?" One of the passive users would have voted against using Lotus products because of bad experiences earlier. No one proposed any particular groupware application to replace QP for this group.

Even the passive users believed that the group's work methods could be transferred to a virtual workplace. It is a different question whether this is necessary. The QP could not replace dynamic face-to-face, or other interactive communication (teleconference and video conference). All are needed for covering the group's work methods.

4.5 Learning

The fifth phase of the action research was specifying learning. The experienced effects of QP deployment are presented here with realization of the requirements. The

requirements are described in chapter 4.1, Diagnosis. Further development ideas that were collected from the interviewees are summarized.

4.5.1 Effects of the QP on to Group's Knowledge Sharing

Knowledge sharing is an important function of the group. As a virtual team it must assure that its domain policies are shared with all the people who make speeches for the company in these issues. Group members represented different parts of the organization and they worked on various assignments. People also had a diverse level of participation in the group activity according to their work interests. The collaboration was generally sparse, but when it happened, it had succeeded because of good relationships.

Active users' experience of improvement

Improvement in knowledge sharing was seen as the value of the QP. According to active users, information was easier to find and it was better organized than before. QP use was seen as a rational way to share knowledge. Greater member activity is still required to use the groupware instead of email. The content of public utility would attract more members to use the groupware regularly. The active members liked the weekly newsletter for its automated topical updates.

Improvement experienced by passive users

The passive QP users had noticed a slight improvement in their knowledge sharing. The benefits were quite abstract by nature and hard to measure. Currently, the most important benefit has been the online virtual library for group's documents. The group's information can be found from a single source easier than before. The latest document versions are always available from the QP.

Impact of QP on the group's work

Efficiency of QP use had not yet reached optimal level within the group. It was still in a transition phase. Therefore, its potential benefits had not yet been fully realized. It was hard to evaluate actual benefits of QP use in practice, although distribution of massive documents in emails has diminished.

Breaking the habitual stronghold of Email mode working method

The group members experienced improvement by not having all of the group's materials in Email. This was noticed as increased efficiency and relief in email backlogs. Use of the QP has also reduced redundancy in email. Many passive members were still using a more personal level of communication for their knowledge sharing. Typically this meant direct emails and phone calls.

Here is the follow-up of the requirements that were considered solvable by deploying groupware application to the target group.

Virtual teaming and meeting applications (Req. 1, 17)

The group started to use the QP as its online knowledge sharing application and has also increased the use of other virtual teaming applications. For example, some of the most distant group members have participated in group meetings with NetMeeting.

Document management and versioning (Req. 2, 3, 6)

The group's documents are now orderly managed in one centralized place. Document versions are controlled in the QP. Members could be more active in publishing their personal contribution to the QP.

Discussion support (Req. 4, 15)

The group had not yet switched its discussion from email to QP. This knowledge sharing culture might not be developed to a level allowing open commenting of each others work, at least, not in the QP. Members may still give direct feedback to others by personal communication.

Easy access to the group's knowledge (Req. 7)

The QP has made the group's knowledge easily accessible with a Web browser. However, defining any application as "easy" is relative to the target group's abilities. Particularly some non-technical members faced a different magnitude of challenges during the adoption process.

Need to improve organizational learning and overcome old work habits (Req. 14)

Some strong, old work habits have prevented new improved work processes from emerging. This issue is related to the knowledge sharing culture of the group and it can take a long time to change. First of all, the group's mutual agreement on its new work method is required. Then it basically depends on the members' willingness to share.

Continuous improvement of knowledge sharing

Quarterly held physical group meetings were still the main work method and the main knowledge-sharing event. Groupware use was considered to be a good idea. Implementation could be more effective in raising the consciousness and understanding of the QP. While the QP enables knowledge sharing, it does not ensure knowledge transfer to its user. Sometimes the group members may have forgotten to deliver relevant information back to their organizations. The group has a good start in its groupware use but there is still room for improvement.

Adoption process continues

The adoption process has not been completed yet. If most of the members were using the QP, it could significantly improve the group's knowledge sharing. If the tools were properly introduced to all passive users, they would probably use it more. Additional advertisement or marketing would not hurt, quite the contrary. Members needed information about the tool and its benefits. People do not usually have time to spontaneously study new applications by themselves. "The tool will be very useful provided that everyone will use it." The philosophy of sharing starts to work better, when the one who shares also receives something.

Below is the follow-up of the requirements regarding social issues.

Increasing proactive participation and cohesion of the group (Req. 11, 12, 18)

The group's development as a community of practice has indeed improved with the cohesive impact of increased knowledge sharing in common QP application. More initiative and more proactive work of the group was made possible with the QP, but currently it relies on a few active QP users. Positive experiences in small group activity

as a work method have encouraged the increase of its application in the future. These social issues still need some effort (see recommendations in chapter 3.3).

Support for efficient group decision-making (Req. 13)

The group makes its decisions mainly in face-to-face group meetings. Currently it has group materials available in the QP for all members. These suppport group decisions.

Technology and "Human ware"

Knowledge sharing problems would not be solved with plain technologies. Group dynamics still needed more cohesion. The group has to focus on its main purpose. If properly applied, technical applications could greatly increase efficiency and make working more comfortable.

Here is the follow-up of the communication requirements.

Intranet distribution of the publications (Req. 5, 16)

The group has not yet decided whether or not to publish its materials in the Intranet. This issue was regarded as a future development idea. Currently there are general communication channels for distributing company-wide materials, when necessary. The technology platform for an Intranet site should be carefully decided. The QP would be sufficient, at least as a groupware for the group members, although it could also used as an Intranet site.

List of the issue contacts to enable networking and "knowledge brokers" (Req. 9, 10)

Currently the domain contacts have not yet been made available, as it is related to the decision of publishing the Intranet site for the group. The list of issue contacts is currently available within the group. They also have personal expert networks maintained by organizational and personal relationships. The Domain expertise of the group members was not used as much as it could have been. Implementation of the Intranet site could be used for increasing visibility of the group but it should be connected to a wider integrity of Intranet.

Better global coverage of all regions (Req. 8)

This issue has improved within the group during the action research period. It was mainly developed because of managerial decisions. In part, the QP has supported this global development by offering global access to the group's materials.

Conclusion

As a result, the group needs a justified decision for the means to improve its virtual group work. This decision should cover which specific cases are processed in the QP, how they are communicated, and what are the responsibilities. A managerial decision for groupware adoption had become necessary to make such an interactive common tool imperative for group members.

4.5.2 Further Development

During the evaluation phase we gained a large amount of improvement ideas from the group members. Indeed, the next action research cycle could be based on the following findings.

