Communities and other Social Structures for Knowledge Sharing - A Case Study in an Internet Consultancy Company

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Abstract. This research aims at understanding how people share knowledge in their everyday work in a project-based company. The social structures for knowledge sharing are characterised as formal, informal, and quasi-informal structures. They vary from those with high formalisation to the informal, and even include structures which are invisible and unrecognised in the organisation. They also vary in their composition. They may share the same or different space, and communication is based on face-to-face or virtual interaction. Data was collected by means of documents and interviews (n=18) during the autumn of 2002 and the winter of 2003 from an Internet consultancy company. The study shows the great variety of formal, informal, and quasi-informal social structures that are used for knowledge sharing in the case company. In all, sixteen different structures were found. The number of formal structures is smaller than the number of informal ones. Their analysis in terms of five dimensions also shows their great heterogeneity.

Introduction

The challenge of knowledge sharing in project organisations

Organisations are becoming more project-based than before, and results are delivered to customers through projects. Organisations are often multi-project environments, where several projects constitute a major part of the business and several project assignments are under implementation simultaneously (e.g. Frame, 1995; Gareis, 2000; Turner, 1999; Engwall, 2000). In this study, the organisational context is a project organisation. Project-oriented working models are becoming more widespread, because they offer, among other benefits, organisational flexibility (Rolstadås & Kolltveit, 1999). One of the challenges in a multi-project environment is sharing knowledge among projects: how is it possible to prevent the "reinvention of the wheel" and share knowledge accumulated in one project with others? This requires us to focus on finding competence and knowledge-sharing mechanisms on both organisational and individual levels (e.g. Crawford, 1999).

Basically, knowledge sharing is based on two strategies (Hansen, Nohria & Tierney, 1999). The codification strategy relies on carefully codifying the knowledge and storing it in archives and databases, where it can be assessed and used over and over again. Examples of codified mechanisms are electrical learning environments and knowledge support systems, e.g. electronic performance support systems (EPSS). This strategy faces many difficulties: tacit knowledge and experience are difficult to identify and store and the storage itself is also time-consuming; additionally, codified knowledge loses its usefulness quite soon. In the personalisation strategy, knowledge is closely tied to the people who developed it (people as repositories) and is shared by personal face-to-face interaction. Examples of personalised mechanisms are learning by reflection and dialogues. The targets of this study are communities and other social structures as knowledge- and competence-sharing mechanisms.

People are basically willing to share their knowledge, but in order to do so they need to have a supportive environment. Constant et al. (1994) discovered that people distinguished between tangible information and intangible information, embodied as human memory, knowledge, experience, or a skill. Although they were willing to share both, the motivation for sharing intangible information was lower. They felt that it had, to a great extent, become part of their identity and self-worth. This intangible information was shared more easily if people gained personal benefits from sharing it. This emphasises the importance of face-to-face communication (Dixon, 2000). Face-to-face interaction increases the sense of safety and promotes virtual interaction as well (e.g. Cross et al., 2001). Sharing

must result in not only organisational outcomes but personal benefits as well (Wenger, 1998; Dixon, 2000).

This paper reports the results of a case study on the communities and other social structures that are used for knowledge sharing on an intra- and inter-organisational basis in an Internet consultancy company. This paper focuses on informal and work-related social structures. Information and communications technology for knowledge sharing are not discussed in this paper. In particular, personalised mechanisms for knowledge sharing have not been widely studied in the project context. First, a short description of the current literature on social structures for knowledge sharing is provided, and then the results of the case study are presented and discussed.

Formal and informal structures in organisations

Scholars have distinguished between formal and informal organisational structures. The main problem with formal organisational charts is that they do not show the informal social relations that exist between company employees. Buchanan and Huczynski (2001) argue that formal organisation refers to the collection of work groups that have been consciously designed by senior management to maximise efficiency and achieve organisational goals. Informal organisation, on the other hand, refers to the network of relationships that spontaneously establish themselves between members of the organisation on the basis of their common interests and friendships. These are formed across functions and divisions (Krackhardt & Hanson, 1993).

Historically, organisational scholars have made important theoretical and empirical distinctions between formal and emergent networks (Monge & Contractor, 2000). Emergent structures have been seen as being more worthy of study than formal ones, because they are seen as promoting a better understanding of organisational behavior (Monge & Contractor, 2000; Krackhardt & Hanson, 1993).

