Chapter 1

Introduction

This dissertation addresses the issue of how organizational knowledge networks – Networks of Practice – are coordinated to support knowledge sharing and organizational learning. Nowadays, knowledge is considered to be a key resource for organizational advantage. Consequentially, organizational knowledge networks are increasingly being introduced to support organizational knowledge processes. However, coordinating these informal social structures within a hierarchical context is a challenging task which often tends to fall short of expectations. This dissertation aims to further understanding in how these networks are coordinated to support knowledge processes.

This first chapter introduces Networks of Practice as the key focus for dispersed knowledge sharing in organizations. To bring the importance of distributed knowledge sharing to the fore, I will start with an example of one of the biggest ecological disasters in history, one that can, at least partly, be ascribed to insufficient knowledge sharing among dispersed experts. Subsequently, I will delve deeper into knowledge sharing and introduce Networks of Practice as a locus where dispersed individuals may interact, share expertise and learn around their common practices. Comparing Networks of Practice to related groups revolving around distributed knowledge sharing (virtual teams and online professional communities) reveals that Networks of Practice provide some unique coordination challenges, which will be the key research topic of this dissertation. Further considering this comparison also illustrates that three coordination roles are relevant when studying the coordination of Networks of Practice: management, leadership and core members. Subsequently, the research questions are formulated, each tailored to study the coordination of NOPs from one of these coordination roles, so that these research questions together provide insight into the overarching research question of how intra-organizational Networks of Practice are coordinated to support knowledge sharing and organizational learning. I will end this chapter with a brief overview of the research strategy, the practical and theoretical relevance of this dissertation and the outline of the remaining chapters.

1.1 Setting the Scene

1.1.1   The importance of distributed knowledge sharing: the British Petroleum's (BP) Deep Horizon Oil Spill disaster

To illustrate the importance of distributed knowledge sharing, I would like to refer to one of the biggest ecological disasters in history; one that can, at least partly, be ascribed to insufficient knowledge sharing among dispersed experts. In 2010 the largest accidental marine oil spill in the history of the petroleum industry occurred at BP's oil rig in the Gulf of Mexico. After an explosion occurred on the Deepwater horizon drilling unit, and numerous failed attempts at stopping the consequent blow-out from the well, oil was constantly flowing into the Gulf of Mexico for three months, releasing about 700 million liters of oil into the ocean. The BP oil spill disaster took the life of eleven people, killed thousands of animals, severely damaged both sea and land ecology, harmed local economies, and caused BP and its associated partners to pay billions of dollars for oil removal costs. How could such an immense disaster happen? The US White House set up an oil spill commission to investigate the cause of the disaster and concluded (a.o.)that: "*Most, if not all, of the failures can be traced back to underlying failures of management and communication. Better management of decision-making processes within BP and other companies, better communication within and between BP and its contractors and effective training of key engineering and rig personnel would have prevented the incident*" (National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, 2011, p. 122). Moreover, the commission reports very critically on knowledge sharing within BP and between BP and its partner organizations.

> "*BP did not share important information with its contractors, or sometimes internally even with members of its own team. Contractors did not share important information with BP or each other. As a result, individuals often found themselves making critical decisions without a full appreciation for the context in which they were being made (or even without recognition that the decisions were critical). For example, many BP and Halliburton employees were aware of the difficulty of the primary cement job. But those issues were for the most part not communicated to the rig crew that conducted the negative-pressure test and monitored the well. It appears that BP did not even communicate many of those issues to its own personnel on the rig. (...) Similarly, it appears at this time that the BP Well Site Leaders did not consult anyone on shore about the anomalous data observed during the negative-pressure test. Had they done so, the blowout may not have happened. (...)Transocean failed to adequately communicate lessons from an earlier near-miss to its crew. Had the rig crew been*

adequately informed of the prior event and trained on its lessons, events may have unfolded very differently" (pp. 123-125).

Inadequate knowledge sharing may not be held fully accountable for this crisis. However, as BP concluded in its own investigation of the disaster, both in-house practices and knowledge, as well as communication with its contractors was not current enough to timely and adequately handle the oil spill. Prusak and Davenport go even further on their evocatively named Harvard Business Review blog (2010) "If Only BP Knew Now What it Knew Then". The authors suggest that BP's oil spill disaster and its alleged causes is especially interesting in light of the sharply declined efforts that BP put in their once successful knowledge management programs; changes that were made under the pressure for profit. One of the general conclusions from the analysis of the BP oil spill disaster is accordingly that '*events may have unfolded very differently*' if BP's knowledge processes were in better order.

1.1.2   Change is inevitable

The BP oil spill disaster highlights the importance of sharing distributed knowledge in a clear fashion. Indeed, the issue of how to coordinate dispersed knowledge puzzles organizations more and more often. This relatively new concern is instigated by three interrelated changes that have had an effect on some of the key challenges that organizations nowadays face.

First, an increasing number of firms take part in today's *global* economy (Chen & Dahlman, 2005; OECD, 2010). Due to globalization, organizations are thus increasingly operating across boundaries of nations, organizations, time and culture. For example, one third of turnover in the Netherlands comes from foreign organizations, and 20% of the Dutch workforce works for a foreign owned company (OECD, 2010). Production work and services are also increasingly outsourced to other countries for more efficient allocation of resources (OECD, 2010). As a consequence, organizational practices and expertise are more dispersed, making it more difficult to learn from colleagues (Orlikowski, 2002). This globalization trend is augmented by the increased possibilities to communicate over distance.

Next, the rising availability of ICT systems has tremendously increased opportunities for global communication across time and space, thereby enabling distributed work (Hinds & Kiesler, 2002). Hence, both within and outside organizations we see information and communication technologies supporting the establishment of numerous types of groups that interact, collaborate, and share knowledge over distance. This poses such challenges as how to coordinate work and how to share knowledge if parties don't see each other, don't know each other, are from different time zones or cultural backgrounds. Sharing knowledge over

distance has not only become paramount to organizations because our economy and communication has globalized, knowledge itself has also become of utmost importance for an organization's survival (Grant, 1996a; Spender & Grant, 1996).

The last major change is that our economy has shifted to a knowledge economy meaning that our economy relies more on intellectual capabilities than on physical inputs and natural resources (Powell & Snellman, 2004, p. 201). For instance, in Europe the trade in knowledge-intensive goods showed an annual average growth of 12% between 1997 and 2007. In the Netherlands, the percentage of the workforce with higher education has tripled from 10% in 1970 to almost 30% in 2010 (CPB, 2002). The importance of the knowledge economy was also stressed by the European Union which set itself the following strategic goal for the next decade at the Lisbon European Council (March 2000): to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion. Evidently, knowledge has become a key resource of organizations. In line with this development, the 'knowledge-based view' of the firm was introduced in the nineties (Grant, 1996b; Spender, 1996, 1998; Spender & Grant, 1996). According to this view, organizations must integrate dispersed knowledge within the firm to improve organizational learning, generate innovative capabilities, gain competitive advantage, and ultimately, to survive. The main organizational problem, then, is the challenge of integrating and coordinating "*dispersed bits of incomplete and often contradictory knowledge which all the separate individuals possess*" (Hayek, 1945, p. 519). If knowledge is the key resource of organizations, coordinating dispersed knowledge is of the utmost importance for their survival, and this necessity is easily complicated due to distance.