The QP improvement ideas

The active users proposed several improvements to the group's knowledge sharing. Groupware, for example QP, should become a standard tool everywhere. Groupware applications should be consistent with other applications of the company. It could become a natural Intranet site, where members would visit a few times a week. The groupware application should receive up-to-date information on current topics. The structure should be clearly hierarchical and allow the use of a search engine. We should not develop the application itself, but instead improve user support, ease usability and introduce supportive materials and instructions to better support users. We should actuate the group members' abilities to use groupware and solve problems independently. If difficult problems occur, there should be personal assistance available. The opportunity to receive voluntary group training during group meetings was proposed.

Some thought that groupware could be greatly utilized during discussions of active policy identification. A groupware could be used more to aid small group activity. For example, to mutually comment on, or discuss issue papers prepared within a small group. Perhaps to send notifications between subgroup members. New actions could be better tracked down with calendar reminders. The possibility to integrate the QP somehow with NetMeeting was presented as a further development proposal. At least this combination could be used in interactive QP introductions.

People and their habits

A groupware could be used as a mediator in discussions of the company's best interests in the group's domain areas. New ideas could be proposed and commented on between meetings and final policies, or other decisions could be distributed to all member organizations. The secretariat would like to deliver forthcoming presentations in good time before the meetings. Therefore, they would like to get the presentations from members earlier and preferably directly to the QP. The chairman of the group proposed that his recommendations of QP use could increase its adaptation. The group's activity could also be developed to utilize the QP in its work.

Intranet

There had been a demand for the Intranet site to deliver current and forthcoming domain topics. It could be a company-wide coordinated effort to avoid redundancies of information follow-up and maintenance work. That was seen as important when thinking of the best ways to have an influence on domain issues outside the group. The use of the QP was suggested as one solution for the site. The QP's advantage would be ease of publishing. Issue owners could personally publish recent news and materials to the Intranet without intermediaries.

Activating passive users

The passive QP users were asked what would make them use the QP more. We found out several different enablers that are listed below. Tackling each of those issues would, according to interviewees, increase their activity.

Training. Almost all of the passive users welcomed training and introduction. Only 25 % of them had received training. The passive users needed interactive demonstrations of the QP and its possibilities, for example, making drafts, editing documents and commenting on proposals by creating responses. They would like to see more activity in their QP. Unfortunately, it is hard for busy members to schedule time for traditional courses. Therefore training could be better suited to members' needs if it was more personal. Training could solve many of the other barriers of active use as well. The current work method of the group was perceived as a good combination of different communication and knowledge sharing channels and collaboration methods. Still, each member could improve one's own use of groupware. It would be useful to teach people to work in a new and more active way with groupware. It could be started with a few power users, who distribute a lot of material to others. It could show a good example to other members. Changing the strong, established tradition of email use is hard to accomplish. Emailing has become a paradigm that is hard to break.

Ease of use. Many usability issues were mentioned. The members would use QP more if it were easier to use, had easier access, saved time and provided easier domain information retrieval than any other place. Training would certainly improve members' ability to use groupware and thus make operating situations easier. But it would not change the application itself.

Necessity. Some passive users required a priority reason to access the QP. For example, if the information or documents were not available in any other way. People would use the QP more often if it were required for their daily decision-making. Then QP use would be necessitated. Thus, people would also publish their documents there, if it belonged to the group's work processes. The QP would be a better way to work within the group if a critical mass of members were using it. Some of the passive members needed an order to use it.

Document Management and Content management. Use of the QP would increase if the latest versions of certain documents were always available there. The QP would also be useful for massive document sharing purposes. If the QP were more focused on

current issues, it would attract more members to use it. Then it would also require more effort from content providers.

Increasing activity with re-launch

The interview revealed concrete proposals for actions to increase QP activity within the group. According to one member, the QP should be re-launched for the group with another presentation in a group meeting with more face-to-face time. The QP was previously launched with introductory emails and a short group presentation. It would not suffice to re-launch the same way again. Before the actual re-launch, the user interface should be checked for good usability, structure and functionality. It should be assured that there was enough quality content. If needed, more content could be provided with a small group. According to the members, content determines value, and therefore use of this kind of tool. The user has to receive added value. What would it specifically be for the group members? Whether it was information, effect, communication, or giving information to others, it should be clearly decided and that decision communicated to all members. If a wider and more active use were necessary, what would it be?

Improvement ideas by passive members

The development of knowledge sharing in the group could be linked with and built upon the QP groupware application. It would not be necessary to apply too many tools. While the physical group meeting was considered as the main knowledge-sharing event of the group, the QP could provide additional support for its continuity. All this is complemented with personal communications.

Proposals for further improvement

Needs. Utilization of a tool should be based on its need. If the group has a need for tool, it will be utilized more. The tool should meet the demand of its users. Motivation was considered important; the use of the tool is not an end in itself. When developing groupware for this group, one must focus on what is the real benefit for the user. It is important not to forget the users' real needs when trying to satisfy them with an application.

Re-launch. Re-launch of the QP was proposed. Members could be asked for more feedback, which also increases the use. The group could think about improving the user interface and layout together. The simpler the tool is, the better. If learning to use the tool takes too much time and effort from the users, they will probably find a way to circumvent the tool altogether.

Mandate. According to interviewees, a common agreement on groupware use should be made. It should at least assure that material that needs to be shared is available to everyone in the group. Currently, the group's use of the QP is based on casual endorsement. There was no mandate for it.

Team building. The group should first become more cohesive. That is challenging among people with different personal interests. "If we are to develop as a team that works closely, we should create things together and find motivation for people from different backgrounds." It is challenging to find a reason to be together and work together in a situation where all are extremely busy. Accordingly, building a strong team spirit with the willingness to help others, especially when members meet quite infrequently, might be quite hard to achieve in practice. Therefore, some had a humble attitude towards any improvement ideas. According to one member, the lack of discussion within the group was related to group dynamics. The abilities of the people in QP use need to be improved for it to become a well-established practice.

A proposed improvement for the meeting culture was to use more teleconferences in between the physical group meetings. This could allow more discussion and planning together. "Common issues require common decision-making." No complex solutions were necessarily required, only a simple user interface and interesting content.

Content. If the QP were to include results of strategic work, it would be more valuable.

Time saving. People would use the QP more, if using it saves their time. Groupware should not require an extra effort to go there and contribute. In fact, contribution should

be made easy—taking as few clicks as possible. Otherwise it might not happen at all. When the user is motivated to search and look for specific information, he may take one extra click to access it.

Information management. Availability of the latest information from the QP should be assured. Information classification, creation of information structure, document management and updating were considered a challenge. Published materials could be developed to become more interactive by nature. Such material could invite or force more users to visit the QP and then the application becomes more dynamic. In this respect the group is a bit serious, a senior and executive forum that may limit the distributed material and its possibilities to attract members. We should pay heed to differences in various groups' needs for material that is supplied with groupware. Generally, people would welcome a fun way to receive their necessary information (infotainment).