Wenger (1998) argues that there are always two views of an organisation: the designed organisation and the practice that gives life to the organisation. The designed organisation is called an "institution" in order to distinguish it from the organisation as lived in practice, which gives life to the organisation and is often a response to the designed organisation. Both aspects contribute to making the organisation what it is and the organisation could be defined as the interaction of these two aspects. Organisations are social designs directed at practice. It is through the practices they bring together that organisations can do what they do. Wenger (1998) argues that an organisation is a constellation of communities of practice, and through these communities of practice an organisation knows what it knows and becomes effective and valuable as an organisation.

Networks and communication make possible informal communities

There are streams of communication network theories. Communication networks are described as the patterns of contact between communication partners that are created by transmitting and exchanging messages through time and space (Monge & Contractor, 2000, p. 440). They take many forms in contemporary organisations, including personal contact networks, flows of information within and between groups, strategic alliances between firms, and global network organisations (Monge & Contractor, 2000).

Informal communities as social structures emerge from those social networks that exist in an organisation or between them. Wenger et al. (2002) argue that community development begins with an extant social network. Important topics usually attract an informal group of people who begin networking. Networks may also remain invisible to others who are not involved in them. As informal networks of people with the ability and passion to develop competences already exist in organisations, the challenge is to identify them and help them to develop (Wenger and Snyder, 2000). This can be done, for example, by conducting a formal or informal social network analysis to identify who is involved in the networks and how strong the ties are (Scott, 1991). Relations are central to network analysis because they define the nature of the communication connections between people, groups, and organisations (Monge & Contractor, 2000, p. 441).

Networks are generally described as being looser than communities. Krackhardt and Hanson's (1993) study revealed three types of emergent relationships, which formed informal networks in organisations: advice networks, i.e. who depends on whom to solve problems and provide information; trust networks, in which employees share potential information and back each other up in a crisis, and communication networks, in which employees regularly talk to each other about work-related matters. They are formed across functions and divisions.

Networks have also been described as intentionally created. Dixon (2000, p. 9) discusses problem-solving networks, which are created to help groups to solve problems more efficiently and faster. British Petroleum's 'Peer Assist Programme' enables a team that is working on a project to call upon another team (or a group of individuals) that has had experience with the same type of task to work as temporary networks.

Nonaka and Takeuchi (1995) refer to redundant information, which promotes the sharing of tacit knowledge. Various organisational devices can be used for building information redundancy in organisations, for example, frequent meetings on both regular and irregular bases and formal and informal communication networks, which can facilitate the sharing of both tacit and explicit knowledge.

Organisations can promote community development by providing time and space, which promote communication. People communicate naturally in informal

spaces, usually outside the traditional hierarchies of an organisation. Nonaka and Konno (1998) distinguish the 'ba' from networks as a space where information resides. The ba is a specific time and space where knowledge is created in the organisation. The ba is a context for knowledge creation; it sets a boundary for interactions among individuals, and yet its boundary is open (Nonaka et al., 2001). Knowledge is embedded in the ba, where it is then acquired through one's own experience or reflections on the experiences of others. Nonaka and Konno (1998, p. 40) define it as a shared space for emerging relationships. This space can be physical (e.g. office, dispersed business space), virtual (e.g., e-mail, teleconference), mental (e.g., shared experiences, ideas, ideals), or any combination of them. Value creation in knowledge creation emerges from interactions within the shared ba. In the ba, the individual realises that he is a part of the environment on which his life depends. The individual ba is a part of the greater ba (basho), and it exists on many levels. The self is embraced by the collective when an individual enters the ba of the team. The team is the ba for individuals, and in turn, the organisation is the ba for the team. Finally, the market environment is the ba for the organisation. The ba is based on participation, which means getting involved and transcending one's own limited perspective or boundary.

Dixon (1997) uses the metaphor of 'hallways of learning' to describe organisational learning that takes place in organisations. Collective meaning is constructed, rather than discovered, among organisational members through dialogue, and it is something that members hold in common. Interaction with organisational members is based on discussion and cognitively organising what they know (Weick, 1995), and not just on speech and one-way interaction. Differences foster collective learning, and, therefore, hallways must involve multiple perspectives. Interaction and participation and a certain degree of informality are similar to how Wenger describes communities of practice. Dixon refers to meaning processes, which are also central in Wenger's work.

All in all, networks form the basis from which informal social structures, for example communities of practice, are born. These communities are driven by organisational members' shared interests and communication in a certain time and space.

Communities and other social structures for knowledge sharing

Wenger (1998) refers to 'Communities of Practice' as social networks that take place informally within and between organisations. Wenger et al. (2002) argue that communities as social structures have existed for as long as people have had the need for communication and interaction.

