

Cracking the network boundaries:

How Networks of Practice and Communities of Practice contribute to knowledge sharing in ICT sector

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ABSTRACT

This paper aims at better understanding the dynamics leading a firm in information and communication technologies (ICT) sector to create Networks of practice (NoPs) to transfer knowledge and know-how between its geographically dispersed business units. In this paper we focus on the complementarity between communities of practice (CoPs) and networks of practice (NoPs) inside firms to share knowledge and consolidate organizational learning. We show that Informal settings where people interact around their practices, such as Cops facilitate and consolidate knowledge sharing inside firms and enable to create a larger network. (Brown Duguid, 1991, Wenger, 2008, Agterberg et al. 2010). CoPs are work-related networks defined as self-organizing and tightly-knit groups of people working together on a shared practice: groups which interact together, make common works, share knowledge and encounter close issues in the same organization (Wenger, 1998, 2002; Amin, Roberts, 2008). In a context of increased market globalization and uncertainty leading firms to focus on their core business, knowledge is often dispersed across different locations, making such interactions very difficult. Consequently, geographically dispersed networks called NoPs are very important. NoPs are larger than CoPs, members are more geographically dispersed, having much looser ties and less frequent interaction and their practices are not co-located (Brown, Duguid, 2001, Duguid, 2001, p 140-141). CoPs can hence provide a favorable context for creating connections between firms which can enhance intra-organizational learning through the consolidation of inter-individual transversal relationships. Besides, intra-firm NoPs consolidate social interaction around common local and national practices. The more relevant the knowledge shared within the Network is for members' local situation, the more they are inclined to contribute to knowledge sharing (Agterberg et al., 2010). After a literature review on CoPs and NoPs, this paper will analyze a case study in the ICT sector. The paper will highlight the role of CoPs and boundaries processes (brokers, boundary objects) in the development of NoPs involved in sharing knowledge and organizational learning between geographically dispersed business units.

Key words: Networks of practice, Communities of practice, knowledge sharing, brokers, boundary objects, ICT sector.

INTRODUCTION

The insights of practice-based literature show that knowledge sharing requires interactions and informal learning inside organizations that Communities of practice (CoPs) provide (Brow and Duguid, 1991; Wenger, 1998, 2002). In a context of increased market globalization and uncertainty leading firms to focus on their core business, knowledge is often dispersed across different locations, making such interactions very difficult (Agterberg and al. 2010).

Consequently, geographically dispersed networks called “Networks of practice” (NoPs) become very important in the organizations. NoPs are larger than CoPs, members are more geographically dispersed, having much looser ties and less frequent interaction and their practices are not co-located (Brown and Duguid, 2001, Duguid, 2001, p 140-141). As noted by Agterberg and al. (2010), NoPs emerged with some interest within organizations (Collison and Parcell, 2001 Wenger et al. 2002; Rumyantseva et al. 2006) but several initiatives failed (Voelpel et al. 2005).

As a consequence, we can see that the practice-based literature has not totally yet managed at precisely tackling how firms can structure and implement NoPs with success.

Considering the lack of empirical studies, we conducted an exploratory case study to answer the following research questions: 1 - Why do NoPs emerge inside organizations? 2 - How NoPs are organized inside organizations?

Our aim in this paper is to understand how these NoPs are organized and what are their success key factors. The main contribution of this paper is better understanding the dynamics leading a firm to create NoPs to transfer knowledge and know-how between its geographically dispersed business units. It explores how the literature on communities of practice (CoPs) and networks of practice (NoPs) can enrich our understanding of knowledge sharing.

After a literature review on CoPs and NoPs, this paper will analyze a case study in the ICT sector. The paper will highlight the role of CoPs, boundaries actors and boundaries objects in the development of NoPs between geographically dispersed business units.