Newsletter. The group could also improve on the QP "push" by sending more notification links from newly developing issues to members. Applying an automatic newsletter delivery to all members could be an even better way to deliver links to new materials in the QP. Issues are often developing faster than in 3 month cycles. That is why automatic newsletter updates would keep people continuously aware of recent developments of issues. People would not regard it as junk mail (spam) if those updates were sent infrequently. People should be able to select how much and which information emails they want to receive, as they are already receiving too much of it.

Service level and technical problems. The members had encountered some reliability problems with the tool. Sometimes there were server problems, during which the QP was not available for users. Sometimes the QP was a bit too slow. Therefore, service levels could be higher.

Improving knowledge sharing work

These three improvement areas were revealed by the interviewees.

a) Places and technologies. The use of technology was not seen as the biggest issue within this group. The current level of implemented technology is enough. There would be ways to utilize it better than the members currently do.

b) People and their capabilities. Although the current work method already serves many, people and their capabilities should be developed more than the technology. For example, one member required easier access to the QP and simplified distribution of documents. A few were still not quite used to web passwords. Some who favoured email as their primary work environment had an attitude against groupware use. If the QP did not bring any improvement to such members, it was because of their failure to use the QP at all.

c) Practice, work methods and organizational challenges. "Everything that improves efficiency of people's work is good development." If we should utilize technologies better, we should slightly change the way people work. However, we cannot change that dramatically, but we could make it a bit easier. For example, technologies could be used more for document management. Distribution of the group's documents should be agreed upon to happen through groupware. If groupware applications improve, it could diminish the efficiency of email as a tool.

Bringing in new issues and working as small teams

A proposal for bringing new issues to the group's agenda was introduced. The QP could be used to put a new idea or "seed" into the group's agenda. Any member (managers, directors, or issue experts) could have the possibility to share and start a new issue for the group. Each seed could have an issue owner that would be indicated. It would be valuable for bringing in and delivering those initiative ideas, or for commenting on something from an idea introduced by another group member. For example, this could be started by a proposal, or a white paper on a new issue, or an idea to tackle recurring problems. That way the QP could improve the work of the group itself. As the group has many issues to deal with, the QP could better support ad hoc small groups to deal with each matter that is derived from the group. The QP was also considered a good tool for sharing this kind of knowledge from small groups. This method could start with the

coordination of the group. A common problem within this kind of group, is that members do not have time to think about improvements of their work methods, but instead have to work on daily matters.

Choosing a new groupware platform

Although this is not a primary question for the group, it should over time consider the option of using another application. It does have other possibilities. This requires careful estimation of costs and benefits. The group should not use its limited resources for development work, only to make the group's work as efficient as possible with reasonable effort. Currently the group has a useful system that really works and people are familiar with it. Would it serve any purpose to invest in changing to a new platform which has the same functionality?

Visibility of the group in the company

Interviewees had opinions for and against increasing the group's visibility in the whole organization. Some of the interviewees thought that the group has good visibility directly to senior executives through to its chairman. The group does not have much visibility within the mid-level employees of the company. It has not been advertised. Some felt that it does not even need more visibility, because it is a low profile, undercover practice having visibility in a need to know basis. Issues of the group do not necessarily require broader publicity at mid-level. Visibility and awareness issues are mainly the chairman's definition of policy.

Some of the members proposed that information about the group should be available to a wider audience than just the group. They needed a list of issues, contacts and a brief summary of what the issues and key messages are. It was preferred to have just one place for the domain information, not two. The Intranet site maintained by the group and connected directly to the QP could provide brief company-wide information about the group and its work. The Intranet site and the QP should address different matters, but they could be interlinked. The QP could be used for preliminary work and the Intranet site for distributing final products of the group.

The group is part of a big global organization, whose specific domain issues it must align. Therefore, it is very important for people to know where the company is headed. Our speech must be in alignment every time, in every place and situation. Sometimes it is difficult to make that alignment. Within its field, the group produces alignments for the company. These must be shared with every manager or director, who should then be oriented to deliver one's speech in line with the company alignments.

Table 16. Major Proposals for Future Improvements.

Improving QP use	- Consistency with other tools - Support, Usability, Instructions - Personal assistance available if needed - Training - QP Applicable in small group work - Combining synchronous and asynchronous teamwork (QP + NetMeeting?) - Minimizing technical problems with QP
User habits	- QP to become shared discussion forum of domain issues - Support for bringing in new ideas—"seeds"
Intranet	- Proposal for Intranet site, QP one possible solution - Increase visibility of the group within the company
Activating passive use	- Motivation - Training – Improving user abilities - Improvements in perceived ease of use and usability - Necessitating QP use as part of the group process – Mandate - Information management, newsletters, document and content management of current issues and latest news - Communicating a realistic picture of QP groupware application, its purpose and possibilities - Re-launch the QP with more face-to-face time after making improvements to its content, usability and value to users - Team building - More virtual teamwork
Improving knowledge sharing work	- Better utilization of the current QP technology - Improving people's capabilities - Revising group's practice and work methods

5 DISCUSSION

The discussion chapter provides the main results of the study. Connections to earlier research are also presented here with reliability issues and future research propositions.

5.1 Results of the Study and Connections to Earlier Research

The results of the action research are presented and analyzed in this chapter. They are also divided in two sections, based on the two main research questions. The knowledge sharing effects of the groupware adoption are outlined in the first section. The second section expands on the social aspects of the adaptation process within the group. The third section provides practical recommendations for application of the results.

5.1.1 The Effects of Groupware to Knowledge Sharing

As a result of groupware deployment, knowledge sharing of the virtual team was affected. The quality of the deployed groupware was estimated as quite good and at least useful. Now, common documents of the group were managed orderly in one designated place. Centralized document sharing, for example, the meeting minutes and presentations, were comprehensively managed and distributed via the groupware. The group members knew where its documents were. This also reduced the email flood in terms of the group's substance issues. Still, the group discussion did not emerge within the groupware. Members preferred to use traditional and established practices for their prompt and more personal messaging. Deployment of the groupware presents a new work method and requires new practices from its users. It seems that the knowledge sharing culture of the group had not yet developed to a level of active group discussion (Dixon 2000, 72-73). We could also rethink the actual need for group discussion in this group. If the group's knowledge sharing flow is effectively covered with members reporting inwards to meetings, core members and to the chairman, maybe they do not need to discuss their issues with other members. Distribution of materials outwards, from core members to other members, was apparently working by centralized sharing, and notification by the secretariat.

Infrequent need for knowledge sharing was characteristic of the target group. This phenomenon can be perceived as *strategic transfer* described by Dixon (2000, 125): "The collective knowledge of the organization is needed to accomplish a strategic task that occurs infrequently but is critical to the whole organization." It has characteristics of sharing both tacit and explicit collective knowledge, related to strategic tasks that occur infrequently with other units. When knowledge sharing events of the group occurred, they were intense and focused on currently important issues.