The terms 'community' and 'practice' together refer to a special type of social structure with a special purpose (Wenger et al., 2002). The concept 'community of practice' was first defined by Lave and Wenger (1991, p. 98) as:

> *"An activity system about which participants share understandings concerning what they are doing and what that means in their lives and for their community. Thus, they are united in both action and in the meaning that the action has, both for themselves and for the larger collective."*

According to Lave and Wenger (1991), the term 'community' does not necessarily imply co-presence, a well-defined, identifiable group, or socially visible boundaries. A community of practice is a set of relations among persons, activity, and the world, over time and in relation with other tangential and overlapping communities of practice. Lave and Wenger refer to legitimate peripheral participation as a process by which newcomers become included in a community of practice (Lave & Wenger, 1991). To open up a practice to newcomers, peripheral participation must provide access to all three dimensions of practice: to mutual engagement with other members; to their actions and their negotiation of the enterprise, and to the repertoire in use (Wenger, 1998, p. 100)

Brown and Duguid (1991) built on the practice-based theory of Lave and Wenger (1991), Orr's investigation of knowledge practice, and Daft and Weick's interpretative account of enacting organisations. Brown and Duguid view communities of practice as non-canonical and not recognised by the organisation. They often cross the boundaries of an organisation and involve people from outside. As they see communities of practice as being emergent, the central questions involve the detection and support of these emergent communities. They argue that group theory in general (e.g. Hackman, 1990) focuses on groups as canonical, bounded entities that lie within an organisation. Brown and Duguid (1991) argue that there is a remarkable gap between canonical and non-canonical practices in work. This means that there are significant differences between the way the work is documented and the way it is actually performed. When facing problems, people rely on solutions that are not provided by the formal structure. Informal mechanisms and systems, such as conversation with others, mentoring, and storytelling are then used.

Wenger (1998) developed the concept further. He takes as his basis the social theory of learning, which views learning as social participation. The main traditions that have affected his thinking involve, on one hand, theories of social structure (e.g. Giddens' structuration theory) and theories of situated experience (e.g. Schön). On the other hand, theories of practice (Lave, Bourdieu, Vygotsky) and theories of identity (e.g. Strauss, Giddens) are also central. In the area of theories of structure and theories of practice, theories of collectivity address the formation of social configurations of various types, from the local to the global, and define basic types of social configurations (Wenger, 1998).

Wenger et al. (2002) define a community of practice as "a group of people who share a concern, a set of problems, or a passion about a topic, and who deepen their understanding and knowledge of this area by interacting on an ongoing basis". Liedtka (1999, p. 5) describes them as being composed of groups of individuals united in action.

Botkin (1999) refers to 'Knowledge Communities' as groups of people with a shared passion to create, use, and share new knowledge for tangible business purposes. The main difference with communities of practice is in the formalisation of knowledge communities and in the link to business goals. Botkin views communities of practice as informal groups, shaped by circumstances and visible only to social anthropologists. Instead, knowledge communities are purposely formed and their purpose is to shape future circumstances. They are also highly visible to everyone in the organisation. The existing communities of practice, according to Botkin, need to be made visible by formalising them. Wenger (1998) emphasises the informal nature of communities of practice. Knowledge communities are usually based on a product or service, markets or clients, function, or geography and are reminiscent of matrix management (Botkin, 1999). Furthermore, Botkin (1999) argues that knowledge communities are similar to communities of practice in the way the work gets done and how participation gives identity and meaning to their members' work. Botkin (1999) views knowledge communities as the next step beyond teams and task forces. They are larger than task forces and live longer than teams. They are like departments, but cross-functional.

'Strategic communities' differ from communities of practice as they are created by management to address broad strategic objectives and are focused on achieving specific goals (Storck and Hill, 2000). They have a clear relationship to formal organisational objectives. The long-term value they are seen as providing comes through learning, innovation, and knowledge transfer. Communities of practice are voluntary groups; strategic communities, however, are quite deliberately established by the management. Storck and Hill (2000) call these groups 'communities', because they differ from traditional teams since they are not integrated into the management process but the corporate intervention is rather minimal. They are 'strategic' in the sense that their members' activities focus on a broad goal that is integral to overall business strategy. (Storck & Hill, 2000, p. 67).

The discussion shows the variety that exists in the degree of formality and formalisation in communities. They may be very formal and have an institutionalised status in the organisation (e.g. Botkin, 1999; Storck & Hill, 2000), while others are based on ad hoc relationships and are very informal (e.g. Krackhardt & Hanson, 1993), and not even recognised by the organisation (Brown & Duguid, 1991). Wenger (1998) also recognises the variance in the level

of formality within the communities, but refers to communities of practice as informal structures in organisations.

