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**CREATING POSSIBILITIES FOR COLLECTIVE  
CREATIVITY**  
**Brokerage Functions in Practice-Based Innovation**

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## **Abstract**

Parjanen Satu

### **CREATING POSSIBILITIES FOR COLLECTIVE CREATIVITY Brokerage Functions in Practice-Based Innovation**

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In the network era, creative achievements like innovations are more and more often created in interaction among different actors. The complexity of today's problems transcends the individual human mind, requiring not only individual but also collective creativity. In collective creativity, it is impossible to trace the source of new ideas to an individual. Instead, creative activity emerges from the collaboration and contribution of many individuals, thereby blurring the contribution of specific individuals in creating ideas. Collective creativity is often associated with diversity of knowledge, skills, experiences and perspectives. Collaboration between diverse actors thus triggers creativity and gives possibilities for collective creativity.

This dissertation investigates collective creativity in the context of practice-based innovation. Practice-based innovation processes are triggered by problem setting in a practical context and conducted in non-linear processes utilising scientific and practical knowledge production and creation in cross-disciplinary innovation networks. In these networks diversity or distances between innovation actors are essential. Innovation potential may be found in exploiting different kinds of distances. This dissertation presents different kinds of distances, such as cognitive, functional and organisational which could be considered as sources of creativity and thus innovation. However, formation and functioning of these kinds of innovation networks can be problematic. Distances between innovating actors may be so great that a special interpretation function is needed – that is, brokerage.

This dissertation defines factors that enhance collective creativity in practice-based innovation and especially in the fuzzy front end phase of innovation processes. The first objective of this dissertation is to study individual and collective creativity at the employee level and identify those factors that support individual and collective creativity in the organisation. The second objective is to study how organisations use external knowledge to support collective creativity in their innovation processes in open multi-actor innovation. The third objective is to define how brokerage functions create possibilities for collective creativity especially in the context of practice-based innovation. The research objectives have been studied through five substudies using a case-study strategy. Each substudy highlights various aspects of creativity and collective creativity. The empirical data consist of materials from innovation projects arranged in the Lahti region, Finland, or materials from the development of innovation methods in the Lahti region. The Lahti region has been chosen as the research context because the innovation policy of the region emphasises especially the promotion of practice-based innovations.

The results of this dissertation indicate that all possibilities of collective creativity are not utilised in internal operations of organisations. The dissertation introduces several factors that could support

collective creativity in organisations. However, creativity as a social construct is understood and experienced differently in different organisations, and these differences should be taken into account when supporting creativity in organisations. The increasing complexity of most potential innovations requires collaborative creative efforts that often exceed the boundaries of the organisation and call for the involvement of external expertise. In practice-based innovation different distances are considered as sources of creativity. This dissertation gives practical implications on how it is possible to exploit different kinds of distances knowingly. It underlines especially the importance of brokerage functions in open, practice-based innovation in order to create possibilities for collective creativity. As a contribution of this dissertation, a model of brokerage functions in practice-based innovation is formulated. According to the model, the results and success of brokerage functions are based on the context of brokerage as well as the roles, tasks, skills and capabilities of brokers. The brokerage functions in practice-based innovation are also possible to divide into social and cognitive brokerage.

Keywords: collective creativity, brokerage functions, practice-based innovation, distance, proximity, regional innovation system

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## Tiivistelmä

Satu Parjanen

### **MAHDOLLISUUKSIEN LUOMINEN KOLLEKTIIVISELLE LUOVUUDELLE Brokerointi käytäntölähtöisessä innovoinnissa**

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Verkostoitumisen myötä luovat aikaansaannokset kuten innovaatiot syntyvät yhä useammin eri toimijoiden välisessä vuorovaikutuksessa. Nykypäivän monimutkaistuminen haastaa yksilön luovan kyvyn ratkaista ongelmia, jolloin kollektiivisen luovuuden merkitys korostuu. Kollektiivisen luovuuden tulos ei ole yhden yksilön aikaansaannos, vaan siihen tarvitaan useamman toimijan panostusta. Kollektiivisen luovuuden lähteinä pidetään tietojen, taitojen ja näkökantojen erilaisuutta, jolloin vuorovaikutus erilaisten toimijoiden välillä avartaa näkökantoja ja luo mahdollisuuksia kollektiiviselle luovuudelle. Tässä väitöskirjassa kollektiivista luovuutta tutkitaan käytäntölähtöisen innovoinnin kontekstissa.

Käytäntölähtöinen innovointi voidaan määritellä innovaatioprosesseiksi, joiden ongelmanasettelu saa alkunsa käytännönläheisissä konteksteissa ja jotka hyödyntävät niin tieteellistä kuin käytännönläheistä tietoa monitoimijaisissa ja monitieteellisissä innovaatioverkostoissa. Oleellista näissä verkostoissa on toimijoiden erilaisuus, jolloin toimijoiden välille muodostuu erilaisia etäisyyksiä. Keskeistä innovaatiotoiminnassa on hyödyntää näihin etäisyyksiin sisältyvä innovaatiopotentiaali. Tässä väitöskirjatutkimuksessa esitellään erilaisia etäisyyksiä kuten kognitiivinen, organisatorinen ja funktionaalinen etäisyys, joita voidaan pitää luovuuden ja sitä myötä innovaatioiden lähteinä. Toisaalta etäisyyksiä sisältävien verkostojen muodostaminen ja toiminta saattaa olla haasteellista. Etäisyydet innovaatiotoimijoiden välillä saattavat olla niin laajoja, ettei innovaatiotoimintaa synny ilman erityistä välitystoimintaa eli brokerointia.

Tässä väitöskirjatutkimuksessa määritellään niitä tekijöitä, jotka edistävät kollektiivista luovuutta käytäntölähtöisessä innovaatiotoiminnassa. Väitöskirjatutkimus keskittyy innovaatioprosessin alkuvaiheeseen, jolloin luovuuden merkitys erityisesti korostuu. Väitöskirjatutkimuksen tavoitteena on ensinnäkin tutkia yksilön luovuutta sekä kollektiivista luovuutta työntekijätasolla ja määrittää niitä tekijöitä, joilla luovuutta voidaan tukea organisaatiossa. Toiseksi tavoitteena on tutkia, kuinka organisaatiot hyödyntävät organisaatioiden ulkopuolista tietoa tukeakseen kollektiivista luovuutta innovaatioprosesseissaan. Kolmanneksi väitöskirjan tavoitteena on määritellä, kuinka brokeroinnilla voidaan luoda mahdollisuuksia kollektiiviselle luovuudelle erityisesti käytäntölähtöisessä innovaatiotoiminnassa.

Väitöskirja koostuu johdanto-osuudesta sekä viidestä osatutkimuksesta, jotka korostavat luovuutta ja kollektiivista luovuutta käytäntölähtöisessä innovoinnissa eri näkökulmista. Väitöskirja lähestyy kollektiivista luovuutta tapaustutkimuksen keinoin. Osatutkimusten empiirinen aineisto on kerätty Lahden alueella järjestetyistä kehittämisprojekteista sekä innovaatiotyökalujen kehittämisestä syntyneestä aineistosta. Lahden alue on valittu tutkimusympäristöksi, koska alueen innovaatiopolitiikka korostaa erityisesti käytäntölähtöistä innovointia.

Väitöskirjatutkimuksen tulosten mukaan voidaan olettaa, että kollektiivisen luovuuden tarjoamia mahdollisuuksia ei hyödynnetä organisaatioiden sisäisessä toiminnassa. Väitöskirjassa nostetaan esille useita tekijöitä, joiden avulla kollektiivista luovuutta voidaan tukea organisaatioissa. Kuitenkin, on huomioitava, että luovuus sosiaalisena konstruktiona koetaan ja ymmärretään erilalla eri organisaatioissa, jolloin luovuutta tuettaessa on pystyttävä määrittämään kunkin organisaation oma tapa toimia ja tukea luovuutta. Innovaatioiden monimutkaistuminen vaatii useinkin organisaation ulkopuolisen asiantuntijuuden hyödyntämistä organisaatioiden innovaatiotoiminnassa. Käytäntölähtöisessä innovoinnissa luovuus löytyy etäisyyksistä toimijoiden välillä. Väitöskirjassa tuodaan esille keinoja, joiden avulla erilaisia etäisyyksiä voidaan tietoisesti käyttää innovaatioiden lähteinä. Erityisesti väitöskirja korostaa välitystoimintaa eli brokerointia avoimissa, monitoimijaisissa ja käytäntölähtöisissä innovaatioprosesseissa. Aineiston pohjalta väitöskirjassa on muodostettu käytäntölähtöisen brokeroinnin malli. Mallin mukaan brokeroinnin onnistuneisuus on riippuvainen brokeroinnin kontekstista, sekä brokerin rooleista, tehtävistä sekä taidoista. Edelleen väitöskirjassa jaetaan käytäntölähtöisessä innovoinnissa tapahtuva brokerointi kognitiiviseen ja sosiaaliseen brokerointiin.

Avainsanat: kollektiivinen luovuus, brokerointi, käytäntölähtöinen innovaatio, etäisyys, läheisyys, alueellinen innovaatiojärjestelmä

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Lahti, April 2012

Satu Parjanen



## Table of contents

Abstract	
Tiivistelmä	
Acknowledgements	
Contribution of the author to the research articles	
List of tables	
List of figures	

### Part I: Introductory part

1 Introduction.....	17
2 Research design.....	23
2.1 Research objectives and questions .....	23
2.2 Structure of the research .....	28
3 Innovation and knowledge interaction in open innovation .....	32
3.1 Types of innovations.....	32
3.2 Innovation as knowledge interaction .....	36
3.3 The innovation system as a combination of networks.....	38
4 Creativity in innovation activities .....	41
4.1 Creativity as a social construction .....	41
4.2 Definitions of creativity .....	42
4.3 From individual creativity to collective creativity .....	46
4.3.1 Individual creativity .....	46
4.3.2 Group creativity.....	48
4.3.3 Organisational creativity.....	50
4.4 Collective creativity .....	54
4.4.1 The definition of collective creativity .....	54
4.4.2 The need for collective creativity .....	56
4.4.3 The model of collective creativity .....	57
4.4.4 Distances as a source of collective creativity .....	60
5 Challenges for collective creativity in open innovation.....	62
5.1 Innovation potential of cognitive distance.....	62
5.2 Different kinds of expertise in innovation activities.....	63
5.3 Innovation as a communication process.....	65
5.4 Innovation as a social process .....	67

5.5 Cultural readiness to open innovation .....	68
5.6 Organisational arrangements to support open innovation.....	70
5.7 Temporal complexity in innovation.....	71
5.8 Virtuality as a possibility to shorten geographical distance .....	73
6 Brokerage functions in creating possibilities for collective creativity .....	76
6.1 Intermediating in innovation.....	76
6.2 The literature about brokers .....	79
6.3 Brokerage functions .....	83
6.4 Effects of brokerage on collective creativity .....	86
7 Research context .....	90
7.1 Practice-based innovation activities in the Lahti region .....	90
7.2 Innovation tools.....	92
7.2.1 Innovation catcher.....	92
7.2.2 Innovation session method .....	93
7.2.3 Lahti Living Lab .....	93
7.2.4 Innovation promoter system.....	94
8 Research strategy .....	96
8.1 Case study as a research strategy.....	96
8.2 Action research as a case study.....	99
8.3 Empirical data collection .....	101
8.3.1 Qualitative and quantitative investigation .....	101
8.3.2 Documents.....	102
8.3.3 Semi-structured interviews .....	103
8.3.4 Observations.....	104
8.3.5 Questionnaires .....	105
9 Findings.....	107
9.1 Results of the substudies.....	107
9.1.1 Internal creativity: How can organisations support individual and collective creativity inside the organisation? .....	107
9.1.2 External creativity: How do organisations use external knowledge to support collective creativity in their innovation processes? .....	109
9.1.3 Brokerage functions: How can collective creativity be skilfully enhanced by brokerage functions? .....	113
9.2 Conclusions.....	115
9.2.1 Role of collective creativity in practice-based innovation.....	115

9.2.2 Distances as a source of creativity in practice-based innovation.....	116
9.2.3 The model of brokerage functions in practice-based innovation .....	118
9.2.4 Brokerage functions as a dialogical process.....	124
9.2.5 Social and cognitive brokerage.....	126
9.2.6 Brokers as actors in regional innovation system.....	127
10 Reflections of the dissertation and avenues for future research.....	131
10.1 Reflections of the dissertation .....	131
10.2 Suggestions for future research .....	135
References.....	140

## Part II: Articles

- Article 1: Parjanen, S. (2012) Experiencing Creativity in the Organization: From Individual Creativity to Collective Creativity. *Interdisciplinary Journal of Information, Knowledge, and Management*, 7, 109-128.
- Article 2: Parjanen, S., Harmaakorpi, V. and Frantsi, T. (2010) Collective Creativity and Brokerage Functions in Heavily Cross-Disciplined Innovation Processes. *Interdisciplinary Journal of Information, Knowledge, and Management*, 5, 1-21.
- Article 3: Parjanen, S. (2012) Innovation sessions as sources of new ideas. *International Journal of Innovation and Learning*, 11(4), 352–368.
- Article 4: Parjanen, S., Hennala, L. and Konsti-Laakso, S. (2012) Brokerage functions in a virtual idea generation platform: Possibilities for collective creativity? *Innovation: Management, Policy & Practice*, 14(2), 205-216.
- Article 5: Parjanen, S., Melkas, H. and Uotila, T. (2011) Distances, Knowledge Brokerage and Absorptive Capacity in Enhancing Regional Innovativeness: A Qualitative Case Study of Lahti Region, Finland. *European Planning Studies*, 19(6), 921-948.

## **Contribution of the author to the research articles**

Article 1: The author is the sole author.

Article 2: The author formulated the research questions and wrote the theoretical part of the article together with the other authors. The author's main contribution to the theoretical part was in relation to the field of creativity. The author collected the data for the study. For example, she observed the innovation session as the participant-observant. The author analysed the data and wrote most of the empirical part of the paper. The conclusions were written together.

Article 3: The author is the sole author.

Article 4: The author wrote the theoretical part of the article and formulated the research question mostly by herself. She analysed the data and wrote the case study and conclusions together with the other authors.

Article 5: The author wrote the theoretical part concerning proximities and distances. The author collected and analysed the data. The conclusions were written together with the other authors.

## **List of tables**

- Table 1. Summary of the substudies
- Table 2. Examples of definitions of creativity in organisational creativity and innovation literature
- Table 3. Factors related to low creativity in idea-generating groups
- Table 4. Characteristics of collective creativity
- Table 5. Roles of intermediaries
- Table 6. Summary of the relevant literature concerning brokers
- Table 7. Cohesion and brokerage in research literature
- Table 8. Summary of the data collection for the five substudies
- Table 9. Characteristics of a creative organisation
- Table 10. Summary of the findings of the substudies concerning how organisations use external knowledge to support collective creativity in their innovation processes
- Table 11. Innovation brokers' own perceptions concerning their functions and roles
- Table 12. Questions for brokers to be considered

## **List of figures**

- Figure 1. The innovation process according to Herstatt and Verworn (2001)
- Figure 2. Research questions in the research context
- Figure 3. The contribution of the substudies to the research questions
- Figure 4. Data collection for studying the innovation session process
- Figure 5. The action research process of the first substudy
- Figure 6. The model of brokerage functions in practice-based innovation
- Figure 7. Social and cognitive brokerage in practice-based innovation



## **PART 1: Introductory part**





## **1 Introduction**

Many current approaches to innovation hold the assumption that organisations are seldom capable of innovating independently and that an organisation's internal capabilities are insufficient to cope with the challenges of the changing environment. The search for new product ideas, new forms of organisation, and solutions to existing problems goes beyond the organisation's boundaries in exploring available capacities in other organisations (Chesbrough, 2003). For example, the open innovation process redefines the boundary between the organisation and its surrounding environment, making the organisation more porous and embedded in loosely coupled networks of different actors, collectively and individually working toward generating and commercializing new knowledge (Laursen and Salter, 2006).

Traditionally, large firms have relied on internal research and development (R&D) to create new products. In many industries large internal R&D labs have been a strategic asset and represented a considerable entry barrier for potential rivals. As a result, large organisations with extended R&D capabilities and complementary assets could outperform smaller rivals. According to this logic, organisations would have to generate their own ideas which they would then develop, manufacture, market, distribute, and service themselves (Teece, 1986; Chesbrough, 2003). At the centre of the open innovation model and other similar conceptualizations of innovation is the way organisations use ideas and knowledge of external actors in their innovation processes (Laursen and Salter, 2006). An often cited example is Procter & Gamble's shift from internal R&D to Connect & Develop (C&D) -based innovation processes (Huston and Sakkab, 2006). The C&D model is based on the idea that external sources of ideas may often be more valuable than internal ones (Sakkab, 2002).

What is common to these newer models of innovation is that they highlight the interactive character of the innovation process, suggesting that organisations rely heavily on their interaction with users, suppliers, and with a range of other organisations inside the innovation system (von Hippel, 1988; Chesbrough, 2003; Lettl, Herstatt and Gemuenden, 2006). For example, von Hippel (1988) suggested using lead users and other stakeholders as external sources of innovation. These models further redefine the inbound-innovation-process by extending von Hippel's (1988) sources of innovation to include universities, suppliers and online communities (Christensen, Olesen and Kjaer, 2005) or basically to any external expert (Bogers and West, 2010). One example of an innovation model that emphasises the interactive nature of innovation processes is practice-based

innovation. Practice-based innovation processes are triggered by problem setting in a practical context and conducted in non-linear processes utilising scientific and practical knowledge production and creation in cross-disciplinary innovation networks. Practice-based innovations are typically based on ideas from employees, customers, or partner networks of daily operations. (Harmaakorpi and Melkas, 2012; Melkas and Harmaakorpi, 2012.)

Despite the fact that not many organisations have followed a fully closed innovation approach, a multitude of developments within and outside the innovation arena have made it necessary to make the innovation process more open. Relevant developments in the wider innovation environment include social and economic changes in working patterns, increased labour division due to globalisation, improved market institutions for trading ideas, and the rise of new technologies to collaborate across geographical distances. However, this does not mean that organisations should forget in-house innovation activities. Innovation efforts are also generated in-house and there is risk of overestimating the role played by external knowledge sources. The study conducted by Oerlemans, Meeus and Boekema (1998) showed that the firm's internal resources are the main determinants of their innovation performance, and that the creation of external networks has only a limited impact. Some researchers have even suggested that in attempting to decentralize and outsource R&D activities, organisations may weaken their core competences (Coombs, 1996). In practice, open innovation reflects less a dichotomy of open versus closed than a continuum with varying degrees of openness (Dahlander and Gann, 2010; Huizingh, 2011).

In today's business, organisations invest simultaneously in closed and open innovation activities. Too much openness can negatively impact organisations' long-term innovation success because it could lead to loss of control and core competences. Moreover, a closed innovation approach does not serve the increasing demands of shorter innovation cycles and reduced time to market (Enkel, Gassmann and Chesbrough, 2009). On the contrary, and from a more integrative perspective, some works point out that external and internal knowledge acquisition can be complementary activities in the organisation's innovation strategy. The effect of external knowledge sources on innovation performance depends on the internal capabilities of the firm (Vanhaverbeke, Cloudt and van de Vrande, 2007). The concept of absorptive capacity (Cohen and Levinthal, 1990) places special emphasis on the organisation's pre-existing knowledge in the tasks of identifying, assimilating, and exploiting external knowledge. On the basis of this concept, it has been argued that not only do the firm's internal efforts to create new knowledge encourage the use of external knowledge sources but they also increase the organisation's ability to exploit these sources efficiently in the

development of new products and processes. Thus, the greater the internal capabilities of the firm, the greater are the effects of the different external knowledge acquisition strategies on innovation performance (Vega-Jurado, Gutierrez-Gracia and Fernandez-de-Lucio, 2009).

By integrating different kinds of actors into the innovation process, creativity and know-how is brought into the organisation. Creativity, which is closely related to knowledge (Leonard and Sensiper, 1998), is seen as an important organisational capability (Amabile, 1998), a possible source of organisational effectiveness (Woodman, Sawyer and Griffin, 1993) and a source of competitive advantage (Leonard and Straus, 1997). Creativity allied to innovation plays a critical role in the innovation process. This explains why an increasing emphasis is placed, for example, on the individual's creative abilities and their use in organisations, and at both societal and national levels (Oinas, 2005; Himanen, 2007). For example, in Finland innovation and ultimately the creativeness of individual employees are presented as a critical factor that has contributed to economic success in the past, and continues to do so in the future (Työministeriö, 2005; Himanen, 2007; Kansallinen innovaatiostrategia, 2008; Alasoini, 2010).

Creativity does not occur in a vacuum or exclusively in one person's head but in interaction with a social context (Csikszentmihalyi, 1996). For any organisation, operating in an external environment, an interactionist model of creativity and innovation needs to encompass the organisational context, organisational knowledge, and inter- and intra-organisational relationships. Open, multi-actor innovation processes challenge how creativity is understood and exploited in innovation processes. In today's society a single source of creativity coming only from one individual is inadequate for the organisation to survive in this changing business world. Innovation is mainly based on the capacity of collaboration, generating new ideas that meet perceived needs or respond to market opportunities. Creativity is considered a prerequisite or a necessary condition for innovation (Shalley and Gilson, 2004). The rationale behind this consideration is that in the dynamics of creating knowledge, people can foster innovation, share knowledge and create new ideas (Nonaka and Takeuchi, 1995). In fact, collaboration between people with expertise in different domains creates an environment conducive to the emergence of new ideas.

Proximate actors like people and organisations have a tendency to collaborate. On the other hand, if collaborators become "too proximate", the advantage of collaboration starts to disappear (Boschma, 2005; Nooteboom et al., 2006). The significance of proximity versus more distant relations for organisations' innovation capability and regional development has been the subject of intense

debates in recent years (e.g., Lagendijk and Oinas, 2005). Innovation literature has usually pointed out the importance of proximity and especially geographical proximity in achieving an integration of diverse knowledge (Gertler, 1995; Bathelt, Malmberg and Maskell, 2004). For example, the role of tacit knowledge in innovation processes is crucial, and the cost of transmitting tacit knowledge rises with distance. In addition, tacit knowledge is often very contextual and most easily transmitted via face-to-face interaction and frequent contact, while, in contrast, the costs of transmitting explicit knowledge or information may be invariant to distance (Tödtling and Trippl, 2005). The importance of tacit knowledge in innovation processes also relates to the concept of “social capital”, that some scholars refer to as the key advantage of regional economies (Schienstock and Hämmäläinen, 2001, p. 88; Tura and Harmaakorpi, 2005).

However, there is increasing consensus that diversity provides potential for innovation (e.g., Leonard, 1995; Johansson, 2004; Carlile, 2004; Pekkarinen and Harmaakorpi, 2006). Innovations involve the challenge of enabling renewal based on diversity and facilitating the integration of knowledge in a creative way. This indicates that the primacy of local relationships may be questioned, and non-local relations often constitute important avenues for carrying out successful economic interaction. Actually, too proximate relations may have negative impacts on innovation due to the problem of lock-in (Boschma, 2005). This kind of lock-in may be solved by establishing non-local linkages, providing access to the outside world. One should also notice, that it is claimed that geographical openness is neither necessary nor sufficient for breaking a situation of lock-in, because the other dimensions of proximities or distances may provide alternative solutions to the problem of lock-in (Boschma, 2005; Rallet and Torre, 1999).

Geographical proximity is not the only form of proximity but other forms such as organisational, cultural and social proximity are used as well (Boschma, 2005; Rallet and Torre, 2005; Knobens and Oerlemans, 2006). Innovation activities are often dispersed, involving heterogeneous internal and external actors from different places and backgrounds (Bechky, 2003), which means that there is a need to highlight the importance of distance as a source of creativity and innovation. The ability to innovate turns into an “ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments” (Teece, Pisano and Shuen, 1997, p. 516), i.e., the ability to manage heterogeneous collaboration. Innovation is therefore a complex combination of distances and proximities. The challenge of organisations is to find different ways to enable the involved heterogeneous actors to innovate.