The deployment process itself has a significant role in affecting users' experience of the groupware application in general (Grudin 1994). Just implementing it does not necessarily increase knowledge sharing (Dixon 2000, 2). Although many issues were carefully considered before the adoption, we could have better implemented training and motivating in this study. Orlikowski (1992), Karsten (1999) and Herrmann et al. (2000) have also emphasized the importance of training in making groupware application a success.

Grudin (1994) had emphasized the importance of demonstrating the mature use of the application to the adopting group to reduce uncertainty. He suggests that education should give step-by-step instructions and illustrate the positive impact on the group's daily work. This study supports this proposition. All of the active members had received the demonstrations and instructions for the particular groupware use. Those who had not received any demonstrations or instructions were mainly passive users. However, many of the passive users were not willing to receive training.

As the group lacked its own specific code of practice for groupware use, the amount of passive users was still quite high (75%). The groupware adoption process requires even more commitment from the group members and coordinated efforts at the managerial level in order to reach a critical mass of active users (Grudin 1994). According to the members, a higher utilization rate could have resulted in a greater impact on the group's knowledge sharing than it currently had.

There were several reasons for the high degree of passive users: The lack of introductory training, members did not feel that the groupware was necessary for their

work, communication culture, persistence of old work habits and attitudes, misunderstanding of the groupware's fundamental idea and technical problems with its use. It is important to react to these reasons in the future, because of the currently high degree of passive users.

Deployment of the groupware had an effect on the use of different communication media in knowledge sharing. Face to face meetings remained the main knowledge-sharing event. Those were regarded as more human and sociable communication methods than computer mediated methods. Valacich et al. (2002) have also discovered this issue in their study. Partial email use evolved into symbiosis with groupware use. Notification emails with links to documents were sent to members from the groupware application.

The idea of sharing works better when the one who shares also receives something useful in return. The virtual team members would use their groupware application more, if they experienced a balance between extra work and benefit (Grudin 1994). At least that is applicable at a personal level. At a group level, the organizational interests and managerial decisions can drive the development of group work within the domain. The work methods can be contractual. Uncertainty of work methods could undermine the work of the group. A virtual team should decide how it shares its knowledge and consciously apply that code of practice to its communication etiquette.

The target group of this study had many requirements for its development before the action research intervention. The groupware offered a solution to many of those issues. The research shows that it improved the group's use of *virtual teaming and asynchronous meeting applications.* The groupware was proven capable of *document management and versioning.* However, activating the virtual team members requires decisions and coordinated efforts from the team itself. The development of *group discussion* and commenting on other's work depends on its becoming culturally accepted. In this study we also found out that the attitude to the groupware's *easy access and tools* is relative to the target group's abilities. Developing *organizational learning and overcoming old work habits* required further cultural change in knowledge sharing

within the group. It may take a long time to change. As a recommendation to start with, we have two propositions:

> 1) Reach a mutual agreement on new work methods in the group.
>
> 2) Just start sharing—the knowledge sharing culture will evolve accordingly.

The target group had ideas for further development of its knowledge sharing. Communication should be increased amongst members and relationships could be more intense. There was already a strong degree of trust between members. Yet the group had no time for discussion. Some of the members thought they did not have much to discuss, since they had different specialities.

The groupware was considered a useful application for knowledge sharing, but sometimes it requires a long time for the adoption process. The full benefits will not be realized until a new knowledge sharing method has gained the critical mass of users. This situation could be improved by motivating and training the intended users. Training can affect the user's ability to use groupware. If one cannot use it, one is likely to circumvent the groupware with previous methods. Training can affect the utilization ratio of groupware, as this study shows. So does motivating, ordering, and making groupware imperative for the target group's work. Groupware could improve knowledge sharing of a virtual team when the deployment process pays attention to the advice presented previously.

5.1.2 Social Adaptation to Groupware Use

Adaptation to groupware use may be a laborious and prolonged process. In this action research it took over two years. Even so, the comprehensiveness of the adaptation (the active utilization rate) has not yet reached the majority of the group members. This is congruent with Mark and Poltrock (2003), who experienced an adoption process of over three years in their study. Many issues affect the adaptation process. These are dependent partly on the group and also on its members' abilities and readiness to use groupware (Mark & Poltrock 2003). These are due to subjective attitudes and individual differences in capabilities.

The knowledge sharing culture of the target group did improve during the action research, but the improvement of the group is also related to the collective culture of the company. Members of the group participated in group work in addition to their daily line of work. They belonged to multiple social worlds. Hence, their home organizations strongly influenced their knowledge sharing culture. Cultural issues had an affect on adoption. According to Dixon (2000, 72-73) and Olson and Olson (2000), culture can even prevent adoption of a new application.

There were several enablers of social adaptation identified in the target group. One of them was a high level of trust within the group, which was reinforced by face-to-face meetings. Open communication and collaboration over time, shared experiences and knowledge sharing existed between the members. Mostly the members needed improvement of their knowledge sharing in a globally distributed virtual team. In the end, all of the interviewed group members accepted the groupware as their knowledge sharing solution.

The requirements of social issues demanded increasing proactive participation and cohesion of the group. Participation, cohesion and knowledge sharing of the group were supported by the groupware. However, members participate in the group activities according to the expertise needs in the current agenda of substance matters and also due to professional interests. Increasing cohesion of the group would also need additional shared experiences and team events to raise team spirit. Developing the group as a community of practice would help. Stuckey and Smith (2004) have noticed in their research that successful community leaders continued community development work to achieve togetherness (being together inside their communities) by actively participating in their community activities. Sociability within a community is important beyond the constraints of any technological platforms (Stuckey & Smith 2004).

Proactive and initiative work was also supported by groupware, but the group needs more encouragement to break the ice and start sending in ideas to groupware. Some members even doubted whether these mostly senior level professionals would chat about their ideas in discussion databases. Instead, they increasingly continued to form sub-task forces to divide the workload of the group. Partly groupware also supports

group decision-making, but the group had not yet shifted any of its reasoning to the computer mediated system.

Communication connects social worlds and enables virtual teams. Communication channels can be used to advance the use of new technologies. Some problems occurred in the communication culture. Old work habits seemed to be deep-rooted and change may take long time. The time it takes to adopt technology within a working sphere depends on two issues, according Mark and Poltrock (2003): Favorable conditions of the target group and seeing new technology as a better fit to work practices. In this study, the target group's ability to use new technology was only partially favorable, due to the active users. Some of the members were not motivated enough to develop their capabilities. They did not have time to use groupware, or time to learn how to use it. Groupware, as the new technology, was considered fitting to work practices as a solution to sharing explicit knowledge. The group still discussed and communicated its tacit knowledge mainly with previous work methods, for example email and telephone.