Communities also vary in the way they cross organisational boundaries. Andriessen et al. (2002) distinguish between intra- and inter-organisational communities. Intra-organisational communities of practice have been clustered under four clusters on the basis of their studies of Dutch companies (Andriessen et al., 2002, pp. 4–5). A 'daily practice community' consists of both experienced workers and newcomers, working in physical proximity and having mainly face-to-face meetings. A 'formal expert community' is a group comprising a limited number of dispersed experts. It is formally instituted, interaction being both face-to-face and via ICT. An 'informal network community' is a medium-sized group, spontaneously originated, freely accessible, and interacting informally, geographically widely dispersed and communicating mainly via ICT. Finally, 'problem-solving communities' involve a large number of geographically dispersed employees with the same function, and are focused on daily problem-solving through email questions and answers. Additionally, they describe inter-organisational communities, whose members come from different organisations. These are generally of the formal expert and informal network types.

Communities may enhance boundary-crossing within the organisation and involve a similarity or diversity of competences. McDermott (1999) argues that communities of practice are particularly useful when cross-functional teams are the basic structures of the organisation. In project organisations relationships are maintained cross-functionally, which may increase knowledge sharing, yet at the same time, isolate people from their peers. Communities of practice are a way to knit people back together with their peers while maintaining the focus on cross-functional project teams. 'Learning communities' (McDermott, 2000) are formed around topics that are important to both the business and community members. At Shell, these learning communities are each responsible for managing the knowledge in their own topic area. As people are, at the same time, members of their teams and communities of practice, McDermott refers to what he calls a double-knit organisation. At the World Bank (Wenger et al., 2002), "Thematic Groups" have been established to strengthen knowledge sharing across the organisation, involving community leaders, community support functions, and systematic Web-based repositories and a website. Boundary-crossing is critical and can result in a deep kind of learning, as interacting across practices forces members to take a new look at their assumptions (Wenger & al., 2002).

Space and the media used to communicate also characterise the dimensions of communities. Interaction may also take place in a virtual world instead of real space and time (Nonaka & Konno, 1998). Rheingold (1993) defined virtual communities as social aggregations that emerge from the Net when enough people carry on those public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace.

Palloff and Pratt (1999) argue that a virtual community requires a clearly defined purpose and a distinctive gathering place for the group. Virtual communities have been referred to as groups that use networked technologies to communicate and collaborate. They are designed, while communities of practice are emergent (Johnson, 2001). Wenger et al. (2002) prefer to call them 'distributed communities', as these communities generally connect in many ways, including face-to-face, although they may rely primarily on "virtual" communication. They use the term 'distributed' to describe any community of practice, which cannot rely on face-to-face meetings and interactions as its primary vehicle for connecting its members.

The development of the Internet and electronic communication tools has affected communication between people. Jarvenpaa and Tanriverdi (2003) argue that there are two forces affecting the development of companies' virtual networks. Firstly, information technologies make coordination across time and space boundaries possible. Secondly, products, services, and processes are becoming more knowledge-intensive and many products and services are being digitised and traded via virtual media.

Elements of informal and quasi-informal communities

Communities of practice, as described by Wenger and his co-authors, have a wide variety of dimensions and forms, and this sometimes makes it hard to distinguish them from other forms. There are many overlapping types, and though they share similar elements, they also have distinguishing elements. According to Wenger (1998), communities of practice are combinations of three elements, which can be used to distinguish them from other social structures: a domain of knowledge, which defines the key issues in the community; a community of people who care about the domain, and the shared practice that they create. The domain gives its members the sense of a joint enterprise and brings them together. The concept of practice points out that the community concentrates on the learning that takes place through working in practice.

Practice is seen as the source of the coherence of a community. This is characterised as having three dimensions. Firstly, membership is a matter of the mutual engagement of the participants. This allows for the dynamic negotiation of both tacit and explicit knowledge. Interaction builds trust between the members and this allows all sorts of subjects to be discussed (Wenger, 2000). Secondly, a community is a joint enterprise, which keeps the community of practice together and builds a sense of accountability to a body of knowledge. Thirdly, the members together develop a shared repertoire, which includes routines, words, tools, stories and so on (Wenger, 1998).