Despite this increased importance, we still know little about how knowledge sharing and learning in dispersed settings is actually coordinated (Becker, 2001; Foss & Pedersen, 2004). Though many different definitions of coordination exist (see e.g. Okhuysen & Bechky, 2009 for an overview), their main commonalities are that coordination includes people working collectively and interdependently to achieve a common goal. In line with Malone and Crowston (1994) I will define coordination as "*the act of managing interdependencies between activities performed to achieve a goal*" (p. 361). As organizations are increasingly operating globally and virtually, and since learning has become of paramount importance for an organization's survival, this dissertation aims to provide insights into the coordination of distributed knowledge sharing. As the philosopher Alan Watts (1951) wrote: "*The only way to*

make sense out of change is to plunge into it, move with it, and join the dance"(p.43). That is exactly what we are going to do!

1.2 Distributed Knowledge Sharing

Coordinating individual knowledge contributions to achieve collective learning is an ongoing challenge for organizations, especially in distributed settings (Dahlander & O'Mahony, 2011; Sproull & Kiesler, 1991). In an organizational context, distributed learning not only entails learning among individuals in the organization, but also requires the integration of individual or local knowledge in the organization (March & Olsen, 1975). Only when individual and group learning becomes institutionalized, for example in new routines, work practices, processes, culture and strategies, one can say that organizational learning has taken place and (Crossan, Lane, & White, 1999; Vera & Crossan, 2004). Besides an outcome, organizational learning refers also to the process by which knowledge flow takes place (Weick & Westley, 1996). This dissertation will not merely focus on organizational learning as an outcome but will include the processes that occur within and between the levels of the individual, the group and the organization. Organizational learning is furthermore characterized as a dynamic social process through which knowledge is both created by and flows within organizations via social interaction (Easterby-Smith & Lyles, 2003; Kane & Alavi, 2007; Tsai, 2001; Tsoukas, 2009). At the core of learning processes lies knowledge sharing among individuals or groups (Brown & Duguid, 2001; Brown & Duguid, 1991; Tsai, 2001). Hence, to understand the coordination of distributed learning, one first needs to understand how knowledge sharing over distance takes place. The question of how knowledge is shared, how that contributes to organizational learning and how organizations can coordinate these processes is central to knowledge management literature.

Two generations have been identified in the history of knowledge management. In the first generation of knowledge management, the literature, research, and practices were dominated by *"technological determinism"*: knowledge was conceptualized as an object that could be stored, transferred and retrieved with the aid of information and communication technologies (Hendriks & Vriens, 1999; Huysman & de Wit, 2004). Both in practice and in academic research, this approach yielded somewhat disappointing results inducing some writers to critically discuss the technological determinism that characterized this first generation (Hislop, 2002; Ruggles, 1998; Scarbrough & Swan, 2001). K In the second generation of knowledge management, knowledge was no longer simply considered an aggregate of information which can be de-coupled from its context. The focus of attention

shifted towards the tacit dimension of knowledge which is socially embedded in the context in which it takes shape and creates meaning. Consequently, increasing attention was given to the subjective, socially embedded nature of knowledge and the importance of practice in explaining issues of knowledge and organization (Blackler, 1995; Brown & Duguid, 2001; Brown & Duguid, 1991; Cook & Brown, 1999; Gherardi, 2000; Orlikowski, 2002; Wenger, 2000). Knowledge sharing in this view does not occur by imposing structures and tools but instead by rich social interaction and by immersion in practice. In the words of Tsoukas:

> *'the key to achieving coordinated action does not so much depend on those 'higher up' collecting more and more knowledge, as on those 'lower down' finding more and more ways to get connected and interrelating the knowledge each one has'* (Tsoukas, 1996, p. 22).

More recent research related to the knowledge based view of the firm stems from this practice-based approach. In this approach, knowledge is not conceived as an object that can be transferred from a 'knowledge owner' to a 'knowledge receiver', but as being socially situated and inextricably linked to practice (e.g. Blackler, 1995; Gherardi, 2001). In this view, knowledge is shared most naturally within networks of people who share a common ground because of shared practices, and have rich social interactions (Brown & Duguid, 2001) such as in communities of practice. A community of practice (COP) is a group of people, informally bound together by a shared practice and passion for a joint enterprise resulting in self-organizing capabilities (Wenger & Snyder, 2000). COPs are generally believed to foster knowledge integration and organizational learning (Brown, 1998; Brown & Duguid, 1991; Thompson, 2005; Etienne Wenger & Snyder, 2000) as they serve as the link between individual learning and organizational level learning (Bogenrieder & Nooteboom, 2004).

COPs are not usually studied in terms of management, because they are assumed to be coordinated by fully informal, emergent and self-organizing processes. Members of international organizations, however, are geographically distributed and it is doubtful whether the same self-organizing principles apply to large and dispersed communities (Roberts, 2006). Brown and Duguid (2001) write nonetheless that even though people in distributed settings do not participate in the same practice, they can still transfer knowledge over distances as long as they share a common 'know-how' or tacit knowledge. In other words: "where practice is common, communication can be global" (based on Knorr-Cetina, 1999 in: Brown & Duguid, 2001). This notion leads Brown and Duguid (2001) to introduce the concept of Networks of Practice (NOPs).

1.3 Networks of Practice

Networks of practice (NOPs) are self-organizing groups of people who share the same practice but are geographically dispersed. Moreover, compared with COPs, NOP members are more sparsely connected through weaker social ties and less interaction, generally supported by information and communication technology tools (Brown & Duguid, 2001; Faraj & Wasko, 2005; Vaast, 2004; Wasko, Faraj, & Teigland, 2004). An example of a NOP is a group of Human Resource managers who interact online to discuss work-related problems and to exchange advice and ideas with others who do the same work. NOPs thus serve as boundary spanners that enable the integration of dispersed knowledge, such as by connecting people who share a common practice but work in different professional groups (Bechky, 2003; Tagliaventi & Mattarelli, 2006) or different organizations (Brown & Duguid, 2001; Faraj & Wasko, 2005). NOPs may serve to connect local COPs (Brown & Duguid, 2001; Tallman & Chacar, 2010; Vaast & Walsham, 2009) and as such create knowledge flows between dislocated groups of people.

Members of NOPs voluntarily contribute their expertise to help their peers. This practice has left many researchers puzzled as to why people would behave in such a seemingly altruistic manner and why others don't just free-ride on the knowledge contributed by these volunteers. Research on the motivations for knowledge contribution in NOPs shows that members contribute when they feel it enhances their professional reputation, when they have a central position in the network or strong social ties within the network, if they enjoy helping others, or when they have relevant knowledge (Faraj & Wasko, 2005; Wasko, Faraj, & Teigland, 2004). In general it can be said that NOP members are intrinsically motivated to participate, and do not receive any tangible rewards for their contributions.

Besides such inter-organizational NOPs, these networks can exist among people who work in the same organization as well (Tallman & Chacar, 2010; Vaast, 2004; 2007). A group of maintenance engineers working at different locations for the same international production company who meet online to share knowledge and learn from their peers are an example of an intra-organizational NOP. Thus far research on intra-organizational NOPs has investigated how local learning may result from NOPs (e.g. Vaast, 2007; Vaast & Walsham, 2009), or how IT supports the development of NOPs (e.g. Hayes & Walsham, 2001; Olivera, Goodman, & Tan, 2008; Vaast, 2007; Vaast & Walsham, 2009), without taking into account how knowledge sharing in NOPs is coordinated to support organizational learning. This dissertation focuses specifically on these intra-organizational NOPS since we aim to gain insight in how NOPs support distributed learning within organizations.