LITERATURE REVIEW

COMMUNITIES OF PRACTICE (CoPs) AND NETWORKS OF PRACTICE (NoPs)

CoPs are defined as groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly (Wenger, 1998, 2002). According to Wenger, communities of practice are formed by people who engage in a process of collective learning in a shared domain of human endeavor. CoPs typically consist of co-located people who work together on common practices. As specific forms of communities, they have been identified as effective vehicles to support practice-based knowledge sharing. Several scholars and practitioners have actually discussed the communities' concept to explain learning and knowledge sharing across a variety of work as insurance claim processing, photocopy machine repair, corporate research, healthcare, public policy (Lave and Wenger, 1991; Wenger, 1998; Orr 1996; Brown and Duguid, 1991, Bate and Robert, 2002; Creplet et al. 2001; Lindkvist 2005; Haas, 1992).

However, in a globalization context, knowledge is often dispersed across different locations, and organizations are therefore facing the challenge of how to organize knowledge sharing between geographically dispersed business units (Becker, 2001). The concept of Networks of Practice (NoPs) has then been presented to introduce a practice-based view on geographically dispersed knowledge sharing. Similarly to CoPs, NoPs refer to groups of people who engage in common practices - however, NoPs are not necessarily co-located and are larger in scale. The concept of NoPs is thus relevant in professional, epistemic/creative and virtual activities.

ORGANIZATIONAL ASPECTS OF KNOWLEDGE SHARING

In CoPs, sharing, diffusion, combination of internal and external knowledge requires interaction and informal learning processes such as storytelling, conversation, coaching and apprenticeship (Wenger, 2002). A CoPs is characterized by 3 key elements (Wenger, 1998; Chanal, 2000):

- The mutual engagement of its members. A community of practice is not merely a network of connections between people. It has an identity defined by a shared domain of interest. Membership therefore implies a commitment to the domain and a shared competence that distinguishes members from other people.
- A joint enterprise (common objective). In pursuing their interest in their domain, members engage in joint activities and discussions, help each other and share information. They negotiate common actions which create mutual responsibility ties between actors. They build relationships that enable them to learn from each other. Wenger refers to this process as a "participation process".
- A shared repertoire (practice): members of a CoP are practitioners. They develop a shared repertoire of resources: experiences, stories, tools and ways of addressing recurring problems. In short a shared practice. This takes time and sustained interaction. The development of a shared practice may be more or less self-conscious. Wenger refers to this process as a "reification process".

Concerning NoPs, Agterberg et al. (2010) highlight three levels of embeddedness that seem required for the effective sharing of knowledge between geographically dispersed units and which can both improve or deteriorate their value.

1. Embeddedness in practice: “the more knowledge shared in networks concerns common practices and is perceived as relevant to local practices, the more network members tend to share knowledge with each other”.
2. Social embeddedness: “the more members are aware of who knows what in the network and the more the network is characterized by strong social ties, the more members will tend to share knowledge”.
3. Organizational embeddedness: “the more organizations are involved in the network, the more knowledge is being shared and the more organizations are able to learn from what is being shared”.

For these authors, “more embeddedness is better than less for knowledge sharing”. However, there are dangers of a NoPs “too” embedded. A NoPs “too” socially embedded can lead to group-think, ‘collective blindness’ and isolation from external sources (Janis, 1982; Nahapiet and Ghoshal, 1998; Uzzi, 1997). Besides, a NoPs “too” embedded in local practices can hinder organizational learning (Brown and Duguid, 2000) and induce a ‘local learning trap’ (Huysman and de Wit, 2004). As noted by Agterberg et al. (2010) these ‘lock-in’ effects are often associated with communities of practice and their boundaries (Contu and Willmott, 2000; Fox, 2000).

However, the growing of CoPs and NoPs inside firms are also deemed to favor the co-creation of value with other communities and networks outside (Wenger, 1998, 2002). This has led corresponding authors to introduce the notion of boundary relations. For Wenger (1998, p 113-114), CoPs are the source of their own boundary: “Participants form close relationships and develop idiosyncratic ways of engaging with one another, which outsiders cannot easily enter”. However, “in addition to being a source of boundary for outsiders and insiders, practice can also become a form of connection”. This connection relies on two processes: participation and reification.