Different kinds of innovative networks are important tools for getting new ideas and information from outside the organisation. The relations like the proximity and distance between the actors in networks can be described as strong ties and weak ties. Strong ties are characterized by common norms and high network density. These strong ties are easier for innovations, since they normally include a relatively high amount of trust, common aims and the same kind of language with which to communicate. However, strong ties add little value when one is searching for resources such as new knowledge because everyone within the network has access to the same resources (Granovetter, 1985). If the network relations are related to specific trading partners, diversity decreases and it becomes difficult for the organisation to adapt to new trends and directions (Andersson, 2001). Over-embeddedness can reduce the flow of novel information into the network because the redundancy of ties to the same network partners means that there are only few or no links to outside members who could potentially contribute innovative ideas (Burt, 1992). Granovetter (1973) labels this problem as the weakness of the strong ties.

Weak ties allow for diversity, which is needed for innovations, and they bring the network members in contact with other, less well-known actors. Acquiring new information and knowledge often results from interaction with new and different people. Burt (1992, 2004) has developed the weak ties argument further by arguing that innovations are most likely found in structural holes. The term refers to the social gap between two groups. Structural holes are often the weak connections between clusters of densely connected individuals. Networks with an abundance of structural holes create opportunities for a new combination and recombination of ideas.

However, the differences between the innovating partners are often so large that a special interpretation function is needed. Burt calls this special function brokerage in the structural hole (2004). Burt suggested that brokers focus on establishing ties to other disparate or disconnected groups, exploiting the structural hole, so they can then bring together members of the two groups who would otherwise be more difficult to connect. People on either side of the structural hole have access to different flows of knowledge (Hargadon and Sutton, 1997). Brokers support innovation by connecting, recombining, and transferring to new contexts pools of ideas that would otherwise be disconnected (Verona, Prandelli and Sawhney, 2006). Multiple relationships especially with individuals holding broker positions within these networks are perceived to be important to innovative behaviour (Shaw, 1998). Whilst spontaneous cooperation between organisations can occur, it appears that a brokerage intervention can help cooperation, for example, by advising on the

advantages of cooperation, giving information, identifying opportunities, catalysing discussions between different actors or bringing organisations together.

## **2 Research design**

### **2.1 Research objectives and questions**

According to Huizingh (2011), there are two processes that are relevant in open innovation. The first one is the process that leads to open innovation, in other words the process opening up innovation practices that were formerly more closed. The second process refers to the practices of open innovation: how to do open innovation. The transition process from closed to open innovation details the steps through which organisations open up their innovation activities (Huizingh, 2011). This dissertation is interested in this latter process: how to do open innovation and especially how to do open innovation so that collective creativity is supported. In this dissertation, collective creativity refers to the collaboration and contribution of many individuals so that new forms are produced collectively by individuals connected by the common concern.

For his part, Haga (2005) introduces two different approaches to innovation: direct innovations and indirect innovations. The direct innovation approach will emphasise definite innovations. The focus is on the development of a single product or solution. The development might be done by a single individual or collectively. According to Tidd, Bessant and Pavitt (2005), organisations have to manage four phases that make up the innovation process. Organisations have to scan and search their environments to pick up and process signals about potential innovation, select from this set potential triggers for innovation, resource the option, i.e., providing the knowledge resources to exploit it, implement the innovation, and learn from progressing through this cycle so that they can build their knowledge base and improve the ways in which the process is managed. The second approach of Haga (2005) is the indirect innovation approach. This approach will emphasise preparation for definite innovations. The preparation can include different conditions that are necessary to conduct the activities needed. The emphasis is on ways to prepare favourable conditions for innovation, rather than dealing with the innovations themselves. The approach of this dissertation to innovation is accordant with the indirect innovations.

The focus of this dissertation is on studying those conditions that are important to enhance collective creativity especially at the beginning of the innovation process. This phase is often called the fuzzy front end (Koen et al., 2002; Khurana and Rosenthal, 1998). Typical tasks of the fuzzy front end are idea generation and concept development. Characteristic to this phase, besides the

need to systematize activities to enhance the efficiency, is that there has to be sufficient room for creativity. (Herstatt and Verworn, 2001.) The phases of the innovation process are introduced in Figure 1. In practice, innovation processes often differ from theoretical process models. Some phases may be left out; others may be revisited in a cyclical fashion.

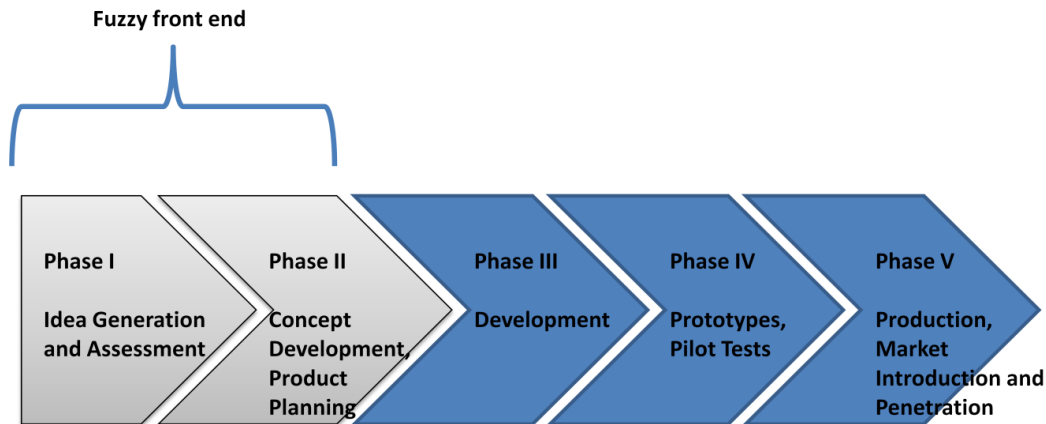


Figure 1. The innovation process according to Herstatt and Verworn (2001).

The context of this dissertation is practice-based innovation activities. Practice-based innovations are seen to be triggered in different places of practically oriented social and economic networks using, for example, the weak ties and structural holes of the innovation system. Practice-based innovation highlights the enriching interaction between innovation actors. The origins of innovations are not only networks but also employees, users and customers (Harmaakorpi and Melkas, 2012; Hennala, Konsti-Laakso and Harmaakorpi, 2012; Nilsen and Ellström, 2012). The social nature of innovation implies that knowledge production takes place within groups of people having a common interest determined by the practical context in which the group is working. These people often have very different backgrounds. In practice-based innovation processes, there is a common practical context within which a problem to be solved has to be specified. Within this practical context, each co-operator may have a different point of view and hence the specific problems they have in mind may differ. Nevertheless, they solve their problems within the same context. (Melkas and Harmaakorpi, 2012; Harmaakorpi and Mutanen, 2008; Harmaakorpi and Tura, 2006.)



An essential source of practice-based innovation is creativity. Eliminating the obstacles to creativity is one of the vital elements in maintaining the innovative capability of the organisation (Kallio, Kujansivu and Parjanen, 2012). Supporting creativity in the practice-based multi-actor innovation processes is not an easy task. Partners participating in practice-based innovation processes on different sides of structural holes have different knowledge interests. These differences may prevent cooperation between potential innovating partners. Innovativeness depends in most cases on the innovation network's ability to interact rather than on an individual actor's progress in a particular scientific field (Tura and Harmaakorpi, 2005). The difference is often so great that a special interpretation function is needed – information brokerage in the structural hole (as it is called by Burt, 1997).

The objectives of this dissertation are

- To study individual and collective creativity at the employee level and identify those factors that support individual and collective creativity in the organisation
- To study how organisations use external knowledge, e.g., from experts and customers, to support collective creativity in their innovation processes in open multi-actor innovation
- To define how brokerage functions create possibilities for collective creativity especially in the context of practice-based innovation
- To create a model of brokerage functions in practice-based innovation

This dissertation understands that the ideas of open innovation are adaptable also inside the organisation. For example, Pihkala and Harmaakorpi (2011) point out that under the shift from a closed innovation paradigm to an emerging open innovation paradigm, the R&D departments in an organisation may even be opening up to the outside world but still remain closed in relation to other parts of the company. In order to better profit from internal knowledge, organisations may engage in various practices like venturing and outward licensing of intellectual property. One practice to benefit from internal knowledge is to capitalize on the creativity of current employees, including especially those who are not employed at the internal R&D department (van de Vrande et al., 2009).

Innovation by an individual employee is a means to foster organisational success. Employees can be involved in innovation processes in many ways, for example, by taking up their suggestion and allowing them to take initiatives beyond organisational boundaries (Nijhof, Krabbendam and Looise, 2002; Forssén, 2001; van de Vrande et al., 2009). This raises the question of employee

creativity and collective creativity in the organisation. Steiner (2009) calls this internal creativity in the organisation. One objective of this dissertation is to study internal creativity and how creativity is experienced in the organisation by the employees. How is creativity and especially collective creativity present in the practices of the organisation? When is it needed and how would it be enhanced in the organisation by the employees?

Examples of practices that enable organisations to acquire new knowledge and ideas from the outside are external networking and customer involvement. External networking is an important dimension which is usually associated with open innovation. It includes all activities to acquire and maintain connections with external sources, including individuals and organisations. It comprises both formal and collaborative projects and more general and informal networking activities. Networks allow organisations to fill specific knowledge needs without having to spend enormous amounts of time and money to develop that knowledge internally or acquire it through vertical integration. (van de Vrande et al., 2009; Chesbrough, Vanhaverbeke and West, 2006.)

Open innovation theorists recognise that customer or user involvement is one important alternative to inform internal innovation processes (Alam, 2002; Magnusson, 2003; Magnusson, Matthing and Kristensson, 2003; Gassman, 2006). Users are increasingly regarded not just as passive adopters of innovations, but they may rather develop their own innovations which producers can imitate (von Hippel, 2005). Organisations may benefit from their customers' creativity and ideas. Especially users have value in the fuzzy front end of innovation and especially in incremental innovations (Lettl, Herstatt and Gemuenden, 2006). The objective of this dissertation is to study how organisations use external knowledge, for example, from experts and customers to support collective creativity in their innovation processes in open, practice-based innovation.

In comparison with the closed innovation, the open innovation model implies that the management and organisation of innovation processes becomes more complex. For example, opening the innovation process inside the organisation and to external actors requires a set of tools or methods to support the creativity and knowhow of these actors. Thereby, open innovation includes many more activities than just those that have been assigned to a traditional R&D department (Huizingh, 2011; Gassman, Enkel and Chesbrough, 2010). Establishing a partnership is both an essential and time consuming issue in open, multi-actor innovation. The question is whether organisations should do this by themselves.

Different actors of the innovation network play different roles, one of which is as a third party providing some sort of linkage between two or more other actors. These kinds of innovation intermediaries have gained in importance because of an increase in different sorts of actors involved in the innovation process (van Lente et al., 2003). Innovation intermediaries create value for clients by identifying, accessing, and transferring solutions to problems in various stages of the innovation process (Hargadon and Sutton, 1997; Verona, Prandelli and Sawhney, 2006), and that way they have possibilities to enhance organisational innovativeness. Innovation intermediaries are also considered actors in an innovation system (Klerkx and Leeuwis, 2009). In this dissertation, brokerage functions of intermediaries are studied in the context of a regional innovation system. One objective of this dissertation is to define how brokerage functions create possibilities for collective creativity especially in the context of practice-based innovation.

The main research question of this dissertation is: how to enhance collective creativity in practice-based innovation activities? This main question may be divided into three sub-questions:

- How can organisations support individual and collective creativity inside the organisation?
- How do organisations use external knowledge to support collective creativity in their innovation processes?
- How can collective creativity be skilfully enhanced by brokerage functions?

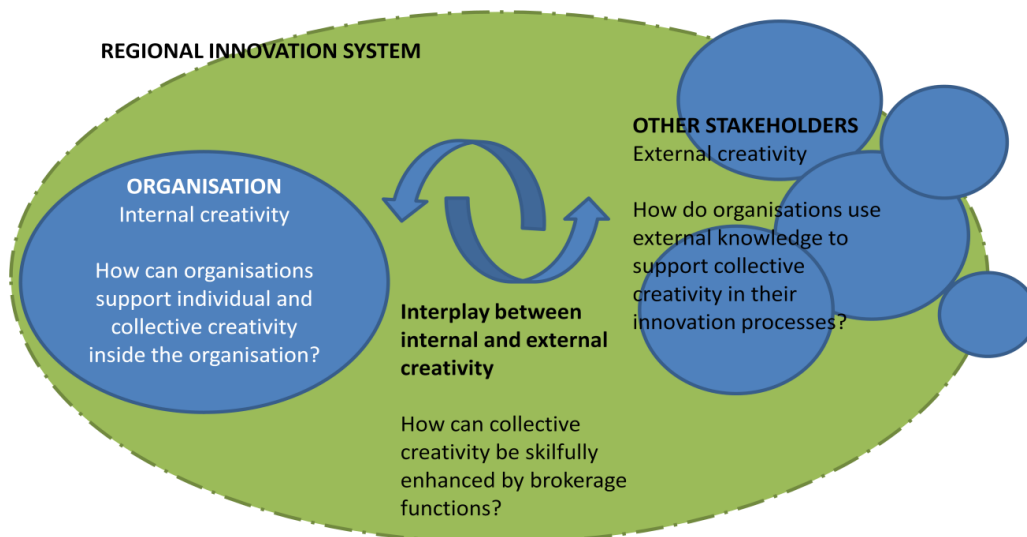


Figure 2. Research questions in the research context.

Figure 2 presents the research questions and context of this dissertation. The regional innovation system forms the research context of this dissertation. However, it does not mean that the enhancing of collective creativity is bound only to the activities of those actors who are inside the region. For instance, some of the actors participating in innovation activities in the regional innovation system may be outside the region.

## 2.2 Structure of the research

This dissertation consists of an introductory part and a part containing five substudies, which highlight various aspects of creativity and collective creativity in innovation activities. In the introductory part, an overview of the dissertation and the theoretical and methodological background including the research context are presented. At the end of the introductory part, the results and conclusions from the substudies are summarised. The results and conclusions of this dissertation are based on the findings of the five substudies. The contribution of the substudies to the research questions and their links are introduced in Figure 3 that summarizes the dissertation and positions the substudies. The black arrow indicates that the substudy gives answers to that question. The broken line arrow indicates that the substudy answers implicitly to the research question.

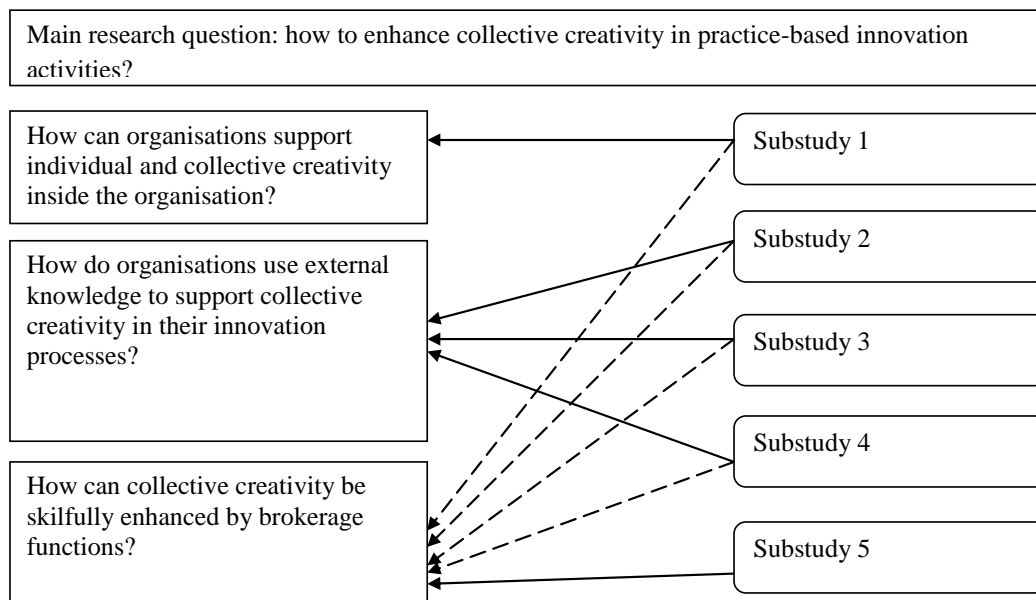


Figure 3. The contribution of the substudies to the research questions.

The dissertation consists of five substudies (Table 1) including empirical data from separate case studies. The empirical data consist of materials from innovation projects arranged in the Lahti region, Finland, or materials from the development of innovation methods in the Lahti region. The innovation policy of the region emphasises especially the promotion of practice-based innovations. These five substudies could be divided into three parts according to how they answer the research questions:

*Internal creativity in the organisation: How can organisations support individual and collective creativity inside the organisation? (Substudy 1)*

One option for organisations to become more innovative is to encourage their employees' creativity and innovativeness. Previous studies suggest that organisations can indeed benefit from employees' creativity in innovation activities (Axtell et al., 2000; Forssén, 2001; Nijhof, Krabbendam and Looise, 2002). In open, practice-based innovation, innovation is no longer reserved for those employees doing scientific or technological work. The aim of the first substudy is to study how individual and collective creativity is experienced in the organisation. This substudy contributes to the innovation literature by aiming to understand the antecedents of internal creativity in the organisation. The substudy studies how employees experience creativity in their organisation and in what way they would support creative processes in their organisation.

*External creativity in the organisation: how do organisations use external knowledge to support collective creativity in their innovation processes? (Substudies 2, 3 and 4)*

In order to foster innovation and strengthen competitiveness, it becomes important to integrate different types of knowledge, competences and experiences into a cooperative perspective. The second, third and fourth substudies concentrate on how organisations can use external knowledge and expertise in their innovation processes and how collective creativity is supported in these processes. The assumption behind these substudies is that structural holes (Burt, 2004) and weak ties (Granovetter, 1973) create opportunities for a new combination and recombination of ideas. These substudies fall in the category of the tool perspective on open innovation as defined by Gassmann, Enkel and Chesbrough (2010). According to them, opening up the innovation process requires a set of instruments. Those tools, for example, enable customers to create or configure their own product with tool kits or enable companies to integrate external problem solvers or idea creators.

The second and third substudies describe the innovation session method as a way to support organisations in bringing in new ideas from outside the organisation. The second substudy stresses that innovations emerge in nonlinear processes, often combining very diverse knowledge bases. In theoretical discussion, seven dimensions of distance and proximity are presented: cognitive, communicative, organisational, functional, cultural, social, and geographical. The substudy uses the experiences of the case study to answer how it is possible to span the structural holes in cross-disciplined multi-actor innovation. The perspective of this substudy is on how brokerage functions and brokers facilitate an organisation's innovation activities. This substudy presents the innovation session process, while the third substudy concentrates on the innovation session and examines the possible creativity in innovation session groups. In this substudy the perspective is on the participants of the innovation sessions. It demonstrates that under the right conditions the exchange of ideas in groups may be an important factor in enhancing innovation. In the empirical part, the substudy uses the experiences of the participants of the innovation sessions to answer the questions of how to support organisations to bring in new ideas from outside and how to promote collective creativity in the group context.

According to open innovation, organisations must locate knowledge using a wide range of sources, including users. The fourth substudy focuses on the fuzzy front end phase of an innovation process related to well-being services, i.e., the ideation phase, in which new ideas that are based on the users' needs are searched for in order to support the innovation process. The research differs from the second and third substudy because the idea generation was conducted in a virtual environment. It analyses brokerage functions in the framework of the concepts of proximity and distance, including also the eighth dimension of distance – temporal distance.

*Brokerage functions: How can collective creativity be skilfully enhanced by brokerage functions?  
(Substudy 5)*

The last substudy tackles the same theme of distances and proximities, but this substudy uses the experiences of the knowledge brokers to answer the question of how collective creativity could be skilfully enhanced by brokerage functions by utilising distances and proximities. This substudy sees that innovations are created in networks and are embedded in a regional innovation system. A regional innovation system rich in structural holes offers a high level of opportunities for new, networked innovation processes (Kallio, Harmaakorpi and Pihkala, 2010). Major challenges in regional innovation activities lie in enhancing absorptive capacity in the region in question, for

example, finding a suitable mix of knowledge brokerage functions and skilfully collecting and utilising knowledge from the region and from outside of the region. Brokers' own perceptions concerning their functions and roles in a regional innovation system are investigated by means of a case analysis of the Lahti region, in Finland. The theoretical discussion provides the background for why the brokerage activities are considered an essential component of the regional innovation system in the Lahti region. For example, the role of absorptive capacity in a regional innovation system is examined.

Table 1. Summary of the substudies.

Substudies	Research questions
<b>Internal creativity</b>	
1) <i>Experiencing creativity in the organization: From individual creativity to collective creativity</i>	How do the employees themselves perceive creativity in their work place, and in what way would they support creativity and especially collective creativity in the organisation?
<b>External creativity</b>	
2) <i>Collective creativity and brokerage functions in heavily cross-disciplined innovation processes</i>	What are the forms of distance in structural holes in cross-disciplined multi-actor innovation, and how can the spanning of the structural holes be facilitated by brokerage functions?
3) <i>Innovation sessions as sources of new ideas</i>	How to support organisations to bring in new ideas from outside and how to promote collective creativity in a group context?
4) <i>Brokerage functions in a virtual idea generation platform: Possibilities for collective creativity?</i>	How do brokerage functions support collective creativity in virtual idea generation, especially when the collaboration happens amongst people with diverse experience and areas of expertise?
<b>Brokerage functions</b>	
5) <i>Distances, knowledge brokerage and absorptive capacity in enhancing regional innovativeness: A qualitative case study of Lahti region, Finland</i>	How do knowledge brokers themselves perceive their roles and functions in innovation activities?

### **3 Innovation and knowledge interaction in open innovation**

#### **3.1 Types of innovations**

An economy or viable business environment with competitive organisations cannot exist without innovation (Haga, 2005). According to the open innovation paradigm organisations that do not innovate will die (Chesbrough, 2003). Without continuous development and innovation, disturbances in internal and external conditions would destroy the balance between supply and demand in the market. This is recognized as the basic drive to innovate in a modern economic system. The classical Schumpeterian definition of innovation emphasises the introduction of new goods, methods of production, markets, raw material, and organisation (Schumpeter, 1939). The definition of innovation includes the concepts of novelty, commercialization and/or implementation. According to Tidd, Bessant and Pavitt (2005), innovation is a process of turning opportunities into new ideas and putting these new ideas into a widely used practice. Ideas are necessary conditions for innovations. They are a starting point, but they cannot be called innovative without further development efforts. In other words, if an idea has not been developed and transformed into a product, process or service, or it has not been commercialized, then it would not be classified as an innovation (Popadiuk and Wei Choo, 2006).

There have been various innovation types identified in the literature. Tidd, Bessant and Pavitt (2005), for instance, argue that there are four types of innovation: product innovation, process innovation, positioning innovation and paradigm innovation. Armbruster et al. (2008) distinguish the following different types of innovations: technical product innovations, non-technical service innovations, technical process innovations, and non-technical process innovations, understood to be organisational innovations.

The main focus of innovation research has traditionally concentrated on technological innovation in manufacturing, reflecting the fact that innovation theories have their roots in the era of manufacturing as the major economic activity (Pekkarinen and Melkas, 2010). A product innovation could be defined as the planning and realization processes that create or rebuild a new technological system and provide the necessary functions to satisfy the needs of customers (Chen and Liu, 2005). Product innovations are to exploit new markets or expand the existing markets through putting the new products into the markets, whereas the objectives of the process



innovations are to change the production process of the existing products to reduce expenses, defects, wastes and lead time or to improve production efficiency and eventually to increase the sales and profits of a firm (Llorca, 2002). Although product innovation and process innovation are not the same thing, they are often interconnected. For example, process innovation may be required to support product innovations (Baker, 2002).

According to Reichstein and Salter (2006), process innovations are central elements in the main theories of innovation and economic development, but have received much less attention than product innovation in the literature. According to them, one reason for lack of organisational attention to process innovation may be that the concept encompasses both improvements in manufacturing operations through the use of new machine tools and other pieces of capital equipment and changes in the processes of production and distribution. That way, it comes close to organisational innovation. Organisational innovation may be defined as either a necessary adaptation to the introduction of new technologies, or as a precondition for successful product or technical process innovations. They try to understand how and under which circumstances organisations change. To do so, they analyse the triggers and the paths organisations take to achieve a structure increasingly capable of continuous problem solving and innovation. (Lam, 2004.)