One essential problem in the adoption process was the infrequent use of groupware. The periodical meetings caused a few months gap in groupware use. In between the meetings members could forget how to use it. Therefore, groupware should be easy to use.

The interview revealed some misunderstandings regarding the purpose of groupware in general. Some members had not started to use it as a shared workspace for teamwork. Groupware could offer a place to prepare and create these positions together as a virtual team. Instead, a few members regarded it as an information warehouse or archive. They could have been disappointed because it did not serve as a comprehensive source of their work related information. In the end, groupware application held mostly what the members and their assistants brought there. Members used the secretariat or assistants as "human interface" to publish materials to groupware. This shows a slight misunderstanding of user roles. It alienated many users from active subjective participation.

In this study social acceptance for groupware use would have required more encouragement from the management. According to Grudin (1994), management

attitude is even critical. The formal mandate for groupware use was not clear enough for the members. This influenced their attitudes to groupware. Mark and Poltrock (2003) had also noticed the lack of a mandate inhibiting the diffusion of technology. In addition, Dixon (2000, 3) promotes managerial encouragement for reusing the knowledge in their technical solutions.

5.1.3   Practical Recommendations

Recommendations for the groupware deployment practitioners are listed here. Virtual teams that are not currently using groupware, but who are planning to do so can utilize the results of this study. Applying the practical guides of the first two theory chapters can be useful in addition to the empirical findings of this action research study. There are some limitations to the applicability of the results. The study is a product of its specific conditions.

Action research was considered as a good participatory method for the study, because it allowed the researcher to get a good understanding of the target group's needs. It also enabled the researcher to provide good support for the target group during the research period. However, the objectivity of the research may have some limitations, when the researcher and practitioner are the same person.

The initial capabilities of a target group should be noticed before deploying new technologies. This initial capability can guide the amount of efforts needed for motivating and training, which have a strong effect on the success of the adoption process. These activities related to groupware deployment should be openly discussed and decided upon within a target group. Resources of time and effort should be dedicated to groupware deployment. Even though the actual technical installation of the application would not take much time anymore, the change in user behavior can take quite a while. For example, it depends on the communication culture of the organization.

In the data collection phase, it would be recommended to collect all relevant requirements, but those should be narrowed down to the main development issues with focus on a collective decision. According to our experiences, the groupware application

does not necessarily solve all problems related to virtual teaming, but it can greatly improve some planned focus areas. However, adoption of new technology may bring new problems. The benefits should be made clear to all team members with the ease of realizing them in practice. The change in traditional work methods requires an ability for double-loop learning—challenging the prevailing norms and the will to develop them.

5.2 Validity and Reliability of the Research Results

Validity and reliability issues, which are applicable to any empirical social research according to Yin (1994, 33), are noticed in the final study as follows, and because action research is one form of such an empirical research, these are valid to this action research: *Construct validity* refers to "establishing correct operational measures for the concepts being studied" (Yin 1994, 33). Selecting the measure for knowledge sharing in the virtual team was rather complicated. How to measure effects of a groupware application deployment to the target group's knowledge sharing? We used a combination of subjectively experienced measures: selection of media use and the interviewees' subjective estimation of its utilization rate distribution. The issue was considered so personal that a semi-structured interview with open ended questions was selected as appropriate to reveal rich user experiences.

The combined research methods helped to reach results and made validity stronger. Multiple sources of evidence were used in the data collection phases—the two interview rounds, direct observation and studying the group documents. The results are mainly deducted from the interviews and from intensive collaboration experiences (typical to action research studies) with the target group. The chain of evidence was established during the interviews by recording them and making complete transcriptions for further analysis. A polyphonic presentation of all interview materials was produced, including all the interviewees' answers to all questions. Analysis was done from that material incorporated with observations. The key informants reviewed their answers from the first interview round.

Internal validity is used to measure established causal relationships of conditions (Yin 1994, 33). Action research was considered a suitable research method for this study.

Since this study is an action research, it is assumed that planned change activities have an affect on the target group. To verify these changes, we trusted the interviewees' words and eyewitness observations of their actions. The active use of the groupware application could be detected from the application itself. As a limitation, the rate of passive use could not be detected or measured with the used technology. Data analysis was made from the collected information by reading the answers of the interviews and making conclusions based on the evidence.

External validity refers to "establishing the domain to which a study's findings can be generalized" (Yin 1994, 33). This study shares the limitations of single case studies in the realm of statistical generalization. However, as a carefully selected sample of knowledge sharing development in a virtual team of senior level managers, this study had the capability of analytical generalization of its results within the domain. The use of replication logic research design and multiple action research groups would have increased the validity of the study, but was not possible within the limits of the research resources allocated to this study.

Reliability demonstrates the repeatability of the operations of a study. For example, the data collection procedures should produce the same results when repeated. (Yin 1994, 33) The study procedure and collected data was documented in a database and supervised by the company employer. A university instructor guided the research design and writing procedure throughout the study. The limitations in the reliability of this study relate to the questions and the answers of the interviews. The results were open to various interpretations, as the personal opinions of the interviewees could be ambiguous and sometimes even contradictory. Therefore, the results could have a different emphasis if the same study was redone.

An over two years long study allowed the researcher to work close to the group and enjoy a rich collaboration with the same group of people. The researcher often participated in the virtual teamwork within the same organizational unit. That may certainly reduce objectivity, but it really had advantages in other areas like trust and teamwork, which took the development further.

The results of this action research may be, as qualitative action research in general, quite subjective. While we studied one virtual team inside one company, the results cannot be generalized without considerations. However, considering that the results are in line with existing research, they may be generalized. The research may not be unique in global scale, but it can have significance in Finland.

5.3 Future Research

There could have been more motivation and training for the target group members to reach a better outcome in the objective of developing knowledge sharing within the group. But then again, we might not have found out these results of the remarkably interesting challenges in reaching that goal. The results of this study and issues that remain to be studied encourage making a proposal for the research academy. The focus of future research could be set more towards groupware adoption in general and especially in studying the methods of motivation and training to further groupware adoption.

6   SUMMARY

Globalization of companies has created a situation where practical work within extended enterprises increasingly relies on work in virtual teams. This requires efficient and effective sharing of the team's common knowledge. These issues are discussed in the knowledge management discipline. Knowledge sharing is one of the processes related to knowledge management.

This action research study reminded us of the challenges of the groupware adoption process. Overcoming those challenges was seen to be important for future improvements in the knowledge sharing support of virtual teams. Social issues were also acknowledged as a factor of knowledge sharing of the virtual team. The team member's utilization rate of the groupware technology seemed to explain the amount of the experienced benefits at a personal level.