The concept of the negotiation of meaning is referred as a process by which people experience the world and engagement in it as meaningful (Wenger, 1998,

p. 53) Whatever people are involved in involves meaning. Wenger (1998) discusses two other community processes: participation and reification. Participation refers to the process of taking part and also to the relations with others that reflect this process. It suggests both action and connection (Wenger, 1998, p. 55). Participation is a way of learning (Lave & Wenger, 1991). Reification refers to the process of giving form to experience by providing objects that congeal this experience into "thingness" (Wenger, 1998, p. 58). The processes of participation and reification are a duality; they are two constituents intrinsic to the process of the negotiation of meaning, and their complementarity reflects the inherent duality of this process (Wenger, 1998, p. 66).

A shared domain and interest	A sense of a community	Shared practice
•Joint enterprise •Shared understanding of the domain •Passion for the domain •Sense of accountability	•Interaction and relationships •Sense of belonging •Mutual commitment •Shared identity •Learning together	•Shared repertoire •Ideas, tools, frameworks, routines, stories •Shared understanding of the domain
Voluntary	Self-managed	Informal

Figure 1. Basic characteristics of communities of practice
(Wenger, 1998; Wenger et al., 2002).

To summarise the ideas of Wenger (1998; Wenger et al., 2002), the basic elements of the community of practice are (Fig. 1): domain; community and practice. They are central when distinguishing communities of practice from other types of social structures. In addition, a certain degree of voluntariness is required. Members are passionate about the domain. Interaction must be continuous. Communities of practice are also self-managed and loosely connected, as well as informal. They may be highly institutionalised in the organisation, but these other elements must still be present. Institutionalising means that they have a certain status in the organisation, but they are not a part of the official organisational structures in the way that, for example, business units are. They could be termed 'quasi-informal'.

Wenger et al. (2002) argue that communities of practice differ from business or functional units as they are more loosely connected, informal, and self-managed, even when they are highly institutionalised. Their relationships are based on collegiality, and memberships depend on participation rather than on institutional affiliation. In teams, members are to perform a set of interdependent tasks that contribute to a predefined, shared objective, as in communities of practice, the members' personal investment in the domain is central. Informal networks, communities of interest, and professional associations are seen more as a set of relationships, whereas communities of practice are "about" something,

their domain gives them an identity, and commitment to the domain provides cohesiveness and intentionality.

A study of the literature shows various dimensions and characteristics by which communities and other social structures are described. In this paper, formal, informal and quasi-informal social structures in the case company are described in terms of five characteristics. Firstly, the *degree of formality* varies in communities from the highly formalised to the informal. Boundaries are approached with two dimensions: intra- or inter-organisational structures (as also suggested by Andriessen et al., 2002), and the same is true of different competence areas. Communities may exist across *organisational boundaries* (Wenger et al., 2002). Intra-organisational structures involve members from only one company, while inter-organisational ones involve members from one or more organisations. *Competence diversity* varies from involving members from the same competence centre to involving members from different competence centres. Boundary-crossing is critical and can result in a deep kind of learning, as interacting across practices forces the members to take a new look at their assumptions (Wenger et al., 2002). In this case, competence diversity as a dimension is important, because boundary-crossing is critical in a project context and in this case company there are boundaries between different competence centres. Physical proximity is approached with a dimension; the *space* the members share varies from the same physical location to purely virtual structures, where members do not share the same physical space at all and instead are connected in a virtual space (as suggested by e.g. Rheingold, 1993). Finally, the dimension of *interaction* may vary from face-to-face communication to virtual communication.

Case Study: Satama Interactive, an Internet consultancy company

Objectives and research questions

The objective of this case study is to identify the social structures for knowledge sharing in the case company. The research aims at reaching an understanding of how people share knowledge and competences in their everyday work in a project-based company. The main focus is on the informal structures, which may vary from being invisible to others than the participants to highly formalised and recognised ones.

The main research question is: what kinds of communities and other social structures are there to create and share knowledge and competences in the case company – within and between offices, projects and client teams, and competence

centres, as well as across organisational borders? On the basis of the results, a typology of knowledge networks and communities is presented. The functionality and benefits of communities will be addressed by further research, and therefore these are not reported in this paper.

The case company

The case company is an Internet consultancy firm, 'Satama Interactive', that operates in four countries. The head office is in Helsinki, Finland, and there are sub-offices in Tampere and Oulu. There are also offices in Amsterdam, Düsseldorf, and Stockholm. The company is organised on the basis of four Competence Centres: Design, Technology, Consulting, and Project Management. Satama Interactive is a project organisation as all its activities are based on working on client projects. The company was founded in 1997, and today the company employs altogether 280 people in these four countries.