As noted by Wenger (1998), the products of reification (boundary objects) can cross boundaries and enter different practices. Wenger (1998) presents different types of connections enabling to create links or “continuities” between CoPs. These connections are described through boundary relations and are developed through boundary objects, brokering and boundary practices (see table 1 below).

Boundary relations	Definitions
Boundary-Objects	“Artifacts, documents, terms, concepts and other forms of reification around which CoPs can organize their interconnections” (p. 105).
Brokering	“Brokering is a common feature of the relation of a community of practice with the outside”. “Brokers are able to make new connections across CoPs, enable coordination and open new possibilities for meaning” (p. 109). “Connections provided by people who can introduce elements of one practice into another” (p. 105).
Boundary practices	“A form of collective brokering: Attempt to bring two practices together”. For example, “engineers of a supplier company working with engineers of another supplier can create a community of practice that reflects deep working relations and create an indispensable bridge between their practices” (p. 114).

Table 1: Boundary relations between CoPs

METHODOLOGY

Our research is based on a successful exploratory case (Yin, 2003) of organizing NoPs in the computer science and telecommunications industry. -an industry considered as an emblematic example of successful online and offline communities (Edwards, 2001, Belussi, 2005, Benner, 2003; Ellis et al., 2004 ; Saxenian et al., 2001). It more specifically deals with virtual communities, situated learning and global networks – a field which remains under-investigated in spite of existing technical communities cases (most research deals with open source software). Our research problem is at the stage where “something is known conceptually about the phenomenon, but not enough to house a theory” (Miles & Huberman, 1994: 17). Given our research objective, a qualitative method based on a case study thus came across as most appropriate. It is adapted to analyze complex, social processes as it preserves chronological flows (Miles & Huberman, 1994) and take into account the various stages and the non-linear process that characterize the creation of NoPs. It also enables to obtain detailed descriptions of the process when a holistic perspective is required (Lincoln & Guba, 2000). Finally, it is adapted to exploratory research design in the analysis of business exchanges (Ghauri & Gronhaug, 2005).

We selected the company ItSol, an IT systems integrator. ItSol operates in 3 main businesses: Computer Maintenance (Maintenance and control solutions of applications and systems: (software, hardware, workstations servers, security, data back-up), Network maintenance (study

of needs, evolution of networks) and Professional applications (development of applications and CRM). ItSol is a company which has geographically dispersed business units throughout the world in 5 countries. The expertise of ItSol's 6000 employees is very dispersed. ItSol created 20 online knowledge networks to support knowledge sharing between business units throughout the world. ItSol's knowledge networks are organized around specific areas of expertise such as Computer Maintenance, Network maintenance and Professional applications. These NoPs are discussion forums where actors can post their message, store and share documents. These online knowledge networks have 200 members from business units located in different countries.

Each network has 2 managers-facilitators, generally experts in the field. They are in charge to organize and to coordinate the activities of networks. The facilitators capture and transfer the available expertise between the different networks. They foster the sharing of experiences, translate the requirements of actors, and finally approve the problems solving. These networks enable to improve the daily local work and to solve problems quickly.

We have used three sources of evidence recommended by Yin (2003, p. 85): documentation, individual semi-structured interviews and physical artifacts (Discussion Forums). A total of 70 face-to-face in-depth interviews have been carried out including: the 40 managers-facilitators in charge of supervising the networks' knowledge exchanges. 15 software engineers and 15 sales engineers who post messages, share documents on Forums and who benefit knowledge from the networks of practice.

The data collection process focused on the gradual emergence of Networks of practice, the types of actors involved, their roles and interactions during the various phases of the project, and the methodology required for its design, marketing and implementation. We gathered information on the organization of NoPs between geographically dispersed business units (Agterberg and al. 2010).

Each interview has been recorded and fully transcribed. We have used Wenger (1998) and Agterberg et al. (2010) to identify the various forms of organizational structures (CoPs, NoPs) in our case analysis. Based on Miles and Huberman's (1994) recommendations, two analytical categories have been identified from the data: the process of emergence of NoPs and knowledge transfer throughout the organization. The company was characterized by the existence of internal CoPs of software engineers and sales engineers before they managed to develop the online knowledge networks.