Persistence of old work habits and the existing knowledge sharing culture were seen to affect the adoption of groupware technology. Our suggestions for improvements are: brave management decision for giving justification and mandate for common groupware use, and also commitment to make changes in work methods. Regardless of the groupware adoption challenges, knowledge sharing in the virtual team was positively affected by the groupware adoption, but the full potential of the technology was not realized. The results are applicable for virtual team decision makers who are planning to use groupware to improve knowledge sharing in their team. Overcoming the inhibiting factors of groupware adoption needs further study.

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APPENDIX 1: THE FIRST INTERVIEW FORM

⇨ Overview of the focus group, description of the process

- Describe shortly the mission of the group

- What instances are involved as external constituent groups or interest groups?

- Describe the connections to these interest groups

- From where and how does the group get its knowledge?

- What decisions and processes does the group make?

- Where and how does the group deliver its outputs?

- Who are the beneficiaries of the group's decisions?

⇨ Internal communication of the group

- Describe your connections to the rest of the group members

- What are the communication systems used by the group?

- Is there a clear information sharing process?

- Describe the roles and responsibilities of the members

⇨ New topic or issue arrival

- How do the new topics arrive to the discussions?

- Who are the initiators of the new topics?

- In what form do these new topics arrive?

- What will be done to the new topic?

- How are the discussions documented?

- How are the documents stored and archived?

⇨ Issues covered by the group

- What documents are used by the group?

- What are the documents created by the focus group?

- See the proposal in the end of this document …

- In your opinion, what are the main categories of the shared knowledge?

- What would be the sub categories?

Example: One proposal for categorization with sub categories (removed)

⇨ Possible problems and development needs on these areas

- Communication systems, discussion, email etc.

- Knowledge sharing

- Document sharing

- Schedules

- Visibility

- What are the biggest problems at the moment?

- What phases seem to take the most time in the group work or communication?

- Do you have requirements for the new system and what problems it should solve?

APPENDIX 2: QUESTIONS FOR THE SECOND INTERVIEW (THE FORM FOR AN INTERVIEWEE)

Introduction to Interview

This interview is part of the development project that is set to improve knowledge sharing in the group. It is also part of a master's thesis study. This second interview will collect information to evaluate, whether introduction of QuickPlace groupware application has improved group's work and knowledge sharing.

Glossary

The group	The target group. Globally distributed team that has face-to-face meetings.
Groupware	Groupware is technology designed to facilitate the work of groups.
QuickPlace	Groupware tool developed by Lotus.
Nokia QuickPlace	Lotus QuickPlace with the Nokia template.
QP	Nokia QuickPlace groupware tool that is deployed and "furnished" for the target group's use. Includes storage for the team's meeting documentation, discussions, related information, and links to intra-organizational and external bodies.

General Questions

1. Communication etiquette and ability to exchange knowledge electronically

1.1 What are your usual communication and collaboration habits? How many percents of your time do you spend in each?

a) Face-to-face meetings and discussions (speaker in events, consulting with your assistant)

b) Business telephone conversations (one-on-one)

c) Distant connections to workgroups (Teleconferencing, videoconferencing)

d) Communicating with your personal computer (emails, scheduling, NetMeeting, WebCasting, using interactive Web pages, groupware use)

2. The target group: How cohesion of the group works at the moment

2.1 How well do you know other members of the group?

2.2 How strong relationships and high trust group members have between each other?

2.3 Do group members have active discussions between meetings?

2.4 What are the group's regular work methods?

3. Personal Level: Your preferred working and knowledge sharing methods with the group

3.1 How often do you need to contact or work with other members?

3.2 What would be the most efficient way of sharing knowledge within this group?

4. QuickPlace: Groupware use of the group

4.1 Have you previously used any groupware applications or other virtual teaming methods?

4.2 Have you received enough instructions for QP use? Would you like to learn how to use QP? How?

     a) Watching others to do examples, using manuals with pictures

     b) Listening to instructions (Phone consultancy or someone telling instructions near you)

     c) Doing yourself all common tasks to have hands-on experience

     d) Reading first all relevant manuals

     e) Holistic, trial and error learning after short introduction

4.3 How was the QP tool introduced and deployed to the group?

4.4 How much have you used QuickPlace?

- Active use (Read, fetch, and publish documents): Proceed to chapter 5.

- Passive use (Read and fetch documents occasionally): Proceed to chapter 6.

5 Questions for active QP users

5.1 How do you use QP? Have you personally put your documents into the QP?

5.2 Have you read or become acquainted with QP instructions? Which ones and were they useful?

5.3 Do you know how to work with QP?

5.4 Do you feel making extra work while using QP?

5.5 Do you feel that QP use is necessary for your work?

5.6 How would you evaluate the quality of the QuickPlace as a groupware tool?

5.7 Which areas of QP you are most satisfied and which areas dissatisfied?

5.8 Have you had any problems with QP?

5.9 Improvement ideas for future development of knowledge sharing and QP within the group

5.10 Do you accept QP as the group's groupware tool?

5.11 Your conclusion: Has QP improved group's work and knowledge sharing? Why?

6 Questions for passive QP users

6.1 What are the reasons, why you have not much used QP so far?

6.2 What does it take for you to start using QP?

6.3 What kind of effects do you expect QP to have on group's knowledge sharing?

6.4 Do you feel that QP use is necessary to do your work in the team?

6.5 Do you know where to get support or information about QP?

6.6 Has the mature use of QP been demonstrated to you with step-by-step instructions? Has QP's impact to group's daily work been illustrated to you?

6.7 Improvement ideas for future development of knowledge sharing and QP within the group

6.8 Do you accept QP as the group's groupware tool?

6.9 Your conclusion: Has QP improved group's work and knowledge sharing? Why?

APPENDIX 3: QUESTIONS FOR THE SECOND INTERVIEW (INCLUDING EXTENSIVE QUESTIONS FOR THE INTERVIEWER)

Introduction to Interview

This interview is part of the development project that is set to improve knowledge sharing in the target group. It is also part of a master's thesis study. This second interview will collect information to evaluate, whether introduction of the QuickPlace groupware application has improved the group's work and knowledge sharing.

Glossary

The group	The target group. Globally distributed team that has face-to-face meetings.
Groupware	Groupware is technology designed to facilitate the work of groups.
QuickPlace	Groupware tool developed by Lotus.
Nokia QuickPlace	Lotus QuickPlace with the Nokia template.
QP	Nokia QuickPlace groupware tool that is deployed and "furnished" for the target group's use. Includes storage for the team's meeting documentation, discussions, related information, and links to intra-organizational and external bodies.

