LEADERSHIP IN ONLINE KNOWLEDGE NETWORKS: CHALLENGES AND COPING STRATEGIES IN A NETWORK OF PRACTICE

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ABSTRACT

In this paper we explore the challenges and coping strategies for leading online intra-organizational Networks of Practice (NOPs). The research indicates that coordinating distributed knowledge in NOPs poses a leadership challenge that is not yet addressed in the literature on knowledge management in general and is unique when comparing intra-organizational NOPs to research on leadership in other types of online knowledge networks. This challenge entails creating and maintaining a balance between the interests of the formal organization and the interests of the informal network, and shows that coordinating informal knowledge sharing in a formal context involves a management dilemma thereby contributing to theory on coordinating distributed knowledge.

Keywords: distributed knowledge, knowledge coordination, leadership, management dilemma, networks of practice

1.   INTRODUCTION

According to the practice-based perspective on knowledge, knowledge sharing transpires most effectively in informal settings in which people interact around their practices, such as in co-located Communities of Practice (COPs) (Blackler 1995; Brown and Duguid 1991; Gherardi 2000; 2001; Wenger 2002) or in geographically dispersed Networks of Practice (Brown and Duguid 2001). In our globalizing economy, these geographically dispersed networks are increasingly important, as organizations (and consequently, knowledge) are often dispersed across different locations. Increasingly, Networks of Practice (NOP) or knowledge networks are used as a vehicle for the coordination of such dispersed knowledge. Compared to COPs, NOPs are larger, more geographically dispersed and have much looser ties (Tagliaventi and Mattarelli 2006). Even though both in practice and in academia there is a rising interest in these distributed knowledge networks, the role of leadership within these networks has so far been neglected. In this paper, we aim to contribute to filling this gap in the literature by identifying the main *challenges* faced by organizations trying to manage such NOPs, as well as the *coping strategies* developed to meet these challenges. We focus specifically on intra-organizational NOPs, networks that are aimed at integrating knowledge at different locations within one organization, since we aim to gain insight into managing the coordination of informal knowledge sharing within organizations.

As there is no substantial theory available to study the challenges of leading NOPs, we conducted a theory building case study. The research indicates that coordinating distributed knowledge in NOPs poses a management dilemma that is not yet addressed in the literature on knowledge management in general and is unique when compared to two streams of related literature that pay attention to coordinating distributed knowledge: literature on virtual teams and on open source software communities.

2. THEORETICAL FRAMEWORK

2.1 KBV AND THE PRACTICE BASED PERSPECTIVE

Over the past two decades, literature using a knowledge based view (KBV) on organizations has been growing in importance. The knowledge-based view of the firm

(Grant 1996; 2002; Spender 1996; 1998) focuses on the question how to integrate and coordinate the knowledge that is present in the organization. The main organizational problem identified in literature using the KBV is the challenge of integrating and coordinating "*dispersed bits of incomplete and often contradictory knowledge which all the separate individuals possess*" (Hayek 1945: 519), which poses the challenge of managing knowledge, or "*utilizing knowledge not given to anyone in its totality*" (Hayek 1945: 519) .

While the interest in knowledge in organizations originated from a cognitive perspective (focusing on issues such as organizational learning, memory and cognitive schemes), more recent research related to the KBV stems from a practice based approach. In this approach, knowledge is not conceived of as an object that can be transferred from a 'knowledge owner' to a 'knowledge receiver', but as 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 and Duguid 2001).

Even though the topic of management in terms of coordination and integration of dispersed knowledge has been the key focus in the KBV (Spender and Grant, 1996), it is striking to note that the practice based perspective refrains from issues related to management or leadership (Alvesson and Kärreman 2001; Alvesson, Kärreman and Swan 2002). Regarding the terms *management* and *leadership* Alvesson and Kärreman (2001: 1002) note, '*leadership in organizations is typically exercised based on a managerial role*'. Hence, they conclude, a distinction between management and leadership is hardly relevant. In line with this view, both terms will be used interchangeably in this paper.

The absence of leadership in practice based literature on knowledge is not only an omission within the scholarly attention to KBV on organizational issues. As more and more organizations face the challenge of coordinating geographically dispersed knowledge and become aware of the possible role of knowledge networks in meeting this challenge, a more solid understanding of managerial or leadership intervention in such networks is needed.

2.2 NETWORKS OF PRACTICE

Networks of Practice are characterised by ties that are much looser than those in communities of practice (Brown and Duguid 2001), implying that ties are more heterogeneous, that mutual trust is less developed and that the frequency of interaction is lower (Jack 2005; Landqvist and Teigland 2005; Levin and Cross 2004; Tagliaventi and Mattarelli 2006). As membership of NOPs is voluntary and informal (Wasko et al. 2004), they are not imposed with deliverables and formal rules (Andriessen 2005; Lesser and Everest 2001). Due to the geographical distribution, these distributed networks are usually supported by internet technology such as online communication platforms (e.g. Orlikowski 2002; Sole and Edmonson 2002).

NOPs are growing in popularity with practical applications in organizations like Shell (Wenger et al. 2002), BP Amoco (Collison and Parcell 2001; Prokesch 2000), Siemens (Nielsen and Ciabuschi 2003), Unilever (Rumyantseva et al. 2006) and Buckman labs (Pan and Leidner 2003). There is also an increasing academic attention for this subject (e.g. Ormrod et al. 2007; Tagliaventi and Matterelli 2006; Vaast 2004; 2007; Wasko et al. 2004). In spite of this popularity, we are still in the dark on how to manage the distributed knowledge in informal networks.

In COP literature, authors seem to be extremely cautious when referring to management, as managing COPs easily implies killing them (Thompson 2005). Consequently, reference is made to 'stewardship' (Wenger 1998) 'care' (Von Krogh 1998), 'cultivation' (Ciborra 1996; Ward 2000) or 'nurturing' social relations (Alvesson, Kärreman and Swan 2002) within communities or networks. These terms refer to a "hands off" approach towards knowledge coordination, as COPs are assumed to be mainly self-organizing (Lave and Wenger 1991). The characteristics of a NOP, however, raise questions as to whether these principles of a COP apply to distributed knowledge networks (Roberts 2006).

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 (Brown and Duguid 2001). 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 need resources (e.g. time, money, ICT facilities) for mutual engagement (Pan and Leidner 2003;

Vaast 2004; 2007). 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, while at the same time having to acknowledge the informal nature of NOPs. As Tsoukas and Chia (2002: 579) claim: "Whether local changes are amplified and become institutionalised 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 also depends to a large extent on managerial influence.