1.4 Coordinating NOPs

As explained, the practice-based perspective made paramount the significance of bottom-up NOPs emerging for individual and collective learning (Brown & Duguid, 2001) to the forefront. From a managerial perspective, the aim of intra-organizational NOPs is to support knowledge sharing to enhance individual, group and organizational level learning. NOPs are therefore growing in popularity and these ideas from practice based learning are increasingly appropriated as practical solutions or tools to stimulate organizational learning in organizations like Shell (Wenger, McDermott, & Snyder, 2002), BP Amoco (Collison & Parcell, 2001; Prokesch, 1997), Siemens (Neilsen & Ciabuschi, 2003; Voelpel & Han, 2005; Voelpel, Dous, & Davenport, 2005), Unilever (Rumyantseva, Enkel, & Pos, 2006) and Buckman labs (Pan & Leidner, 2003). Despite this level of popularity, little is known about how knowledge networks are coordinated to achieve their goals (Muller, 2006) or as O'Mahony and Ferraro state: *"one of the most significant problems in organizational scholarship concerns how social collectives govern, organize and coordinate the actions of individuals to achieve collective outcomes"* (2007, p. 1079).

As stated in paragraph 1.2.2 I define coordination as "the act of managing interdependencies between activities performed to achieve a goal" (Malone & Crowston, 1994, p. 361) which entails "working together harmoniously" (p. 358). From an organizational perspective, the goal of intra-organizational NOPs can be described as to support knowledge sharing to enhance individual, group and organizational level learning. Achieving that goal calls for the coordination of interests, i.e. "the functional interconnections between member interests and goals, and group (and organization, MA) interests and goals" (McGrath, Arrow, & Berdahl, 1999, p.1). As will become clear later, connecting these different interests can be difficult for intra-organizational NOPs. Gaining insight in how NOPs are coordinated is important because more understanding in the organizing principles of knowledge networks may improve the sharing, creation and integration of knowledge (Antonelli, 2005; Lee & Cole, 2003; Markus, 2007; Nooteboom, 2000; Shah, 2006), improve the sustainability of networks (O'Mahony & Ferraro, 2007) and ultimately enhance organizational learning.

To delve deeper into the dynamics underlying the coordination of NOPs, the analysis will first be expanded to two other groups that revolve around distributed knowledge sharing: virtual teams and online professional communities. As I will next propose, intra-

organizational NOPS pose some specific coordination challenges that are unique when compared to related dispersed knowledge sharing groups.
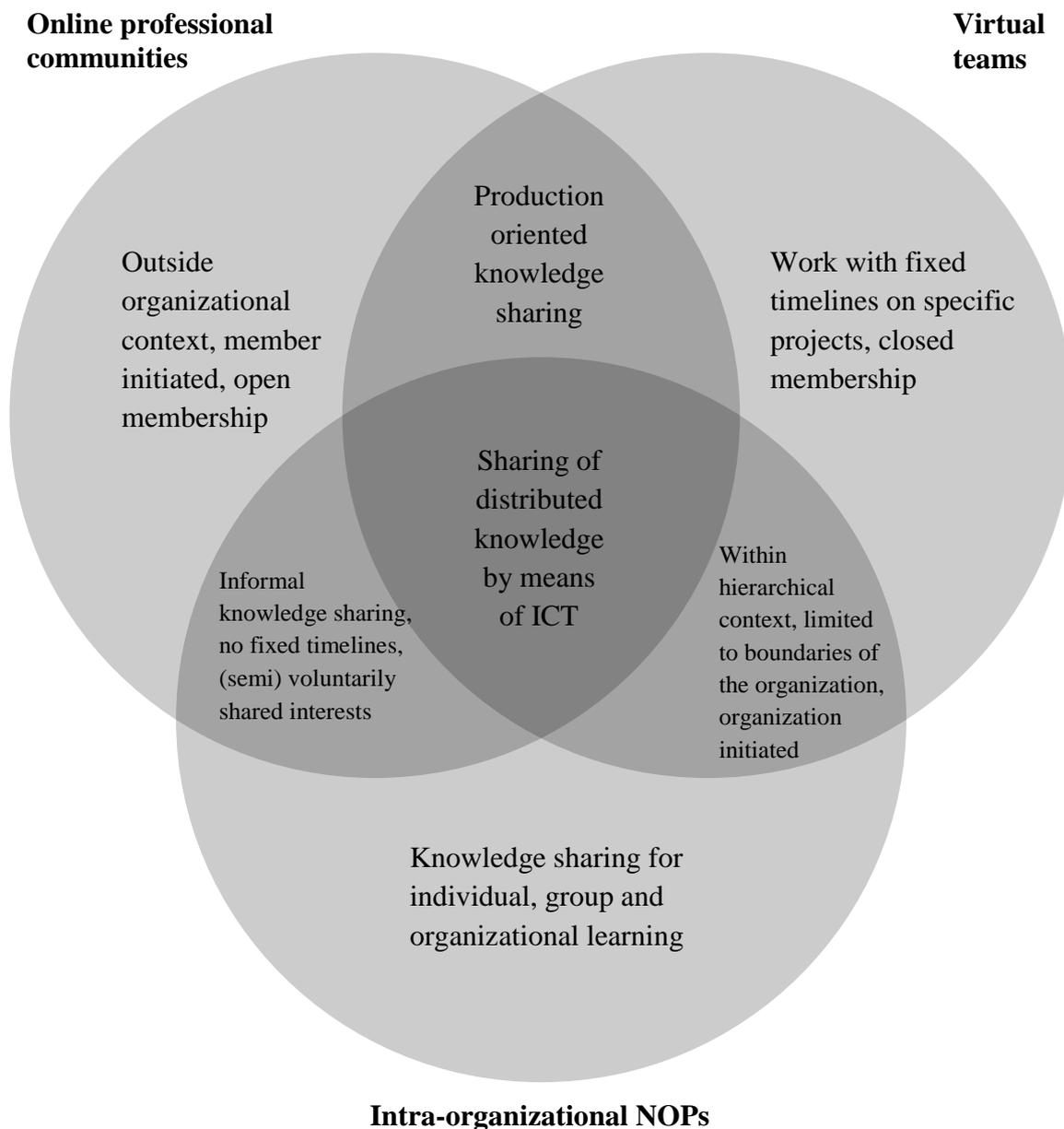
1.4.1 Distributed knowledge sharing: Virtual teams, online professional communities and intra-organizational NOPs.

Virtual teams and online professional communities both revolve around sharing distributed knowledge by means of ICT. Comparing NOPs to these related groups will help to clarify the concept of intra-organizational NOPs and reveal a challenge that is specific to coordinating them. Figure 1.1 provides an overview of the main commonalities and differences between these three groups. For analytical purposes I will treat these three groups as distinct, however, I do acknowledge that the boundaries between these groups can be blurry as there may be instances where characteristics of these groups overlap.

In this comparison I will focus specifically on online communities that are characterized by knowledge collaboration (see e.g. Faraj, Jarvenpaa, & Majchrzak, 2011). Even though there are many online communities that are either more socially oriented towards bonding and support (e.g. patient support groups or communities of interest) or more commercially oriented (Markus, 2002; Porter, 2004) towards the buying and selling of products (De Valck, Van Bruggen, & Wierenga, 2009; De Valck, Langerak, Verhoef, & Verlegh, 2007), both these groups will not be included here as they provide little insight into distributed learning processes. Instead, this comparison will refer to online professional communities, defined as '*virtual communities that exist on the internet and are populated by members with a professional interest in a specific topic*' (Moser, Groenewegen, & Huysman, 2011, p. 2). In these communities, professionals, semi-professionals or serious hobbyists meet to discuss, exchange ideas and share knowledge around their shared (semi) professional interests (Markus, 2002; Moser et al., 2011; Porter, 2004). Online professional communities are usually, though not exclusively, initiated by members. They are voluntarily joined and can consist of a large number of members. Unlike intra-organizational NOPs, online professional communities function outside hierarchical settings and are thus not limited to the boundaries of an organization. Knowledge sharing in online professional communities generally revolves around the production of a specific outcome, and often results in innovation or the production of a collective product (Franke & Shah, 2003; Jeppesen & Frederiksen, 2006; Ljungberg, 2000; Moon & Sproull, 2002; O'Mahony, 2007). Outcomes are defined and negotiated by the members and interactions around these tasks may result in products that better suit the interest of the members. In user innovation communities, members voluntarily share expertise to