General Questions

1. Communication etiquette and ability to exchange knowledge electronically

1.1 What are your usual communication and collaboration habits? How many percents of your time do you spend in each?

- o Face-to-face meetings and discussions (speaker in events, consulting with your assistant)

- o Business telephone conversations (one-on-one)

- o Distant connections to workgroups (Teleconferencing, videoconferencing)

- o Communicating with your personal computer (emails, scheduling, NetMeeting, WebCasting, using interactive Web pages, groupware use)

2. The target group: How cohesion of the group works at the moment

2.1 How well do you know other members of the group?

- (All quite well…some…none well?

- Core members, secretariat, some issue owners?)

2.2 How strong relationships and high trust group members have between each other?

- Lot of networking and knowledge sharing…or…no trust, not much sharing

- Are there controversies between members' views on the issue topics? (Unanimity & consensus vs. ambiguity & controversies)

- Do people dare to show their different views?

- Do you receive enough information from other group members? Yes…No

- Do members remember that they belong to the group?

- What does connect the members or what is common to all members?

- How does the trust build in the group?

2.3 Do group members have active discussions between meetings? Do they need to have active discussion between meetings?

Yes: How do group members usually communicate with each other?

- o By phone, discussion database, long email discussions, with long threads? (face-to-face/over distance/synchronous(at the same time)/asynchronous(different time))

No: Is there a communication silence between meetings? If so, why?

2.4 What are the group's regular work methods?

- Reporting, linking or control mechanisms for (virtual) teamwork / Connections outside the group

- <u>Are there accepted norms for communication?</u>

- Does the group's work have enough visibility?

3. Personal Level: Your preferred working and knowledge sharing methods with the group

3.1 How often do you need to contact with other members?

- Do you need to contact other members between the official (face-to-face) meetings?

- How do you contact other members at the moment?

3.2 What would be the most efficient way of sharing knowledge within this group?

- How would you like to contact others? (What are your preferred ways to contact other members?)

    o Goupware (between members) and/or Intranet (inside company)

    o Direct emails or email distribution lists

    o Personal meetings

4. QuickPlace: Groupware use of the group

4.1 Have you previously used any groupware applications or other virtual teaming methods?

- (Lotus Notes and TeamRoom, eRoom, virtual classroom solutions, virtual conference tools, SameTime, NetMeeting)

4.2 Have you received enough instructions for QP use? Would you like to learn how to use QP? How?

- Would you like to have personal training for QP use?

- Is there enough support provided for QP use? (instructions, contacts)

- o a) Watching others to do examples, using manuals with pictures,

- o b) Listening to instructions (Phone consultancy or someone telling instructions near you)

- o c) Doing yourself all common tasks (Its good to have hands-on experience)

- o d) Reading first all relevant manuals

- o e) Holistic, trial and error learning after short introduction

4.3 How well was the QP tool introduced and deployed to the group?

- Do you feel that QP deployment decisions have been done based on clear reasons?

4.4 How much have you used QuickPlace?

- Active use (Read, fetch, and publish documents): Proceed to chapter 5.

- Passive use (Read and fetch documents occasionally): Proceed to chapter 6.

5 Questions for active QP users

5.1 How do you use QP? Have you personally put (shared) your document(s) into the QP?

- How often do you use QP personally? Why?

- Diversity: What kind of activities have you done with QP?

5.2 Have you read or become acquainted with QP instructions? Which ones and were they useful?

- None: Why not?

- Yes:

    a) Have you used QP online helps? (Help within QP)

    b) Have you visited QP eLearning material, QP tutorials?

c) Have you answered to the tests in eLearning materials? In which level: Basic, Authoring QP, Managing QP?

d) Have you visited Nokia QuickPlace Forum?

- Would you consider the eLearning package be a sufficient training for learning to use QP?

5.3 Do you know how to work with QP?

- Has the mature use of QP been demonstrated to you with step-by-step instructions and examples? Has QP's positive impact on group's daily work been illustrated to you?

- Has the group established its own rules (code of practice) for working together with QP?

- Are you aware of the current information structure in QP? Yes: Are you satisfied with it?

5.4 Do you feel making extra work while using QP?

- Do QP's advantages outweigh its disadvantages or vice versa?

- (active / passive user?)

5.5 Do you feel that QP use is necessary for your work?

- Does QP aid in team's process of reaching its common goal?

- Could you see any alternatives for groupware use with this team? (For example: embedded functionality to existing tools, having just an Intranet site)

5.6 How would you evaluate the quality of the QuickPlace as a groupware tool?

- It has enough resources to facilitate the group's activities

- Does QP work the way members want it to work? Does it serve members' needs?

- Have you used other groupware tools? If yes, How would you relate QP to other groupware tools you have used?

- Usability: Do you find QP user-friendly or difficult to use?

- Does the QP meet the real needs of the team? Do you feel that QP is a matching technological solution to the group's knowledge sharing needs?

5.7 Which areas of QP you are most satisfied and which areas dissatisfied?

- What are the areas that work best? (Sharing internal documents, working together with documents…)

- What are QP's most valuable benefits?

- Do you see group processes that greatly utilize QP?

- Whish areas you are unhappy about?

5.8 Have you had any problems with QP?

- Yes: What kind of problems? (Slow access, password problems, network problems, documents not visible, problems with notification links, need to share or distribute information to other persons than the QP members)

- Language/terminology/jargon are problematic: For example "Rooms", "Publish" & "Publish as"?

- Do these problems prevent you from sharing your documents to other members with QP?

- Do you know what to do, if possible problems occur?

- Were possible early problems with the QP dealt quickly?

- Is information entry too complicated process? (Providing your contribution or feedback through the QP?)

5.9 Improvement ideas for future development of QP and knowledge sharing within the group

- Do you have any QP improvement ideas?

- How to improve knowledge sharing within the group?

- What areas need most development attention? Immature technology, people and their capabilities, work methods, organizational structures?

- Should we establish Intranet site to share company-wide information?

5.10 Do you accept QP as the group's groupware tool?

- How do you find QP as a solution to group's knowledge sharing?

- Does QP fit to the group's ad hoc work method?

- No? What would be better tool or way to share your work in the group?

5.11 Your conclusion: Has QP improved group's work and knowledge sharing? Why?

- Has QP use improved group's internal communication, knowledge sharing, and collaboration?

- Has QP made knowledge sharing in the group easier or not, and why?

    o Personal advantages?

    o Collective advantages?

6 Questions for passive QP users

6.1 What are the reasons, why you have not much used QP so far?

- Access problems

- Too busy with other tasks, no time for using or learning: Someone should put my documents there: Should the group hire data entry personnel to provide information to QP?

- Learning difficulties

- Bad usability issues experienced: (What is your expectation of the usability of groupware?)

- Too much extra work required from users / I am prepared to use QP even if it required some extra work in publishing documents for other members to see them

- Do you know what to do, if possible QP problems occur?

- Were possible early problems with the QP dealt quickly?

- Would incentives motivate members to use groupware? Yes: what kind of incentives?