All in all, distributed knowledge networks cannot sustain without management support. On the other hand, however, too much interference from management is likely to diminish members' intrinsic motivations to participate in a knowledge network (Hislop 2005). Consequently, intra-organizational NOPs constitute a more complex context for leadership than COPs because of two characteristics: (1) they are geographically distributed, and (2) they imply community-based governance structures within a hierarchical context. These characteristics of a NOP create even more challenges concerning the coordination of knowledge in such networks (Roberts 2006; Swan et al. 2002; Vaast 2004).

In the following sections, we will develop a better understanding concerning these NOP-specific leadership challenges based on a case study we conducted in an international development aid organization: The Development Organization (TDO). This organization offers insight into a geographically distributed, knowledge intensive organization and the knowledge networks used. This case was selected based on theoretical sampling (Eisenhardt and Graebner 2007). TDO's networks not only seemingly fitted our definition of a NoP but were also known to have leadership issues before we started our in-depth investigation.

3. METHODS

As existing theory insufficiently explains the role of leadership in NOPs, the principal aim of this study is to contribute to theory development. A theory building study is consequently the most appropriate research method (Eisenhardt and Graebner 2007). In order to gain an in-depth understanding of the challenges of managing NOPs, interviews

were conducted with 34 different members of the organization – from formal management such as the board of directors and the strategy unit at the head office, to network leaders and practice area leaders and others such as network members (see table 1).

Table 1: Representation of interviewees

Interviewees	N
Formal management	13
Network leaders, members	14
Others (members, focal points etc.)	7
Total	34

We used an interview guideline for the semi-structured interviews with a few main topics, but the interviewers explicitly left it up to the interviewee to determine the discussion topics. We also made a one week site visit to one of the regions, where we made observations at TDO's local offices, visited a client and acted as participant observant at several meetings, such as a network leaders meeting, a directors meeting and a social event. While staying at the same hotel as many TDO employees, we were able to interrelate on many occasions and in different (social) settings. Where possible, we tape-recorded and verbally transcribed the interviews. If recording was not possible, we made notes during and right after the occurrence. In addition to these data we made use of organization reports, minutes of meetings and policies. Triangulating these different data sources asserted the convergent validity of our analysis. Our findings have been reported back to TDO, both during a management meeting at the head office, as well as during regional meetings in various countries. Overall, TDO consultants and management indicated that our findings corresponded with their personal impression of the dynamics related to the knowledge networks, affirming the communicative validity of our results.

Since we adopted an inductive approach we started to analyse the data by means of open coding. After the first codes emerged, we also started to check our first results with existing theory to sharpen the coding scheme. When no new codes or sub codes emerged, we finalised our coding scheme and switched to axial coding by using the final scheme to recode all data, following the procedures as described by Corbin and Strauss (1990). To

ensure consistent and replicable coding we made use of the Atlas.ti software program which assists in structuring large amounts of data. Memos were frequently inserted while coding to make sure that the line of reasoning behind coding decisions can be traced back. The main concepts that came up were: (1) balancing between the formal organization and network, (2) creating social embeddedness, (3) creating and sustaining momentum (4) connecting specific interests, and several coping strategies. The subdivision of the concepts and definitions as well as the grounding of these concepts in the interviews are represented in appendix 1. In order to gain more understanding in the perspectives of on the one hand formal management (e.g country directors, head office) and on the other hand the network level (e.g. network leaders, members), the coding results are subdivided for these groups.

Having assigned codes to the interviews and observation data, the next step was to identify the relationships between these concepts. Atlas.ti offers two ways to do this. First we looked at which codes are co-occurring, i.e. codes which are mentioned in the same piece of text. For instance, the code face-to-face contact is frequently co-occurring with momentum, indicating that face-to-face meetings are related to momentum. Obviously we have to look at the exact content to see which acts lead to momentum and in what way. From a theoretical perspective it is nonetheless interesting to find out which codes are related to one another as that forms the basis of theory building. Based on the analysis of both the co-occurring codes and the content we drew a network view in which the relationships between the different concepts can be assigned, thereby helping the researcher to interpret the results.

In the following sections, the challenges (and the strategies to cope with these) that emerged from this analysis will be discussed in more detail.

4. RESULTS

4.1 CHALLENGES AND COPING STRATEGIES IN TDO'S KNOWLEDGE NETWORKS

TDO is an international development organization which has evolved over the years from an organization of volunteers into a professional consultancy organization, active in five regions: Balkan, Latin America, Asia, West and Central Africa and East and Southern Africa, representing approximately 30 countries. The work in these regions is organised

around a number of *practice areas* (PAs)*,* such as Poverty, Drought and Deforestation. TDO's organizational mission is to develop the capacity of local organizations by providing these organizations with advice. In practice, this implies that TDO consultants need know-how on institutional development (dealing with local government, partnership building and advisory skills) on the one hand and thematic knowledge about their specific practice areas on the other. Notwithstanding their different practices, TDO employees are bound together by their strong commitment to poverty alleviation.

For TDO, coordinating the distributed knowledge in the organization became a focal point in its ambition to become a professional, efficient consultancy organization. A knowledge management (KM) unit was installed which implemented knowledge networks, or NOPs around each PA in every region with an average of 60 members. In order to manage these networks locally, the KM unit selected network leaders and allocated budget to the networks for traveling expenses and such. Some regions appointed network leaders who were also formally responsible for the practice areas, others preferred to select network leaders based on their expertise. Meeting face-to-face is difficult for network members due to the distances and poor infrastructure in the regions, leaving electronic communication the main way to communicate. Therefore TDO decided to provide the networks with electronic discussion groups (e-groups), where (e-mail) messages and documents can be shared and stored. Members use these online networks to exchange ideas, policies and experiences, to post documents that might be relevant for others and to plan activities and meetings.

4.1.1. Challenge 1: Balancing between the formal organization and the network

During the kick-off meeting in the Netherlands, top management realised that a potential value of the networks' contribution could reside in bringing together the diverse expertise in TDO with regard to its practice areas. While realizing that all experts of TDO were now grouped together in networks, it was decided that networks should have two aims: (1) mutual learning: exchanging knowledge so that consultants are able to learn from each others experience and expertise in order to improve the services to clients and (2) organizational learning: increase existing knowledge of the head office by providing input related to the expertise at the various local practices. This could be done by "creating a stronger profile in the practice areas by formulating strategies". Since the networks were at

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first thought to be serving only the first aim, the decision to make networks at least partially responsible for TDO's strategy created confusion at local levels about the role of the networks and the responsibilities of the network leaders.