produce new or better products related to for example their sports equipments, like sailplaning or canyoning (Franke & Shah, 2003). Another example are the communities of basketball shoe developers, where people intending to be sports footwear designers, share and develop shoe designs, write manuals for shoe customization and organize design contests. The quality of these designs is surprisingly high and acknowledged by sporting goods companies (Fuller, Jawecki, & Muhlbacher, 2007). In these examples, members share expertise and experiences online to develop or improve a product offline in their local situation. Open source software development (OSS) communities are even more production related (Lee & Cole, 2003; O'Mahony & Ferraro, 2007) as people voluntarily collaborate to produce software that solves practical problems. In order to do so, the contributions made by different members need to be integrated into one collective product (Moon &proull, 2008; O'Mahony & Ferraro, 2007), which is then free to be used by whoever is interested in doing so (Ulhøi, 2004). Members contribute to this process because they enjoy working on a specific kind of coding or want to create a program that suits personal needs (Kogut & Metiu, 2001; Lerner & Tirole, 2001). Linux is a famous example of how a group of volunteers produced a very successful software package that competes with operating system software like software giant Microsoft's Windows. In a recent development, a small number of workers are being compensated by their firm to collaborate in OSS communities (e.g. De Laat, 2007).

Virtual teams have become an established way to consolidate the geographically distributed expertise in an organization (Griffith, Mannix, & Neale, 2003; Jarvenpaa & Leidner, 1999). They are usually brought together to integrate dispersed experts who are best capable of accomplishing an organizationally predefined task (Alavi & Tiwana, 2002; Bell & Kozlowski, 2002; Kanawattanachai & Yoo, 2008). Members work on these projects as part of their formal job and within a fixed timeline. Virtual teams are especially useful for projects that require input from diverse functions and backgrounds (Leekelley & Sankey, 2008) and such teams are becoming increasingly important for global firms as they make it easier to share, acquire and integrate dispersed expertise (Sole & Edmonson, 2002). Virtual team members often have different background (Bell & Kozlowski, 2002) which is, on the one hand, making them likely to be successful in terms of completing complex tasks, but on the other hand, inducing many challenges that may hinder innovation due to virtual interaction and differences across groups (Gibson & Gibbs, 2006).

Figure 1.1. Main differences and overlap between distributed knowledge sharing groups

Online professional communities

Virtual teams

Production oriented knowledge sharing

Outside organizational context, member initiated, open membership

Work with fixed timelines on specific projects, closed membership

Sharing of distributed knowledge by means of ICT

Informal knowledge sharing, no fixed timelines, (semi) voluntarily shared interests

Within hierarchical context, limited to boundaries of the organization, organization initiated

Knowledge sharing for individual, group and organizational learning

**Intra-organizational NOPs**

1.4.2   The unique challenge of coordinating NOPs

Comparing NOPs to these two groups reveals two major points of difference, as visualized in figure 1.2. In online professional communities, knowledge processes are coordinated according to *community based principles*, implying that knowledge, as well as the resulting innovations are freely shared, that membership is open, completely voluntary and not paid for, that the distribution of knowledge crosses the boundaries of the firm, and that communication is technology-mediated (Lee & Cole, 2003; Franke & Shah, 2003). This community based model describes knowledge creation in loosely coordinated and distributed settings such as

online professional communities and provides an alternative to firm based models which we see in virtual teams. A *firm based coordination model* implies that knowledge is regarded as private and owned by the company, that membership is restricted to the organization's employees, that participation in and the scope of learning processes is prescribed and are part of one's formal job for which salary is received, and that knowledge distribution is limited by the boundaries of the firm (Lee & Cole, 2003, p.635).

Both models only partially apply to coordinating NOPs. In contrast to the firm based principles applicable to virtual teams, NOPs are not imposed with organizationally defined deliverables, have no fixed timeline and people contribute more or less voluntarily based on their own interests and practices (Andriessen, 2005; Lesser & Everest, 2001; Wasko et al., 2004). However, community based principles associated with online professional communities cannot be applied directly to intra-organizational NOPs either. NOPs reside within organizational boundaries, are implemented or at least supported by the formal organization and membership is limited to members of the organization.

Figure 1.2. The unique challenge of coordinating knowledge sharing in intra-organizational NOPs
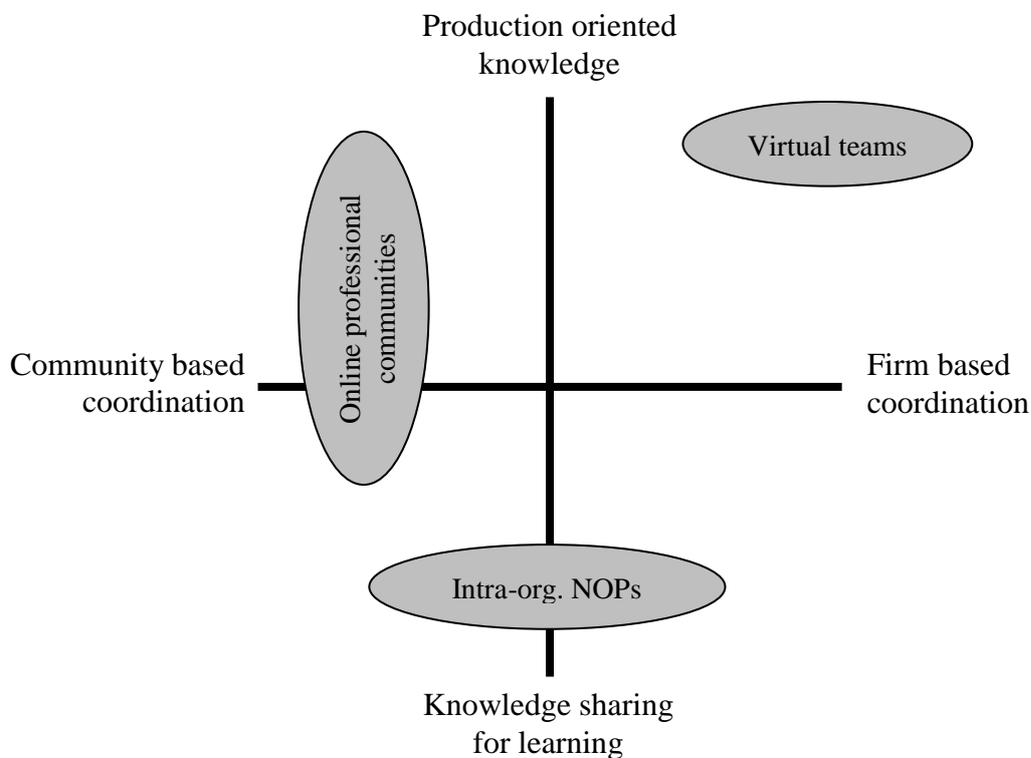
A second difference between these three groups is their main aim in terms of knowledge sharing. Virtual teams are set up by organizations to accomplish an organizationally defined task, and are especially useful when requiring cross-function or cross-boundary inputs (Leekelley & Sankey, 2008). Knowledge sharing among the distributed members is an important way to achieve these goals (Haas, 2006). This is similar to the aim of online professional communities although in these communities, tasks are motivated by individual interests instead of those of the organization. In general, knowledge sharing in both groups can thus be said to be production related. However, not all professional communities are collaborating to produce a specific outcome; some, like inter-organizational NOPs, are more tailored for individual learning, without necessarily producing something. Literature on coordination usually addresses situations in which individuals are interdependent to accomplish a specific task. For example, in open source software communities, coordination of the work performed by dispersed members is required in order to cohesively integrate individual efforts into a successfully operational piece of software. In intra-organizational NOPs these interdependencies are less obvious. Instead, in order to achieve learning, the coordination of NOPs needs to be tailored to knowledge sharing (Bechky, 2003), thereby requiring others to connect local knowledge (Brown & Duguid, 2000a), locate where expertise resides (Faraj & Sproull, 2000), understand the pattern of knowledge distribution (Hsiao, Tsai, & Lee, 2006), interpret this distributed knowledge (Boland & Tenkasi, 1995) reach shared understanding (Bontis, Crossan, & Hulland, 2002; Crossan et al., 1999), and institutionalize the outcomes of these learning processes into the organization (Crossan et al., 1999; Tsoukas & Chia, 2002). How coordination of such groups takes place is hitherto not well understood.