A service is commonly defined as the non-material equivalent of a good (Bygstad and Lanestedt, 2009). Actually innovation research does not agree whether the innovation of services is fundamentally different from the innovation of products (Drejer, 2004). One strand of research, however, has documented empirically that the service innovation process often differs from the innovation of products (Abramovici and Bancel-Charensol, 2004; Schulteß et al., 2010). There are two important differences. Firstly, services are usually developed in close interaction with the customers, and secondly services are usually innovated in networks rather than labs (Bygstad and Lanestedt, 2009; Toivonen, 2004).

The term social innovation has entered the innovation literature with particular speed, but there is no consensus regarding its relevance or specific meaning. Social innovation is a complex process of introducing new products, processes or programs that profoundly change the basic routines, resource and authority flows, or beliefs of the social system in which the innovation occurs (Westley and Antadze, 2010). According to Pot and Vaas (2008), social innovation is a broader concept than organisational innovation. It includes such things as dynamic management, flexible organisation, working smarter, development of skills and competences and networking between

organisations. It is seen as complementary to technological innovation. Social innovation may also be part of process innovation as well as product innovation. Pol and Ville (2009) see the value of the concept of social innovation because it identifies a critical type of innovation. In the broadest sense, social innovation is needed to solve the complex social-ecological problems facing the world. Social innovation does not necessarily involve a commercial interest, though it does not preclude such interest. More definitively, social innovation is oriented towards making a change at the systemic level (Pol and Ville, 2009; Westley and Antadze, 2010; Pekkarinen, 2011).

Innovations have also been characterised on the basis of how they relate to each other. Teece (1984) distinguishes between two types of innovation: autonomous and systemic. An autonomous innovation is one which can be introduced without modifying other components or items of equipment. A systemic or system innovation requires significant readjustment to other parts of the system. The major distinction relates to the amount of design coordination which development and commercialization are likely to require. In a system innovation, there are multiple, linked innovations (Koskela and Vrijhoef, 2001). System innovation could be aimed to change an entire system or its parts. Characteristic to system innovations is that changes are done at the same time in different parts of the system. These changes could be related to processes, services, structures, organising methods, personnel, and technology (Saranummi et al., 2005).

Innovations have also been defined according to who have been involved in the innovation process. It is widely accepted today that users or user networks are often an essential source of innovation and have even been proven to be the principal driving force of many innovations in different industries (Alam, 2002; Kristensson, Gustafsson and Archer, 2004; Lettl, Herstatt and Gemuenden, 2006). End-users or customers are involved in an innovation or development process and the user actually develops the product or service her/himself; the user is a subject (Lettl, 2007). For example, in service innovations customers play an important role because in the case of service innovation, the production and use of innovation take place simultaneously, and service innovations are typically produced in an interactive process together with the customer (Toivonen, 2004).

Kesting and Ulhøi (2010) define employee-driven innovation as the generation and implementation of significant new ideas, products, and processes originating from a single employee or the joint efforts of two or more employees who are not assigned to this task. Thus, these kinds of innovations indicate that innovations can emerge from shop floor workers and professionals or middle managers across the boundaries of existing departments and professions. The basic idea of employee-driven

innovation rests on the assumption that employees have hidden abilities for innovation (Forssén, 2001), and that this potential can be made visible, recognized, and exploited to the benefit of both the organisation and its employees (Kesting and Uihøi, 2010).

There is a distinction between not only types of innovation but also levels of innovation. Advanced or radical innovations entail creating knowledge in order to make fundamental changes that represent revolutionary alterations in, for example, a product's technology (Dewar and Dutton, 1986; Henderson and Clark, 1990; Herrmann, Gassmann and Eisert, 2007). Advanced or radical innovations are said to draw on new scientific knowledge, generated in universities and research organisations (Un, Cuervo-Cazurra and Asakawa, 2010). In contrast, incremental innovations deal with creating knowledge for minor improvements or simple adjustments in a product's current technology (Banbury and Mitchell, 1995; Henderson and Clark, 1990; Un, 2008). The major difference captured by the labels "radical" and "incremental" is the degree of novel technological content, and hence the degree of new knowledge embedded in the innovation.

These different kinds of innovations reveal that nowadays innovation is about more than product breakthroughs resulting from scientific and technological research. Actually, this science and technology-driven innovation is complemented by the idea of practice-based innovation, emphasising that innovations may also have their origin in practical contexts – i.e., everyday activities (Harmaakorpi and Tura, 2006; Ellström, 2010; Melkas and Harmaakorpi, 2012). It is a collaborative form of creating knowledge in which experts and practitioners of various fields leverage their different perspectives, conceptions, ideas and competences to co-produce new knowledge (Jensen et al., 2007, Harmaakorpi and Melkas, 2012; Oikarinen, Pässilä and Kallio, 2011). This dissertation focuses on practice-based innovations.

So, innovations are as much about new services and business models as about organisational forms, and they can occur in all sectors of the economy and at all levels of an organisation. Innovation is also no longer restricted to the process of creating something new from the beginning to the end but can include the capacity to quickly adopt externally created innovations that may be of benefit to the organisation (Baker, 2002). Different kinds of innovation types highlight the scope for variability in innovation definitions according to the approach of the researcher, the dimensions of innovation studied and the objectives of the inquiry. This dissertation will view innovation from the perspective of the organisation and favours a broad multi-dimensional definition of innovation because it is more representative of today's multi-faceted organisations.

### **3.2 Innovation as knowledge interaction**

Earlier, innovation has been guided by linear models like the technology-push and the market-pull models. In the former, the development, production and marketing of new technology was assumed to follow a well-defined time sequence which began with basic and applied research activities, involved a product development stage, and then led to production and possibly commercialisation. In the second model, this linear sequential process emphasised demand and markets as the source of ideas for R&D activities. Intensifying competition and shorter product life cycles are necessitating a closer integration of R&D with the other phases of the innovation process. This criticism has led to a broader view of the process of innovation as an interactive process. The presently emerging innovation theory emphasises the central role of feedback effects between the downstream and upstream phases of innovation and the numerous interaction between actors in an innovation process. Through interaction and feedback, different pieces of knowledge become combined in new ways or new knowledge is created. (Fischer, 2000; Törrö, 2007.)

Innovation, be it undertaken internally or externally, is a complex process which may require knowledge flow between organisations and other actors (Meagher and Rogers, 2004; Lichtenthaler, 2005; Sammarra and Biggiero, 2008). This means that organisations have a dual necessity to form and manage external networks producing knowledge and information of value, as well as to possess the internal capabilities to profitably exploit this knowledge. The research has highlighted the general advantages for innovation in collaborative, networked relationships as opposed to competitive, hierarchical or market-based arrangements. Increasingly, the innovation process is viewed as a systemic undertaking, i.e., organisations no longer innovate in isolation but through a complex set of interactions with external actors. (Chesbrough, 2003; Swan and Scarbrough, 2005.) Therefore, inter-firm knowledge networks and networks with other external actors are potentially an important aspect of the innovation process.

Networks are usually based on evolutionary or sociological approaches. Evolutionary theorists, for instance, consider that innovation involves a process of continuous interactive learning between the organisation and the various actors surrounding it (Lundvall, 1992; Edquist, 1997). Moreover, innovation network theorists like Baptista and Swann (1998), Cooke and Morgan (1998) and Nieto and Santamaria (2007) maintain that organisations rarely innovate on their own, and that the introduction to the market of new products and processes largely depends on the organisation's ability to build links with external actors. In particular, the open innovation paradigm favours the

idea that innovations are created in networks in the social interaction of actors rather than in the minds of individuals (e.g., Chesbrough, 2003; Granovetter, 2005). Chesbrough (2003), through his open innovation model, also points to the importance of external ideas for the innovation process and even suggests that internal R&D is no longer the strategic asset it once was.

Innovations are to an increasing extent seen as the result of an interactive process of knowledge generation, diffusion and application. In this dissertation the interest lies in the knowledge generation. In the model of dynamic knowledge creation of Nonaka, Toyama and Konno (2000), knowledge is described as dynamic, since it is created in social interaction amongst individuals and organisations. Knowledge is context specific, as it depends on a particular time and space. Without being put into context, it is just information, not knowledge. Information becomes knowledge when it is interpreted by individuals and given a context and anchored in the beliefs and commitments of individuals (Nonaka, Toyama and Konno, 2000). There are two types of knowledge: explicit knowledge and tacit knowledge. Nonaka, Toyama and Konno (2000) describe explicit knowledge as what can be embodied in a code or a language and as a consequence it can be communicated, processed, transmitted and stored relatively easily. In contrast, tacit knowledge is personal and hard to formalise – it is rooted in action, procedures, commitment, values and emotions, etc. Tacit and explicit knowledge are complementary, which means both types of knowledge are essential to knowledge creation. Explicit knowledge without tacit insight quickly loses its meaning. Knowledge is created through interactions between tacit and explicit knowledge and not from either tacit or explicit knowledge alone (Nonaka, Toyama and Konno, 2000).

Gibbons et al. (1994) approach the knowledge used in innovation processes by categorising it into two classes. Mode 1 is hierarchical and tends to preserve its form, while Mode 2 is more heterarchical and transient by nature. One of the key contrasts between the two modes is that in Mode 1, problem solving is carried out by following codes of practice relevant to a particular discipline and problem solving, while in Mode 2, knowledge activity is organised around a particular application and is more diffuse by nature. Gibbons et al. (1994) report an epoch change in knowledge activity in innovation networks with a shift from Mode 1 to Mode 2 knowledge creation. For example, practice-based innovation processes are based on Mode 2 knowledge generation. They are defined as innovation processes triggered by problem-setting in a practical context and conducted in non-linear processes, utilising scientific and practical knowledge production and creation in cross-disciplinary innovation networks. In such processes, there is a strong need to

combine knowledge interests from theory and practice, as well as knowledge from different disciplines (Harmaakorpi and Tura, 2006; Harmaakorpi and Melkas, 2012).

Jensen et al. (2007) have compared two ideal modes of innovation: the STI (science, technology, innovation) mode that is based on the production and use of codified scientific and technical knowledge, and the DUI (doing, using, interacting) mode that, again, is based on an experience-based mode of learning. The STI mode of innovation refers to the way firms use and further develop this body of science-like understanding in the context of their innovation activities. It relates to the use of explicit knowledge. The STI mode of learning—even if it starts from a local problem—will make use of “global” knowledge all the way through and, ideally, it will end up with “potentially global knowledge”. The DUI mode of learning most obviously refers to “know-how” and “know who”, which are tacit and often highly localized. While such learning may occur as an unintended by-product of the firm’s design, production and marketing activities, Jensen et al. (2007) emphasise that the DUI mode can be intentionally fostered by building structures and relationships that enhance and utilise learning by doing, using and interacting.

### **3.3 The innovation system as a combination of networks**

The importance of knowledge and knowledge interaction for innovation has been stressed by the literature on innovative milieux (Breschi and Lissoni, 2001; Maillat, 1998) knowledge spillovers (Bottazzi and Peri, 2003), innovation networks (Baptista and Swann, 1998; Nieto and Santamaria, 2007), and innovation systems (Doloreux, 2002; Cooke, Uranga and Etxebarria, 1997; Doloreux and Parto, 2005). Of particular relevance for the research questions of this dissertation are the innovation systems approach and the studies on innovation networks. This dissertation assumes that networks can be considered important sources of creative ideas because of the heterogeneity of the resources in networks. The network approach looks at specific, well-selected relationships in the innovation process among specific actors both in the region and beyond. It stresses motives for engaging in cooperation, such as technological complementarities or access to resources and specific knowledge, and it emphasises the role of trust and social capital for the development of networks (Tödtling, Lehner and Kaufmann, 2008).

This dissertation also considers innovation as a socially and economically embedded process (Schienstock and Hämäläinen, 2001; Doloreux and Parto, 2005). This raises the question of the

social-institutional environment in which the innovation process takes place (Harmaakorpi, 2004; 2006). In a regional context, innovation is seen as a process embedded in a regional innovation system (e.g., Cooke, Uranga and Etxebarria, 1997; Doloreux, 2002). The approach of the regional innovation system originates from and is much inspired by the discussions about the national innovation system (Asheim and Coenen, 2005). The regional innovation system approach was developed when it became apparent that some of the systemic dimensions of the development of innovations were difficult to capture at the national level, even though the precise distinction between the regional and national innovation system is often difficult to ascertain (Doloreux, 2002).

Characteristic of a systems approach to innovation is the acknowledgement that innovations are carried out through a network of various actors underpinned by an institutional context (Asheim, Coenen and Svensson-Henning, 2003). The regional innovation system is characterized by co-operation in innovation activity between firms and organisations creating and diffusing knowledge, such as universities, training organisations, R&D institutes, technology transfer agencies and so forth, and the innovation-supportive culture that enables both firms and systems to evolve over time. The regional innovation system is a normative and descriptive approach that aims to capture how technological development takes place within a territory. The approach has been widely adopted to underline the importance of regions as modes of economic and technological organisation, and to reflect the policies and measures aimed at increasing the innovative capacity of all kinds of regions. (Doloreux and Parto, 2005.) The approach focuses particularly on analysing the structure and dynamics of innovation processes (Lyytinen, 2011).

In principle, the regional innovation system consists of the same elements as the national innovation system. Contrary to national systems, regional innovation systems are focused on interactions between diverse actors within the limited geographical area. (Lyytinen, 2011.) Defining the geographical boundaries of an innovation system is not a straightforward question. Regions are linked to the outside world by various sorts of connections. Organisations located in a region have linkages elsewhere, being members of extra-regional networks. These linkages are necessary as mechanisms of knowledge generation and circulation, keeping the organisations competitive in the long run. These linkages and extra-regional networks raise questions about the boundaries of a regional innovation system and make the definition of the boundaries for a regional innovation system more complex (Doloreux and Parto, 2005; Uotila, 2008). Regional innovation systems are also entities embedded in national innovation systems and so influenced by co-ordination at the national level (Harmaakorpi, 2004).

The regional innovation system is a social system, which means that innovations are the result of social interaction between economic actors. It is an open system that interacts with its environment. Here the feedback mechanism is of importance, which means that by producing new knowledge and new technologies the regional innovation system has an influence not only on its environment but also on the external conditions of its own functioning. It is not necessary to assume that innovation systems always consist of tightly linked actors or that they have clear-cut boundaries. There is no need to expect that all regional innovation systems consist of the same actors performing the same function. On the contrary, such an understanding of the systems approach is open to flexible interpretation. (Cooke and Memedovic, 2003.) A regional innovation system is affected by social and economic changes creating demands for renewal of regional resource configurations in an interactive, networked and cumulative development process (Harmaakorpi, 2006). For example, new laws, entry of new actors, and other events change the character of an innovation system over time (Hekkert et al., 2007).

A regional innovation system consists of innovative networks with different kinds of social relationships. Social structure, especially in the form of social networks, affects economical outcomes, since the networks affect the flow and the quality of the information (Granovetter, 2005). In his influential work, Granovetter (1973) defines the concepts of strong ties and weak ties in social networks. Strong ties are characterised by common norms and high network density. These strong ties are easier for innovation, since they normally include a relatively high amount of trust, common aims and the same kind of language for communication. However, weak ties are reported to be more fruitful for innovations, as more novel information flows to individuals through weak ties than through strong ties (Granovetter, 2005). They are also associated to creativity because exposure via weak ties may serve as a seed that causes an actor to pursue previously unexplored directions or provide a spark that propels an actor to integrate new ideas (Perry-Smith, 2006). Burt (2004) has developed the “strength of weak ties” argument further by arguing that innovations are most likely found in structural holes between dense network structures. An actor able to span the structural holes in a social structure is at a higher “risk” of having good ideas: new ideas emerge from selection and synthesis across the structural holes between groups (Burt, 2004). A regional innovation system rich in structural holes offers a lot of opportunities for new, networked innovation processes (Kallio, Harmaakorpi and Pihkala, 2010).



## **4 Creativity in innovation activities**

### **4.1 Creativity as a social construction**

Questions of ontology are concerned with the nature of social entities. The central point of orientation is the question of whether social entities can and should be considered objective entities that have a reality external to social actors, or whether they can and should be considered social constructions built up from the perceptions and actions of social actors. This dissertation draws on the social constructionist perspective. Social constructionism as an ontological position asserts that social phenomena and their meanings are continually being constructed by social actors. A social construct is anything that exists by virtue of social interaction, as opposed to objective reality. (Berger and Luckmann, 1994; Searle, 1995; Burr, 1995.) Such things as creativity or innovation do not exist outside the context of human social behaviour. According to Csikszentmihalyi (1996, p. 314), creativity is a social construct that is the result of an “interaction between the producer and the audience”. Creative activity grows out of the relationship between an individual and the world of his or her work, as well as from the ties between an individual and other human beings. Creativity does not happen inside a person’s head, but in the interaction between a person's thoughts and a sociocultural context (Csikszentmihalyi, 1996).

Social constructionism also implies that social phenomena are not only produced through social interaction but that they are in a constant state of revision. How creativity is understood in different times, for example, is also under constant change. Montuori (2011) looks at the way creativity itself is being transformed in the West from the individualistic view of Modernity towards a more contextual, collaborative, complex approach. Modern creativity was associated to an individual who generates a major breakthrough in science or art. The creative process occurred inside the person’s head, and was not influenced by the environment or interaction and relationships with other people. Nowadays creativity research includes an emerging focus on everyday creativity. The notion of everyday creativity suggests that creativity can occur everywhere at home or at work and does not have to take the form of a major work of art or scientific discovery. Either is the individual anymore the only source of creativity, but there is increasing recognition of collective creativity and networked everyday creativity.

## 4.2 Definitions of creativity

Innovation through creativity is an important factor in the success and competitive advantage of organisations (Woodman, Sawyer and Griffin, 1993). Changes within the business environment require new and creative ways of organising and managing organisations. Creativity plays an important role in the long-term survival and development of organisations because it is the basis of successful innovation and provides organisations with the means of coping with change (Amabile, 1997; Woodman, Sawyer and Griffin, 1993). An organisation that supports creativity and influences the adoption of innovative practices, products and services improves an organisation's ability to remain competitive. That is why creativity has been seen as an essential goal for many organisations and as potentially having influence on organisational performance (Mumford et al., 2002; Drazin, Glynn and Kazanjian, 1999). Creativity, as expressed and brought to life through organisations, also plays a larger, critical role in society. Whether the organisation is a business that brings creativity to life through innovative products and services that fulfill customers' needs, create jobs, and contribute to the economy, or whether the organisation is a public organisation using ideas in a creative way to meet the needs of the community, therefore increasing the quality of life, organisational creativity and innovation play an integral role in serving all of society. (McLean, 2005.)

Given the apparent impact of creativity and innovation on organisational performance, it is not surprising that scholars from a number of disciplines have sought to understand the factors that shape creativity and innovation. A large amount of creativity research has been devoted to the examination of personality or person-specific factors that contribute to creativity. The aim of this kind of research has been to identify how creativity or innovativeness is affected by differences in individual characteristics (Anderson, De Dreu and Nijstad, 2004; Shalley, Zhou and Oldham, 2004). According to Anderson, De Dreu and Nijstad (2004), this is a natural tendency given the emphasis on micro-level factors in recent innovation research. However, it is worth reminding ourselves that the contextual factors, such as the organisational context, provide the boundaries for employee creativity and innovativeness (Parzefall, Seeck and Leppänen, 2008). Contextual factors at the organisational level have been studied with respect to strategy (Cottam, Ensor and Band, 2001; van der Panne, van der Beers and Kleinknecht, 2003), organisational climate and culture (Mumford, 2000; Martins and Terblanche, 2003; van der Panne, van der Beers and Kleinknecht, 2003; Miron, Erez and Naveh, 2004), group interaction (Paulus, 2000; Keller, 2001), work environment (Amabile et al., 1996) and leadership (Mumford et al., 2002; Shalley and Gilson, 2004).

Much of the research has defined creativity as an outcome, focusing on the production of new and useful ideas concerning products, services, processes, and procedures (e.g., Amabile et al., 1996; Ford, 1996; Oldham and Cummings, 1996). For example, Oldham and Cummings (1996) define creativity as products, ideas, or procedures that satisfy two conditions: (1) they are novel or original and (2) they are potentially relevant for, or useful to, an organisation. Further, they consider a product, idea, or procedure novel if it involves either a significant recombination of existing materials or an introduction of completely new materials. In these kinds of definitions, novelty is not considered an absolute term in the sense of novel versus not novel, but rather a continuum of ideas possessing different degrees of novelty from somewhat new and incremental such as suggestions that improve existing practices to radically new and original ideas that create totally new practices and products that transform industries (Madjar, 2005). Almost all definitions of creativity involve the concept of usefulness and appropriateness as well as novelty (see Table 2). More specifically, a product or procedure should be not only novel and original but also have some practical value: in other words, being both novel and useful are important and necessary characteristics for qualifying an idea as creative (Madjar, 2005).

Drazin, Glynn and Kazanjian (1999) define creativity as an ongoing process rather than an outcome. This definition refuses to consider whether an idea is creative because it did or did not become an innovation. This definition permits an examination of how creativity arises from big or small ideas, ideas that evaporate or those that take hold. The potential value in this process orientation is that it enables questions to be raised about the daily acts of creativity, about the many small ongoing acts that solve practical problems, and about those acts that aid in the implementation of initiatives, instead of concentrating solely on ideas that radically transform or those that result in major innovations (Watson, 2007). This kind of definition suits the purposes of this dissertation as this dissertation concentrates on the fuzzy front end of innovation. In that phase, there is no guarantee that a creative idea will be implemented. This dissertation understands creativity as a process, and during that process creative ideas are generated and some of these ideas could be implemented in the future.

Table 2 introduces different definitions of creativity found in organisational creativity and innovation literature. In these definitions, it is seen that creativity could happen in different levels. Some researchers consider creativity an individual construct, whereas some researchers see that it could also happen at a group and organisational level. It is also seen that creativity is considered a part of the innovation process.

Table 2. Examples of definitions of creativity in organisational creativity and innovation literature.

Definition	Reference
"I define creativity as a domain-specific, subjective judgment of the novelty and value of an outcome of a particular action."	Ford, 1996, p. 1115
"... we define creativity as the production of novel and useful ideas in any domain."	Amabile et al., 1996, p. 1155
"Creativity is considered as the idea generation stage in the innovation process."	McAdam and McClelland, 2002, p. 87
"... to define creativity at the individual level as novel and appropriate ways of accomplishing tasks, and at the organisational level as the operating logic and internalised disposition that inform activities."	Nayak, 2008, p. 420
"... as putting new things in old combinations and old things in new combinations."	Weick, 1979, p. 252
"... creativity is viewed as the production of new and useful ideas or solutions by one or more individuals within a work environment."	Klinj and Tomic, 2010, p. 323
"We define creativity at work – an individual-level construct- as an approach to work that leads to the generation of novel and appropriate ideas, processes, or solutions."	Perry-Smith and Shalley, 2003, p. 90
"Organisational creativity is the creation of a valuable, useful new product, service, idea, procedure, or process by individuals working together in a complex social system."	Woodman, Sawyer and Griffin, 1993, p. 293

Unsworth (2001) criticises the common definition used for creativity, which implies that creativity is only one construct without considering the type of an idea, why it is generated, or how the process began. She developed a conceptual matrix of four creativity types that varied on two dimensions: what was the driver for the engagement (internal or external) and what was the problem type (open or closed). According to her, open ideas are those ideas that are discovered by the individual, while closed ideas are those that are presented to the individual. The four creativity types are: responsive (closed, external), expected (open, external), contributory (closed, internal) and proactive (open, internal). According to Unsworth, there might be differences in the processes

of these types of creativity. For example, she suggested that internally driven ideas might need to be “sold” more to those who evaluate them.