Most members considered strategy formulation to be a line responsibility and expected the network activities to contribute to their daily work practices. Formal management however invested in the network by providing facilities, traveling budget and allowing time for network leaders. Because of these investments the formal organization considered it to be even more important that the knowledge of the networks offered value to the formal organization. Consequently, top management tried to directly influence the network, by setting up goals, deadlines, requesting output and so on.

> *"You cannot let those guys over there just do whatever they feel like, it needs to serve a purpose and in the end it is line management who decides. And that's how it should be" (*interviewee 14, formal management).

Network leaders were subsequently given the responsibility to write strategy papers with the network members, something which came unexpected to most network leaders as this was reaching much further then the initial aim of creating and exchanging knowledge.

As the network leaders were assigned tasks beyond their responsibility and general ability, writing these strategy papers turned out to be a challenging task, often with disappointing results. Since network leaders were officially appointed, they were expected to keep track of both goals and thus consider both the practice oriented and the organization oriented beliefs in the network. Network leaders thus had to try to make a link between the daily practices of the members and the organizational strategy. This mixing of managerial aspects with practice-based knowledge exchange clearly hindered the development of a common understanding of the networks' aims, and members were dissatisfied with the extent to which network served their interests. Network leaders consequently faced the challenge, on the one hand of keeping the members interested in the network its activities while on the other hand being held responsible for meeting the objectives of the formal organization which was necessary to guarantee support for the networks' activities.

An analysis of the grounding of the codes (see appendix) shows that formal management mentions commitment to the organization and commitment to the practice in a more or less balanced way then interviewees at the network level who emphasise their commitment towards the practice is much more.

Coping strategies

Balancing between the interests of the formal organization and the informal network is seen as a complex undertaking, especially because the network leaders –in general- have little authority within the formal organization. The authority of the network leaders is mainly based on their expertise and accordingly, they seem to be more committed to the practice than to the formal organization. In that respect, it is not surprising that having a close work relationship with the formal organization is the most often mentioned coping strategy by the network. Leaders connect to the formal organization either by having authority in the formal organization themselves or by having a close working relation with for example the network members, supporting the transfer of relevant knowledge to the formal organization and vice versa, as the following leader reports:

> "[one of the aims is] that our advisors have a platform for themselves where they can exchange experiences or propose themes for discussion and deepen that discussion within the knowledge network. If that leads to interesting things that might be important for the practice area, it will come to me via the network" (interviewee 10, network leader).

Having authority based on expertise fosters this relationship, probably because senior experts are well respected by, and more embedded in the formal organization. A high level of expertise also forms the main authority base within the network. Some leaders tried to reward participation or 'penalise' disappointing results, but due to the informal status of the networks the activities in the network were not part of members' formal tasks and hence such a strategy was not effective. To foster knowledge exchange around the interests of the members, leaders tried to connect the networks' activities to the daily practices of their members by investigating what issues advisors are facing in daily work and how the networks could support them in that. Achieving this connection to the daily practices of network members was however problematic at TDO. This was partly due to the next challenge.

4.1.2 Challenge 2: Connect the specific practices of the members.

Although TDO's networks are arranged around practice areas, many members still feel the networks have too broad a scope to serve their interests. This is not only due to the pressure to discuss strategic issues, even within the practice areas the direct connection to personal interests is often missed as this member notes:

> *"I don't want to talk about market access for the poor, I want to talk about small farmers, value chains, how to value organic certifications or free certifications"*
> (interviewee 24, member)
>
> .

A discussion often encountered in the networks consequently relates to the scope of the network and the level at which issues are being discussed. The interests of members depend not only on their formal position or personal interest but also their geographical location affect the extent to which the networks served personal interests. Local differences were often found to make it difficult to create a common ground for knowledge sharing. The Asian region is for example divided into two sub regions which are characterised by different levels of development. These differences affect the relevance of discussing issues raised in the other sub region. On the other hand, members of the Drought network in West-Africa all work in the Sahel Interior and work with the same partners and on the same issues which makes it much easier to find enough common ground for meaningful knowledge exchange.

As interest in sharing knowledge about the same topic is for most members the main reason to participate in the network, these specific interests pose network leaders with the challenge of finding enough common ground for the members to make the networks' activities interesting enough to motivate them to participate in the network.

Coping Strategies

In order to provide room for more specific practices of the members, some leaders decided to support sub groups or workgroups. These groups still operate under the scope of the PA network but are for example allowed to organise specific meetings and have a separate forum on the e-group to discuss their specific interests. Most network leaders remained

involved in those sub-groups to monitor whether issues need to be taken to the 'network level', as can be read in an e-mail a network leader wrote to explain how he dealt with these sub-groups:

> *"The [network] leader and advisors decide when and how to scale up; that's to say, when they think having enough critical mass, having enough concrete matter and practices, the different 'sites' come together to verify that they really have critical mass. If they understand each other, they capitalise and develop new lines for the PA. That's how the 'cotton club' has worked until now with success; that's how poverty is building around 'shea-nut'. TDO has now enough mass for pastoralism to operate the same way"* (E-mail / interviewee 31, network leader).

Sometimes these bottom-up initiatives are encouraged to apply for a more official status as a PA network. If such a proposal is approved by head office, they split up and become an independent network. This for example happened with a group of people specifically interested in HIV issues who after a strong lobby in the formal organization became a formally supported network. With a few exceptions where network leaders did nothing to keep the members connected around their more specific interests, the major strategy to deal with this challenge was thus supporting sub-groups.

4.1.3 Challenge 3: Creating social embeddedness

One of the main challenges in organizing TDO's distributed knowledge networks is making the network and its members socially embedded. Social embeddedness is associated with feelings of trust, reciprocity and close contact, preferably face-to-face, all of which have been noted to be difficult though important to establish. This lack of social embeddedness was one of the main concerns for network leaders because it affects the motivation of members to help answer questions of colleagues. The development of social embeddedness is complicated because of the dispersion of the network members and the high rate with which people leave the company. Face-to-face meetings are highly favored since it helps creating trust and a 'group' feeling. Such network meetings are organised on average every 18 months after which enthusiasm for the network is said to be revived. The constantly changing composition of the networks diminishes this positive effect as it makes it difficult to get to know each other and find out where knowledge resides within the network:

"Maybe we did not realise this enough, but over the past year, in East and Southern Africa the number of advisors doubled. In addition, about 10% of the people do not finish their contracts and half of the advisors only have a three years contract at TDO. You could then say that after two years we have more or less 75 % new people. Did we do enough to integrate and introduce these people to make them part of the network... That would be interesting to find out" (interviewee 10, network leader).