CASE STUDY

September Year 1 - Support knowledge sharing throughout the company

In the south of France (Sophia Antipolis), the business unit's manager of ItSol looks for an improved knowledge sharing to compensate for the lack of efficiency and price competitiveness of their current computer maintenance solution. He wants to create online knowledge networks between Business units of ItSol around specific areas of expertise. He sends an e-mail to all the business units' managers of ItSol in France and throughout the world. Several managers answer to this e-mail and they show their interest in this project. It would enable to access technical and commercial knowledge from anywhere in the world. This project seems to meet the objectives of business units' managers.

October Year 1- December Year 1 - Mobilization of business units' actors

In October, the business units' manager of ItSol invite its counterparts in Sophia Antipolis to discuss on the creation of online knowledge networks organized around specific areas of expertise (Computer Maintenance, Network Maintenance, Professional Applications). A specific seminar gathering experts (managers, software engineers and sales engineers) in the different fields is organized in Sophia Antipolis to mobilize the actors on the project.

Based on these first positive contacts, the managers decide to organize in their business units several meetings with their software engineers and sales engineers to further investigate online knowledge networks opportunities. Engineers acknowledge its potential benefits: 1 - the possibility to accelerate knowledge sharing between ItSol's Business units. 2 - The possibility for the business units to improve the applications of their existing software. For business units' actors, the knowledge networks provide a time and cost reduction benefit to acquire knowledge and solve problems. This perspective fosters their desire to share and to become future members of these networks.

January Year 2 – May Year2 – The implementation of discussion forums and the role of high level managers in the field

Discussion Forums are implemented around specific areas of expertise where people can post their messages, answer to questions, send and store documents. After these implementations, business units' Managers appoint Managers-facilitators (two managers by networks), specialized in each expertise area, in charge of coordinating the NoPs. Managers-facilitators invite people to become members of the networks. The choice of people depends on their areas of expertise and their daily local work. This step marks an increased commitment towards the desire both to share local knowledge and to capture others' knowledge. These managers develop tools for driving the right behaviours in the networks. They create key performance indicators (KPI) to assess the number of messages posted on discussion forums per members. This assessment enables to identify who post the more messages on the forums and who brings the best answer to solve problems.

ANALYSIS: THE ROLE OF COPS AND BOUNDARY RELATIONS IN THE CREATION OF NOPS IN THE ORGANIZATION

The existence of CoPs among ItSol's engineers played a specific role in the creation of NoPs.

The first steps of the creation of NoPs are greatly facilitated by the existence of CoPs inside business units on the different areas of expertise. CoPs are characterized by 3 key elements (Wenger, 1998):

- Mutual engagement of its members, mutual identity with shared domains of interest and shared competences: Computer maintenance, Network maintenance and Professional Applications.

- Joint enterprise (common objective) and participation process: knowledge capitalization to solve problems quickly: technical functionalities, servers evolution, outsourcing, applications CRM, ERP.
- Shared repertoire of resources: reification process in the form of technical documents, commercial documents, CRM, customers' opportunities management system. Because of the dispersion of their Business Units in the world, ItSol decided to develop 20 online knowledge networks to support knowledge sharing between Business Units throughout the organization.

Members of CoPs have the sharing culture and mix direct contact (participation) and formalized practices (reification). The existence of CoPs in ItSol enables to consolidate a social network linking individuals and a dual process of collective learning: participation and reification which transform tacit into explicit knowledge. The engineers of ItSol are conscious to belong to communities of practice but have difficulties in sharing their knowledge with their peers belonging to others business units. They lack an efficient system enabling them to easily transfer, codify and capitalize their knowledge.

The managers-facilitators play a key role in fostering the development of trust and commitment between the business units. Wenger (1998) calls this use of multiple membership to transfer some element of one practice into another brokering: "brokers are able to make new connections across communities of practice, enable coordination, and – if they are good brokers – open new possibilities for meaning" (1998, p.109). As recognized members of Business units' CoPs, managers-facilitators are legitimated by their peers for their expertise and integrity. They play the role of broker. They are well positioned to be involved in the resource allocation necessary to the online networks process and to play this essential coordinative role over time. They actually organize the resource storing in the networks by identifying the expertise available in each business units and approving the technical content posted in Forums. They supervise knowledge available in the discussion forums. Thanks to this control, knowledge is easily understood and can be readily exploited by the actors of each business units for their own project purposes.