In practice organizations are increasingly implementing NOPs as an attempt to seize the anticipated benefits of knowledge networks for their knowledge processes. Such an instrumental approach however fundamentally contradicts the idea of communities and networks of practice that is central to the practice-based perspective on knowledge. In this perspective communities are considered emergent instead of engineered. In light of this, communities and networks may emerge by virtue of a bottom-up drive for knowledge sharing; thus, knowledge sharing does not necessarily happen because organizational managers implement NOPs as organizational entities in a top-down fashion. The bottom-up approach implies community-based principles, whereas the top-down approach represents hierarchical coordination.

Figure 1.2 demonstrates something unique about coordinating intra-organizational NOPs. In this case, NOPs combine community based coordination principles with a firm based setting. At the same time, they do not intend to produce a specific outcome, but rather to facilitate individual, collective and organizational level learning within the firm. It is precisely this combination that is likely to make coordinating NOPs a challenging task.

In distributed settings such as NOPs, organizations cannot rely solely on the situated mutual learning processes that occur as a natural consequence of daily work activities. Rather, because members are geographically distributed and have their local practices as their primary focus, effort is needed to coordinate and integrate practices. Members are less likely to encounter one another in daily work and require, at the least, resources (e.g. time, money, ICT facilities) for mutual engagement (Pan & Leidner, 2003; Vaast, 2007; Vaast, 2004). In this sense, one could argue that intra-organizational NOPs, at least partly, depend on the formal organization. By supporting NOPs, organizations expect to reap the benefits of distributed knowledge sharing for the organization while at the same time protecting their knowledge by keeping the knowledge exchanges within the boundary of the organization. Moreover, in order to learn, organizations are highly dependent on bottom-up knowledge sharing around practices (Bontis et al., 2002; Brown & Duguid, 1991; Crossan et al., 1999)

However, members cannot be forced to share knowledge (Bogenrieder & Nooteboom, 2004; Schwen & Hara, 2003; Tsai, 2002). As a result, a top-down approach to coordinating networks might be detrimental for emergent and practice based knowledge sharing processes within NOPs (Alvesson & Sveningsson, 2003; Hannah & Lester, 2009; Jarvenpaa & Leidner, 1999; Plaskoff, 2003; Wenger & Snyder, 2000).

Management thus has to acknowledge the informal nature of NOPs, while at the same time trying to incorporate valuable learning that might emerge within NOPs into the organization. This induces a balancing act (Brown & Duguid, 2000b) between *process* (in terms of organizational coordination to bring local knowledge into wider circulation) and *practice* (in terms of the way people's daily work is actually done). Indeed, the analysis of literature suggests that coordinating NOPs is similar to walking a tightrope; yet, how to keep your balance between community based and firm based coordination and the consequences of tripping over are hitherto unanswered questions. Before trying to answer these questions, we first need to determine what to examine; who is coordinating these distributed knowledge sharing groups?

1.4.3   Who is coordinating distributed knowledge sharing groups?

Depending on whether one is looking at literature on firm based or community based settings, a broad range of concepts can be found related to the roles involved in coordinating distributed knowledge sharing groups. In studies on coordinating dispersed groups in firm based settings, the terms "management" and "leadership" are frequently used, in different contexts and to connote a multitude of meanings. Community-based groups, on the other hand, are often supposed to be self-organizing without formal management (though some types of lateral authority may be developed within these communities). Moving beyond this terminology reveals a continuum from coordination by formal hierarchical authority – traditionally associated with firm-based settings– to coordination by informal lateral relations – traditionally associated with community based settings. In the first, coordination is highly dependent on managers who have authority based on their formal position. In the latter, coordination takes place voluntarily through the relations between and communication among (a group of) members (Galbraith, 2008; Okhuysen & Bechky, 2009; Powell, 1990; Tsai, 2002). Between these two extremes lies the notion of lateral authority, referring to a situation where leaders (who may be assigned by management or may emerge from the group) earn authority over the task at hand without having authority over the people in the group (Dahlander & O'Mahony, 2011).

These different coordination roles cannot be simply related to a specific group; coordination by informal lateral relations can take place in organizations (see e.g. Tsai, 2002) just as online professional communities can develop quite formal authority structures (see e.g. Bonaccorsi & Rossi, 2003; Ljungberg, 2000; O'Mahony & Ferraro, 2007). They can however be placed on a continuum, as represented in figure 1.3, between fully hierarchical authority – found most often in firm-based settings – and fully lateral authority by members – found most often in community based settings. In this dissertation, I will study coordination roles from these three main perspectives.

The role of management

First, I will examine the role of management, usually associated with formal hierarchal authority based on formal position (Malone, 1987) in coordinating intra-organizational NOPs. Activities of managers are traditionally described as planning, coordinating, commanding, organizing and controlling the firm's resources to achieve its objectives (Fayol, 1969). Management may furthermore command, supervise, allocate and control resources, use incentives, formulate procedures, and design and implement systems for knowledge

integration, all directed toward specific and planned objectives (Barker, 1997; von Krogh, Nonaka, & Rechsteiner, 2011). The terms "management" and "leadership" are sometimes used interchangeably, although many authors nowadays argue that leaders coordinate by vision, organizational harmony, a high moral level, shared interest and common beliefs, rather than coordinating by formal coercion and control (Barker, 1997; Foss, 2001; Sveningsson & Alvesson, 2003). To maximize clarity, when referring to management in this dissertation, I denote those people with a function on top or middle management levels who are responsible for corporate strategy formulation and implementation (Raes, Heijltjes, Glunk, & Roe, 2011).

In terms of coordinating NOP, managerial involvement is required to facilitate the NOP so that members can meet and interact (Pan & Leidner, 2003; Vaast, 2007; 2004). Moreover, especially in the case of intra-organizational NOPs, organizations strive to have at least some influence on the networks in order to warrant a certain degree of organizational benefit in terms of organizational learning. As Tsoukas and Chia (2002, p. 579) claim: "*Whether local changes are amplified and become institutionalized depends on the 'structural context,' created to a large extent (...) by senior managers*". In other words, whether learning processes in NOPs contribute to learning at an organizational level is likely to depend to a large extent on management. On the other hand, management involvement may be difficult as it may conflict with emergent and informal processes underlying practice based knowledge sharing. In addition, knowledge workers are considered difficult to manage because they may be less inclined to subordinate themselves to managerial hierarchy, and rather see expertise as an alternative base for authority (Alvesson & Sveningsson, 2003b; Bogenrieder & Nooteboom, 2004). The issue of how NOPs can be managed will be further introduced in paragraph 1.5.1 and empirically investigated in chapter 2.