Research methods and procedure

The research methods used included documents and interviews. 18 people were interviewed. This number of respondents was selected in order to represent all the offices and competence centres and included people from various positions and with various tasks in order to represent multiple viewpoints and perspectives. The first four interviews were conducted in order to achieve a better understanding of the context and the case company. The interviewees were representatives of the administration and management. Networks and communities were also discussed with them. The other 14 interviews concentrated on communication, cooperation, and knowledge-sharing issues.

The research process was abductive (Dubois & Gadde, 1999). There were basic theoretical ideas on communities and other types of social structures for knowledge sharing. The interview themes were based on these concepts. They involved issues relating to intra- and inter-group relations and cooperation, communication, knowledge sharing and collaboration, and networks and communities. They were designed to find answers to the research question. All the interviewees were asked basically the same questions in order for reasonable and valid comparisons across informants to be capable of being made. This allowed the results to be analysed in a meaningful way. Although all the interviews involved the same questions, each informant was encouraged to explain different points in more detail if necessary (Johnson & Weller, 2002). Even though the analysis was based on the interview themes, emergent issues were allowed to appear, thus allowing greater rigour. There was an ongoing comparison with the existing theory, based on Dubois and Gadde (1999), who argue that the dialogue between theory and empirical data is ongoing and that the findings may affect the shape of the existing theoretical model.

The research was conducted during the autumn of 2002 and winter of 2003. Interviews were taped and transcribed verbatim. One interview, with a representative from the Stockholm office, was a phone interview. After the transcription, the interviews were analysed using a text analysis program, Atlas.ti. Data were classified on the basis of the themes of the interview, which in turn were based on the wish to find answers to the research question. Knowledge-sharing forums, cooperation, and relationships were further classified for each respondent. Similarities and differences were analysed and a typology of social structures for knowledge sharing was created. These structures were further analysed on the basis of the five dimensions already mentioned and three categories within each: formality (very formalised – fairly formalised - not formalised at all), organisational boundaries (members only from the company – some members from outside – members from different organisations), competence diversity (members from the same competence centre – members from some centres – members from all centres), space (all from the same location – some from other locations – all from different locations), and interaction (only face-to-face – face-to-face and virtual – only virtual).

The main challenge with this kind of research is that some of the social structures remain invisible to others and they may be difficult to identify. This is especially the case with the most informal structures.

Formal, quasi-informal and informal structures

Most communication takes place within predefined organisational structures, e.g. within offices, competence centres, and project teams. Project teams are major connecting structures between competence centres, as their members represent various competence areas. Most projects were within offices, yet there were some cross-office ones as well. There are several additional formal, quasi-informal and informal structures that connect professionals. In all, sixteen different social structures were found for knowledge sharing in the company.

Type 1: Professionals representing the same competence

Formal professional groups connect members from the same professional positions, such as project or client managers. Their purpose is to share knowledge between the professionals and discuss issues of mutual interest. They are intra-organisational. They are very formalised and work-related. Members are mainly from the same competence centre. They usually share the same physical space and communication takes place both face-to-face and virtually.

Competence-based communities involve members from the same competence area, such as consulting, design, and technology. Their purpose is to connect people within competences and help them share advice and experience. They are

fairly formalised and intra-organisational. Members usually share the same physical space and communication takes place both face-to-face and virtually. They are more loosely and informally connected than formal professional groups, which have nominated leaders, agendas, and regular meetings. The distinction between these two is in the degree of formalisation.

Peer groups appear on various levels. They are informal and emergent, as opposed to professional groups. A person may have a peer group that shares their immediate physical space, e.g. colleagues sitting in the same room. Relationships are very informal and continuous. There are also peer groups within the company who may not always share the same physical space. Peer groups are also inter-organisational. Peer groups are mostly within competence centres. Communication takes place both face-to-face and virtually.

Type 2: Cross-competence structures

Project teams, internal development project teams, strategic communities, SIG communities, interest groups, and personal networks usually consist of members with various competence areas. What keeps these structures together is a shared goal or shared interest. They may vary from highly formalised to very informal structures.

Satama Interactive is a project organisation, and the main structure for organising work is a project team. Project teams have goals of delivering client projects. Project work includes the project team and a project manager. Project managers work for the "Project Management" competence centre and act as professional project managers. Project members come from different competence centres. Projects have regular, formal meetings.

Internal development projects are temporary and have a formal status in the organisation. Their purpose is to develop concepts that are not directly related to any ongoing client project. They are formalised, and they involve a project manager and have an allocated, restricted time for developing a new idea or a concept. They are intra-organisational, involving members from different competence centres. Members working on a development project usually share the same physical space, but communication can take place both face-to-face and virtually.