Firstly, the managers-facilitators help people identify the networks relevant to their work.

Secondly, the managers-facilitators foster inter-business units trust: Their expertise enhance the development of competence-based trust (Boersma et al, 2003). They organize the networks and help the business units assess the interest of working together. They control and validate the quality of messages posted on the discussion forums of networks. The business units realize that they can both benefits from the online Knowledge networks to solve problems in daily local work processes and that it is more costly and much longer to develop that knowledge alone.

Thirdly, the managers-facilitators publish the KPI to congratulate the members who use the online knowledge networks and who bring the best answers to solve problems on discussion forums.

The organization of NoPs has been greatly facilitated by the existence of brokers (managers-facilitators) and boundary objects (discussion forums). Both the boundary objects and the brokers travelled together between the different business units' CoPs. The complementarity of participation (managers-facilitators) and reification (discussion forums) processes enabled to consolidate knowledge sharing.

The creation of NoPs increased the ItSol's performance in several ways. Firstly, it increased their market legitimacy through a more global and integrated offer and reinforced their competitive advantage. Secondly, it reduced their time to market and costs to answer customer needs (through mutualisation) as their engineers could easily access to a codified knowledge and to its founding experts. Thirdly, it reinforced their relationships with a key-customer account.

Due to this increased proximity (collective brokering), ItSol had a unique opportunity to better understand, anticipate and even shape the customer's needs and to reduce the impact of project discontinuity. Several software engineers from business units inside ItSol and even the key customer contribute to Discussion Forums in storing and capitalizing their knowledge inside: a boundary practice i.e. a collective brokering practice is developing. Dispersed geographically business units inside ItSol and the key customer post their messages, reply messages, create links to external sources, send in, store documents and capitalize their knowledge in the Forums. NoPs enable to members to create virtual links with the colleagues working in other Business Units.

The NoPs have managers-facilitators - the brokers of the networks. Agterberg et al. (2010) call them "moderators" whose role is to stimulate discussion in the networks, organize the networks, transfer and valid relevant knowledge in the networks. As noted by these authors, the main perceived benefits of this type of NoPs are: extending social network in the organization, quicker or better problem solving and improving organizational processes. The managers-facilitators act as knowledge brokers helping members to get in touch with the right person or referring them to other sources of information (Agterberg et al. 2010). They are responsible for the functioning of the networks. The NoPs facilitates knowledge sharing between business units and with the customers through different media: e-mails, forum, skype and telephone. It becomes possible through the online knowledge networks to get to know colleagues working on similar issues in the region, in other regions or in the world and to find out who knows what and where they are located (Agterberg et al. 2010). These specific conditions directly impacted the performance of ItSol in front of customers.

DISCUSSION

Our paper focused on the role played by CoPs, boundary relations in the development of NoPs. It has highlighted that NoPs between geographically dispersed business units may be enhanced by the preliminary existence of CoPs which consolidate intra-organizational learning through the development of boundary relations.

In particular, this paper has emphasized the key role of brokering in the development of successful NoPs:

- The managers-facilitators acted as brokers to organize coordination during the development of the NoPs (fostering trust, enforcing rules, defining a common language, approving content...). They played the role of moderators of the technological NoPs. They validated the knowledge capitalized in the discussion forums by the various geographically dispersed units of ItSol.
- Hence, a form of collective brokering around brokers (managers-facilitators) and boundary objects (discussion forums) enabled to ItSol to solve customers' problems more quickly.

Managers-facilitators had to be legitimated by their peers to play this brokering role. They were legitimated to act as brokers due to their central position in the local CoPs of key actors in information technology. This central position was obtained through a strategy of communication and local CoPs animation (regular meetings, seminars and awards). The managers-facilitators have a recognized expertise and competence in information technology and share a common goal of innovation in this field. As such, they have defined internal criteria for fostering and assessing knowledge in information technology.