Finke (1995) classifies new ideas into four domains: creative realism, creative idealism, conservative realism and conservative idealism. According to his view, there is a continuum between creative and conservative ideas. In this continuum, Finke distinguishes new ideas that are realistic, i.e., connected to current ideas and knowledge, from ideas that are idealistic, i.e., disconnected from current ideas and knowledge. If new ideas are not connected to current ideas and knowledge, they are often unimplementable. The best possible domain is creative realism, because these ideas are highly imaginative and highly connected to current structures and ideas. Conservative realism represents ideas that are highly traditional and highly connected to current knowledge and practices. This domain contains little ambiguity and little uncertainty. Conservative idealism is perhaps the worst type of thinking for the organisation because such ideas exhibit little or no imagination and are not connected to existing knowledge. Creative idealism represents highly unrealistic ideas.

Creativity and innovation are terms which are frequently interchanged in day-to-day discussions. While both terms are interrelated and have an impact on, for example, the organisation’s ability to meet future demands, they are not the same. Creativity differs from innovation in that innovation refers to the implementation of ideas at the individual, group or organisational level (Amabile, 1996; Anderson and King, 1993; Mumford and Gustafson, 1988; von Stamm, 2003). An innovation results from creativity combined with a successful implementation of the creative idea. According to Taatila et al. (2006) idea is always the starting point, plan or intention for potential innovation. Idea changes to innovation during the execution process. Without the successful execution, the idea will not change to innovation. In simple terms, creativity is a necessary but not sufficient condition for innovation (Fedorowicz, Laso-Ballesteros and Badilla-Meléndez, 2008). As many researchers consider a creative idea as the foundation for innovations, it should be noted that creativity is needed during the whole innovation process. Idea implementation may call for as much creativity as initial idea generation (Mumford et al., 2002).

According to some researchers, creativity and innovation differ also in the required degree of idea novelty and social interaction. Creativity is truly novel, whereas innovation can be based on ideas that are adopted from previous experience or different organisations. Innovation is primarily an interindividual social process, whereas creativity is to some extent an intraindividual cognitive

process (Anderson and King, 1993). Also Oldham and Cummings (1996) recognize the distinction between creative performance and innovation. Creative performance refers to products, ideas, and so forth produced at the individual level, whereas innovation refers to the successful implementation of these products at the organisational level. On the other hand, research on creativity has included investigations and theorizing about ways in which social domains influence individual creativity, and has considered groups or organisations the actors or agents to be analysed for creative processes or behaviours (Watson, 2007). Based on abovementioned, creativity cannot be seen only as an intraindividual process where the creative outcome could be traced to a single individual. Instead, researchers have begun to talk about collective creativity, (Hargadon and Beckhy, 2006; Sawyer, 2006; Sanders and Stappers, 2008) which happens between two or more people.

### **4.3 From individual creativity to collective creativity**

#### **4.3.1 Individual creativity**

Individual creativity is important to organisational success. The presence of creative people is essential to every organisation, whether in the public or private sector. The ability to invent, dream, solve, and correspond in fresh, new ways is vital to organisational success. In this dissertation, individual creativity refers to the creativity of the employee. Research suggests that employee creativity makes a substantial contribution to organisational innovation, effectiveness, and survival (Amabile, 1996; Axtell et al., 2000; Oldham, 2002; Nijhof, Krabbendam and Looise, 2002; Nayak, 2008). By generating creative ideas, employees provide new solutions and possibilities that benefit the organisation. To make distinctions between employee creativity and innovativeness, it can be argued that every innovation needs creativity, but creativity does not necessarily lead to innovation. Employee innovativeness can thus be argued to cover a broader range of behaviours than creativity (Parzefall, Seeck and Leppänen, 2008; de Jong and Kemp, 2003).

Creativity does not have to exist only in specific types of work; it can occur while an employee performs in various work situations. When employees perform creatively, they suggest novel and useful products, ideas, or procedures that provide an organisation with important raw material for subsequent development and possible implementation (Woodman, Sawyer and Griffin, 1993). Robinson and Schroeder (2004) point out that the employees see many opportunities in their day-to-

day work that their managers do not. According to Robinson and Schroeder, it is important to make ideas everyone's job. Innovation processes that are born bottom-up (Nijhof, Krabbendam and Looise, 2002; Forssén, 2001) can create more value for the organisation. This is because small everyday observations of one's surroundings can become a competitive advantage because they are not visible to competitors and remain proprietary (Zien and Bucker, 1997).

An employee's engagement to innovative work behaviours requires the employee to be both able and willing to be creative. Amabile (1997) writes that three areas of creativity, i.e., expertise, creative-thinking skills and motivation, identify the level of creativity within an individual when mixed together. The expertise component includes a memory for factual knowledge, technical proficiency and special talents in the target domain. Domain-relevant knowledge is an individual's knowledge of facts, circumstances, and issues surrounding a given problem or area (Amabile, 1997). It involves technical expertise and the experience necessary to be able to come up with feasible solutions to a given problem. When individuals have more domain-relevant knowledge, the incidence of creative performance is enhanced (Mumford and Gustafson, 1988) by an increased ability to generate potential solutions and to validate them to determine their appropriateness (Perry-Smith, 2006). For example, research in the marketing literature shows that product managers with more knowledge of a marketing environment produce more creative marketing programs (Andrews and Smith, 1996).

According to Amabile (1997), a person with a high level of expertise will not produce creative work if creative thinking skills are lacking. Skills relevant to creativity can be defined as the ability to think creatively, generate alternatives, engage in divergent thinking, and suspend judgement (Vincent, Decker and Mumford, 2002; Shalley and Gilson, 2004). Creative thinking means that an individual is able to see things from more than one perspective and is able to question the existing working models. If problems are solved the way they have always been solved, it blocks creativity and prevents new ideas from penetrating. Creativity and innovativeness also require a certain level of internal force that pushes the individual to persevere in the face of challenges in creative work (Shalley and Gilson, 2004). Research has repeatedly highlighted the importance of intrinsic motivation in creative work. An internal force or intrinsic motivation also keeps the person going after the challenges are successfully overcome (Amabile, 1997; Amabile et al., 1996).

#### 4.3.2 Group creativity

Many organisations have turned to team-based work systems to increase their ability to foster innovation. That is why organisations need to be concerned not only with fostering creativity and innovation among individual employees but also with developing creative and innovative teams. A number of researchers have examined group creativity from an organisational perspective. For example, Woodman, Sawyer and Griffin (1993) give a central place to group creative performance in their model of organisational creativity. Researchers have tackled group creativity either by focusing on the contributions of individual team members (e.g., Scott and Bruce, 1994), focusing on the team processes and broader contextual influences (e.g., Bain, Mann and Pirola-Merlo, 2001; Burningham and West, 1995), or by examining the interaction between member contributions and group processes (e.g., Taggar, 2002). For example, Choi and Thompson (2005) studied the impact of membership change on group creativity. It appeared that open groups with rotating group subsets were more creative than closed groups. The open groups produced more ideas and a greater variety of idea types than did the closed groups.

Many studies (Paulus, 2000; Keller, 2001) indicate that diversity in team composition is very important for facilitating creativity. It is presumed that the diversity represented in the group is relevant to the group task. That is, if a group has the range of skills and knowledge required for a particular problem area, it is likely that they can tap this diversity to come up with a broader range of ideas than those with a more limited diversity in knowledge. Diversity with dimensions that are not related to the task or problem should not be particularly helpful (Paulus and Brown, 2007). Hence, it would be expected that knowledge diversity would be most helpful for groups doing intellectual tasks, whereas social diversity (ethnicity, age, etc.) would not be that relevant (Mannix and Neale, 2005). However, if social diversity is related to different life experiences or perspectives that are potentially relevant to a task or problem, then social diversity is potentially beneficial (Paulus and Brown, 2007). For example, in the fourth substudy of this dissertation, there was cognitive and social diversity between the participants of an idea generation session. The purpose of the idea generation session was to develop the concept of a wellbeing centre for elderly. The participants differed in age because the case organisation wanted to have ideas from the users or potential users of their services but also ideas from future users of their services (Substudy 4).

Several studies about group creativity have focused on communication in the group (Keller, 2001; Leenders, van Engelen and Kratzer, 2003). According to Leenders, van Engelen and Kratzer (2003),



the creative nature of a new product development task requires teams to combine and integrate input from multiple team members, and therefore the team's communication pattern is an important determinant of team creativity. They found that for new product development teams a moderate frequency of communication was the best for creativity. This enabled team members to share their ideas and have a constructive dialogue while not becoming distracted by the amount of information exchanged in the team and still having the cognitive ability to focus on the value of the information. Also, a low level of communication centralization was the best for the team creativity because that way the majority of the team members were aware of the different opinions shared and no one member was dominating the creative process.

Group idea generation or brainstorming sessions are often promoted as an important vehicle for the development of creative ideas (Sutton and Hargadon, 1996). However, studies have demonstrated that group interaction leads to a much lower level of productivity than individual brainstorming does in terms of both the quantity and quality of the ideas (Diehl and Stroebe, 1987). There are a number of factors that lower the creativity in a group. Paulus (2000) divided these factors into two groups: social inhibitors and cognitive interferes (see Table 3). Social inhibitors are social anxiety, social loafing, illusion of productivity, matching and downward comparison. Cognitive interferes are production blocking, task-irrelevant behaviours and cognitive load. On the other hand, Sutton and Hargadon (1996) have argued that there is too much of emphasis on the productivity of group brainstorming. They propose that there are a number of other criteria that should be considered in evaluating the utility of group brainstorming for an organisation, such as supporting the organisational memory and supporting the attitude of wisdom, i.e., acting with knowledge while doubling what one knows.

In a group context, creativity could be supported by group facilitators (Paulus and Dzindolet, 1993; McFadzean, 2002; Thompson, 2003). A trained facilitator can better follow the rules of brainstorming and keep the teams on track. A facilitator may also use different kinds of creativity methods to enhance creativity and avoid factors lowering creativity in the group. Many different methods have been developed to support and enhance creativity. Different methods can help group members to see problems differently and thus trigger different production rules, resulting in different types of ideas. The methods are not only designed to stimulate the use of specific cognitive processes, but they also create a social environment that reinforces the generation of specific types of ideas (Garfield et al., 2001).

Table 3. Factors related to low creativity in idea-generating groups.

<b>Cognitive Interference</b> (Paulus, 2000)	
Production blocking	Production blocking occurs when an individual is unable to express ideas to the rest of the group because he is waiting for an opportunity to speak and forget his own idea. A person might also start to think about the suggested idea further, with the consequence that he forgets his own idea. (Pennington, 2002.)
Task-irrelevant behaviours	Group discussion may involve behaviours such as story-telling or talking on a cell phone which can inhibit an individual's or others' concentration on the task (Paulus, 2000).
Cognitive load	The cognitive demands of attending to the ideas presented by others while attempting to generate one's own ideas may lower individual creativity (Paulus, 2000).
<b>Social Inhibition</b> (Paulus, 2000)	
Social anxiety	This is the process by which an individual's attitudes, beliefs, and behaviours are influenced by other people. Individuals may change their opinion under the influence of another or they do not tell others about their idea. (Ocher, 2005.)
Social loafing or free-riding	This describes the tendency of individuals to put forth less effort when they are part of a group. They do not work as hard in the group as they would alone. (Pennington, 2002.)
Illusion of productivity	Brainstorming groups may suffer from the illusion that they function very effectively. They suffer from the illusion of invulnerability, collective rationalization and stereotyping of outgroups. (Stroebe, Diehl and Abakoumkin, 1992.)
Matching	Individuals working in brainstorming groups tend to match their performance to that of the least productive member (Pennington, 2002; Paulus, 2000).
Evaluation apprehension	Participants may be unwilling to state some of their ideas because they are afraid of being negatively evaluated (Pennington, 2002; Paulus, 2000).

#### 4.3.3 Organisational creativity

Miron, Erez and Naveh (2004) identify two streams of creativity research: one at the individual level, examining personal characteristics that enhance and inhibit creativity; and the other at the organisational level, identifying organisational factors that affect creativity. Some researchers

(Amabile, 1996; Bharadwaj and Menon, 2000; Shalley, Zhou and Oldham, 2004) combine these two streams. Organisational factors such as structure and culture may play a more important role in predicting the realization of innovations than in influencing employee tendency to produce creative and innovative ideas (Axtell et al., 2000). Open, flexible structures, decentralising decision-making and low hierarchical levels favour creativity. Organic structures allow diversity and individual expression and they are well suited to the fuzzy front end phase of innovation processes. They are also often more conducive to the open, effective organisational and interdepartmental communication. (Parzevall, Seeck and Leppänen, 2008.) Hierarchical decision-making with a traditional structure is efficient in exploitation, using the existing knowledge efficiently. But innovation also requires exploration; finding new combinations of knowledge and creating new knowledge (e.g., March, 1991). On the other hand, some level of stability, clarity and coordination is needed. If formal mechanisms are absent, communication comes to depend solely on the discretionary and ad hoc effort of the organisation members, which may not be sufficient. (Parzevall, Seeck and Leppänen, 2008.)

Creative work is ambiguous, risky and subject to criticism. It can be expected that supportive leadership will facilitate creativity and innovation in the organisation. For example, Oldham and Cummings (1996) found that support for creativity was related to innovation. Leaders may also influence creative work through the vision provided by charismatic or transformational leaders (Mumford, 2000). Leadership that nourishes the renewal and motivation of the employees makes them aware of how important their work results are. It encourages employees to acquire new experiences and do more than is expected in their job description. In an ideal situation, leadership pushes employees to reach for higher needs and goals. (Viitala, 2005; Yukl, 1998; Hyypiä and Parjanen, 2008.)

Creativity is increasingly understood as a social phenomenon, especially in an organisational context. Researchers have looked at the range of ways in which creativity has a social aspect (Watson, 2007). Some examples include social influences on creative individuals through interaction or a relationship (Madjar, 2005; Perry-Smith, 2006), individuals operating in multiple social domains (Ford, 1996), organisational factors that influence individual creative behaviour (Amabile, 1996), and the effect of social networks on individual creativity (Perry-Smith and Shalley, 2003).

Madjar (2005) explores the relevance of sets of other individuals, both inside and outside the boundaries of the organisation, who have the potential to influence creative performance. Others may stimulate creativity by presenting new information and knowledge to the employee, which in turn trigger novel ideas and alternative solutions. Others can give examples, raise different issues, make certain perceptions more visible, and provide alternative situations and comparison points. In addition, different groups of others can influence creativity by simply reformulating the existing knowledge and information and providing new perspectives on it. The employees' interaction with people from different departments and different organisations can provide information that is beneficial for the generation of new ideas. Research suggests that unique information and knowledge provided by dissimilar individuals may enable the employee to see new connections between concepts and issues and to approach problems from different directions (Ely and Thomas, 2001; Milliken, Morrison and Hewlin, 2003). Souder and Moenaert (1992) identified the role of integrating R&D and the marketing and the communication of the R&D department with other business areas/units for successful new product development.

Ideas and information from work-related others outside of the work unit should have a stronger impact than the information from people inside the immediate work unit. The former will be more likely to provide a perspective of an outsider: to approach the issue from a different angle and present new expertise, facts, and alternatives that were available only in their specific work settings (Madjar, 2005). For example, customers could be a crucial source of information and cues that will prime the generation of new ideas (Leonard, 1995; von Hippel, 1988; Hennala, Melkas and Pekkarinen, 2011; Hennala, Parjanen and Uotila, 2011).

According to Perry-Smith and Shalley's (2003) social perspective on creativity, the process through which social network parameters influence creativity can be linked with creativity-relevant cognitive processes and domain-relevant knowledge. A creative-relevant cognitive process is any problem-solving approach that helps one to come up with different alternatives. Perry-Smith (2006) suggests that weak ties facilitate creativity and that strong ties do not. In addition, connections to a more heterogeneous set of direct contacts mediated the relationship between weak ties and creativity. Exposure from this type of direct contact set may facilitate a variety of cognitive processes. In contrast, the social influence pressures leading to conformity and the cognitive constraint associated with strong ties may offset any potential benefits associated with social support. Also as expected, the relationship between centrality and creativity depended on the number of ties outside an organisational network. When the number of outside ties was high,

centrality appeared to have little effect on creativity. It appears that peripheral individuals may feel freer to develop unusual ideas gleaned from connections outside. However, the combination of outside ties and high centrality was not preferred. In this case, outside ties may distract from creativity.

Ford's study (1996) integrates insights from psychology and sociology to capture the interaction of actors and the situation in which they operate. This theory has stated the goal of integrating creativity and innovation research. It stresses the tension between creative action and habitual or routine actions, as the contexts exert influence on creators and judge the outcomes. He suggests that the employee will be more likely to choose familiar habitual actions unless certain motivations and conditions support creative actions. An intentional pursuit of creativity must be present before expectations and emotions can influence individual creative action. Furthermore, creativity should be expected from those who are intrinsically motivated to be creative. A person also develops expectations based on previous experiences, which influence receptivity beliefs toward future experiences. He identified effective communication, reward systems, availability of resources and tolerance of ambiguity as receptivity beliefs that are associated with creative performance. For example, if an individual is punished for an idea that fails to solve a problem, the individual would probably not contribute any additional ideas to solve the current or future problems.

It should be mentioned that few studies have directly examined the negative, unintended consequences of creativity. It is reasonable to expect that the production of creative ideas may have unintended effects on other employees or processes in the organisation (Janssen, van der Vliert and West, 2004). For example, it is conceivable that a creative idea developed by one employee may involve changes in work processes that, if implemented, could result in fewer opportunities for other employees in the organisation. Or individuals might expend so much time and energy developing new ideas that they would have little energy remaining for complementing their normal work. Similarly, when ideas are transferred or made available to others, these ideas might distract the attention of the other employees, causing them to attend less to their regular duties than to the ideas they are considering. (Shalley, Zhou and Oldham, 2004.)

## **4.4 Collective creativity**

### **4.4.1 The definition of collective creativity**

In today's rapidly changing environments, employees do not always have the needed knowledge and individual expertise to generate solutions of their own. The growing complexity of problems and challenges requires collective solutions to produce creative outcomes. The growing complexity is not only related to products and services but also to organisational systems, most business sectors and the society as a whole (Steiner, 2009).

Collective creativity raises the question that when individuals, groups and organisations engage in creative processes, who or what actually creates (Watson, 2007). Drazin, Glynn and Kazanjian (1999) use the concepts intrasubjective, intersubjective and collective to describe these levels of creation. The intra-subjective level is regarded as the individual level, characterized by internal cognitive processes. The inter-subjective level is regarded as the level between two or more individuals. The collective level represents the unfolding of change across inter-subjective levels. Watson (2007) defines four categories based on her literature review that answer the question "who or what creates". According to her view, first there is the individual, independent actor as the creator and agent. Secondly there are the individuals who interact with other individuals, with situational variables or within the system and then either create as independent actors or produce outcomes that have been influenced by the interaction. Third, the actor is the social unit, such as a group or team. Forth, the actor is the organisation. In the two last cases, the collective is the generator or actor that produces the creative outcome.

According to Webster's online dictionary, a collective is a number of persons considered to be one group, and it is characterised by some sort of similarity among its members. For example, members may share a common interest or they can work together to achieve a common objective. There are different types of collectives, ranging from small groups to organisations, from ad-hoc alliances to longstanding federations, and various instances of the society at large. In general, collective refers to an assemblage of independent but interrelated elements comprising a unified whole and linked together for some common purpose or function. Collective refers to the collective and collaborative engagement of a group of people with shared interests or goals in meaningful actions (van Osch and Avital, 2009).

When researchers point to collective creativity (Hargadon and Beckhy, 2006; Sawyer, 2006; Sanders and Stappers, 2008) they mean creativity that emerges from the collaboration and contribution of many individuals. In this kind of situation the generation of an idea cannot be traced to a single individual. Instead it is socially constructed or generated creative outcome (Watson, 2007). Many researches on collective creativity focus on the importance of collaboration to solve complex and interdisciplinary problems (Chaharbaghi and Cripps, 2007; O'Donnel et al., 2006) and some of them use the concepts like social creativity (Fischer et al., 2005) or collaborative creativity (Steiner, 2009; Sonnenburg, 2004) to describe this kind of creative approach. However, it should be noticed that social creativity is also associated to creativity where social factors influence individual creativity and the level of analysis is still the individual. The concept of collective creativity is used in this dissertation to highlight that the level of analysis is the collective.

However, the concepts used in creativity literature are somehow overlapping. For example, Steiner (2009) agrees that group creativity and collaborative creativity have a very similar meaning. According to him, "group" is commonly used with a stronger inward looking perspective, such as a group within an organisation. What distinguishes collaborative creativity from group creativity is that it leaves more possibilities for border-crossing creative cooperation. A crucial difference between group creativity and collaborative creativity is that the first implies a more segmented work process based on the division of single obligations without necessarily having strong interaction between single participants. Collaborative creativity is more inherently concerned with mutual processes of creativity. According to Steiner (2009), organisational creativity is a special form of collaborative creativity but differs from it in that it does not encompass the external creativity potential found outside the organisation. Organisational creativity makes use of the organisation's internal creativity potentials.

In this dissertation, collective creativity is possible to happen in the group and also at the organisational level. For instance, Drazin, Glynn and Kazanjian (1999) in their study on creative changes in an organisation hold the organisation as both the actor and environment. In that way, the organisation or the group can be an arena for individual creative processes, but it could be understood as the actor at the collective level. This is also acknowledged by Hargadon (1999) when he writes that "groups act as agents and not simply arenas for creative action in those organisational contexts where social interactions can trigger the recognition and recombination of diverse individual knowledge". This dissertation defines collective creativity as an approach of creative

activity that emerges from the collaboration and contribution of many individuals so that new ideas are produced collectively by individuals connected by the common concern.

#### **4.4.2 The need for collective creativity**

The problems that people nowadays are confronted with are usually complex and multi-faceted and require a wide variety of knowledge and expertise in order to be solved. The essential features of a problem are given when there is a goal, but there is a lack of a clear or well-learned route to that goal. A problem solving process is one whereby a situation that is not as it should be is changed into one that is as it should be. In problem solving, it is possible to distinguish between routine problem solving and creative problem solving. (Proctor, 2005; Steiner, 2009.) Core processes required for creative problem solving are problem identification and construction, identification of relevant information, generation of new ideas, and the evaluation of these ideas (e.g., Mumford and Connelly, 1991). Because problem construction provides the context for the application of other processes in the creative problem-solving effort, it has been suggested that the way the problem is constructed will have a marked impact on creative production and solution generation (Mumford and Connelly, 1991).

One way to approach problems is divide them to well-defined or ill-defined. In a well-defined problem, the solver or solvers are provided with all the information needed in order to solve the problem. On the contrary, in ill-defined problems there is little or no information on the initial state, the goal state, the operators, or some combination of these. When solving an ill-defined problem, the solver has to define the problem to her or himself. Ill-defined problems seldom fall within the boundaries of one specific domain. (Mumford and Connelly, 1991.)

Creative problem solving can occur when the task presented involves complex, ill-defined problems where performance requires the generation of novel useful solutions (Ford, 2000; Mumford and Gustafson, 1988). The more complex the problems, the harder it will be for an individual to creatively develop solutions by her or himself. Therefore, they require the participation and contributions of different stakeholders with various backgrounds. In creative problem solving, the parties involved must define the problem, they must gather information, and they must refine and extend initial ideas to permit successful implementation. Because these activities are all difficult to execute, creative problem solving can be expected to be a demanding and also time consuming activity. Multiple people must devote time and effort to solution generation, equipment must be



acquired, and development and implementation will require support from multiple groups. (Mumford et al., 2002.) Collective creativity takes place in those situations when any one individual does not hold all of the necessary knowledge to construct a creative solution but the potential for a creative solution requires the domain relevant skills of multiple participants. One person might have a potentially valuable idea but may not recognize its value, while another has enough knowledge of the problem to value that idea but does not know of it (Hargadon and Beckhy, 2006).