Strategic communities are related to the company's strategy. Their purpose is to create new business potential and new client solutions, connect competences, and concentrate on strategically important issues. They are very formalised and have organisational support. Members may share the same physical space, but there may also be members from other offices. Communication takes place both face-to-face and virtually.

Cross-competence communities connect people from different competence areas and different competence backgrounds. Their purpose is to connect people with shared interests in a certain domain. Examples are the Mobile Network and

the "SIG" community for the Flash program. They are only fairly formalised and may be both intra- and inter-organisational. They may also be dispersed geographically. Communication takes place both face-to-face and virtually.

Interest groups are loosely connected and very informal. Their purpose is to share ideas and experiences concerning a certain common area of interest. Examples of intra-organisational interest groups are Games Development and e-Learning. An example of an inter-organisational interest group is the Special Interest Group on Computer-Human Interaction (SIGCHI). Members represent different competence areas. They do not generally share the same physical space. Communication takes place both face-to-face and virtually.

Personal networks are emergent and usually invisible to others. They are informal. Examples of these are advice, idea generation, problem-solving, and cooperation networks. They are based on social relationships between people and are usually formed on the basis of experience of former working relationships. They may involve members from one or more competence areas. They may be either intra- or inter-organisational. Communication takes place both face-to-face and virtually.

Type 3: Meeting spaces

Physical, face-to-face forums, virtual meeting forums, and ad hoc spaces for interaction are based on the dimension of physical or virtual proximity.

Knowledge-sharing forums are physical or virtual. Their purpose is to share knowledge and experience with others. They are intra-organisational. Physical ones are fairly formalised and follow a pre-designed concept. Examples of these are Friday Infos, Fast Breaks, and Satama Opens. They involve members from all competence centres. Members share the same physical space, and communication is always face-to-face. Virtual meeting places involve discussion folders in Outlook, and communication is virtual. Some of them are accessible only to certain groups, while some are open to everyone. Some are accessible for all offices. These are not frequently used. In one of the smaller offices, there is an Intranet, which is frequently used for communication, even though the members share the same physical space.

Meeting spaces are either physical or virtual. The spaces are for ad hoc discussions on matters of mutual interest, knowledge sharing, and for discussions on problems and ideas. Physical meeting spaces include hallways and corners, the coffee machine, a special meeting room, and the cafeteria. In the main office, the cafeteria in particular is an important space to connect people and form relationships. Virtual meeting spaces were mainly discussion folders in Outlook. Additionally, one smaller office has an active Intranet discussion space. Both types of space are informal and intra-organisational. They may involve members from one or more competence areas. There were also inter-organisational meeting spaces.

Type 4: Inter-organisational structures

Professional associations are inter-organisational and fairly formalised. Members do not share the same physical space and communication takes place both face-to-face and virtually.

Partner networks involve partners working for the same client or working as sub-contractors on a project. Examples of members in partner networks are advertising companies and technology consultants. Networks are inter-organisational and fairly formal. Their members do not share the same physical space. Communication takes place both face-to-face and virtually.

Inter-organisational networks involve members from various organisations. They are dispersed and communication takes place mainly on a virtual basis. They may share an interest in a certain domain, such as mobile issues, or they may share the same background, such as the Satama Alumni. Meetings of the Alumni take place irregularly and bring together both present and former Satama workers.

Type 5: Social networks not related to work issues

Additionally, there are social networks that are not related to work issues, but take place within the context of the company. They serve to help people to get to know the people they work with and, in that way, enhance communication and interaction.

Social networks involve activities outside work. There is a formalised core group, 'Body and Soul', that is responsible for organising social events. It is intra-organisational and involves members from different competence areas. Their target group is the whole staff, though the activities basically take place in the main office. Members share the same physical space and communication takes place mainly face-to-face.

Besides the formalised group, there are emergent social networks, which involve people from various competence areas. Activities involve, for example, sports and bands. Communication is face-to-face.

All the sixteen formal, quasi-informal, and informal social structures were analysed using five dimensions and their three categories. Table 1 shows that social structures were mostly fairly formalised through having regular meetings. This is partly due to the fact that the organised ones are more easily recognised. The most informal ones often remain invisible to others and this makes it difficult to identify them. A social network analysis (e.g. Scott, 1991) would be an appropriate method to detect the most informal, invisible networks that exist in the organisation. Members were mostly from the case company, though there were also members from other organisations; they involved members from more than one competence centre, most members came from the same location, and communication took place both face-to-face and virtually.