In addition, social embeddedness is associated with a common understanding of what the networks' aims and beliefs are. Such a 'joint enterprise' was found to be more difficult to develop in TDO's networks because of the weak ties, but also because of the diverging interests as described under the first two challenges.

Whereas the difficulties with creating social embeddedness are widely recognised at the network level, formal management notably puts little emphasis on social embeddedness in general, indicating that the importance of these 'soft' aspects is not recognised at higher managerial levels.

Coping strategies

The results show that, to achieve and maintain social embeddedness, the main role of leaders lies in bringing people together. One member described how the leader of a network she recently joined flew to her and not only updated her on the main issues that had lately been discussed, but also introduced her to the main experts in the field, thereby considerably speeding up her socialization in the network. Network leaders generally bring people together by setting up meetings, introducing newcomers, referring members to one another or by creating 'yellow pages' for the network. Again, this task is mainly mentioned at the network level and not as much by formal management. Having authority based on expertise is deemed to be important for leaders to create social embeddedness, as that implies they know the people working in the field.

Although many interviewees consider having a common understanding of the network's aims and beliefs is important for the success of a NoP, only five interviewees consider

creating a joint vision and goal for the network to be a specific task for leaders, leaving the question open how such a joint enterprise is supposed to arise in a NOP.

4.1.4. Challenge 4: Creating and sustaining momentum

The challenge most frequently mentioned by network leaders is what was called creating and sustaining momentum in the network. Momentum is associated with members' drive to participate in the network. A network is supposed to have momentum if members have the intention to at least continue their network activities under the same circumstances. This intention is often reported to be difficult to create but even more difficult to sustain. Many network leaders are puzzled with the question what the network members' drive to participate in the network. For most network leaders creating and sustaining momentum is just a black box often leading to disillusionment and frustration:

> *"Having to spark every time again, and to spread those sparks on as many colleagues as possible, to encourage people, and make them enthusiastic… To prevent frustration and other distress, you just have to acknowledge reality, that well, in such a knowledge network you will only get a small percentage of people active"* (interviewee 5, network leader).

Statements regarding momentum are often reported in relation to the previous discussed challenges. First of all, higher levels of social embeddedness in terms of trust, reciprocity, identification and the extent to which members know each other are reported to motivate people to contribute to the network. Secondly, members' participation in the network seems to depend on the extent to which they consider the network's activities to be valuable to their work. As many members considered the networks more relevant for the formal organization, participating in the NOPs is often regarded as an additional task or something of little value, which was enhanced by the attempts to influence the network by setting goals and requiring specific output. In the long run this often had a negative influence on the momentum of the network.

> *"One of their [the networks'] biggest mandates was to define their strategies for each practice area. A lot of people saw them as that. They didn't see their primary purpose as being there to their service, their advice, to answer questions and so on. So, if I speak to a regular advisor in TDO for example, who joined six months ago, it's very likely that they will know about the practice area network, but they will not*

be a member of it. Or the practice area network is not the first place they go to if they have a question" (interviewee 4, local manager).

Formal management often did not understand why members considered the networks' activities to be irrelevant for their daily work, as they considered strategy to be the basis of every practice. This lack of awareness of members' interests induced formal management to actively control the networks' activities, which negatively impacted the momentum in the network. The finding that members are less inclined to participate in NOPs under conditions of formal control is further supported by the observation of a growing number of bottom-up initiatives to start networks around specific practices, which operated without any form of control.

Although too much involvement of the formal organization was found to be harmful for the networks' momentum, too little involvement of the formal organization in the network showed to be damaging as well as it deprived members of recognition for their activities, which made them doubt whether they were spending their time legitimately. In this sense, involvement of the formal organization primarily concerns providing support and recognition, for instance by making time available for network activities and rewarding participation.

Coping strategies

Since the problem of momentum is perceived to be so imperative to the networks, many initiatives were undertaken to influence the level of momentum in the network. Coordinating, moderating and facilitating the network is one of the main strategies for getting the network up and running. By for example categorizing messages, structuring discussions and approving membership requests some of the basics needs in a network are supposed to be fulfilled. Moreover, many efforts focus specifically on stimulating activity by initiating and reviving discussions, asking for input or by brokering potential relevant external knowledge to the network. Since creating and sustaining momentum is related to the other three challenges as discussed above, dealing with these issues is thus also a way to cope with this challenge. Having authority based on expertise is also associated with creating momentum. In addition to the coping strategies for creating social embeddedness

and balancing the interests of the formal organization and the informal network, expertise also increases a leader's ability to provoke discussion and to broker knowledge.

All in all, the analysis of the NOPs within TDO indicates that organizing intra-organizational NOPs entails four interrelated challenges for which several coping strategies have been found. It is thereby interesting to note that the grounding of the codes shows that formal management generally makes very few references to coping strategies for leaders, which might be interpreted as a lack of understanding for the position of network leaders (see appendix 1). Table 2 offers an overview of these results.

Table 2: Challenges and coping strategies for coordinating knowledge in NoPs.

Challenges NOPs	Coping strategies
Balance the interests of the formal organization and of the informal network	Adjust the networks' activities to the practices of the members and link these activities to the formal organization and vice versa.
	Have high expertise as well as a close working relation to the formal organization.
Connect the specific interests of the members.	Support sub-groups
Create social embeddedness	Organise meetings, bring people into contact and introduce newcomers
	Create a shared vision and goal
	Have high expertise
Create and sustain momentum	Cope with the first two challenges
	Stimulate activity, e.g broker knowledge, start discussions
	Coordinate and facilitate activities (e.g. discussions) in the network
	Have high expertise