Innovation is often studied as a decision-making and problem-solving process with its roots in engineering - from this perspective, innovation is defined as an analytical linear project with a well-defined beginning and end, aimed at solving existing problems. The analytical approach to innovation works well when there is a clear idea of what problems need solving. According to Lester and Piore (2004), a missing dimension in innovation research can be found in the field of interpretation. The goal of interpretative innovation is to discover new meanings. It is a multi-voiced dialogue emphasising interaction and communication. An interpretative innovation process is on-going and open-ended. It takes place through a process of communication among people and organisations with different perspectives and backgrounds. (Lester and Piore, 2004.) Interpretative innovation shares many common characteristics with collective creativity. Therefore, one can argue that in interpretative innovation collective creativity is especially needed.

#### **4.4.3 The model of collective creativity**

Hargadon and Beckhy (2006) introduce a model of collective creativity that explains how the locus of creative problem solving shifts, at times, from the individual to the interaction of a collective. According to their field study, some creative solutions can be seen as the products of individual insight, and others should be regarded as the products of a momentary collective process. Such collective creativity reflects a qualitative shift in the nature of the creative process, as the comprehension of a problematic situation and the generation of creative solutions draw from and reframe the past experiences of participants in ways that lead to new and valuable insights.

Hargadon and Beckhy (2006) base their model on the literature on collective cognition (Meindl, Stubbart and Porac, 1996; Thompson, Levine and Messick, 1999; Hutchins, 1991). In particular, the concept of a collective mind and heedful interrelations may help explain highly creative organisations, where the emphasis on novel solutions requires mindful exploration. According to

Weick and Roberts (1993), a collective mind resides in the mindful interrelations between individuals in a social system. One person's action or comments, when considered by others, shape theirs, which in turn shape the next ones. A focus on the collective aspects of these interactions recognises that one person's past thinking and action take on new meanings to everyone involved in the evolving context of subsequent thinking and action. According to Hargadon and Beckhy (2006), collective creativity represents particular moments when people's perspectives and experiences are brought together to bear on problematic situations in ways that create distinctly new solutions. At these points, what to think of as a problem and how to think of it become the products of a collective process.

The model of collective creativity identifies the precipitating roles played by four types of social interaction: help seeking, help giving, reflective reframing, and reinforcing. Help seeking describes activities that occur when an individual who either recognizes or is assigned a problematic situation actively seeks the assistance of others. Help seeking could happen through formal means but usually more often through many informal and unstructured methods for soliciting help. Conversely, help giving represents the willing devotion of time and attention to assisting in problem-solving efforts. Hargadon and Beckhy (2006) suggest that especially help giving plays a vital role in precipitating moments of collective creativity within a larger web of activities that include help seeking, reflective reframing, and reinforcing.

Reflective reframing stands for the mindful behaviours of all participants in an interaction, where each courteously attends to and builds upon the comments and actions of another participant. The idea of collective creativity comes very close to that of dialogue. In dialogue, one person has a perspective or idea, another person takes it up, and someone else adds to it. The idea is that all participants have an important contribution to make and that the full range of their perspectives and ideas is necessary for developing an integrated, whole view. The goal is for parties to learn from each other, rather than to evaluate perspectives and determine who has the "best" view. They participate in the conversation together, as equals. As they interact and listen to one another, participants become aware of all of the different opinions that have surfaced and begin to examine them. Rather than trying to persuade or convince one another, they regard their opinions as existing on the same level as the opinions of others. Once they have laid all of the assumptions and opinions of group members out on the table, they can begin to do something that none of them can do separately. They begin to talk with one another rather than at one another, and to listen to one another's opinions. While they may very well continue to disagree, they can begin to think and work

in some common area beyond these different opinions. (Puro and Matikainen, 2000; Isaacs, 2001; Palus and Drath, 2001.)

Moments of collective creativity involve considering not only the original question, but also whether there is a better question to be asked. Collective creativity is therefore not answering mindlessly the question as given, or deflecting it completely. When participants come together in collective problem-solving efforts, one person often has a good understanding of the problematic situation, while others have potentially relevant ideas and experiences to contribute. The locus of creativity in the interaction moves to the collective level when each individual's contributions not only give shape to the subsequent contributions of others but, just as importantly, give new meaning to others' past contributions. (Hargadon and Beckhy, 2006.)

Reinforcing activities are those that support individuals as they engage in help seeking, help giving, and reflective reframing and, as a result, they are also critical to enabling those moments when collective creativity emerges. Creating possibilities for collective creativity is about more than bringing people together. Social interactions that give meaning and value to these collective efforts are also important. Reinforcing reflects those activities that subtly or not subtly reinforce the organisational values that support individuals as they engage in help seeking, help giving, and reflective reframing; reinforcing happens as a direct consequence of engaging in these three activities as well as through more indirect actions within the organisation. (Hargadon and Beckhy, 2006.)

O'Donnell et al. (2006) describe collective creativity as a situated practice which is embedded in a social context. Within a notion of creativity as a situated practice, knowledge is of value when it gives rise to and develops yet newer knowledge. Similarly, creativity as a collective practice is understood in a much broader sense as referring to the fact that thinking together not only consists of re-finding bodies of knowledge, competence, skills or solutions which already exist but also of developing them. Therefore, by making a crucial link between creativity and the creation of new knowledge, emphasis is put upon the emergence of innovation, unplanned outcomes and unexpected solutions, rather than simply upon the reproduction of existing solutions (Grossen, 2008).

#### **4.4.4 Distances as a source of collective creativity**

Collective creativity is often associated with the diversity of perspectives (Fischer et al., 2005; Kozinets, Hemetsberger and Schau, 2010). For example, according to Csikszentmihalyi (1996, p. 9), the centres of creativity tend to be found at the intersections of different domains, where beliefs, lifestyles and knowledge mingle and allow individuals to see a new combination of ideas with greater ease. Thus, people tend to be attracted to groups made up of members similar in some way to themselves, and relatively few people are capable of bonding different groups together. If group selection favours those who are similar, it reduces the diversity of the members. Homogenous groups often reach solutions more quickly and with less friction along the way. Homogenous groups do little to enhance expertise and creative thinking. Everyone comes in with a similar mind-set and leaves with the same. (Amabile, 1998.) Based on this, distances between innovating partners can be considered as sources of collective creativity.

Fischer et al. (2005) describe different sources of creativity by exploiting four different distances: spatial, temporal, conceptual, and technological. According to Fischer et al. (2005), in collective creativity voices from different places should be brought together. Spatial distance could be supported, for example, by computer-mediated communication. That allows the prominent defining feature of a group of people interacting with each other to become shared concerns rather than a shared location. It allows more people to be included, thus exploiting local knowledge. These opportunities have been employed by the open source communities as well as by social networks that have a shared concern. The idea of exploiting the temporal distance and building on the voices of the past is based on the assumption that many discoveries, inventions or innovations would have been inconceivable without prior knowledge. According to Fischer et al. (2005), computer-mediated collaboration among humans reduces the gaps created by spatial and temporal distances. The challenge is often not to reduce heterogeneity and specialization but to support it, manage it, and integrate it by finding ways to build bridges between local knowledge sources and by exploiting conceptual collisions and breakdowns as sources of innovation.

To analyse the contribution of voices from different communities (conceptual distance), Fischer et al. (2005) differentiate between two types of communities: communities of practice (CoPs) and communities of interest (CoIs). Communities of Practice (CoPs) (Wenger, 1998) consist of practitioners who work as a community in a certain domain undertaking similar work. CoPs gain their strength from shared knowledge and experience. However, they face the danger of groupthink:

the boundaries of domain-specific ontologies and tools that are empowering to insiders are often barriers for outsiders and newcomers. Communities of Interest (CoIs) (Fischer, 2001) bring together stakeholders from different CoPs to solve a particular problem of common concern. Differences between stakeholders also create challenges for CoIs. Technological distance emphasises computer-mediated collaboration among humans to reduce the gaps created by spatial, temporal, and conceptual distances (Fischer et al., 2005).

In the same vein, Kozinets, Hemetsberger and Schau (2010) use the concepts of variation and selection to describe the sources of collective creativity. According to them, there are possibilities for collective consumer creativity, when more consumers from diverse backgrounds bringing to bear different experiences are going to offer a greater variety of ideas to use for ideation. That way, the variation of the ideas proposed as the solutions to a particular consumption-related problem also increases. They also see that that way consumer groups are going to bring their increased depth of experience and expertise to bear against the weighting of criteria used for selections of new ideas. In addition, the consumer group's talents, networks, and ability to keep one another motivated are likely helpful in developing and realizing the idea and propagating and promoting it. Table 4 summaries characteristics of collective creativity found in the literature.

Table 4. Characteristics of collective creativity.

<b>Collective creativity</b>	
<ul style="list-style-type: none"> <li>creativity that is shared by two or more people</li> </ul>	Hargadon and Bechky, 2006; Sawyer, 2006; Sanders and Stappers, 2008
<ul style="list-style-type: none"> <li>outcome is more than a sum of individual efforts</li> </ul>	Fischer et al., 2005; Hargadon and Bechky, 2006; Sawyer, 2006
<ul style="list-style-type: none"> <li>importance of collaboration</li> </ul>	Chaharbaghi and Cripps, 2007; O'Donnel et al., 2006; Sanders and Stappers, 2008
<ul style="list-style-type: none"> <li>common interest or concern</li> </ul>	Fischer et al., 2005; van Osch and Avital, 2009
<ul style="list-style-type: none"> <li>dialogue</li> </ul>	Fischer et al., 2005; Sundholm, Artman and Ramberg, 2004
<ul style="list-style-type: none"> <li>emphasis is on past knowledge</li> </ul>	Fischer et al., 2005; Hargadon and Beckhy, 2006; O'Donnel et al., 2006
<ul style="list-style-type: none"> <li>situated practice</li> </ul>	Sundholm, Artman and Ramberg, 2004; O'Donnel et al., 2006
<ul style="list-style-type: none"> <li>diversity as a source of collective creativity</li> </ul>	Fischer et al., 2005; Kozinets, Hemetsberger and Schau, 2010

## **5 Challenges for collective creativity in open innovation**

### **5.1 Innovation potential of cognitive distance**

The collaboration between heterogeneous actors triggers creativity and gives possibilities for collective creativity by allowing the development of new ideas which could not have emerged in isolation. This is because the collaboration between heterogeneous actors allows drawing upon additional expertise (Burt, 1992) and accessing additional knowledge (Zhang, Baden-Fuller and Mangematin, 2007). At the same time, collaboration with different actors breaks up established paths (Gerybadze, 2004) and thereby avoids getting trapped in lock-in situations (Boschma, 2005).

Interaction between heterogeneous knowledge bases in an organisation and with the external knowledge bases is necessary in order to experience the effect of diversity, but the presence of relevant knowledge does not imply that the inflow of new ideas into the organisation is an automatic or easy process. This dissertation uses the concept cognitive distance (Boschma, 2005; Nooteboom et al., 2006) to describe the heterogeneity between innovating partners. According to the social constructionist view of knowledge, people who have been raised in different environments interpret, understand and evaluate the world differently (Berger and Luckmann, 1994; Searle, 1995). This implies that an organisation's development along a specific path determines its organisational focus. The upshot of this is that to the extent that organisations have developed in different technological environments, they operate at a certain cognitive distance, which provides the basis for resource heterogeneity across organisations (Nooteboom et al., 2006).

A cognitive distance between innovating actors presents both a problem and an opportunity. As cognitive distance increases, it has a positive effect on innovation by interaction because it yields opportunities for novel combinations of complementary resources. Knowledge building often requires dissimilar, complementary bodies of knowledge (Boschma, 2005). A study by Mitchell and Nicholas (2006), for example, supports the idea that new knowledge is created through interactive processes based on sharing and integrating of previously unshared knowledge. According to them, knowledge is dependent upon the existence of disparate perspectives. In this respect, cognitive distance tends to increase the potential for innovation (Boschma, 2005). However, at a certain point cognitive distance becomes so large as to preclude a sufficient mutual understanding needed to utilise those opportunities (Nooteboom et al., 2006). On the other hand, too much proximity may

take out the innovative steam from collaboration. Cognitive proximity may, for example, easily lead to a cognitive lock-in in the sense that routines within an organisation or in an inter-organisational framework obscure the view on new technologies or new market possibilities (Boschma, 2005).

Organisations' absorptive capacity determines their ability to in-source externally developed technology or ideas. Absorptive capacity is the ability of the organisation to identify and value, assimilate and exploit external information (Cohen and Leviathal, 1990). Zahra and George (2002) specified absorptive capacity as a set of organisational routines and processes by which organisations acquire, assimilate, transform, and exploit knowledge to produce a dynamic organisational capability. They also divided absorptive capacity to potential absorptive capacity that comprises of knowledge acquisition and assimilation capabilities and realized absorptive capacity that includes knowledge transformation and exploitation capabilities. Both are important in innovation processes: potential absorptive capacity enables exploration of knowledge (often) over the weak ties of the innovation system, and realized absorptive capacity secures exploitation (often) in the strong ties of the networks. It could be assumed that higher absorptive capacity enables easier crossing of structural holes in the innovation system.

## **5.2 Different kinds of expertise in innovation activities**

At the organisational level, studies (e.g., Brusconi, Prencipe and Pavitt, 2001; Patel and Pavitt, 1997) show that large innovative companies are able to integrate knowledge from a wide range of fields, including fields in which they do not innovate themselves but cooperate with other actors. The implication is that these firms have learned to use functional distance (Harmaakorpi, Tura and Melkas, 2011). Functional distance involves crossing essential boundaries within which knowledge is organised. The more different firms are with regard to their knowledge bases, the more there is to learn, but the more difficult it becomes to learn as well (Knoben and Oerlemans, 2006). For example, social science and medicine claim different knowledge of and insights into the issues of the elderly within a given social context. The way in which boundaries are arranged around the knowledge, goals and values that constitute each discipline also provide a stable jumping-off point to explore combined perspectives or, indeed, the generation of new perspectives. (Blackwell et al., 2009.)

Functional distance or proximity seems similar to the concept of cognitive distance or proximity. Cognitive proximity is a much broader concept that refers to the extent to which actors can communicate efficiently, whereas functional proximity refers to the extent to which actors can actually learn from each other. Cognitive proximity deals with the issue of “how” actors interact, whereas functional proximity deals with the issue of “what” they exchange and the potential value of these exchanges (Knoben and Oerlemans, 2006). Contrary to the general concept of absorptive capacity, which assumes that an organisation’s capacity to learn depends only on the organisation itself, the concept of relative absorptive capacity (Laneh and Lubatkin,1998) states that this capacity also depends on the source of the knowledge exchanged. Organisations must have comparable knowledge bases in order to be able to recognize the opportunities offered by collaboration but a different specialized knowledge base in order to permit effective and creative utilisation of new knowledge. (Colombo, 2003; Knoben and Oerlemans, 2006.)

Developing successful new innovation requires collaboration among people from different areas of expertise brought together in groups or teams and belonging to one or several organisations. Expertise is traditionally connected to a person who is perceived to be knowledgeable in an area or topic due to his or her study, training, or experience in the subject matter. That way expertise can describe skills, knowledge or abilities, in task, activities, jobs, sports and games (Farrington-Darby and Wilson, 2006). One characteristic of expertise is that it is domain specific. It relies on skills and competences related to a particular domain of activity where a person has been trained (Hakkarainen et al., 2004). Reilly (2008) suggests that there is a need to expand the notion of expert to the realm of collaborative and socially shared expertise. Expertise need not be embodied in a single individual but it can be collectively created through processes of reflective dialogue. Thus created and shared, these skills then become the foundation for collectively creative approaches. (Reilly, 2008.)

In open innovation activities, experts with extensive education and training in different fields have to contribute knowledge. Their contributions have to be coordinated in a way that the solutions that experts in one field come up with are compatible with the solutions contributed by experts from other fields (Schmickl and Kieser, 2008). Functional or professional proximity describes the mutual understanding among professionals having passed comparable educations or sharing professional experiences in comparable branches or functions. Functionally close actors act in areas of expertise close to each other, for example, in the same industry. Functional or professional proximity emerges at various spatial levels. Such proximities emerge within the organisation, within or between



departments, between colleagues from different organisations in the locality, and between professionals who usually work in different places. (Harmaakorpi, Tura and Melkas, 2011; Lorentzen, 2007; Harmaakorpi, Tura and Artima, 2006.)

The distances between professional and academic forms of knowledge can act as barriers in some respects. It is assumed that in the same cases the specialists of different functional domains have to intensively learn from each other in order to be able to jointly develop the new innovation. This implies that groups of specialists transfer their specific knowledge, which encompasses different concepts, theories, methods and worldviews, among each other. However, it is argued that intensive cross-learning between specialists is a considerable expense in time and effort and, therefore, inefficient. (Schmickl and Kieser, 2008.) Clearly, the sharing of knowledge across functional or professional boundaries could be problematic. The notions of brokers (Wenger, 1998) and boundary objects (Bechky, 2003) are widely cited as providing two possible channels through which distinct groups can communicate.

### **5.3 Innovation as a communication process**

The social construction of reality refers to the processes people use to actively create and shape the world through social interaction. Language has a direct and important function in social relations, for it is the means by which people discuss and exchange information, ask questions and conduct business in society. Language does not simply describe reality but also constructs it. (Berger and Luckmann, 1994.) Without a common language, it is difficult to engage in a combination and exchange of knowledge. To the extent that people's language use and concepts are different, they keep people apart and restrict their ability to gain access to other people and their information (Nahabiet and Ghostal, 1998).

Communication and especially communication about ideas occurs during all stages of the innovation process and it can serve in different functions for creativity (Binnewies, Ohly and Sonnentag, 2007; Perry-Smith, 2006; Perry-Smith and Shalley, 2003). In the early stages of idea generation, by communicating ideas, an individual shares his or her knowledge with others. During this phase the individual also receives input from others. This input might include relevant task knowledge or a change in perspectives (Madjar, 2005). Furthermore, individuals might build on the ideas suggested by others to develop their own ideas. These processes are rather cognitive in nature

and contribute to the novelty and usefulness of an idea. In addition, when communicating about the idea a person has a chance of receiving emotional support (Madjar, 2005), thereby building confidence, and publicly commits to working on a given problem. These are social processes stimulated through communication. (Ohly, Kaše and Škerlavaj, 2010.)

Innovation emerges as a kind of a synthesis of several points of view. This leads naturally to the problem of how to fit together different perspectives. Often there is even cognitive dissonance between different points of view. People with different points of view use different languages and interpret the problem differently. However, collective creativity can only emerge if all participants take part in the process of communication and interpretation. Collective creativity relies more on communication breakdowns as a vehicle for innovation. Actually, it is a dialogue between individuals who in some sense share a mutual goal. (Sonnenburg, 2004; Sundholm, Artman and Ramberg, 2004.) Dialogue at its best is a way of creating profound levels of shared meaning in a group so that creative courses of action can emerge. It invites people to participate in the creation of something that may challenge their “own” ideas, feelings and experiences. It also asks people to handle others’ ideas so that they are worthy both for them and for other participants. (Palus and Drath, 2001.) During dialogue novel knowing is constructed by the participants themselves in a socio-cultural context through the interpretation of information and the construction of a common socio-cultural ground, rather than through simply managing information (Pässilä, Oikarinen and Harmaakorpi, 2010; Mahy, 2012).

Communication, particularly when taking place across cultural, geographic, or professional boundaries, needs particular care. Partners on the opposite sides of the structural hole have information of different quality and obtained for their own purposes (Melkas and Harmaakorpi, 2008), which can cause misunderstandings between innovating partners. For example, those sending communications may be clear about the message they are transferring, but they cannot be sure of how the receiver interprets the information. The receivers will understand the message from their perspective. These kinds of interpretive or communicative barriers can hinder idea generation and slow down the implementation of innovations: for example, technical people look at things differently than people in the field. Occupational communities, because of the specialisation inherent in performing their own tasks successfully and their different work experiences (Bechky, 2003), have different perspectives on work and the organisation (Dougherty, 1992). These different perspectives can result in trouble sharing knowledge in a way that would lead to greater understanding. Some organisational members may not understand each other because they apply

and interpret knowledge in different contexts (Tsai and Ghosal, 1998). There is an array of meanings in an organisation. Understanding is situational, cultural and contextual (Bechky, 2003).

In addition, communication is also dependent on the communication channel used. For example, according to Oke and Idiagbon-Oke (2010), where the innovation task is predominantly unanalyzable and requires creativity, high richness communication channels such as face-to-face communication, video conferencing and telephones would be preferred to low richness channels such as documents and memos. The high contact experience that high richness communication channels offer the chances of members developing high social ties are higher than in situations that involve the use of low richness communication channels. On the other hand, their study suggests that if an innovation task is relatively analyzable, then it would be better off adopting low richness communication channels. These kinds of communication channels tend to avoid a negative impact on social ties, associated with high richness communication channels and they also help to attain efficiency in development time.

#### **5.4 Innovation as a social process**

Nowadays, innovation is seen as a social as much as a technical process. Innovations are seen to emerge as non-linear processes deeply embedded in normal social and economic activities (Lundvall, 1988; Schienstock and Hämäläinen, 2001). The concept of social proximity refers to the embeddedness of social relations between actors. The importance of social proximity lies in the fact that social relations not only coordinate transactions but are also vehicles that enable the exchange of knowledge because of mutual trust, kinship and experience as well as external resources to be mobilised (Boschma, 2005; Oerlemans and Meeus, 2005). When there is a close relationship, people are willing to support and encourage innovative ideas, as the individuals involved are able to give the confidence needed to turn ideas into successful projects (Carmona-Lavado, Cuevas-Rodríguez and Cabello-Medina, 2010).

The concept of social proximity comes close to the concept of social capital. Nahapiet and Ghosal (1998, p. 243) define social capital as the sum of the actual and potential resources embedded within, available through, and derived from the network of the relationships possessed by an individual or a social unit. Through interaction, actors are able to access and leverage resources embedded in relationships. Close social interactions permit actors to know each other, to share

important information and to create a common point of view (Tsai and Ghosal, 1998). Social capital affects, for example, the knowledge creation and access to network resources. Social relations, often established for other purposes, constitute information channels that reduce the amount of time and investment required to gather information. (Nahapiet and Ghosal, 1998.)

There is also the danger that social networks start to suffocate because the relation specific capital that is developed over time may lead to a tendency to stick to existing linkages. As Nahapiet and Ghosal (1998) pointed out, interpersonal networks can over time produce strong norms and mutual identification among network members, thus limiting openness to new information and diverse views. In order to avoid negative effects of proximity, such as different lock-ins, there is a need to open the network to outside ideas and expertise.

Some degree of distance and openness tends to increase the potential for new creative ideas and innovation. This is also underlined in the separation between bridging and bonding social capital (Putnam, 2000). Bridging social capital, i.e., making contacts between different groups or networks, is positive effect. At the micro level, this is related to Burt's theory of structural holes (2004), where the optimal position for an individual is between several groups. Bridging social capital creates bonds of connectedness formed across diverse horizontal groups (weak ties), whereas bonding capital connects only the members of homogeneous groups (strong ties) (Granovetter, 1985). This division of social capital into bridging and bonding types becomes crucial since it is essential for both to build an atmosphere of trust and proximity in each innovation network and keep them open to allow the necessary flows of information to take place. Bridging social capital, with the element of distance, is seen to as positive because it brings the individual innovation networks into trusting interaction, enabling, for example, an increase in the absorptive capacity of these networks. (Tura and Harmaakorpi, 2005.)

## **5.5 Cultural readiness to open innovation**

The literature on organisational innovation emphasises the importance of organisational culture as crucial to an organisation's ability to innovate (Mumford, 2000; Martins and Terblanche, 2003; van der Panne, van der Beers and Kleinknecht, 2003; Miron, Erez and Naveh, 2004). According to Gassman, Enkel and Chesbrough (2010), opening up the innovation activities starts with the mindset. A culture conducive to innovativeness fosters an organisation-wide recognition of the necessity to innovate and values outside knowledge and expertise as source of innovation. An

organisational culture is a set of beliefs and values shared by members of the same organisation. These beliefs and values are taught to new members as the way to perceive, think, feel, behave, and expect others to behave in the organisation. Culture reflects a common way of thinking, which drives a common way of acting in the organisation. Organisational culture affects, for example, the extent to which creative solutions are encouraged, supported or implemented. Organisational culture is developed over time as people in the organisation learn to deal successfully with problems of external adaptation and internal integration (Shein, 1996). Culture is long standing, deeply rooted and often slow to change (Tan, 1998).