In our case study, we show that ItSol created NoPs and the success of this initiative. The three levels of embeddedness of these NoPs (Agterberg, 2010) reinforced its value. The dangers of a network becoming “too” embedded (‘collective blindness’ and isolation from external sources Agterberg et al. 2010) didn’t exist here thanks to managers-facilitators-moderators which consolidated trust and coordinated the NoPs. The dynamics of three level of embeddedness of the NoPs help to understand the success of organizing NoPs in ItSol:

-Embeddedness of the NoPs in local practices: A lot of software engineers interviewed in ItSol refer to the degree in which the technological knowledge capitalized in the discussion forums are perceived as relevant to their daily practice, as an important condition for organizing knowledge sharing. As noted by the members of CoPs in business units, the more relevant the knowledge shared within the network is for members’ local work, the more they are inclined to contribute to knowledge sharing. The managers-facilitators who play the role of brokers – moderators – of the NoPs validate the content of discussion forums, the quality of knowledge capitalized in the systems. Like a software engineer of ItSol noted: “I give my technological knowledge in the forums because the network enable to access knowledge useful for my local practice, I am very motivated to contribute to it”. The knowledge capitalized in the discussion forums are renewed and validated each day by the managers-facilitators moderators.

-Social Embeddedness of the NoPs : the tools of technological NoPs (Forum, E-mail, Skype) enable to software engineers of ItSol to identify the engineers working on similar projects and to find who knows what and where they are located. As noted by several software engineers and by the managers-facilitators interviewed: “the creation of social ties is an essential element to share knowledge in the geographically dispersed regional business units”.

-Organizational Embeddedness of the NoPs: ItSol’s managers support the networks’ activities. The managers-facilitators are formally identified to coordinate the NoPs between business units. He exerts a control over the content of the networks. The use of NoPs and their coordination practically enabled to reduce the distance between knowledge creation and action (Creplet et al., 2001) i.e. to optimize the time-to-market between the design of a new (common) offer, its sales and implementation.

CONCLUSION AND FURTHER RESEARCH

This research has investigated the organizational mechanisms enabling to favor the emergence of NoPs through an emblematic case study in the ICT sector. Four mechanisms have been identified:

- Create the NoPs on existing CoPs. The preliminary existence of CoPs in the ItSol's business units facilitates knowledge sharing between geographically dispersed actors. The actors in Business units have already sharing culture and a shared joint enterprise.
- Embed the NoPs in local practices. The link of NoPs with local practices of actors is very relevant to engage them to share their knowledge. The use of NoPs must be seen like a business opportunity to access quickly toward the good information.
- Supervize the NoPs. The definition of roles and responsibilities is very important in the successful NoPs. The managers-facilitators must be formally identified to coordinate the NoPs between business units. They must exert a control over the content of the networks to ensure the quality of knowledge.
- Dedicate resources for the NoPs. The managers-facilitators must receive additional time to organize the networks and play the role of moderators.

Our paper focused on the 4 success key factors NoPs:

- Understanding of members on the meaning of networks (Why? What value?).
- Engagement of managers (explain the value of NoPs and support the right behaviours).
- Engagement and trust (critical mass of members & quality of content)
- Creation of KPI (tools to drive the right behaviours in the NoPs).

Across large and geographically spread organizations, the challenge of maintaining an effective NoPs is increased. A lot of IT systems integrator think that Gamification can address this challenge. Gamification is the concept of applying game-design thinking to non-game applications to make them more fun and engaging. The process of implementing a Gamification program involves to understand users' behaviors. The KPI created by the managers-facilitators of Networks enable to identify the activities in which members perform, and to leverage those behaviors to motivate them.

Due to its exploratory research design, our paper exhibits several limitations in terms of generalization which call for further research. The precise role and identity of brokers in the development of NoPs requires more case studies to confirm our preliminary findings. Further research is required to confirm and enrich these preliminary findings in the ICT sector. Indeed, we will analyze the role of CoPs and NoPs in a specific business context: the organization of open innovation processes.

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