The role of leadership
Alternatively, leaders play an important role in coordinating knowledge processes (Kulkarni, Ravindran, & Freeze, 2006; von Krogh et al., 2011) as they may connect people and provide a vision and rules for knowledge creation (von Krogh et al., 2011). Virtual team leaders, for example, need to monitor the group process (Bell & Kozlowski, 2002; Weisband, 2002), create a clear vision on why the group exists and what it wants to achieve, create commitment to those tasks (Hollingshead, Fulk, & Monge, 2002; Mannix, Griffith, & Neale, 2002), as well as articulate and embody group norms, roles and procedures for working together and communicating (Armstrong & Cole, 2002; Bell & Kozlowski, 2002; Malhotra, Majchrzak, & Rosen, 2007). It is argued that the geographical dispersion of virtual team members makes it

difficult for a single person to monitor performance (Hinds & Mortensen, 2005) and to coordinate what other members are doing (Malhotra et al., 2007). In addition, virtual team leaders often do not have hierarchical authority over their team members. In community based settings, hierarchical authority is even less viable and hence those involved in coordinating online communities need to find other ways than employment contracts, financial incentives and so forth to foster contributions that members make voluntarily and integrate the collective efforts into a common product (Kraut, Kiesler, & Ren, 2007; Mockus, Fielding, & Herbsleb, 2002; Moon & Sproull, 2002). As an alternative to hierarchical authority, leaders of distributed knowledge sharing groups may attain (or be assigned with) lateral authority over a group, meaning that they have some authority over the collective's activities without having vertical authority over individuals (Dahlander & O'Mahony, 2011)

An example of lateral authority can be found in the work of O'Mahony & Ferraro (2007) and Dahlander & O'Mahony (2011) who describe how some members of an OSS community emerge from the group when they are nominated as leaders and thereby become responsible for the coordination and organization of the communities' activities. These leaders emerge from the group and accrue lateral authority, but can only sustain their position as long as they are perceived as leaders by their fellow members. Especially in distributed settings, the importance of actually being perceived as leader by fellow group members has been emphasized (Weisband, 2002). Leadership in these setting is thus often seen as emergent (Yoo & Alavi, 2004) and can be distributed among a group of members (Fielding, 1999; Mehra, Dixon, Brass, & Robertson, 2006; Mockus et al., 2002).

In practice, NOPs are often coordinated by NOP leaders. These leaders are usually assigned to organize NOPs and stimulate organizational learning processes without having the authority to manage people. How these leaders coordinate NOPs has not been investigated yet. Organizational learning requires learning at, and knowledge flows between, the levels of the individual, the NOP, and the organizational, which may induce conflicting interests that these NOP leaders have to deal with. This will be the topic of the second empirical study as will be introduced in the next section.

The role of members

Online communities that are more oriented towards knowledge sharing and learning instead of producing a specific outcome, are usually coordinated by fully self-organizing processes (Wasko, Teigland, & Faraj, 2009; Wenger & Snyder, 2000), from which multiple informal leaders may emerge (Muller, 2006; Plaskoff, 2003; Wenger, 2000). In these settings,

however, leadership roles are often not explicitly recognized, but are instead informally enacted by willing members who are not formally assigned that role. Coordination in these groups does not so much require the integration of the work of several members into a collective outcome, but is more targeted towards supporting the community. Core members are, for example, important for sustaining (online) communities because they make the lion's share of contributions, but they may also help to build and maintain the network by infrastructure maintenance, e.g. moderating, reading, and writing messages (Butler, Sproull, Kiesler, & Kraut, 2007; Desanctis, Fayard, Roach, & Jiang, 2003; Jones & Rafaeli, 2000; Ren et al., 2007). Furthermore literature on communities of practice emphasizes that core members support learning processes by providing intellectual and social leadership (Borzillo, Aznar, & Schmitt, 2011; Wenger & Snyder, 2000; Wenger et al., 2002). These core members have no formal responsibility over the outcome of the group or over the other members. Instead, coordination by core members takes place by lateral relations where connections and communication between members are the main means to sustain the group's activities (Galbraith, 2008; Okhuysen & Bechky, 2009; Powell, 1990; Tsai, 2002).

Organizational NOPs may also lack clearly assigned leadership roles and instead members may coordinate their NOP, just like core members support learning processes in (online) COPs and NOPs. As such, core members can be seen as the informal leaders of NOPs who coordinate through lateral relations. Who these core members of NOPs are and what they do to support organizational learning will be the subject matter of chapter 4.

Figure 1.3. Coordination roles on the continuum of hierarchy
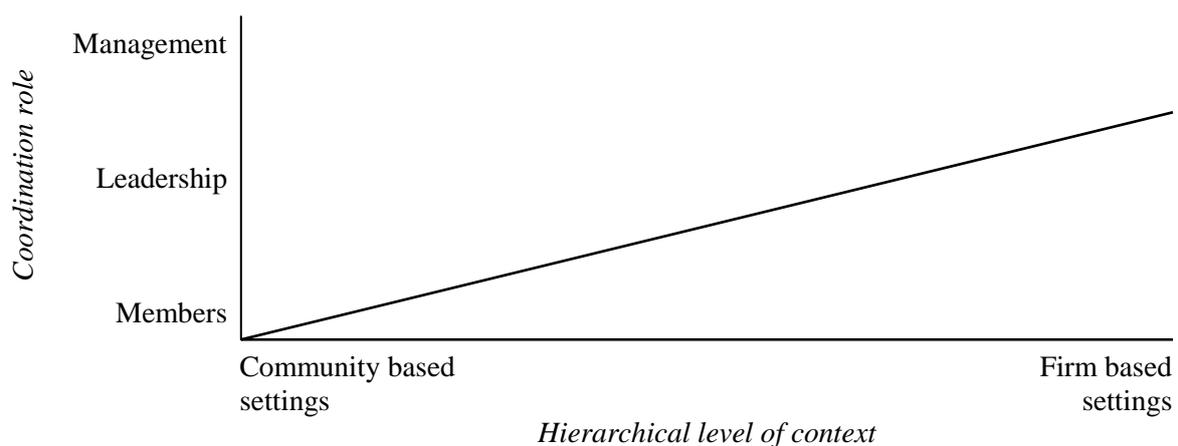
1.5 Research Questions

All in all, many questions regarding NOP coordination lie open. Considering the increased importance of knowledge for organizations, the increasing number of people working across geographical boundaries and the enhanced opportunities to communicate globally through ICT support, this is an urgent topic to address. In light of the above described challenge of combining community based coordination principles within a hierarchical setting, the main aim of this dissertation is to examine *how intra-organizational NOPs are coordinated to support knowledge sharing and organizational learning.*

Building from research on both firm-based and community-based distributed knowledge sharing groups, I studied NOP coordination from the perspective of management, leadership and core members. Studying NOP coordination from these multiple perspectives allows for a more complete appreciation of different coordination issues, practices or strategies for walking the 'tightrope'. For each coordination perspective (management, leadership and core members) an empirical study was conducted. In the next section, the main issues for each perspective will be briefly discussed as well as the subsequent research focus of each study.

1.5.1   How management coordinates NOPs to support knowledge sharing

Whilst management in terms of coordination and integration of dispersed knowledge has been the key focus in the knowledge based view of the organization (Spender & Grant, 1996), it is striking to note that the practice based perspective on knowledge sharing either tends to ignore managerial issues (Alvesson & Karreman, 2001; Alvesson, Karreman, & Swan, 2002) or criticizes management by framing its role in terms of stewardship (Wenger, 1998), care (Von Krogh, 1998), cultivation (Ward, 2000), nurturance (Alvesson et al., 2002), or fine tuning (Alvesson & Karreman, 2001) without taking into account *how* management can nurture knowledge sharing or organizational learning (Foss, Husted, & Michailova, 2010). As described earlier, coordinating NOPs requires the combination of community-based with firm-based principles, which poses the challenge for management to balance between too little or too much managerial involvement. If management simply refrains from involvement, firms will not advance in terms of knowledge sharing because at least some form of management intervention is necessary to connect dispersed members and integrate knowledge within the organization. But too much involvement will likely overrule the informal and emergent knowledge processes underlying practice based knowledge sharing in NOPs. Coordinating NOPs from a managerial perspective thus induces a management dilemma as to how to

reconcile the community-based coordination typical of NOPs with the more hierarchical coordination implied by coordination of distributed knowledge within an organizational context.