4.2 CHALLENGES AND COPING STRATEGIES IN CONTEXT: NOPS IN RELATION TO VIRTUAL TEAMS AND OSS COMMUNITIES

After having thoroughly described the leadership challenges and coping strategies for coordinating knowledge in NOPs the question remains how specific these challenges are for NOPs. Some theoretical understanding can be gained from research on leadership in

two other related contexts: virtual teams and open source software (OSS) communities. These knowledge networks are relevant to compare in this context because both environments are known for their potential to share distributed knowledge, and research concerning these environments has repeatedly addressed leadership challenges and coping strategies for coordinating geographically distributed knowledge. While research on leadership in virtual teams is able to inform us how to manage distributed knowledge within a hierarchical context, literature on OSS informs us how to coordinate distributed knowledge practices within the context of a community-based governance setting. Figure 1 provides an overview of the main areas of overlap and main differences between these three contexts.
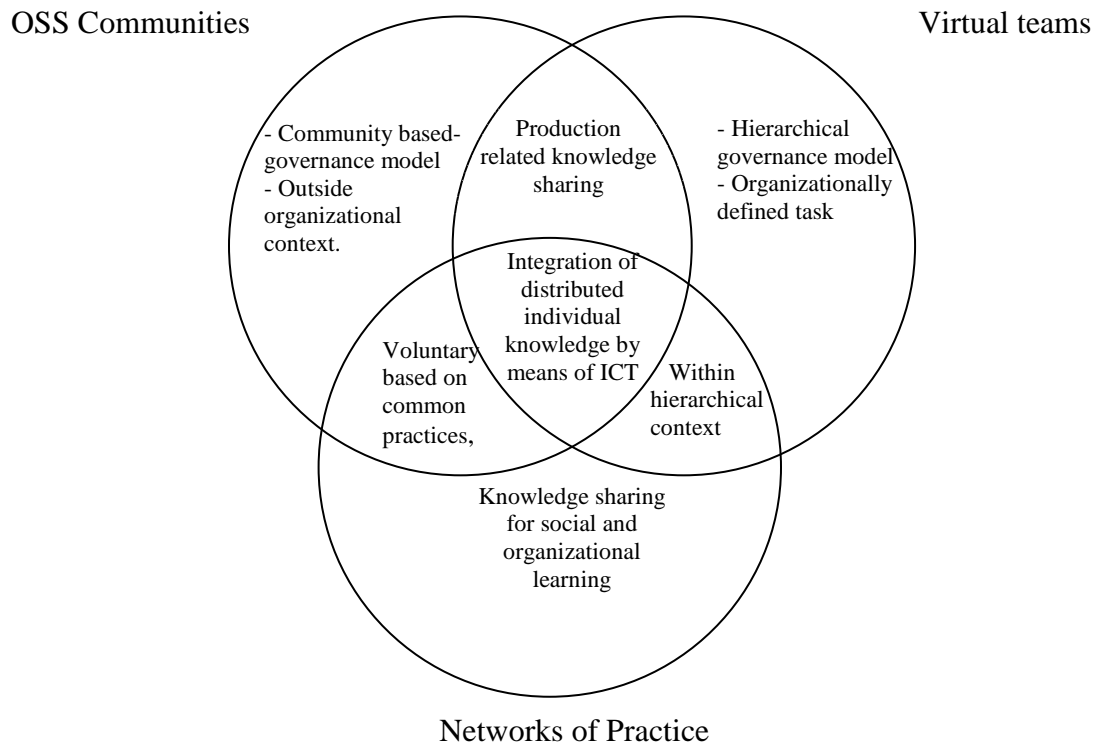

OSS Communities

Virtual teams

- Community based-governance model
- Outside organizational context.

Production related knowledge sharing

- Hierarchical governance model
- Organizationally defined task

Integration of distributed individual knowledge by means of ICT

Voluntary based on common practices,

Within hierarchical context

Knowledge sharing for social and organizational learning

Networks of Practice

Figure 1. Overlap and differences between Virtual teams, OSS communities and NOPs

Virtual teams have become a more or less established way to bring the geographically distributed expertise in an organization together (Griffith et al.2003; Jarvenpaa and Leidner 1999). The defining characteristic of a virtual team is that team membership crosses spatial boundaries (Cramton 2002; Jarvenpaa and Leidner 1999) and that communication is mostly relying on computer mediated communication (Bell and Kozlowski 2002; Jarvenpaa and

Leidner). Compared to NOPs, knowledge sharing in virtual teams is more formalised and directed towards clear targets set by the formal organization in which the team operates.

While virtual teams are based on a hierarchical governance model, OSS communities, are based on a community governance model (Lee and Cole 2003) indicating that knowledge within the community is public, that membership is open and completely voluntary, that the distribution of knowledge crosses the boundaries of the firm and that communication is technology-mediated (p. 635). OSS communities are generally Internet-based networks or communities of software developers (von Krogh and von Hippel 2003: 1149) which often spring from a practical problem requiring a specific software solution (Ulhøi 2004). Well-known examples of open source software development communities are Linux (Bagozzi and Dholakia 2006; Lee and Cole 2003; Ljungberg 2000; Moon and Sproull 2002) and Apache web server software (Lakhani and von Hippel 2003). Compared to NOPs, members of these communities work on a common goal, outside of a formal organizational setting.

In order to compare the leadership challenges found in our study on NOPs to those in virtual teams and OSS communities, tables 3 and 4 present an overview of relevant findings from research on virtual teams and OSS communities.

Table 3: Challenges and coping strategies for managing virtual teams

| Challenges virtual teams	Coping strategies
Monitor the performance (Bell & Kozlowksi, 2002; Yukl, 2006; Malhotra, Majchrzak & Rosen, 2007)	Monitoring the group process by communicating what other team members are doing, when they are available for the project, work planning and deadlines (Bell & Kozlowksi, 2002; Weisband, 2002);
	Scrutinise communication patterns/ level of participation (Malhotra, Majchrzak & Rosen, 2007).
Develop mutual trust and collective identification (Jarvenpaa & Leidner, 1999; Kotlarsky, & Oshiri, 2005; Malhotra, Majchrzak & Rosen, 2007; Yukl, 2006)	Creating a clear vision on why the group exists and what it wants to achieve by providing clear, simple and specific directions in ends and not in means (Mannix et al., 2002, p. 224).
	Making reward system linked to team performance to limit individualistic political and power seeking behaviour that affects the group trust and shared team culture (Mannix et al., 2002)

	Stimulate interaction so that members learn from each other and to create a sense of psychological safety (Kotlarsky, & Oshiri, 2005; Mannix et al., 2002) and norms for how to use these communication technology (Malhotra, Majchrzak & Rosen, 2007).
Coordination problems because of complex tasks, interdependent roles and dynamic and volatile environment (Yukl, 2006)	Meeting the teams need for resources e.g. time and travel budget, appropriate communication and information technology to enable communication and information sharing within the group. (Kotlarsky & Oshiri, 2005; Mannix et al., 2002)
	Initiating task pressure at the beginning of the project (Weisband, 2002).
	Articulate and embody group norms, roles and procedures for working together and communicating (Armstrong & Cole, 2002; Bell & Kozlowksi, 2002).
Being vulnerable to the primacy of short term goals and urgent demands of the proximate environment (Armstrong & Cole, 2002; Bell & Kozlowksi, 2002; Malhotra, Majchrzak & Rosen, 2007)	Creating commitment for the task by making the link between the task, the groups' responsibility and the organizational objectives clear (Mannix et al., 2002).
	Use incentives by rewards or penalties (Hollingshead, Fulk & Monge, 2002) e.g. by rewarding and recognizing individual contributions (Malhotra, Majchrzak & Rosen, 2007).
	Enlarge the commitment to the collective good (Hollingshead, Fulk & Monge, 2002).
	Communicate expectations of each member to the other team members (Bell & Kozlowksi, 2002) and to the manager the member has to report to.