Organisational culture is socially constructed. It is created and changed through interaction and conversations. Each conversation makes meaning of observable actions and reinforces, builds upon, or challenges current cultural norms and beliefs. Social constructionism maintains that there are many interpretations available on any particular subject and each organisational culture will live according to a certain set of interpretations depending on organisation's history and interpretation of events. (Berger and Luckmann, 1994; Burr, 1995; Searle, 1995). Every organisation and even their subunits have a culture of their own, that influences how their members think, feel and act. Subcultures tend to have a common, usually tacit understanding of how things work challenging the creation of a common ground that leads to shared understanding between subcultures. The creation of innovation is therefore a complex process involving the understandings of different organisational cultures and subcultures (Beckhy, 2003).

The importance of culture in innovation activities is that it can stimulate innovative behaviour among the members of an organisation, since it can lead them to accept innovation as a basic value of the organisation and can foster commitment to it (Hartmann, 2006). According to Martins and Terblanche (2003), the basic elements of culture have a twofold effect on creativity and innovation – from the perspectives of socialization and of coordination. Through socialization, individuals can know whether creative and innovative behaviours are part of the path the business treads. At the same time, the business can, through activities, policies and procedures, generate values which support creativity and innovation, and its innovative capacity will subsequently improve.

According to previous research, organisational culture can also hinder creativity and innovation. For example, Mone, McKinley and Baker (1998) note that ideas consistent with the organisation's current mission and core values are far more likely to garner support and be successfully implemented. This kind of tendency may make it difficult for employees to pursue more radical

ideas. It is also assumed that in organisations that value individual efforts and that view creativity as a fundamentally individual process, it is unlikely that the employees engage in activities that support collective creativity (Hargadon and Bechky, 2006). Csikszentmihalyi and Sawyer (1995) suggest that the challenge for organisations is to create cultures that direct internal creativity (i.e., technology, structures, staff and individuals) towards external creativity (which includes customers, competitors, suppliers and governments), resulting in increased market share and customer satisfaction.

Cultural resistance to innovativeness may arise from entrenched routines that inhibit people from looking beyond their own duties and ways of how things have always been done, as well as from stress associated with change and uncertainty. This tempts employees to focus solely on their own tasks and responsibilities. As a result, barriers arise when looking for solutions that surpass individual responsibilities. This is in conflict with the inherent collective nature of innovation projects that demands all participants to work towards a common objective (Dougherty, 1992).

## **5.6 Organisational arrangements to support open innovation**

Organisational practices are very relevant to the issue of innovation because innovation also depends on the capacity to coordinate the exchange of complementary pieces of knowledge owned by a variety of actors within and between organisations. Organisational proximity is believed to be beneficial for innovation. This concept refers to a set of interdependences within as well as between organisations. In principle, a hierarchical organisation or tight relationships between organisational units can provide solutions to uncertainty and opportunism that are related to new knowledge creation. For example, the transfer of complex knowledge requires strong ties because of the need of feedback; but strong ties may limit access to various sources of novel information. It is argued that loosely coupled systems can safeguard organisational autonomy within and between organisations and access to complementary sources of information. (Boschma, 2005; Knoblen and Oerlemans, 2006; Rallet and Torre, 2005).

External knowledge and ideas can only be recognised, accessed and assimilated when organisations develop new practices and change their organisational structure to facilitate open innovation processes. Although the debate over the most appropriate organisational structure for creativity and innovativeness is ongoing, there is general agreement that mechanic organisational structures

characterised by pronounced levels of bureaucracy, formalisation and control are in conflict with the trial-and-error character of innovation processes (Damanpour, 1991; van de Panne, van der Beers and Kleinknecht, 2003). The issue of structure is not clear-cut. Research suggests that successful innovative organisations are typically loosely structured during their fuzzy front end phase of innovation but evolve into more formal structures as their products and processes become better defined (van de Panne, van der Beers and Kleinknecht, 2003; Parzefall, Seeck and Leppänen, 2008).

Gittel and Weiss (2004) noticed that the boundaries between inter and intra-organisational relationships are often blurred, with, for example, intra-organisational boundaries across departments or units sometimes being more sharply defined than relationships across organisations. However, interaction between different departments has been shown to influence innovation and new product success (Moenaert et al., 2000). A number of studies have considered the use of cross-functional teams in the innovation process and their effect on innovation outputs. Zeller (2002), for example, describes the introduction of cross-functional teams as part of the restructuring of R&D activities within pharmaceutical companies in a response to the increasing globalization of R&D: “Implementing new organisational structures such as cross-functional project teams, the pharmaceuticals pursued the goals of accelerating all relevant processes, in particular the development times, maintaining or improving innovative capabilities and integrating R&D operations located at different places” (Zeller, 2002, p. 279). Zeller also stresses the importance of project teams in developing stronger interconnectedness between discovery, development and marketing activities and exploiting potential complementarities.

## **5.7 Temporal complexity in innovation**

Ideally, creative work should not be bound by the complexity of time (Amabile, Hadley and Kramer, 2002), but at least in an organisational context they are often time influenced to balance organisational needs with the competitive benefits of such undertakings. With the increased focus of work toward a task and not the time to carry it out, an awareness of the objective and subjective dimensions of temporal complexity is highlighted. In particular, the competencies both to conceptualize and manage the temporal context and to initiate the appropriate temporal structure of innovative undertakings are becoming critical as innovation centres and creative work in organisations become increasingly distributed and as the virtual domain overtakes traditional face-

to-face communication as the context of cross-border teamwork among creative people (Cascio and Shurygailo, 2003; Thoms and Pinto, 1999). In other words, the awareness of the complex and multidimensional nature of time and the variations in the concept of time by culture and individuals may contribute to the dynamic competencies in attempts to initiate structure to the temporal realities of tasks while considering individual time-related differences when fostering innovation (Halbesleben et al., 2003).

The temporal complexity is related to, for instance, how organisations perceive future and how they use their networks to get weak signals. Innovation is often considered to be path-dependent. This path-dependency may lead to lock-ins to existing production and systems (Pihkala, Harmaakorpi and Pekkarinen, 2007). At the organisational level, path-dependencies and satisfying behaviour tend to strengthen the surveillance and mental and power filters of information (Ansoff, 1975), thus gradually diminishing the organisation's ability to identify signals of change (Könnölä, Brummer and Salo, 2007). The surrounding environment is changing all the time, giving weak signals of future trajectories (Uotila, 2008).

Technological and institutional path-dependence may limit the range of technological options, visions and value networks and that way reduce innovation capabilities in the long term (Könnölä, Brummer and Salo, 2007). Networks keep organisations up-to-date with changes in the economy and allow them to take advantage of opportunities to innovate, thus remaining ahead of their competitors. Strong tie networks generally supply signals in a familiar language which is easy to understand. In addition to this, however, the most dynamic organisations also have contacts with weak tie networks, which are further removed from the usual behaviours of entrepreneurs and provide weak signals that, while difficult to grasp and decode, nevertheless offer new, pre-competitive information that can support major innovations. (Julien, Andriambeloson and Ramangalahy, 2004.)

Diversity is likely to be particularly vital especially in times of discontinuous radical changes that replace existing components or entire systems and, at the same time, destroy old competences and create new value networks (Könnölä, Unruh and Carrillo-Hermosilla, 2006). In that kind of situations, decisions have to be made in great uncertainty. According to Uotila, Harmaakorpi and Melkas (2006), this uncertainty can be reduced by creation of future-oriented knowledge. Future-oriented knowledge is often very challenging to use in an actor's renewal process since the possible futures are hard to outline, future-oriented knowledge is even more abstract than tacit knowledge,



and due to its nature, future-oriented knowledge is hard to adopt in an actor's organisational learning processes and strategic routines. To make use of future-oriented knowledge, actors need to have visionary capability, which refers to an actor's ability to outline the potential development directions by utilising the opportunities emerging from the changing techno-economic paradigm (Harmaakorpi, 2004).

### **5.8 Virtuality as a possibility to shorten geographical distance**

The importance of geographical proximity in innovation lies in the fact that small geographical distances facilitate face-to-face interactions (both planned and serendipitous) and, therefore, foster knowledge transfer and innovation. The main reasoning behind these effects is that short geographical distances bring organisations together, favour interaction with a high level of information richness and facilitate the exchange of especially tacit knowledge between actors (Torre and Gilly, 2000). The larger the geographical distance between actors, the more difficult it is to transfer these tacit forms of knowledge. This is even argued to be true for the exchange and use of codified knowledge because its interpretation still requires tacit knowledge, and thus geographical proximity (Howells, 2002).

Recently, several authors have put forward the notion of temporary geographical proximity (e.g., Hyypiä and Kautonen, 2005; Rallet and Torre, 2005). This notion implies that actors need not be in constant geographical proximity when collaborating but that meetings, short visits and temporary co-location might be sufficient for actors to build other forms of proximity (such as organisational), which subsequently allow collaboration over large geographical distances. Moreover, it can be argued that geographical proximity is only necessary in certain phases of (innovative) collaborations, such as during the production of fundamental and tacit knowledge or during negotiations, but not during others, such as the codification or commercialization phase (Rallet and Torre, 1999; 2005).

One of the practical solutions in trying to overcome the challenges of geographical distance has been the implementation of virtual innovation teams. A virtual team is generally defined as a functioning team that relies on technology-mediated communication while crossing several boundaries, such as geographical, temporal, and organisational boundaries (Martins, Gilson and Maynard, 2004). Virtuality can be seen as a characteristic of all organisations to some extent, and

organising operations virtually can be done at the level of the whole organisation, not only virtual teams. It is a novel organisational form which also changes many of the current practices, tools and processes in organisations, including innovation activities. Through virtual teams, organisations aim at making their processes more effective in terms of speed, flexibility and costs, both internally and externally. (Lampela, 2009.)

Virtual co-creation can support the participation of previously unavailable expertise into the creation of innovation. Advancing information and communication technologies also offer new solutions for efficient collaboration between the organisation and the customer (e.g., Verona, Prandelli and Sawhney, 2006; Füller and Matzler, 2007; Füller, 2010; Antikainen, Mäkipää and Ahonen, 2010). The key benefits of virtual customer integration are the direction of the communication, as the internet leads to an interactive dialogue with the customers; intensity and richness of the interaction, as the richness of interaction with virtual communities enables organisations to tap into the social knowledge of customers in addition to the individual knowledge; and the size and scope of the audience, as even physically remote customers can be reached at low costs (Sawhney, Verona and Prandelli, 2005).

Virtuality presents many positive aspects such as the possibility to use the competencies of the participants effectively, and speed and flexibility. Virtual idea generation may also facilitate creativity because it is possible to limit verbal interaction and exchange ideas by typing on computers (e.g., Nunamaker, Applegate and Konsynski, 1987). Writing ideas instead of talking about them in groups eliminates the problem of production barriers since individuals do not have to wait for their turn to generate ideas and can generate ideas at their own pace. It may also reduce evaluation apprehension since the written format eliminates the need for public speaking and is more anonymous than oral brainstorming. (Paulus, 2000.)

Limitations of virtual teams involve the decrease in productivity due to the lack of face-to-face communication and interaction and the distrust arising among the members as a result of insufficient communication. A considerable loss in the innovation potential among the virtual teams due to a considerably large geographical and cultural distance among the team members has also been indicated (Lojeski, Reilly and Dominick, 2006). One central question in the research on virtual co-creation is how participants like customers can be motivated to participate and collaborate in virtual co-creation (Antikainen, Mäkipää and Ahonen, 2010). According to Füller (2010), consumers' motives in contributing to co-creation may be heterogenous. Differently motivated

consumer groups may have different expectations towards the co-creation process, the content, as well the co-creation partners.

Antikainen, Mäkipää and Ahonen (2010) suggest that using different kinds of tools that allow participants to express themselves and also share some personal details will affect the motivation of participants. A greater sense of collective working was also suggested, for instance, using a web camera and organising real-time sessions. This also means that the management and facilitation of virtual teams differs from a face-to-face situation. Cascio and Shurygailo (2003) stress that leaders of virtual teams should carefully consider when to use virtual environments and what kinds of behaviours are most likely to enhance a virtual team's ability to function effectively. For example, effective virtual co-creation with customers requires certain knowledge and skills, which not every organisation has (Füller and Matzler, 2007). Sawhney, Prandelli and Verona (2003) note that it may be advisable to rely on so called "innomediaries", which are third party actors who facilitate the mediated innovation and are specialized in virtual dialogue with communities.

## **6 Brokerage functions in creating possibilities for collective creativity**

### **6.1 Intermediating in innovation**

The networking perspective on innovation emphasises the importance of the connectivity of a heterogeneous group of actors and the importance of exploring and exploiting weak ties (Granovetter, 1973) and structural holes (Burt, 2004). The formation and functioning of these kinds of innovation networks can be problematic because of the existence of several challenges between innovating partners, as seen in the previous chapter. These challenges could also be described using the concepts of distance and proximity. In innovation activities there is a need to have the right kind of balance between distance and proximity. In order to use these distances as an innovation potential, there is a growing attention to having intermediaries facilitate innovation processes (van Lente et al., 2003).

Intermediaries emerged as a result of the knowledge complexities and distances between actors (Cillo, 2005) and they play different roles in innovation (Diener and Piller, 2009). Intermediaries act, for example, in the midst of the user and the producer of knowledge (Smedlund, 2006) as a member of the network enabling other actors to innovate (Winch and Courtney, 2007), diffuse and transfer technology (Howells, 2006), in overall product development (Hargadon and Sutton, 1997), in creating networks for the information flow (Howells, 2006), and also in Knowledge Intensive Business Services (KIBS) (Muller and Zenker, 2001). Table 5 gives more information about the different roles of intermediary organisations in innovation activities.

Intermediaries could act at different levels. According to Smedlund (2006), national, regional and local intermediaries have distinct roles from the point of view of the innovation, development and production networks of a regional cluster of small firms. For example, national intermediate organisations support the joint projects in innovation, provide national forums of knowledge sharing, and influence the institutional environment for production. Regional intermediate organisations are related to the overall strategy of the region and promote the co-operation between different actors, form relations and attract anchor tenants to the region. The local intermediaries function as hubs in the networks, coordinate forums of knowledge sharing and provide knowledge intensive business services to firms. In this dissertation, intermediaries are seen as regional actors.

Table 5. Roles of intermediaries.

Study	Roles
Smedlund, 2006	The regional intermediaries have the most important role in the creation and supporting of the network dynamics. The most critical roles include forming shared innovation strategies between the actors and attracting anchor tenants to the region.
Winch and Courtney, 2007	Innovation brokers are organisations that are founded especially to undertake an intermediary role, rather than performing that role as a by-product of their principal activities. The key role played by innovation brokers in the innovation process is the independent validation of new ideas, thereby facilitating diffusion. In order to carry out this task, innovation brokers are organized on a not-for-profit basis, typically as a public-private partnership.
Howells, 2006	Intermediaries provide a much wider, more varied and holistic role for their clients in the innovation process than has generally been acknowledged. Innovation intermediaries may have systemic value in policy terms in an innovation system. This is not only in terms of improving connectedness within a system, particularly through bridging ties, but also in its “animateur” role of creating new possibilities and dynamism within a system.
Hargadon and Sutton, 1997	An organisation acts as a technology broker by introducing solutions where they are not known, and in the process creates new products that are original combinations of existing knowledge from disparate industries.
Muller and Zenker, 2001	KIBS play an important role in innovation systems. They show a considerable innovation and growth potential and support economic development at regional and national levels. KIBS do not only “transmit” knowledge, but in fact they play a crucial role in terms of “knowledge re-engineering”.

Intermediaries include third parties, brokers, bridging organisations, technology transfer intermediaries, and boundary organisations. To describe these organisations, Howells (2006) uses the broad term innovation intermediary, which he defines as “an organisation or body that acts as an agent or broker in any aspect of the innovation process between two or more parties”. Dalzier (2010) defines innovation intermediaries as organisations that work to enable innovation, either directly by enabling the innovativeness of one or more organisations, or indirectly by enhancing the innovative capacity of regions, nations, or sectors. The focus of her definition is on organisational purpose. That way it is possible to identify a class of organisations that are intermediaries and to

distinguish this class of organisations from other organisations. Accordingly, industry and trade associations, economic development agencies, chambers of commerce, science and business parks, business incubators, research consortia and networks and research institutes can all be classified as innovation intermediaries insofar as their organisational purpose is to enable innovation.

The provision of innovation intermediation functions may be more or less central to an organisation's identity, and it may often not be their primary role, as Howells (2006) argues. Organisations providing intermediation functions do not solely or even wholly restrict themselves to intermediary functions, but also cover more traditional services which do not involve third-party type collaboration. Winch and Courtney (2007) define innovation intermediaries that have brokerage as their main task as innovation brokers. An innovation broker is defined as an organisation acting as a member of a network of actors in an industrial sector that is focused neither on the generation nor the implementation of innovations, but on enabling organisations to innovate. Furthermore, they state that such brokers represent an additional type of intermediary in innovation networks from those reviewed by Howells (2006) because their sole purpose is to act as a broker, rather than brokerage functions being a by-product of their principal activity. With a similar perspective, van Lente et al. (2003) present a separation between “traditional” innovation intermediaries, who are often also sources or carriers of innovation or are organisationally attached to the sources of the carriers of innovation, and “new” innovation brokers who fulfil a more independent systemic role and adhere more to the role of facilitating innovation.

In this dissertation, innovation intermediaries are considered to be organisations that play a broker role either as their primary role or as a by-product of their other activities. The role of these organisations is close to the view of van Lente et al. (2003) of an intermediary as an independent facilitator of innovation activities in organisations, networks or in a region. The brokerage functions may be carried out by an innovation intermediary or individual (Hargadon, 2002; de Sousa, 2006; Uotila, 2008). In this dissertation, brokers are considered to be individuals who work in the innovation intermediaries.

## 6.2 The literature about brokers

The concept of technology brokerage<sup>1</sup> was first introduced by Hargadon and Sutton (1997). The concept of technology brokerage is rooted in the theory of structural holes, which explains how certain organisations can play a key role in bridging knowledge gaps in a market (Burt, 1992). Hargadon and Sutton (1997) show how the innovation activities of an organisation could benefit from its inter-industrial and inter-organisational technology exposure. Technology brokers could be defined as actors who improve innovation by transporting ideas between unconnected industries, blending old technologies with new ones in order to stimulate innovation, and transferring these new combined technologies to new contexts (Verona, Prandelli and Sawhney, 2006).

According to Hargadon and Sutton (1997), technology brokerage across industries is a four-step process that involves:

- Access — i.e., filling the gap in the flow of technology between industries and between firms by occupying a central node, or a “bridging” position, between subgroups of a more extended network of industries and firms that do not interact with each other
- Acquisition — absorption of knowledge about a specific technology through intensive inter-industrial exposure and in-depth experimentation activity
- Storage — memorizing the solutions by way of people, artefacts, and concepts in the organisation
- Retrieval — applying the stored and old technological solutions to create new solutions by using analogical thinking and brainstorming procedures

Recently, the concept of technology brokerage has been associated with the more general concept of knowledge brokerage (Hargadon, 1998; Hargadon and Sutton, 2000; Sutton 2002; Hargadon, 2002). Knowledge brokers may be defined as “intermediaries ... between otherwise disconnected pools of ideas. They use their in-between vantage points to spot old ideas that can be used in new places, new ways and new combinations” (Hargadon and Sutton 2000, p. 158). Further empirical evidence highlights the presence of a similar brokerage cycle consisting of network access, knowledge absorption, knowledge integration, and implementation, whose objective is not simply technological knowledge but any kind of organisational knowledge that can support a specific invention (Hargadon and Sutton, 2000; Hargadon, 2002). According to Verona, Prandelli and

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<sup>1</sup> In the research literature, both “brokering” and “brokerage” are used, but in this dissertation, the concept of “brokerage” is used for reasons of clarity.

Sawhney (2006), moving from technology brokerage to a more general process of knowledge brokerage is an important generalization of the brokerage concept. According to them, literature on innovation has historically been primarily focused on the role of technological knowledge and has not valued organisational or customer knowledge.

Information and communication technologies, including the internet, have greatly enhanced the ability of organisations to expand their repertoire of knowledge by engaging external actors in the innovation process. Enhanced connectivity allows customers and users to become active contributors and collaborators in an innovation processes (Prahalad and Ramaswamy, 2004; Verona, Prandelli and Sawhney, 2006). The internet enables the creation of virtual customer environments or platforms that allow organisations to tap into individual and social customer knowledge through an ongoing dialogue (Sawhney, Verona and Prandelli, 2005; Füller and Matzler, 2007; Antikainen, Mäkipää and Ahonen, 2010).

Organisations can benefit greatly from engaging directly with customers in virtual environments, but Verona, Prandelli and Sawhney (2006) stress that direct engagement is not necessarily enough. To fully leverage the power of virtual environments, they propose that organisations need to combine direct channels of customer connection with mediated channels that include virtual knowledge brokers. These virtual knowledge brokers manage their own virtual environments and provide these environments as a service to organisations. In so doing, they extend a firm's scope of interaction to include knowledge that comes from diverse and previously disconnected sources. Compared to knowledge brokers, virtual knowledge brokers have specialised competences such as web-specific knowledge that they can use to facilitate innovation by enhancing the reach and richness of interactions between organisation and their customers in virtual environments (Verona, Prandelli and Sawhney, 2006).

Although the role of external brokers has become increasingly popular in recent years (e.g., Hargadon, 2002; Verona, Prandelli and Sawhney, 2006), some studies have focused their attention on the role played by internal brokers. Internal brokers have been defined as individuals who provide connections between communities of practice and transfer elements of one practice to another to enable coordination, and through these activities they can create new opportunities for learning (Wenger, 1998). Similarly, Brown and Duguid (1998) introduce the concept of brokers to refer to people participating in multiple communities and facilitating the transfer of knowledge



between them. Brokers do not, therefore, merely act as agents or negotiators, but manipulate knowledge before transferring it from one context to another.

A critical function of knowledge brokerage is translating local knowledge so that it can be understood by the different units or communities in the organisation (Becky, 2003). Cillo (2005) stresses that when contexts are characterised by rapid technological and market changes, these internal brokers might prove to be extremely useful. For example, when market knowledge is very complex and there is no common world and language in the organisation, the process of sharing and using this knowledge can be enhanced by internal knowledge brokers.

A summary of the relevant literature concerning brokers is presented in Table 6. These studies highlight that the brokerage is a process that consist of different kinds of activities in supporting companies' innovation activities. In this process, having different kinds of expertise allows for the challenge to be studied from many perspectives by recombining existing ideas. The challenges and different contexts of brokerage functions may also demand specified broker roles.

Table 6. Summary of the relevant literature concerning brokers.

Study	Data	Results
Hargadon and Sutton, 1997	The study was conducted at IDEO, the largest product design consulting firm in the United States, using ethnography.	<ul style="list-style-type: none"> <li>• The model of technology brokerage: access, acquisition, storage and retrieval</li> <li>• Innovation through brokerage may generalize beyond technological innovations within the product development process</li> <li>• Different kinds of experts often build innovative new ideas by recombining existing ideas</li> <li>• Technology brokerage offers a perspective on innovation and innovators that recognize the value of not the invention but of the inventive combination</li> </ul>
Hargadon, 2002	Eight knowledge brokerage organisations	<ul style="list-style-type: none"> <li>• The process model of knowledge brokerage: network access, knowledge absorption, knowledge integration, and implementation</li> <li>• The innovation potential is found in recombining existing ideas from other domains</li> <li>• Knowledge brokerage involves cognitive, social and structural activities</li> </ul>
Verona, Prandelli and Sawhney, 2006	Virtual customer environments of different knowledge brokerage organisations	<ul style="list-style-type: none"> <li>• The concept of virtual knowledge brokers — actors who leverage the internet to support the innovation activities of third parties</li> <li>• Knowledge brokerage can play a major role in virtual environments by amplifying the network accessed by any firm that needs market knowledge for innovation</li> <li>• New mediators specialized in customer knowledge absorption can support the firm's innovation processes by leveraging virtual environments in a way that stretches the opportunities available for the individual firm both in time and space</li> </ul>
Cillo, 2005	Data on four companies facing the challenge of continuous innovation in different industrial settings	<ul style="list-style-type: none"> <li>• Companies rely on the use of internal knowledge brokers to absorb market knowledge, drive knowledge sharing, and favour the process of innovation</li> <li>• Different types of internal brokers: Information Broker, Knowledge Coder, Integrated Knowledge Broker, and Pure Knowledge Broker</li> <li>• The type of internal broker needed depends on some key variables, such as the complexity of the task he has to deal with or the frequency of interaction between the broker and the actors he deals with in the innovation process</li> </ul>

### 6.3 Brokerage functions

In the literature, a great number of functions are attributed to brokers (van Lente et al., 2003). Howells (2006) made an extensive review of the existing literature and came to identify the following functions: foresight and diagnostics; scanning and information processing; knowledge processing and combination/recombination; gatekeeping and brokering; testing and validation; accreditation; validation and regulation; protecting the results; commercialization; and evaluation of outcomes. In his case study of an organisation that manages a program of triple helix projects, Johnson (2008) defined broker functions in terms of roles and speaks about the roles of mediator/arbitrator, sponsor/funds provider, filter/legitimater, technology broker, and resource/management provider.