Thus, while literature suggests that coordinating NOPs puts conflicting demands on management, it does not provide a detailed understanding in what this dilemma entails nor does it suggest how management might cope with this challenge in order to successfully coordinate their networks. The first study therefore aimed to disentangle the management dilemma that is associated with coordinating NOPs, by identifying the underlying dynamics that may play a role in coordinating intra-organizational NOPs. As poor understanding of this knowledge management dilemma has shown to be detrimental to informal knowledge sharing (Thompson, 2005) the central research question of the first study is: *how can intra-organizational NOPs be managed without being 'killed'?*

The first study specifically focused on knowledge sharing because that process lies at the base of organizational learning. Because this process requires the transformation of individual knowledge into group and organizational level knowledge, understanding knowledge sharing dynamics thus serves as a stepping stone for explaining organizational learning and needs to be addresses first - after all, without knowledge sharing, no organizational learning will result from the NOP. My research findings show that, next to social factors, knowledge sharing is affected by both the extent to which the knowledge shared in the network is relevant for and integrated in the local practices of network members, and the extent to which the knowledge shared and created in NOPs is integrated in and relevant to the organization of which these networks are a part. This implies that knowledge sharing is stimulated if exchanges are relevant for and integrated in individual, NOP and organizational levels of learning. Findings further imply that NOP leaders play a pivotal role in balancing the multiple requirements that NOPs face. Therefore, the second study focused on how NOPs leaders support organizational learning.

1.5.2   How NOP leaders coordinate NOPs to support organizational learning

In the second study the role of NOP leaders in coordinating NOPs to support organizational learning is investigated. Prior knowledge management literature has argued that leaders play an important role in knowledge processes and the successful implementation of knowledge management (Bryant, 2003; Kulkarni et al., 2006; von Krogh et al., 2011), especially with regard to establishing connections across different levels of learning (Berson, Nemanich, Waldman, Galvin, & Keller, 2006; Hannah & Lester, 2009; Vera & Crossan, 2004).

Coordination of distributed knowledge sharing groups within community based settings, especially OSS communities, highly depends on community leaders. Likewise, even though NOPs are generally perceived as self-organizing (Faraj & Wasko, 2005), intra-organizational NOPs in practice are often led by someone with formal responsibility for organizational learning through NOPs. Such instances have so far received little attention.

As the first study showed that knowledge sharing is promoted if the content exchanged in the network is embedded in the practice of the members (as conduit for individual and NOP level learning) as well as in the organization (as conduit for organizational level learning), a key challenge for NOP leaders is to stimulate knowledge flows between these different learning levels. Organizational learning, conceptualized as a multi-level process occurring at individual, NOP and organizational levels, requires the interpretation and integration of individual knowledge to support network level learning and the institutionalizing of that knowledge into the organization to achieve organization level learning (Crossan et al., 1999). The first two processes have an emergent character while the latter requires a managerial type of involvement. Thus, again, a tension emerges between community based and firm based coordination principles. Network leaders must support individual learning by NOP members according to shared practices, and ensure learning at the organizational level through the NOP by more managerial types of involvement, inducing a *learning tension.* While the first study pointed at the importance of network leaders for learning in NOPs, literature on NOPs rarely has discussed the role and activities of these network leaders in relation to achieving organizational learning, which therefore represents the focus of this paper: *how do NOP leaders cope with the learning tension that results from using networks of practice to support organizational learning?*

Findings indicate that to successfully deal with the learning tension, leaders face multiple requirements; they need authority based on social position, expertise and formal position. Obviously it is not an easy task to find leaders able to meet these multiple needs. One may even wonder whether these requirements need be confined in one person or can be distributed across multiple members as well. The NOPs of this study were coordinated by formally assigned NOP leaders who had no formal authority over the NOP members but were made responsible by management for the functioning of the networks. Hence these leaders represented quite a firm-based coordination role. To align more with community based coordination principles, the next study focused on coordination by core members, which represents a more informal type of leadership.

1.5.3   How core members coordinate NOPs to support organizational learning

Investigating NOP coordination from a management perspective is fully aligned with firm-based settings. Given this and the fact that leadership may apply to both firm-based and community-based settings, coordination by core members is mostly associated with community settings. Core members are supposed to support learning processes in both online (Desanctis et al., 2003; Jones & Rafaeli, 2000; Kraut et al., 2007; Silva, Goel, & Mousavidin, 2009) and offline (Brown & Duguid, 1991; Thompson, 2005; Wenger et al., 2002) communities by actively contributing their expertise and coordinating the network's activities (Borzillo et al., 2011; O'Mahony, 2007; Wenger & Snyder, 2000; Wenger et al., 2002). Hence, when studying how NOP members and their activities are coordinated to support organizational learning, core membership might prove a valuable perspective on how this coordination takes place. Indeed, recent research shows a growing attention for the people within networks and their activities (e.g. Borzillo et al., 2011; Davidson & Vaast, 2009; Spender, 2007).

So far, core members of online communities are mostly defined in quantitative terms: as the critical mass (Mockus et al., 2002; Wasko et al., 2009), the most active contributors (Desanctis et al., 2003; Kraut et al., 2007) or on the basis of core-periphery type social network structures (Borgatti & Everett, 2000; Huang & DeSanctis, 2005), providing little empirical confirmation for whether and why these people are important for coordinating the network and supporting the aims of their group. Literature on OSS communities tends to pay most attention to what core members do but in these contexts their role is usually discussed in terms of integrating the work done by members, which does not apply to NOPs who do not collaborate on a specific task. Hence, core members of organizational knowledge networks are likely to face different challenges, to perform different roles and to support different aims than their counterparts in online professional communities. After all, they are supposed to combine community based coordination principles within hierarchical settings, while coordinating the NOP and its activities for the purpose of individual, collective, *and* organization level learning.

Considering the lack of studies on how core members coordinate NOPs to support organizational learning, the third study will thus try to answer the following three questions: *(1) Who are the core members of an organizational NOP; (2) What do these core members do; and (3) How do these core members support organizational learning?*
In line with research on informal leadership, specifically emergent leadership (see e.g. Yoo & Alavi, 2004; Zhang & Faerman, 2007), and social network analysis (Straits, 2000) core

members are identified by asking NOP members which members are the "*most significant*" for the network. Subsequently the activities that these core members undertake are investigated and finally how that may support organizational learning is explored. This approach allows moving beyond a quantitative approach according to which members posting most messages are considered the core. Making the most contributions does not necessarily mean that one is most significant for the network (see e.g. O'Mahony & Ferraro, 2007) and this way I open up the possibility for different roles or types of core membership. As such, a more detailed understanding of who core members are, and what they do to coordinate the NOP is provided.

A multi-methods case study (including a survey, content analysis, interviews and observation) revealed that core members may perform nine different activities that cluster into three distinct roles, each specifically supporting one of the learning processes underlying organizational learning. These three roles are highly related to the demands placed on NOP leaders as found in the second study.

Together these three studies help reveal the challenges of coordinating NOP to support knowledge sharing and organizational learning and provide insight in how to deal with these challenges.