- <u>Do you feel that working (or not working) with QP would leave you outside of usual group processes or decision-making?</u>

    o Do you think that QP use would differ your possibilities to influence group decision-making? How?

    o Reduces possibilities to influence: Why?

    o Increases possibilities to influence: Why?

- Is information entry a problem for you (Is it too complicated process to put documents into the QP?

6.2 What does it take for you to start using QP?

- Under what conditions you would use QP?

6.3 What kind of knowledge sharing benefits do you expect to get from using QP?

- (For example: See value of sharing knowledge within group, QP as an implementation of additional organizational memory?)

- What kind of idea or vision do you have about QP—even if you have not used it?

- Do you think that QP's advantages outweigh its disadvantages?

- Would QP aid in group's process of reaching its common goal?

- Do you feel that QP could improve group's internal communication, knowledge sharing, and collaboration needs?

6.4 Do you feel that QP use is necessary and required to do your work in the team?

- Should the group members use QP more actively?

- Could you see any alternatives for groupware use with this team? (for example: embedded functionality to existing tools, Intranet site)

6.5 Do you know where to get support or information about QP?

- Where to find user guides?

  a) QP online helps? (help within QP)

  b) QP eLearning material, QP tutorials? Yes: Is the eLearning package a sufficient training for learning to use QP?

6.6 Has the mature use of QP been already demonstrated to you with step-by-step instructions? Has QP's positive impact to group's daily work been illustrated to you?

6.7 Improvement ideas for future development of the group's knowledge sharing

- In which direction to develop our QP in this group?

- How to improve knowledge sharing within the group? (Immature technology, people and their capabilities, organizational challenges and current work methods?

- Should we establish Intranet site to share company-wide information?

6.8 Do you accept QP as the group's groupware tool?

- Do you find QP as a good solution to group's knowledge sharing?

- Does QP fit to the group's ad hoc work method?

- No? What would be better tool or way to share your work in the group?

6.9 Your conclusion: Has QP improved the group's work and knowledge sharing? Why?

APPENDIX 4: QUESTIONS FOR THE CHAIRMAN OF THE GROUP (IN FINNISH)

Johdatus haastatteluun

Tämä haastattelu on osa projektia, joka on asetettu kehittämään tiedon jakoa kohderyhmässä. Projekti sekä siihen liittyvät ryhmälle suoritetut haastattelut ovat myös osa gradututkimusta. Tämän haastattelun tarkoitus on kerätä ryhmän puheenjohtajan kokemuksia siitä, millaisia vaikutuksia ryhmätyöohjelmiston käyttöönotolla on ryhmän sisäiseen tiedon jakamiseen. Lisäksi arvioidaan ryhmän käytössä olevan ryhmätyöohjelmiston sopivuutta ryhmän ja puheenjohtajan tarpeisiin sekä käyttöönottoprosessia.

Sanasto

Ryhmä	Globaalisti jakautunut virtuaalinen tiimi, jolla on myös fyysisiä kokouksia.
Ryhmätyöohjelmisto	Teknologia, joka on suunniteltu edistämään ryhmätyötä.
QuickPlace	Ryhmätyöohjelmisto, jonka on kehittänyt Lotus/IBM.
Nokia QuickPlace	Lotus QuickPlace varustettuna Nokian räätälöimällä käyttöliittymällä.
QP	Nokia QuickPlace ryhmätyöohjelmisto sisustettuna kohderyhmän käyttöön. Sisältää ryhmän kokousdokumentaation, keskustelukannan, oheismateriaaleja, linkkejä sekä Nokian Intranetin että ulkoisten tahojen sivustoille.

Kysymykset

Tiedon jako ryhmässä

1. Saatko ryhmän jäseniltä riittävästi tietoa (ryhmän työn tuloksia) 4-5 kertaa vuodessa pidettävistä kokouksista?

2. Riittääkö nykyinen kokousrytmi ja sieltä saatu materiaali oman työsi kannalta?

3. Miten saat mahdollisesti tarvitsemasi lisätiedon?

4. Tuovatko ryhmän jäsenet aktiivisesti ja omatoimisesti asioita käsiteltäväksi myös kokousten välillä?

5. Miten esittelet ryhmän tuottamat tulokset eteenpäin? (Tulostetut dokumentit, PowerPoint esitykset, kokoukset yms.)

6. Miten päätökset välitetään takaisin organisaatioon, jotta se ymmärretään kaikkialla samanlaisena? Miten tiedon jako varmistetaan?

7. Tarvitseeko ryhmä enemmän näkyvyyttä yhtymän sisällä?

8. Pitäisikö ryhmällä olla oma Intranet-sivusto, jossa päätökset ja muu materiaali olisi jaettavissa Nokia-laajuisesti?

Ongelmat tiedon jaossa

9. Onko ryhmän tiedon jakamisessa mielestäsi esiintynyt ongelmia? Jos on, millaisia? Esiintyykö ongelmia edelleen?

Tiedon jaon kehitysideat

10. Mikä olisi tehokkain tapa jakaa tietoa ryhmän sisällä?

11. Miten ryhmän tiedon jakoa olisi kehitettävä jatkossa?

QuickPlace (QP)

12. Kuinka hyvin QP ryhmätyöohjelmiston esittely ja käyttöönotto mielestäsi sujui tässä ryhmässä?

13. Koetko QP:n käyttöönottopäätöksen perustuneen järkisyihin?

14. Oletko itse kokeillut QP:n käyttöä?

15. Koetko QP:n tarpeelliseksi tälle ryhmälle?

16. Koetko QP ryhmätyöohjelmiston käyttöönotolla olleen positiivisia hyötyvaikutuksia tiedon jakamiseen ryhmän sisällä? Millaisia?

17. Millaisia hyötyjä QP:n käytöllä on sinulle ryhmän puheenjohtajana?

18. Koetko QP ryhmätyöohjelmiston käyttöönotolla olleen negatiivisia vaikutuksia tiedon jakamiseen ryhmän sisällä? Millaisia?

19. Onko QuickPlace ryhmätyöohjelmiston käyttöönotto mahdollisesti aiheuttanut ryhmälle uusia ongelmia, joita sillä ei aiemmin ollut? Millaisia?

Ryhmätyöohjelmiston kehitysideat

20. Millainen järjestelmä mielestäsi parhaiten tukisi tämän ryhmän toimintaa?

21. Miten voisit puheenjohtajan asemassa tukea ryhmätyöohjelmiston käyttöönottoa ja lisätä ryhmän jäsenten aktiivista ja omatoimista osallistumista?

<u>Arviointi</u>

Onko QP ryhmätyöohjelmiston käyttöönotto mielestäsi onnistunut edistämään ryhmän tiedon jakoa? Miksi?

APPENDIX 5: QUICKPLACE APPLICATION FOR THE GROUP