According to van Lente et al. (2003), there appear to be three basic functions for brokers: demand articulation, network composition and innovation process management. Demand articulation comprises the diagnosis and analysis of a problem and the articulation of the needs of the organisation. This could include, for example, providing advice on what the client company should do in the future with regard to analytical activities or how it should react to a changing environment (Howells, 2006). Uotila (2008) sees it as important that knowledge brokers actively seek contacts and tap into organisations carrying out foresight processes and constantly seek information produced in foresight processes worldwide.

Network composition refers to making external relations available to an organisation. This means the scanning, scoping, filtering and matchmaking of sources of complementary assets such as knowledge, material and funding (Howells, 2006; Kolodny et al., 2001). Brokers help to access the variety of tangible and intangible resources that are needed to realise an innovation (Smart, Bessant and Gupta, 2007). Burt (2004) suggested that brokers focus on establishing ties to other disparate or disconnected groups, so they can then bring together members of the two groups who would otherwise be more difficult to connect. In her study of global intellectual capital brokerage, Törrö (2007) underlines that the services of a broker are needed when the access to the other party is missing. Companies consider brokers to be helpful when trying to establish unobvious ties in broader networks to develop or absorb new technologies, commercialise new products or simply to stay in touch with the latest technological developments.

Innovation process management primarily relates to enhancing communication, learning and other forms of interaction, and alignment among partners facilitates the attribution of intellectual property rights and the commercialization of innovation outcomes (Klerkx and Leeuwis, 2008). Innovation process management is the process of creating an atmosphere that stimulates knowledge sharing and learning, enabling a fair distribution of the costs and benefits between innovation network members and anticipating and resolving conflicts between the members (Batterink et al., 2010). Brokers are also defined as the holding glue keeping the network together by taking care of day-to-day network management issues, enhancing trust and resolving conflict (Kingsley and Malecki, 2004).

Melkas and Harmaakorpi (2008) have examined brokerage functions in regional innovation networks. Their main focus is set on investigating data, information and knowledge quality as well as their relation to brokerage functions in regional innovation networks. According to them, practical tasks for a broker could contain: a definition of the operational logic of the innovation network with regard to data, information and knowledge; identification of the necessary flows of data, information and knowledge, as well as potential bottlenecks in these flows; identification of the roles of actors in relation to data, information and knowledge and a consideration of the needs of the different roles (information producers, information custodians, information consumers, information brokers and so forth); consideration of strategic versus tactic/operational gains that can be brought about by a good level of data, information and knowledge quality; and identification of the necessary data, information and knowledge quality for different types of materials, conversion phases and processes. (Melkas and Harmaakorpi, 2008.)

The broker's role is essentially that of an interlocutor: to help other actors transfer, translate or transform the meanings encountered during joint activities (Carlile, 2004). A broker translates knowledge created in one group into the language of another so that the new group can integrate it into its cognitive portfolio (Kimble, Grenier and Goglio-Primard, 2010). There may also be information gaps. Actors are imperfectly informed about possible cooperation partners and what these can offer, i.e., there exists information asymmetry (Bougrain and Haudeville, 2002). For example, in order to be able to utilise the innovation potential in structural holes in practice-based innovation, information should often be transferred between very research-oriented and practice-oriented partners, as well as between partners with totally different horizontal knowledge interests. A remarkable part of the difficulties between potential innovating partners stem from an information asymmetry on different sides of a structural hole (Melkas and Harmaakorpi, 2008). To

manage this, brokers must be able to manage the relations between individuals as well as act as translators. The broker's role is a delicate balancing act. To be effective, brokers need to have authority within all of the groups to which they belong. They need to be able to evaluate the knowledge produced by the different groups and to earn the trust and respect of the various parties involved. (Kimble, Grenier and Goglio-Primard, 2010.)

The literature identifies a number of central values or design requirements that are needed to maintain a brokerage position. A key premise of the facilitator role of brokers is an impartial or neutral and independent position, i.e., that they do not adhere to certain preferred suppliers, network partners, or preferred development strategies (Winch and Courtney, 2007; Johnson, 2008). In the context of the provision of innovation brokerage services to SMEs, Kolodny et al. (2001) formulated a number of design requirements that they see as essential for the proper functioning of innovation brokers: (1) visibility and accessibility to SMEs, (2) trustworthiness to SMEs, (3) access to appropriate sources of knowledge and information relevant to the innovation process, (4) credibility of the intermediary organisation with these sources, (5) a quick response to the requests of SMEs, and (6) complementarity to the weaknesses of the SMEs it serves.

The application of different brokerage functions depends on the requirements of the innovation network in the different phases of its development (Boon et al., 2008) and the composition of the network in terms of tie density and strength (Winch and Courtney, 2007). For example, in the early stages of innovation processes brokers contribute to reducing uncertainty when there is a high risk of failure, which would preclude private parties from innovating. Brokerage functions are not necessarily applied in a linear fashion. It may be necessary to re-articulate demand and re-compose networks during the innovation process (Sapsed, Grantham and DeFilippi, 2007; Jonhson, 2008). Sapsed, Grantham and DeFilippi (2007) show in their study that the effectiveness of brokerage activity depends on the brokerage capabilities.

Brokerage functions can be targeted at individual firms and clusters or networks of firms. At the organisational level, brokerage enhances the dynamic capabilities of the organisation in markets characterized by rapid changes. Additionally, brokerage functions can also be targeted at innovation systems that involve complex constellations of business, government, and societal actors, dealing with complex problems. (Klerkx and Leeuwis, 2009.) Hekkert et al. (2007) have proposed several functions which brokers could contribute for innovation systems, such as knowledge diffusion through networks, guidance for the search of knowledge, resources mobilization, and creation of

legitimacy/counteracting resistance to change. At the innovation system level, innovation brokers create connectedness within the system and new possibilities and dynamism within a system, acting as catalysts (Howells, 2006; Sapsed, Grantham and DeFilippi, 2007; Johnson, 2008).

#### **6.4 Effects of brokerage on collective creativity**

Social interaction is thought to enhance creativity (Sutton and Hargadon, 1996; McFadyen and Cannella, 2004). There is still controversy over the optimal structure of the social interaction and over the relative creative benefits of brokerage between otherwise disconnected people and a cohesive social structure in which most people have strong ties to everyone else in the network (Hargadon and Sutton, 1997; Burt 2004; Obstfeld, 2005; Reagans and McEvily, 2003; Uzzi and Spiro, 2005). Table 7 introduces mixed empirical results related to cohesion and brokerage.

Collaboration in a cohesive network in which most individuals have strong ties to each other is said to enhance creativity because of social capital (Coleman, 1988). The closed social structures engender greater trust among individuals (Reagans and McEvily, 2003; Uzzi and Spiro, 2005). Cohesion occurs when individuals have dense and overlapping ties with each other and this enables individuals to act collectively, making it easier to detect and punish undesirable behaviour, which in turn makes it easier for members of the same group to develop group norms and to trust each other (Coleman, 1988).

Coleman's (1988) arguments imply a variety of benefits for individual and collective creativity. If networks with strong ties are trusting networks where people share information and knowledge voluntarily with those they trust, then closed networks will promote better information flow than open networks will. Creative efforts usually benefit from new information, and therefore this better information flow should enhance creativity (Perry-Smith and Shalley, 2003; Perry-Smith, 2006). Strong ties also facilitate the exchange of tacit, complex or proprietary information (Reagans and McEvily, 2003). Non-information resources also flow more easily between people who, because they trust each other, have less fear of theft or damage and a greater expectation of repayment or reciprocity. The ability to collaborate depends largely on trust. Reciprocity and knowledge sharing will not exist without trust. Trust facilitates positive affect, learning and risk taking, which are all considered to be crucial components of creativity (Amabile et al., 2005).

Table 7. Cohesion and brokerage in research literature.

Cohesion	Brokerage
<p>Reagans and McEvily (2003) propose that social cohesion around a relationship affects the willingness and motivation of individuals to invest time, energy, and effort in sharing knowledge with others. The network range, ties to different knowledge pools, increases a person's ability to convey complex ideas to heterogeneous audiences. Both social cohesion and network range ease knowledge transfer, over and above the effect for the strength of the tie between two people.</p>	<p>According to Hargadon and Sutton (1997) the firm exploits its network position to gain knowledge of existing technological solutions in various industries. It acts as a technology broker by introducing these solutions where they are not known and, in the process, creates new products that are original combinations of existing knowledge from disparate industries.</p>
<p>Obsfeldt (2005) examines the microprocesses in the social networks of those involved in organisational innovation and their strategic behavioral orientation toward connecting people in their social network by either introducing disconnected individuals or facilitating new coordination between connected individuals. This tertius iungens (or "third who joins") strategic orientation, contrasts with the tertius gaudens orientation emphasised in structural holes theory, which concerns the advantage of a broker who can play people off against one another for his or her own benefit. Results of a multimethod study of networks and innovation in an engineering division of an automotive manufacturer show that a tertius iungens orientation, dense social networks, and diverse social knowledge predict involvement in innovation.</p>	<p>Burt (2004) outlines the mechanism by which brokerage provides social capital. Brokerage across the structural holes between groups provides a vision of options otherwise unseen, which is the mechanism by which brokerage becomes social capital. Burt studies the networks around managers in a large American electronics company. The organisation is rife with structural holes, and brokerage has its expected correlates. Compensation, positive performance evaluations, promotions, and good ideas are disproportionately in the hands of people whose networks span structural holes. The between-group brokers are more likely to express ideas, less likely to have ideas dismissed, and more likely to have ideas evaluated as valuable.</p>
<p>Uzzi and Spiro (2005) analysed the small world network of the creative artists who made Broadway musicals from 1945 to 1989. They found that the varying "small world" properties of the systemic level network of these artists affected their creativity in terms of the financial and artistic performance of the musicals they produced. The small world network effect was parabolic; performance increased up to a threshold, after which point the positive effects reversed.</p>	<p>Cross and Cummings (2004) argue that individual performance in knowledge intensive work is associated with properties of both networks and ties. Networks can yield benefit via awareness of and access to nonredundant information. Ties such as relationships crossing organisational boundaries, physical barriers and hierarchical levels, also provide opportunities to gather unique information and consider diverse perspectives when completing tasks at work. Egocentric and bounded network data from 101 engineers within a petrochemical company and 125 consultants within a strategy consulting firm support the contention that both networks and ties are related to individual performance in knowledge intensive work.</p>

While proponents of cohesion often base their arguments on Coleman's model of social capital (Coleman, 1988), proponents of brokerage often build on Granovetter's (1973) concept of the strength of weak ties or on Burt's (2004) concept of the structural hole. According to Granovetter (1973), the ties within closed networks tend to be strong, in the sense that a person invests a disproportionate share of his or her finite social resources in relationships with a few other people. Thus, strong and cohesive networks make connections to dissimilar social circles less likely. In open networks, ties tend to be weaker and are more likely connect people with different interests and diverse perspectives. If creativity requires fresh information and new perspectives, then people within open networks will be more creative, assuming that information is freely shared. Brokers occupy the most advantageous position at the nexus of diverse information. In this position they have the best opportunity to generate new ideas and combinations (Hargadon and Sutton, 1997; Burt 2004).

From the structural perspective, brokers that bridge structural holes tend to have better ideas and individually benefit from them. Burt (2004; 2005) has demonstrated that brokerage across structural holes between organisations produces more ideas and new knowledge. This is because individuals within groups tend to have more homogeneous ideas and brokers who bridge different groups gain exposure to a greater variance of ideas. Moreover, people with contacts in many different areas are more likely to see bridges between otherwise disparate fields (Burt, 2004) and are thus able to contribute to creative and innovative outcomes (Hargadon and Sutton, 1997; Perry-Smith and Shalley, 2003; Perry-Smith, 2006).

If creativity is a collective act as described by Hargadon and Beckhy (2006), then brokers in the collaborative context must not have a good idea themselves but they must be able to elicit and synthesise the ideas of others (Lingo and O'Mahony, 2010). Brokerage based on structural holes has been criticized as being at odds with the creation of collective outcomes (Ibarra, Kilduff and Tsai, 2005). Obstfeld (2005, p. 120) argues that the language of structural holes is one "of competition, control, relative advantage, and manipulation". According to Lingo and O'Mahony (2010), this kind of assumption that the benefits that flow from the broker's position only flow back to the broker is a natural one, but it is also risky. The research of Lingo and O'Mahony (2010) shows that brokers on creative projects draw on both approaches to integrate creative ideas. In their study, the producers who acted as brokers did not use one type of brokerage earlier in the process and another type later in the process. Instead, the brokers interwove approaches throughout the creative process, pursuing a dialectic approach to managing the dualities of generating creative



options and synthesising them into a cohesive whole. For example, brokers connected others to build trust and to create an environment that elicits creative contributions. At the same time, they were keeping people apart and controlling when and how parties engaged with the creative process. Without these practices the creative process could become chaotic with too many disparate voices contributing to the project.

## **7 Research context**

### **7.1 Practice-based innovation activities in the Lahti region**

Innovation policy addresses all actions of policy makers that are intended to influence the processes connected with the generation and diffusion of innovation. These processes go hand in hand with the complexity and uncertainty inherent in changing socio-economic systems. Innovation policy can be designed for the regional, national or supranational level (Morgan, 1997). According to Isaksen (1999), a regionalisation of innovation policy is necessary since innovation occurs differently in different regions. Innovation is often a territorial phenomenon, as the innovation process is in part based on formal and tacit knowledge, norms and institutions that are place-specific, i.e., assets which cannot easily or rapidly be created or imitated in places that lack them.

Concrete policies were shaped in the past by the linear innovation model focusing on R&D and technology diffusion, and more recently by “best practice models” of interactive innovation derived from high-tech areas and well performing regions. These were often applied in a similar way across many types of regions. However, there is no “ideal model” for innovation policy suitable for every region. Regional innovation systems have different characteristics in different regions depending on, for instance, their industrial specialization. Due to regional specificities, regional innovation systems can also possibly be very different between regions with similar industrial structures. One is also likely to observe substantial differences in the structure and functioning of regional innovation systems between large regions with many different economic activities and in small and medium-sized regions with a less diversified economic region (Andersson and Karlsson, 2004). Preconditions for innovation, innovation activities and processes as well networks differ strongly, for example, between central, peripheral and old industrial regions. The regional innovation system approach allows taking such differences into account by analysing the strengths and weaknesses of the various regions. (Tödtling and Trippel, 2005; Isaksen, 1999.) It contains the potential for innovation policy to be more focused by providing support that is needed, given the demands generated by specificities (Asheim, Coenen and Svensson-Henning, 2003).

The research context of this dissertation is the Lahti region, Finland. According to earlier studies, the Lahti region could be considered a regional innovation system (e.g., Harmaakorpi, 2004; 2006; Tura and Harmaakorpi, 2008; Uotila, 2008). The Lahti region, located close to the Helsinki

metropolitan area, is one of the largest regions in Finland, and it has long been one of the most important industrial centres in the country. However, the Lahti region is by far the largest Finnish region without its own university, and its regional rate of R&D investments is relatively low. To overcome these facts, the Lahti region has launched a network-facilitating innovation policy which aims to find the seeds of innovations from practices and everyday life. Actually, the Lahti region has set a goal to be the leading area in practice-based innovation activities in Finland and the best developer of public sector innovativeness and productivity in Finland (Innovaatiostrategia, 2005).

According to innovation strategy of Lahti region the network-facilitating innovation policy is the main instrument for achieving the goals of the strategy (Innovaatiostrategia, 2005). By means of the network-facilitating innovation policy, the regional innovation system is developed in a way that the regional resource platform can be exploited, benefiting both the private and public sectors. Because of the narrow regional resource platform, attention must also be paid to the inter-regional networking and accumulation of active communication networks to get all the knowledge needed in the region (Aula and Harmaakorpi, 2008). The network-facilitating innovation policy is a conceptual framework for specifying the view of innovation policy, underlining the importance of the proximity-with-a-distance (Harmaakorpi, Tura and Melkas, 2011; Harmaakorpi, Tura and Artima, 2006). The special task of the network-facilitating innovation policy is to produce practice-based ways of action to remove the obstacles of innovativeness and to bring the needed knowledge in support of the innovation processes. The competitiveness of the Lahti region is argued to be greatly dependent on its ability to integrate knowledge into the innovation processes also from outside the region (Uotila and Ahlqvist, 2008).

A special feature of innovation policy in the Lahti region is that it emphasises the promotion of practice-based innovations (Lahden alueen kilpailukyky ja elinkeinostrategia, 2009-2015). Practice-based innovation processes are triggered by problem-setting in a practical context and conducted in non-linear processes utilising scientific and practical knowledge production and creation in cross-disciplinary innovation networks (Harmaakorpi and Tura, 2006; Harmaakorpi and Melkas, 2012). This does not mean that the importance of scientific knowledge is not acknowledged but that the origin of innovation processes is in the practical context, such as in companies or in public sector organisations (Uotila, 2008). Actually, in such processes there is a strong need to combine knowledge interests from theory and practice, as well as knowledge from different disciplines (Harmaakorpi and Mutanen, 2008; Hennala, Parjanen and Uotila, 2011; Kallio and Bergenholtz,

2011). To put the ideas and principles of practice-based innovation into practice, several methods or tools have been developed in the region (Cooke, 2012).

## **7.2 Innovation tools**

### **7.2.1 Innovation catcher**

Significant innovation potential can be found in the organisations' everyday activities. Unfortunately, the organisational culture and innovation promotion systems often do not support such exploitation of the innovation potential. This can hinder the innovation capability of the organisation. The innovation catcher system is aimed at promoting the shop floor level innovativeness in organisations. It is a systematic way of going through innovation ideas that are created during normal everyday activities. Its purpose is to couple the knowledge existing in the organisational innovation system with the evaluation and development of the innovation ideas and to support the building of an innovative organisational culture. In innovation catcher, different kinds of distances inside the organisation could be used as sources creative ideas. (Kallio and Konsti-Laakso, 2011; Paalanen and Parjanen, 2008; Paalanen and Konsti-Laakso, 2007.)

Implementing the innovation catcher involves the employees. The employees define the problems and solutions, which guarantees that the system fits into the organisational culture. Organisations can boost the cultivation of ideas by offering actual places that enable different people with different ideas to "collide". The ability to give and receive feedback from the management as well as peer shop floor employees increases the motivation to present development ideas and to do the job better (Kallio and Konsti-Laakso, 2011); this also supports individual and collective creativity. As the shop floor level employees have the expertise and knowledge regarding their job, their contribution to organisations' innovation activities lies in improvements to work conditions and processes, rather than in coming up with radical new product ideas (Axtell et al., 2000). In fact, innovations that are born bottom up (Nijhof, Krabbendam and Looise, 2002; Forssén, 2001) can create more value for the organisation (Paalanen and Konsti-Laakso, 2008).

The innovation catcher is applied to different organisations and has been developed in co-operation between a university and local industry and has been tested in research and development projects (Kallio and Bergenholtz, 2011; Parjanen and Hyypiä, 2009). In addition to the basic shop floor level

of industries, the innovation catcher has been also tested in public sector organisations (Linna, Melkas and Hennala, 2010).

### **7.2.2 Innovation session method**

Practice-based multi-actor innovation networks may be of assistance in the renewal of the public sector, companies and the third sector. Their creation can be enhanced in many ways. One renewal-supporting practical tool in the Lahti region is the innovation session method that supports the generation, selection and furthering of the practice-based innovation processes. The idea of the innovation session method is based on open innovation (Chesbrough, 2003) and the fact that there is huge innovation potential in combining different fields of knowledge and expertise (Leonard, 1995; Johansson, 2004; Carlile, 2004).

The innovation sessions are tailored according to the specific needs and aims of the organisation in question, although active measures are also taken to introduce and forward also new, unorthodox themes within the organisation. The innovation session process is conducted by the brokers of the intermediary organisations in close cooperation with the client organisation. It begins with a preparatory phase, where the existing situation of an organisation or a group of related organisations is analysed. The innovation sessions also allow to combine regional and inter-regional expertise for enhancing organisations' innovation measures. The culmination of the innovation session process is the one-day long innovation session. The sessions are arranged for a heterogeneous group of people, consisting often of representatives of different sectors, hierarchical positions within an organisation, professions and academia (e.g., Linna, Melkas and Hennala, 2010). To support creativity in an innovation session, various group work and creativity facilitating methods are utilised. The purpose of the innovation session is not only to generate ideas but also to create relationships and networks between the participants in the innovation system (Hyypiä and Pekkola, 2011).

### **7.2.3 Lahti Living Lab**

A Living Lab is a system for building a future in which real-life user-driven development and innovation will be a normal co-creation technique for new products, services, and societal infrastructure. A Living Lab offers services and methods which enable the users to actively take part in development and innovation. The Living Lab laboratory is located where the people are, that

is, at home, in school, in the workplace, in town, and among hobbyists. Products, services, and solutions are developed and tested in real surroundings and end-users actively participate in development. The Living Lab believes that the needs of the user and the consumer are paramount in developing products, services, and solutions, and at the same time, new solutions and business opportunities are sought among rising trends and weak signals. (Niitamo et al., 2006; Eriksson et al., 2006.)

Living Labs can be defined as platforms for open, practice-based innovation, where enterprises, users, actors from the private and public sectors and research organisations cooperate in real-life environments. The Lahti Living Lab concept consists of different research and development projects which all have a common nominator, i.e., the users as innovators. The methods of involving and activating the users vary; there are methods based on ICT but also on face-to-face communication. (Salminen and Konsti-Laakso, 2010.)

The main activity of the Lahti Living Lab is to integrate the users into the innovation processes of public sector service development (Salminen and Konsti-Laakso, 2010). Public sector organisations are facing strong pressure to innovate and renew their services. In Finland the public service production will face multiple challenges in the very near future. These challenges are mainly related to the ageing of the population and to the consequences of this negative development. At the same time, when the ageing population is in a growing need of health care and social services, labour shortage is threatening the communes which are struggling with drastically diminishing financial resources. As a result, there is an urgent need to increase the productivity in public and third sector service production by, for example, more effective deployment of technology and finding new ways of organising the service production (e.g., Pässilä et al., 2009; Hennala, Parjanen and Uotila, 2011).

#### **7.2.4 Innovation promoter system**

The so-called mentor professor and innovation promoter system was introduced in the regional university strategy (Korkeakoulustrategia, 2005). The system is in an essential role when conducting network-facilitating innovation policy and enhancing practice-based innovation activities. It sets up a new model of action for the development of the regional effectiveness of the Finnish university system. In the Lahti region, the objective of the system is to promote the networking of the regional university activities, the regional innovation processes in practice and

the sources of high-level knowledge without scattering the scarce national resources (Aula and Harmaakorpi, 2008).

The principle of the mentor-professor system is to integrate the knowledge in strong research centres as part of the regional innovation system and practice-based innovation activities. The fields of knowledge essential to the Lahti region are linked to the region by forming strategic alliances with the university faculties, departments and professors. (Aula and Harmaakorpi, 2008.) The innovation promoter system at the university of applied sciences also differs from the traditional methods. User-oriented and open innovation processes require the creation of new types of intermediary functions for universities of applied sciences. The innovation promoters are experts of the network-facilitating innovation policy methods, contributing actively to the regional innovation processes and continuously making links between the knowledge in their own mentor organisations and the on-going innovation processes. (Parviainen et al., 2007; 2008.)