1.6 Theoretical Relevance

The contribution of this dissertation is threefold. First, it will contribute to knowledge management literature as well as practice-based learning studies. By combining these two fields, I move beyond research that either focuses on internal network dynamics or on formal (knowledge) management. Herewith, the relation between NOPs and the formal organization, the resulting tensions and how they can be dealt will be specified. More particularly, I will provide a more strategic view of practice-based learning theories by combining NOPs with the notion of management and leadership, something typically ignored or downplayed in practice-based knowledge sharing literature. In addition, this research will contribute to knowledge management literature by revealing a tendency in both theory and practice to consider social networks, themselves, as a 'holy grail' for knowledge management. Underlying causes and suggestions to overcome such '*network determinism*' will be discussed in chapter 5.

Second, this dissertation contributes to organizational learning theory by critically reflecting on the role of NOPs in supporting organizational learning processes. Moreover it is

among the first to empirically show if and how NOPs connect individual and network level learning as suggested by some authors (e.g. Bogenrieder & Nootenboom, 2004; Hannah & Lester, 2009). While doing so, I identify the tensions that arise from instrumentally using NOPs to support organizational learning and specify the role of management, leadership and core members within these processes.

Thirdly, this dissertation has implications for the knowledge-based view of the firm. The research findings contribute to our understanding of the integration of knowledge across boundaries; a key issue within that field (e.g. Grant, 1996; Spender 1996). In particular, the research findings will contribute to our understanding of the role of formal management and leadership in crossing the multiple types of boundaries that arise in intra-organizational NOPs as well as further our insight in how more emergent types of organization may concurrently take shape within intra-organizational NOPs.

1.7 Managerial Relevance

As more and more organizations face the challenge of integrating geographically dispersed knowledge and become aware of the possible role of knowledge networks in meeting this challenge, a more solid understanding of how management, leaders and members support learning through NOPs is needed. Notwithstanding the rising number of organizations trying to stimulate distributed knowledge sharing through online knowledge networks (see e.g. Collison & Parcell, 2001; Neilsen & Ciabuschi, 2003; Pan & Leidner, 2003; Prokesch, 1997; Rumyantseva et al., 2006), there is yet limited understanding in how these networks are coordinated to support knowledge sharing and organizational learning. This dissertation will help managers understand the challenges underlying practice based knowledge sharing over distance and give detailed understanding in the coordination of NOPs and the role of management, NOP leaders and core members therein. Chapter five will elaborate more specifically on how the findings of this dissertation may help managers walk the tightrope of coordinating NOPs.

1.8 Research Strategy

As the coordination of intra-organizational NOPs has received little scholarly attention so far, a set of interpretive in-depth case studies were conducted. Interpretive research does not attempt to identify cause and effect relations; instead it endeavors to understand phenomena through the meaning that people assign to the phenomenon under study (Klein & Myers,

1999; Stake, 1995). More specifically, interpretive research aims to understand the context of a phenomenon (i.e. NOPs) and the processes whereby NOPs influence and are influenced by the *context* (Walsham, 1993). The context in this dissertation refers to management, NOP leaders or core members. The conducted case studies are thus instrumental in nature (Stake, 1995); by studying a particular case we expect to build theories on how NOPs are coordinated to support organizational learning. Based on theoretical sampling (as opposed to e.g. random or stratified sampling) (Eisenhardt & Graebner, 2007), two case studies were selected because they are particularly suitable for illuminating the relation between managers, leaders and core members on the one hand, and knowledge sharing and organizational learning on the other.

The first two studies were conducted at an international development organization, referred to as TDO. The organization is active in five regions, comprising 32 countries. TDO is a professional consultancy organization with more than 1500 employees. The work of TDO advisors is knowledge intensive and diverse. TDO management decided to initiate formalized knowledge networks on specific topics, such as HIV prevention and women's rights. Twenty-two formalized NOPs focused on different local practice areas, with the managerial goal of coordinating existing, dispersed knowledge. Each network had a leader assigned who is required to support learning in the NOP. The development aid sector is an ideal environment for addressing our research questions, because it has extensive experience with the use of NOPs as instruments to integrate distributed knowledge. Moreover, for organizations in this sector, learning is absolutely vital and can save actual lives. TDO's NOPs reveal a wide variety of managerial interventions and dynamics and they provide an excellent example of practice based learning within a hierarchical context. As a result, the knowledge management dilemma clearly surfaced making it a highly suitable case for investigating how NOPs can be managed as well as for how leaders deal with the learning tension inherent to coordinating NOPs. Within the TDO case, polar types of NOPs were selected (Eisenhardt & Graebner, 2007) in order to deeply understand the relation between leadership strategies and managerial interventions and knowledge sharing or organizational learning. To gain in-depth understanding I mainly relied on in-depth interviews and observations for data collection. In addition, a survey was conducted to gain a more broad insight in how TDO's networks were used. This survey was however only used for descriptive purposes, not for causal inferences.

The second case study was conducted at an international chemical company, referred to here as TCC. Like TDO, TCC is a highly distributed organization; with manufacturing activities in 20 countries and sales activities in more than 120 countries, the expertise of TCC's 6700 employees is highly dispersed. Because of this dispersion and the highly

knowledge intensive character of the chemical industry, TCC's management decided to facilitate 17 online knowledge networks to support organizational learning. TCC is an excellent example of geographically distributed NOPs; the members rely on online communication for interaction and the NOPs are considered successful by the organization's management in terms of learning. In addition, learning through these NOPs is supposed to depend on a group of active members rather than on formally appointed leaders, making it an excellent case for studying who the core members are and what they do to support organizational learning. While doing so, multiple research methods were applied, each tailored to a specific research question as well as helping to triangulate findings. First, all online messages were analyzed to see what coordination activities members were undertaking. A survey was subsequently conducted to identify the core members as well as to explore how TCC's network were used. Finally, I relied on semi-structured interviews, observations and document analysis to explore how core members support organizational learning.

1.9 Dissertation Outline

Table 1.1 details the structure of the remainder of this dissertation.

Table 1.1. Dissertation outline

Chapter	Purpose	Related Publications
1. Introduction	Introduce problem under study, research objectives, research strategy, practical relevance and outline of dissertation.	Parts of chapter 1 are under review for the Encyclopedia of Social Networks and Mining: section Social Network Applications in Business, Organizations, Industry and Case Studies" (eds. Reda Alhajj, Jon Rokne & Rafael Wittek). Springer Verlag. Parts of chapter 1 were also presented at the *International conference on Organizational learning, Knowledge and Capabilities* April 2008, Copenhagen, Denmark, and *Annual Meeting of the Academy of Management*, August 2008, Anaheim, California.
2. Keeping the wheels turning: The	Empirical study to examine NOP coordination from a managerial	Chapter 2 was accepted for publication in *Journal of Management Studies* 2010,

dynamics of managing networks of practice	perspective. Unravel the knowledge management dilemma inherent to coordinating NOPs and investigate how knowledge sharing in NOPs can be managed.	47(1), 85-108.
3. Leading to learn in networks of practice: two leadership strategies	Empirical study to examine how NOP leaders coordinate NOPs to support organizational learning. Identify what strategies NOP leaders deploy to deal with the learning tension that is inherent to coordinating NOPs.	Chapter 3 was accepted for publication in *Organization Studies* 2011, 32(8), 1005 – 1028.
4. Cracking the core: How core members of networks of practice contribute to organizational learning.	Empirical study to investigate how core members coordinate NOPs to support organizational learning. Study examines who core members are, what they do, and how their activities support organizational learning.	Chapter 4 is submitted to the journal of Human Communication Research and was accepted for presentation at *International conference on Organizational learning, Knowledge and Capabilities* April 2011, Hull, UK., and for the *Annual Meeting of the Academy of Management*, August 2011, San Antonio, Texas.
5. Conclusion and Discussion	Summarize and discuss final conclusion, discuss implications for theory and practice, discuss limitations of dissertation and present suggestions for further research.	-

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