Table 4: Challenges and coping strategies for organizing open source software communities

Challenges OSS communities	Coping strategies
Being recognised as a leader and remain to be accepted (Fleming & Waguespack, 2007; O'Mahony & Ferraro,	Make high quality and well respected contributions (Fleming & Waguespack, 2007; Ljungberg, 2000; Lerner & Tirole, 2001; Moon & Sproull, 2002; O'Mahony & Ferraro, 2007).
	Organization building activities (meet face-to, link activities to

2007).	communities goal etc. (O'Mahony & Ferraro, 2007).
Integrate and bind the community together (Fleming & Waguespack, 2007).	Create occupy network positions, e.g. social brokerage and/ or boundary spanning that help to balance conflicting demands (Fleming & Waguespack, 2007).
	Clear and generally accepted communication procedures, and behavioural norms (Bonaccorsi & Rossi, 2003; Lerner & Tirole, 2001; Moon & Sproull, 2002).
Maintain trust of members in the leaders personal objectives (Fleming & Waguespack, 2007; Lerner & Tirole, 2001; Shah, 2006)	Be physically present in network, be active, meet face-to-face (Fleming & Waguespack, 2007).
	Create neutral and accessible commons to mitigate the possibility to play strategic games (Shah, 2006).
Coordinating the work of the members (Moon & Sproull, 2002; O'Mahony & Ferraro, 2007)	Build coalitions / modularity (Kogut & Metiu, 2001; Moon & Sproull, 2002)
	Leader(s) with a centralised role, who makes the decisions (a benevolent dictator) (Ljungberg, 2000; Moon & Sproull, 2002).
	Peer Review (Lee & Cole, 2003; Ulhøi, 2004).
Prevent the work from forking into (too many) competing versions (Kogut & Metiu, 2001 ; Lerner & Tirole, 2001) while remaining to serve the interests of the members	Modularity / user groups (Bagozzi & Dholakia; 2006; Bonaccorsi & Rossi, 2003) which better adopt to the members interests (Kogut & Metiu, 2001)

A comparison of these challenges with those found in our study leads to the model presented in figure 2, showing which challenges are faced in which context, which ones are common and which ones are unique. In the remainder of this section, we will elaborate on the challenges distinguished in figure 2.
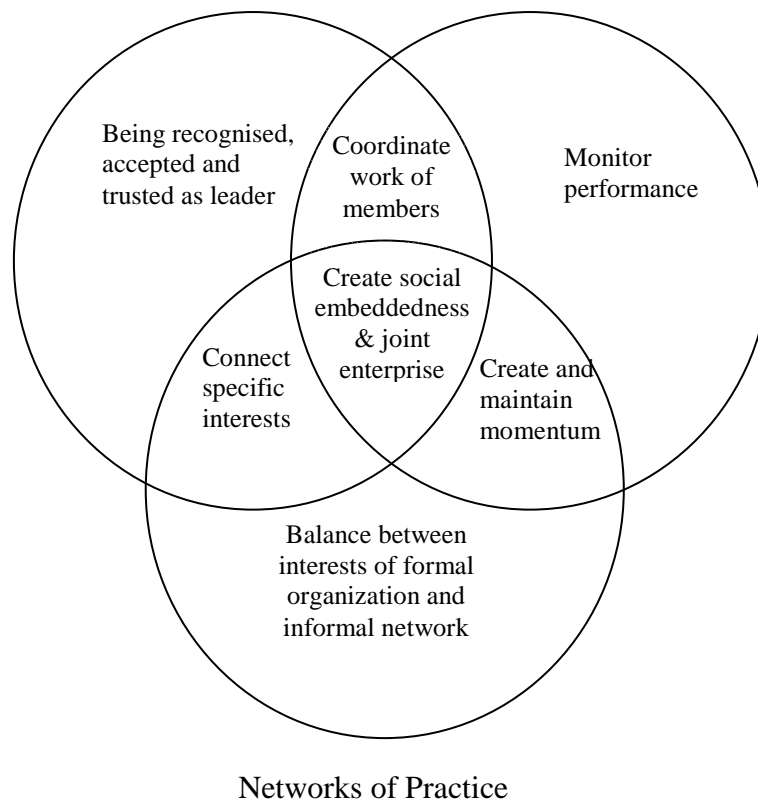
Figure 2. Challenges in managing dispersed knowledge

The main leadership challenge typical to virtual teams is how to coordinate distributed work without falling short of performance expectations, creating the need to monitor performance (Hinds and Mortensen 2005). For instance, geographical distance makes it difficult to monitor and coordinate what other team members are doing, how they do it and when they do it. In OSS communities coordinating the work of the distributed members is also found to be a leadership issue, but monitoring is not, since there is no formal review of members' performance. As for NOPs, neither coordination nor monitoring emerged as a challenge from our study as network members were not expected to collaborate on a common task.

A challenge that is unique to OSS communities is how to maintain being perceived as a leader. The open and evolutionary community-based model of knowledge coordination found in OSS communities challenges the traditional organizing principles of a firm-based model (Lee and Cole 2003). Whereas leadership in firms is mostly a formally assigned role, in OSS communities, leadership is an attribute that only sustains if it is recognised by the

other members. Because both in virtual teams and in intra-organizational NOPs leadership has a more formal basis, only OSS community leaders face this challenge.