Dimension	Level	Frequency	Remarks
Formality	+	3	
	+ +	9	Mostly fairly formalised or informal
	+ + +	4	
Organisational boundaries	+	8	Both intra- and inter-organisational
	+ +	5	
	+ + +	3	
Competence diversity	+	3	
	+ +	9	Mostly across competence boundaries
	+ + +	3	
Space	+	4	
	+ +	9	Most members share the same physical location, but office boundaries are shared as well to some extent
	+ + +	3	
Interaction	+	3	
	+ +	11	Communication both face-to-face and virtual
	+ + +	2	

Table 1. The characterisation of sixteen formal, informal, and quasi-informal social structures in the case company.

Discussion

The study shows the great variety of formal, informal, and quasi-informal social structures that are used for knowledge sharing in the case company. In fact, the number of formal structures is smaller than the number of informal ones. Their analysis in five dimensions shows their great heterogeneity as well.

Knowledge management in the case company is based primarily on the personalisation strategy (Hansen et al., 1999). Formal knowledge-sharing practices are based on face-to-face communication. In informal communication too, the personalisation strategy and face-to-face communication are valued more than virtual communication via ICT tools. The level of activity in the use of the Intranet and Outlook folders varies, but generally is not very high. In one small office, where people are physically close to each other, which promotes informal and spontaneous communication, the internal Intranet is also more actively used than in the other offices.

The social structures found in Satama Interactive correspond to those shown in literature. Lave and Wenger (1991), Wenger (1998), and Wenger et al. (2002) refer to communities of practice as informal, voluntary, and self-managed, with a shared domain and practice and a sense of a community. They may also be

invisible to others than those who are participating. The type that corresponds most closely to these concepts is the cross-competence SIG community. It is self-managed, with a co-ordinator, and membership is voluntary and based on the members' passion for developing the shared domain and practice within it. The elements of the community need to be studied more deeply. There are potential communities in this sense and also networks of people communicating in shared domains. These network communities are emergent and very informal. One possible explanation for the great variety is that the communities are in different phases of their life cycles. A group may start with a loose structure but the level of formalisation may increase with time.

Botkin (1999) and Storck and Hill (2000) refer to more formalised communities that focus on strategic issues. These types of communities, strategic communities, were also intentionally created at Satama Interactive. Their functionality and outcomes require further research, as they are still developing, but there is potential for viewing them as supported, institutionalised communities that enhance knowledge sharing at Satama Interactive. They also have characteristics that correspond to the concepts of Wenger (1998) and Wenger et al. (2002), such as shared domain and practice. The sense of a community needs to develop.

The types of communities defined by Andriessen et al. (2002) can also be recognised at Satama Interactive. Formal expert communities correspond to Satama's Formal Professional communities, such as Project Manager communities, who do not work together on a daily basis, but share the same expertise and are dispersed. Daily practice communities were not emphasised at Satama Interactive. Peer groups working in physical proximity with mainly face-to-face communication correspond most closely to these. What Andriessen et al. call informal network communities are more like networks and potential communities, rather than defined as communities according to Wenger (1998). Large problem-solving communities were not found at Satama Interactive. Problem-solving was based more on personal networks which were not recognised or visible to others. Email lists for problem-solving were mentioned by some respondents, but they were not organised, functioning rather on an ad hoc basis. Problem-solving, idea generation, and advice were based on personal relationships and experience of who knows what. These relationships correspond to what Krackhardt and Hanson (1993) found in their studies. A common feature of personal networks was that they were based on informal relationships that were not based on formal organisational boundaries but rather on previous working and project relationships. Yet there was a shared interest. In this way, they are similar to communities, but they are more like sets of relationships (Wenger et al., 2002), and they are loosely connected. The boundaries of these networks are also constantly evolving.

There is a great deal of informal communication at Satama Interactive. Even though there are various formal meetings, people still have a need to connect with others informally. Nonaka and Konno (1998) refer to physical, virtual, and mental spaces, or ba. Mental spaces were not studied, but both physical and virtual spaces exist at Satama Interactive. Physical spaces can be referred to as "enabling communication spaces". In particular, the lunch room in the main office was the space where relationships and potential emergent communities were built. The coffee machine in the cafeteria was referred to as "a physical hub" by one respondent. In one foreign office, there was a special meeting room for informal communication. As work at Satama Interactive is creative, a lot of informal communication seems to take place in "hallways and corners". All in all, the forms and variety of social structures are varied.

Acknowledgements

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