A challenge found in all three types of online networks is creating what Gulati (1998) calls 'social embeddedness', or establishing meaningful social relations between members. In each type of network members are distributed, hardly ever meet face-to-face, have different backgrounds and are from different local settings. In virtual team research, the lack of face-to-face contact has been found to pose challenges for creating strong groups (Hinds and Mortensen 2005) which is important to coordinate work and to commit people to the team. In OSS communities, creating a strong community is important in order to prevent losing coherence in the activities (Fleming and Waguespack 2007; Kogut and Metiu 2001; Lerner and Tirole 2001). Likewise, our study indicates that being a strong group characterised by mutual trust, reciprocity and a commitment to the same ends affects the motivation to participate in a network. Our results thus support previous studies showing that the existence of such strong groups affects members' willingness to share knowledge (Ardichvili et al.2003; Nahapiet and Ghoshal 1998; Faraj and Wasko; 2001) and the effectiveness (Gulati 1998; Levin and Cross 2004) of such knowledge exchange. Our results imply the need for a network leader who is embedded in the social network of the NOP and therefore able to build trustful and safe relationships with and amongst the members. Jarvenpaa and Tanriverdi (2003) support the importance of social embeddedness of leaders by stating that an important role of leaders in networks is creating relations of trust. Similar to our findings concerning TDO's NOPs, coping strategies for leaders in OSS communities include a brokering role and creating shared norms. In virtual teams creating social embeddedness is also related to creating possibilities to get to know one another, to create shared norms, goals and a clear vision, but also to more directive means like using incentives for group performance.

A challenge that is found in both NOPs and virtual teams is the challenge of creating and sustaining momentum. The drive to participate in the network is considered essential – though not sufficient - to derive value out of the available expertise in the network. After all, if no one participates, knowledge exchange does not occur. In virtual teams, (Armstrong and Cole 2002; Malhotra et al. 2007), the main difficulty lies in competing with the urgent demands of the proximate environment in which the members reside, in

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NOPs, the main difficulties arise from a lack of commitment to helping other members or a lack of relevance of the network activities for members' daily work. Whereas leaders of virtual teams can use directive means such as incentives and clear expectations to create and sustain momentum, our results indicate that NOP leaders have an administrative role as well as an expert role to fulfill. This means that they not only structure, initiate, interpret and summarise discussions, but also broker external relevant knowledge to the network and try to increase both the social embeddedness of the network and the extent to which the activities are embedded in members' practices. In OSS communities, momentum is less problematic since the main benefits of such communities, such as enjoyment, learning, reputation building and gaining direct benefit from the developed software (Bonaccorsi and Rossi 2003; Lakhani and von Hippel 2003; Lerner and Tirole 2000; Ulhøi, 2004) can only be realised by active participation.

A challenge that is found in both NOPs and OSS communities is ensuring that the activities of the groups remain attuned to the practices of their members as that is a main driver for participation in both contexts. Coordinating knowledge in OSS communities requires an awareness of the risk that common projects defer too much from the initial interests of the members, e.g. enjoying to work on a specific kind of coding or creating a program that suits personal needs (Kogut and Metiu 2001; Lerner and Tirole 2001). In OSS communities this challenge can be met by creating modules or kernels that more specifically serve the interests of the members. Likewise, NOP members also tend to split in subgroups or even in new networks if the overall scope of the NOP is not serving the members specific interests well enough.

Finally, our analysis points to one challenge that is unique to intra-organizational NOPs: the challenge of balancing between the interests of the formal organization and the informal network. Being an informal group embedded in a formal context creates a paradoxical situation. The network members require support and recognition from the formal organization for the network activities, as was also shown in a study by Vaast (2007). Our study showed that this involvement mostly resulted in the formal organization overly trying to influence and control the network activities. As the interests of the formal organization differed from those of the informal network this resulted in diminished momentum. Network leaders were consequently forced to coordinate the activities in a way that

maintains formal support for the networks' activities by assuring value for the organization thereby supporting organizational learning, while at the same time preserving local learning around the common practices of the members. As these interests is generally a problem in managing networks (Huysman 2004), our study provide first indications how to cope with such a management dilemma (Hislop 2005), that is by being embedded in both the practice and the formal organization in order to identify and adjust to the interests of the formal organization and the informal network.

5. DISCUSSION

In this study we aimed to gain more understanding in the leadership challenges and coping strategies within the context of intra-organizational Networks of Practice. By comparing our results to two related field of research on the coordination of dispersed knowledge (virtual teams and OSS communities), we can conclude that the challenges of managing dispersed knowledge at least partially depend on the specific context in which this knowledge is created and shared. One relevant context dimension is whether knowledge sharing takes place in a hierarchical setting or in a community-based governance setting. Another context dimension concerns the purpose of knowledge sharing: contributing to formal organizational learning versus primarily learning from one another. As intra-organizational NOPs combine characteristics of both community and hierarchical settings, they present the unique challenge of balancing the interest of the formal organization and the informal network.

This challenge implies that one cannot rely only on self-organizing principles in coordinating knowledge exchange in NOPs. Our results extend existing views on managing knowledge networks which consider the role of management solely as 'nurturing' (Alvesson, Kärreman and Swan 2002) or 'cultivating' (Wenger and Snyder 2000; Ward 2000) networks. The self-organizing principles found in COP theory such as mutual engagement, a joint enterprise, and shared repertoire did not spontaneously develop in TDO's knowledge networks. Instead, both the formal organization and the network leaders were found to influence the functioning of the knowledge networks. The results furthermore imply that NOP leaders play an important role in coping with the different challenges. In order to do so, a network leader should be socially embedded as well as

embedded in the practices and the formal organization, and employ his or her expertise to influence these challenges. Such findings warrant more research on the role of leadership in coordinating knowledge in NOPs. Our study contributes to this as yet limited field of research by illuminating the precarious situation in which NoP leaders have to operate. Being an informal group embedded in a formal context creates a paradoxical situation in which network leaders play an important role in balancing two diverging interests. How leaders can actively balance these two interests, whether these interests should be balanced under all circumstances and whether the interests of the formal organization and informal network always differ requires further investigation.

The case study also shows that high levels of expertise offer an alternative status and power base for managing knowledge coordination (Alvesson and Sveningsson 2003; Jarvenpaa and Tanriverdi 2003). Such expertise-based authority might replace managerial authority as found in virtual teams where knowledge is coordinated by working with deliverables and deadlines. In NOPs these directive strategies might diminish intrinsic motivations to share knowledge (Osterloh and Frey 2000). Further research could provide more insight into how different forms of authority can be acquired and how they relate to coping with the different leadership challenges as well as in selection criteria for network leaders or the development of leadership requirements over time.

Our study has a number of limitations that should be addressed. First of all, future research is needed to replicate this research in other types of organizations and networks. The diverging interests of the formal organization and the network might for example be caused by the relatively solitary and autonomous work situation of TDO's advisors, which could enlarge the difference between the daily local practices and the central organization.

A second limitation concerns the relatively small time span of our study. In order to gain more insight into the effect of certain coping strategies on knowledge coordination, longitudinal research is required. For example, our findings could lead to the conclusion that creating momentum involves the same dynamics as maintaining momentum. Longitudinal research is needed to disentangle the two and investigate whether they involve the same coping strategies.

Despite the fact that our findings are limited to the specific conditions under which our research took place, this study is a valuable contribution to existing theory. The findings of our study suggest that coordinating dispersed expertise in intra-firm NOPs creates a leadership challenge that extends existing literature on coordinating distributed expertise. This challenge entails creating and maintaining a balance in the network between activities that serve the interests of the formal organization and those that serve the interests of the informal network, in which leadership plays an important role. Taking the limitations of this research into account we strongly appeal for more research on this leadership dilemma surfacing in managing knowledge coordination in NOPs.

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Appendix I

Second order construct	First order construct	Definition	Exemplary quote	Grounding (total references to code / (nr of single interviewees))	
Momentum	Drive to participate in network activities	Quotations concerning the drive in the network to prolong its activities.	*"In the next stadium it [the activity] disappears, it just dies. And then just nothing goes on"*	Formal management	11 (6)
				Network level	51 (13)
				Total	62 (19)
Social embeddedness	f-t-f contact	Quotations concerning f-t-f contact in the network	*"I have noticed that for the exchange of knowledge, it is important that you have seen each other, that you for example have had a drink together"*	Formal management	7 (6)
				Network level	28 (16)
				Total	35 (22)
	Trust	Quotations concerning feelings of safety and trust in the network.	*"People feel it's difficult to write things down anyway because they fear that everyone will jump upon them."*	Formal management	6 (5)
				Network level	16 (10)
				Total	22 (15)
	Dispersedness	Quotations concerning the geographical dispersedness of the networks' members	*"You are not in the same office, you are spread over four countries, in different regions (…)"*	Formal management	1 (1)
				Network level	7 (6)
				Total	8 (7)
	Membership stability	Quotations concerning newcomers in the network or people leaving the network	*"Over the past years we expanded a lot in Poverty. Half of our people are new and joined us in the last year. So there is a lot of work to do with that".*	Formal management	1 (1)
				Network level	9 (7)
				Total	9 (7)
	Reciprocity/ helping	Quotations concerning the willingness	*"People are not always that*	Formal management	1 (1)

	members	or eagerness of network members to help other members in the network	*active; they don't think: 'this is someone's problem, I will help them solve it; they don't do that".*	Network level	12 (6)
				Total	13 (7)
	Joint Enterprise	Quotations concerning a shared sense of what the network is, what its aims are, what is supposed to be done in the network, and how.	*"I think that in some cases, there are knowledge networks that, in my opinion, did not formulate or develop a clear goal".*	Formal management	12 (5)
				Network level	36 (13)
				Total	48 (18)
Balancing between the interest of the formal organization and the informal network	Commitment to practice	Quotations concerning discussing issues directly related to work practices	*"they need to be positioned as support mechanisms for everyday advices, and their role in day to day learning has to be better defined as well"*	Formal management	20 (9)
				Network level	49 (17)
				Total	68 (25)
	Steering from formal organization	Quotations concerning active steering from formal organization in the network, i.e. setting goals, aims, giving assignments etc.	*"(..) Of course that is not just because we wanted to, but also because that was directed from above, like: we are not just going to exchange knowledge, there are also some processes that need to be started and we can just as well use the networks for that".*	Formal management	26 (10)
				Network level	32 (11)
				Total	58 (21)
	Commitment to organization	Quotations concerning discussing strategic/organizational issues	*"One [goal] is supporting our thinking on our local Government practice; see if we can extract the experiences of our advisors and let them*	Formal management	21 (9)
				Network level	19 (9)

			contribute to the way in which we formulate our policy, and of course also get feedback from the practice whether our not our proposals are realistic and so on".	Total	40 (18)
Connect the specific interests of the members.		Quotations concerning specific interest of members within the scope of the Network	*" A discussion about partnership might be very important for Vietnam, but not for Nepal. So people from Nepal do not join that discussion, because they don't consider it to be important.*	Formal management	10 (7)
				Network level	23 (11)
				Total	33 (18)
Coping strategies	Broker knowledge	Quotations concerning bringing outside knowledge into the network.	*"I saw something on drylands [network] which was useful for Poverty as well so I took it there".*	Formal management	1 (1)
				Network level	9 (7)
				Total	10 (8)
	Connecting people	Quotations concerning bringing members into contact.	*"To bring people into contact in order to enable them to do something with their knowledge".*	Formal management	3 (2)
				Network level	15 (11)
				Total	18 (13)
	Set vision and goal	Quotations related to creating a vision and goal for the network	*"[I am] Trying to get everyone in the same direction"*	Formal management	0 (0)
				Network level	6(5)
				Total	6 (5)
	Connect to the formal organization	Quotations concerning linking the network and the formal organization.	*"It works quite well if that person is being helped, supported by the country director".*	Formal management	0 (0)
				Network level	18 (11)
				Total	18 (11)
	Connect to the practices	Quotations concerning linking the	*"(…) try to investigate what is*	Formal management	4 (4)

		networks activities to the local practices or vice versa.	*important for the work of an advisor and how the networks might be able to support them in that"*	Network level	7 (7)
				Total	11(11)
	Facilitate / coordinate network	Quotations concerning facilitating or coordinating the networks activities e.g. organise online environment, structure discussion etc.	*"It [a network] needs a facilitator, a person who has time to organise and stimulate, who summarises, etcetera "*	Formal management	7(4)
				Network level	12 (8)
				Total	19(12)
	Stimulate activity	Quotations concerning stimulating people to participate in the network.	*"(..) That's why the network leaders were appointed, they do very important work, they try to promote the network to all advisors"*	Formal management	0 (0)
				Network level	11 (7)
				Total	11 (7)
	Authority based on expertise	Quotations concerning authority in the network based on expertise	*"You need people who are, partly based on academic education and on their work experience and their professional seniority, capable to participate actively and give leadership to a network".*	Formal management	9 (7)
				Network level	19 (12)
				Total	28 (19)
	Support sub-groups	Quotations related to allowing or actively creating subgroups that better fit the specific interests of the members.	*"In the knowledge network Governance sub knowledge networks are brought to life. One of them is education. I have been asked to head that E-group."*	Formal management	8 (6)
				Network level	19 (10)
				Total	27 (16)