## **8 Research strategy**

### **8.1 Case study as a research strategy**

Case study research strategies can be difficult to grasp because many of their features are found in other research methods and designs. Case studies, for example, often use multiple methods and triangulation of data, which can be found in approaches which are not case studies. The lack of an accepted definition has resulted in a case study meaning different things in different research traditions (May, 2011). Case studies can use either qualitative or quantitative methods, they can be prospective or retrospective, they can have an inductive or deductive approach to theory, they can focus on one case or many, and they can describe, explain or evaluate. It is important to understand that a case study is an approach or strategy, not a methodology. Case study strategies allow different data collection methods to be used, as long as they are appropriate to the research questions posed. (Gray, 2009; Yin, 2009; May, 2011.)

Case studies do have features which differentiate them from other strategies. One of the most frequently found definition of a case study is Yin's definition. According to Yin (2009), a case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context especially when the boundaries between the phenomenon and the context are not clearly evident. Stake (1995) defines a case study as a specific, complex, functioning thing. According to him, each case is an integrated system with a boundary and working parts. Whilst he draws attention to similar rationales for choosing a case study as Yin (2009), he places much less emphasis on the methods chosen to study the case, and there is no insistence on the use of theoretical propositions or the development of theory. According to him, case studies are appropriate to study complex social situations or interventions where multiple variables exist.

Studying creativity in the context of innovation activities is multidisciplinary and complex, involving different people and environments. These characteristics mirror the advantages of a case study strategy: its breadth, its collaborative approach, its recognition of complex contexts, the use of multiple research methods, a realistic focus on process and outcome and its flexible approach. The case study is ideal when "how" or "why" questions are being asked about a contemporary set of events over which the researcher has no control (Yin, 2009). In this dissertation, the main research question is how to enhance collective creativity in practice-based innovation activities. To answer this research question, five different case studies have been conducted (Substudies 1-5). The case



studies are not identical for example; the context where the case study is conducted, research question and also the level of analysis differ.

A case study strategy has also been chosen for the empirical part of this dissertation because the aim is to understand a relatively new phenomenon more deeply. Yin (2009) recommends using cases when the research area is new and there is a limited amount of knowledge available about a complex phenomenon. According to Sonnenburg (2004), collective creativity as a research area has remained a marginal research subject until now. Also Hargadon and Bechky (2006) point out that the literature of organisational creativity has generated significant understanding of the effect of ongoing group and organisational context on individual creativity, but it is less concerned with action and interaction at the collective level.

In terms of data collection, the case study requires the use of multiple sources of evidence. This might include the use of structured, semi-structured or open interviews, field observations or document analysis. Multiple sources of data help address the issue of construct validity because the multiple sources of evidence should provide multiple measures of the same construct (Gray, 2009). Figure 4 describes the data collection process concerning the innovation session process. This data were collected for the case studies concerning collective creativity and the brokerage functions in the innovation session process of one private company (Substudy 2) and a case study concerning innovation sessions as sources of new ideas (Substudy 3). For the latter substudy, data were collected from several innovation sessions, whereas for the first substudy only one innovation session process was studied. Some of the data offer background information and some of the data were analysed for research purposes.

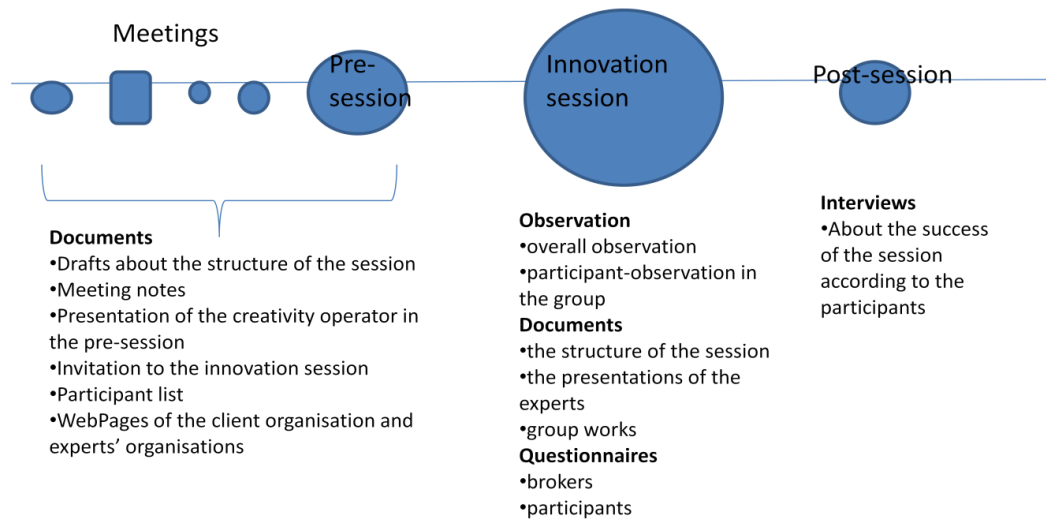


Figure 4. Data collection for studying the innovation session process.

Case studies benefit from the prior development of the theoretical position to help direct the data collection and analysis process (Gray, 2009). The research process for this dissertation included literature reviews and building a theoretical understanding of the different aspects related to individual and collective creativity in innovation activities. At the beginning of the research process, the role of the literature review was to gain a general understanding about the role of creativity in innovation activities. In the latter phases of the research process, literature reviews facilitated the definition of the concepts used in this dissertation and analysis and the interpretation of data. The data were analysed according to the principles of content analysis. For instance, in the first substudy concerning employees' creativity, the purpose was to find similarities and differences in the data and produce a condensed description about how creativity is experienced in the organisation. In the last substudy, concerning the experiences of the knowledge brokers, the data were categorized according to the various roles and functions in innovation activities that could be discerned in the responses. In this categorization, particularly the different distances were an important basis; which roles and functions would be needed to overcome and/or benefit from the distances and proximities in different environments?

## **8.2 Action research as a case study**

Action research is always based on a case or several cases, so it can be considered one form of a case study (Lehtonen, 2007). The first substudy could be considered action research. Action research is a collaborative approach to research that provides the means to take systematic action in an effort to resolve specific problems (Berg, 2001). Action research could be considered a twofold methodological approach that consists of two projects; the action project where action is generated and the research project that intends to create knowledge about that action (Coughlan and Coughlan, 2002; Reason and Bradbury, 2008). This approach endorses consensual, democratic and participatory strategies to encourage people, in this substudy meaning employees in the organisation, to examine reflectively their problems or particular issues affecting them. Further, it encourages people to formulate accounts and explanations of their situation and to develop plans so that they can resolve these problems (Berg, 2001).

The basic action research procedural routine involves four stages: Identifying the research question, gathering the information to answer the question, analysing and interpreting the information and sharing the results with the participants. The action research study follows a kind of spiralling progression, rather than the more traditional linear one (Berg, 2001). For example, Kemmis and McTaggar (1988) describe the process as spiral activity including planning, acting, observing, and reflecting activities. In the first substudy, the initial need for development came from the representatives of the case company, but identifying the development targets was done based on the interviews of the employees. The interviewees were chosen all over the company in order to get the best possible overview of the ideas and challenges of the employees. The planning of the project was made in co-operation between the researchers and the key persons of the company. The next step in the project was always based on the reflection of earlier happenings. The development sessions were places where it was possible to act and reflect with the employees. For example, the findings of the interviews were introduced to the participants of the development session. To share the information with the employees, the researchers also wrote a report about the actions, results and their interpretation. The action research process of the first substudy is described in Figure 5 from the researcher's viewpoint.

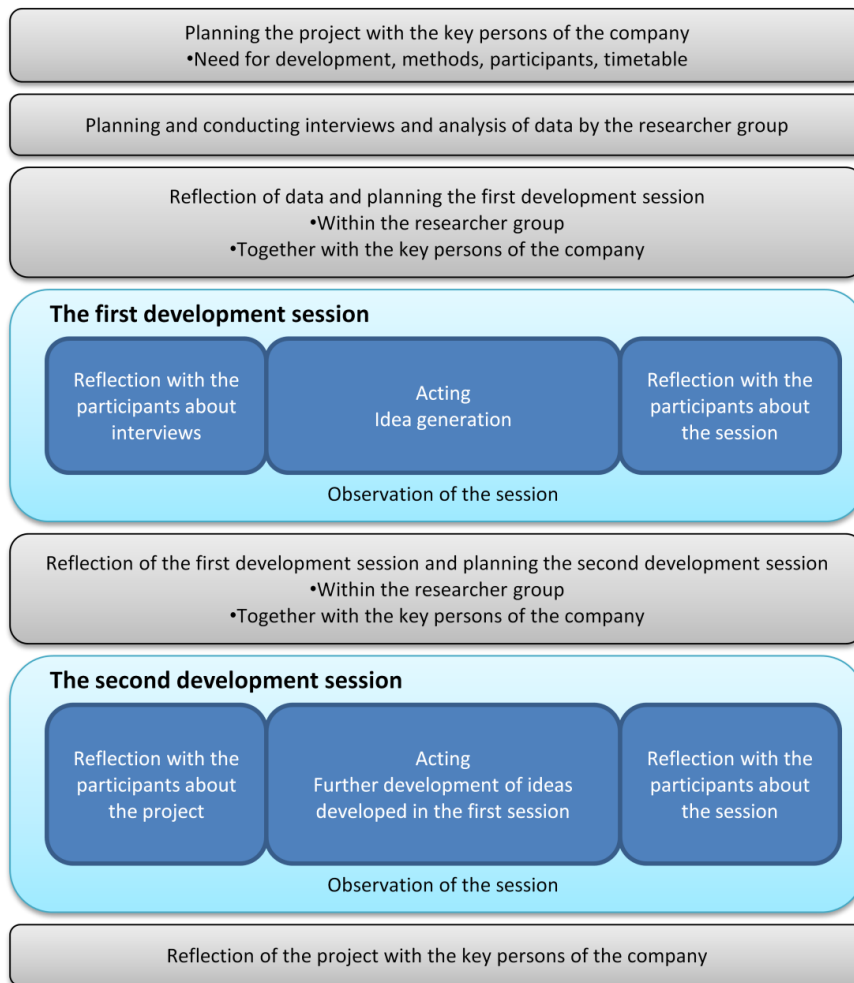


Figure 5. The action research process of the first substudy.

## **8.3 Empirical data collection**

### **8.3.1 Qualitative and quantitative investigation**

The methods used in case studies may be qualitative or quantitative, depending on the circumstances. There are many complex distinctions and debates about exactly what quantitative and qualitative approaches are and how they might be distinguished or compared. Quantitative approaches are characterised by studies that apply mainly statistical analysis to data collected by standardised questionnaire(s) through survey methods that have been numerically transformed and that comes from a sampling frame that indicates they are representative of a broader population. In quantitative research, the researcher is ideally an objective observer that neither participates in nor influences what is being studied, whereas in qualitative research it is thought that the researcher can learn the most about a situation by participating and/or being immersed in it. Qualitative approaches are characterised by, for example, narrative analysis focusing on the meanings that actions have for people. Data is usually collected by ethnographic or participatory methods, much of which are non-numeric and which come from relatively small datasets that make it difficult to infer being representative of a broader population. (Hulme, 2007.) As Bryman (2008) put it, qualitative research usually emphasises words rather than quantification in the collection and analysis of data.

Commonly, discussions about quantitative and qualitative approaches assume a divide between the two in which they are virtually polar opposites. According to Hulme (2007), it is probably best to view the difference in terms of relative positions on a number of continua. At the extreme, an approach might be at one of the poles. However, in most cases, studies have a tendency to lean towards a quantitative or a qualitative approach but not to the same degree in all dimensions (Hulme, 2007). In this dissertation, mostly qualitative methods are used to gather data from multiple sources. The role of quantitative methods in this dissertation is minor compared to the qualitative methods used. For example, in three substudies only qualitative methods are used and in two substudies qualitative methods are used together with the quantitative methods. In this dissertation, the findings were gathered from the following sources: documents, interviews, observations and questionnaires. A summary of the data used is introduced in Table 8.

Table 8. Summary of the data collection for the five substudies.

<b>Substudies</b>	<b>Data</b>	<b>Time and context</b>
<i>Experiencing creativity in the organisation: From individual creativity to collective creativity</i>	<ul style="list-style-type: none"> <li>• 18 semi-structured interviews in a case organisation</li> <li>• Documentary data from 2 development sessions (group work, a report written by the researchers)</li> </ul>	Collected during 2008-2009 from an innovation catcher project
<i>Collective creativity and brokerage functions in heavily cross-disciplined innovation processes</i>	<ul style="list-style-type: none"> <li>• Observation of the innovation session</li> <li>• Questionnaire to 6 brokers</li> <li>• Documentary data like presentations of the experts</li> </ul>	Collected during 2007 from an innovation session process of a single case company
<i>Innovation sessions as sources of new ideas</i>	<ul style="list-style-type: none"> <li>• 293 feedback questionnaires (participants of innovation sessions)</li> <li>• 6 semi-structured interviews</li> </ul>	Collected during 2007-2008 from 20 innovation sessions
<i>Brokerage functions in a virtual idea generation platform: Possibilities for collective creativity?</i>	<ul style="list-style-type: none"> <li>• 47 feedback questionnaires to participants of virtual idea generation</li> <li>• The idea mass created in the idea generation platform</li> </ul>	Collected during 2007-2008 from a Living Lab project with a public sector organisation
<i>Distances, knowledge brokerage and absorptive capacity in enhancing regional innovativeness: A qualitative case study of Lahti region, Finland</i>	<ul style="list-style-type: none"> <li>• Group interviews with 23 participants of brokerage training</li> <li>• Documentary data such as learning tasks and group works</li> </ul>	Collected in the autumn of 2007 among brokers who participated in a special brokerage training

### 8.3.2 Documents

The term “documents” covers a very wide range of different kinds of sources. For example, according to Bryman (2008), documents are material that can be read, have not been produced specially for the purpose of research, are preserved so that they become available for analysis and are relevant to the concerns of the researcher. Mason (2002) acknowledges that also documents that are generated for or through the research process could be considered data sources. She also adds non-text-based documents such as photographs, diagrams and drawings to this data source group. In this dissertation, documents as data sources consist of material that is generated in different kinds of

development or innovation sessions as group work. It also consists of material generated for these sessions either before or after the session. These include timetables, structure of the sessions, list of participants or power point presentations made for the sessions. Mason (2002) notes that documentary and other methods of data generation may overlap in a range ways. For example, in interviewing and observing, a researcher produces documents such as field notes and transcripts for analysis as part of these methods. In this dissertation, the researchers' experiences of observation were collected into a written report and also the interviews were transcribed into documentary data.

### **8.3.3 Semi-structured interviews**

Interviews are one of the most commonly recognized forms of qualitative research methods. The term "qualitative interview" is intended to refer to semi-structured or loosely structured interviews. The two different types of interviews in qualitative research are extreme and there is quite a lot of variability between them, but most qualitative interviews are close to one of the types. (Mason, 2002; Bryman, 2008.) In this dissertation, interviews were used in the first substudy where the interviewees were from the employee-level, in the third substudy where the interviewees were participants in an innovation session and in the last substudy where the interviewees participated in brokerage training.

The two principal uses of the case study are to obtain the descriptions and interpretations of others. The case will not be seen as the same by everyone. A qualitative researcher takes pride in discovering and portraying the multiple views of the case and the interview is the main road to multiple realities (Stake, 1995). In this dissertation, interviewing was chosen as a research method because the researcher was interested in people's perceptions of individual and collective creativity and the factors that enhance or inhibit creativity. A qualitative case study seldom proceeds, for example, as a survey would, with exactly the same questions asked of each respondent. Rather, each interviewee is expected to have unique experiences, special stories to tell (Stake, 1995).

In the semi-structured interviews the researcher has a list of questions or fairly specific topics to be covered, often referred to as an interview guide, but the interviewee has a great deal of leeway in how to reply. The questions may not follow exactly in the way as outlined on the schedule. (Bryman, 2008.) It is possible that the interviewee explains something before it has been asked of her or him. Questions that are not included may be asked as the interviewer picks up on the things said by interviewees. This is especially relevant when the object of the research is not fully clarified

or the area is unknown and, moreover, when answers are wanted so that they can be placed in a wider context (Hirsijärvi and Hurme, 2000). The semi-structured interview process is flexible. The emphasis is on how the interviewee frames and understands issues and events. That means things that the interviewee views as important in explaining and understanding events and forms of behaviour. (Bryman, 2008.)

In the fifth substudy the interviews were conducted as group discussions or interviews. In group interviews the role of the interviewer is not to conduct individual interviews simultaneously but to facilitate or moderate a comprehensive exchange of views in which all participants are able to speak and respond to the ideas of others. The views expressed in a group may well be influenced by the group's dynamics and so differ from those elicited in individual interviews. Talking together is stimulating. In a group setting, people can be helped and stimulated both by their own interaction with other group members and by watching and listening to other people interacting (Hedges, 1993). This could be considered the richness of group interviewing because in this way ideas may be generated which would not have occurred to any one individual. Participants may find it necessary to justify their position so that ideas and weaknesses in an argument may be thrown into greater relief. (Walker, 1993.) According to Hedges (1993), group interviews or discussions are appropriate when understanding and insights are required or where there is also a need to generate new ideas. In the fifth substudy, one of the purposes of the brokerage training was to reach a common understanding of the roles of brokers and also to generate new ideas for brokerage functions (Substudy 5).

#### **8.3.4 Observations**

Observations work the researcher towards a greater understanding of the case (Stake, 1995). The observational method is the primary technique for collecting data on nonverbal behaviour. Although observation most commonly involves sight or visual data collection, it could include data collection via other senses, such as hearing. The observation usually refers to methods of generating data which entail the researcher immersing herself or himself in a research setting so that the researcher can experience and observe at first hand a range of dimensions in and of that setting. These might include: social action, behaviour, interaction, relationships and events, as well as spatial, locational and temporal dimensions (Mason, 2002). There are two main types of observation: participant and nonparticipant. The participant observer is a regular participant in the activities being observed. A



nonparticipant observer, on the other hand, does not participate in group activities and does not pretend to be a member. (Bailey, 1994.)

The terms “observation” and “participant observation” are usually rooted in ethnographic approaches. However, Mason (2002) notices that researchers may use observational methods without considering themselves to be conducting ethnography, as it is the case in this dissertation. Observational methods were used in studying the innovation session method (Substudy 2). In this substudy, observation was one of the methods to answer the research question. The substudy was interested in the innovation session itself and knowledge about the innovation session can be generated by observing, participating in or experiencing the innovation session. Observation made it possible to study the innovation session method from a particular angle: how people behave in the innovation session. Observation allows the generation of multidimensional data on social interaction in an innovation session as it occurs, rather than relying on people’s retrospective accounts and on their ability to verbalize and reconstruct a version of the interactions or the setting (Mason, 2002).

### **8.3.5 Questionnaires**

Questionnaires are a research method through which people are asked to respond to the same set of questions in a predetermined order. A questionnaire is generally (e)-mailed or handed to the respondent and filled in by her or him with no help from the interviewer. The use of questionnaires is probably based on the fact that they are low cost in terms of both time and money and the inflow of data is quick and from many people. The challenge of the questionnaire is to guarantee an adequate response rate (Gray, 2009; Bailey, 1994).

The questionnaire may include open and closed questions. Open questions have no definite response and contain answers that are recorded in full. The advantage of open questions is the potential for richness of responses, some of which may not have been anticipated by the researcher. The downside of open questions compared to closed ones is that they are difficult and time-consuming to analyse. Much of the information to gather may be varied and difficult to categorise. A closed question is one to which the respondent is offered a set of pre-designed replies. The advantages of closed questions are that the answers are standard and can be compared from person to person and usually they are easier to code and analyse. In closed question, there is also the danger

that a respondent who does not know the answer or has no opinion will try to guess the appropriate answer or may even answer randomly. (Gray, 2009; Bailey, 1994.)

In this dissertation, different kinds of questionnaires were used. The substudies of the innovation session method (Substudy 2; Substudy 3) used the feedback questionnaires as one data collection method. The experiences of the brokers of the intermediate organisations were collected by using a questionnaire with open questions. The questionnaire was sent by email to six brokers after the innovation session, and they had a couple of days to answer it. To analyse the experiences of the participants, 293 feedback questionnaires from 20 innovation sessions were analysed. Participant feedback was collected right after the sessions using a questionnaire that consisted of 14 statements. The respondent could indicate to which extent she or he agreed or disagreed with each statement, using a rating scale from 4 to 10. In fourth sub-study, studying experiences of virtual idea generation, the Internet-based questionnaire was sent to 47 participants. The questionnaire was multiple-choice with the final choice being "other" followed by a space for the respondents to answer. The last part of the questionnaire comprised 25 statements, where the respondent could choose a number indicating how much he or she agrees or disagrees with each statement, using a scale of 1 to 5 (strongly disagree, disagree, neutral, agree and strongly agree), adapted from the Likert scale. These questionnaires included also open questions.

## **9 Findings**

### **9.1 Results of the substudies**

#### **9.1.1 Internal creativity: How can organisations support individual and collective creativity inside the organisation?**

Creativity allows organisations to quickly react to changes and to be proactive towards innovation. Breaking down the boundaries inside and between organisations enhances the ability of organisations to build bridges for knowledge sharing within organisations themselves and within networks. In order to survive, adapt, and gain competitive advantage, organisations need to unleash their employees' innate creative potential because employees' creative ideas can be used as building blocks for organisational innovation, change, and competitiveness (Woodman, Sawyer and Griffin, 1993; Zhou and George, 2003). The first substudy views employees as resources in the organisation's innovation activities and presents the question of how their creativity can be fostered in order to serve the organisation's purpose.

Although the level of creativity required and the importance of creativity can differ depending on the task or job in question, there is a need for creativity in every day work according to the results of the first substudy. Challenges that require creativity are (often) complex and ill-defined. In addition, the problems in the case company of the first substudy require multiple different forms of expertise. Because of this, the need for collective creativity in the case organisation was acknowledged. However, there were several challenges in creating possibilities for collective creativity in the case organisation. Firstly, in the interviews, creativity was mainly understood as an individual endeavour. This kind of controversy is demanding if there is a need to develop the creativity and innovativeness of employees especially at a collective level. Secondly, the organisational culture did not support those activities that give possibilities for collective creativity. Thirdly, in the strategies of the company, there were no mentions of creativity or innovativeness. And fourthly, there were no methods or ways of acting to support individual or collective creativity.

To promote collective creativity, the role of the leaders was considered essential in the case organisation. This is interesting because in traditional thinking of creativity, which characterized the thinking in the case organisation, ideas and innovation are attributed to the efforts of the individual.

The traditional way of thinking of creativity tends to discount leader influences and may see leaders at best a hindrance for creativity. One can also argue that the professionalism, expertise, and autonomy that seem to characterize creative people act to neutralize or substitute for leadership (Mumford et al., 2002). Even though it was difficult to describe exactly what kind of leadership was appropriate to support creativity or collective creativity in the organisation, the distinction was made between routine and creative leadership. However, this implies that employees see that leaders have the possibility to support creativity in the organisational context. In managing creativity, an understanding of the personal characteristics of the employees and the characteristics of creative work is essential because employees experience creativity in different ways and there is no simple answer on how to lead creativity. Especially the role of the leaders was considered important to set goals for creativity. Creativeness is not an end in itself but it should support the organisational goals. This also means that the leadership must be clear about the need for creativity and the types of creativity that best suit the organisational goals. If there is a need for collective creativity in the organisation, leaders should encourage employees to collaborate so that the expertise behind the creativity is heterogeneous.

Employee diversity is often considered to be a positive feature in an organisation since it might create a broader search space and make the organisation more open towards new ideas and more creative (Østergaard, Timmermans and Kristinsson, 2011). However, organisations may face barriers to tapping into the diversity of their employees. Issues such as geographic distance, differences in organisational subcultures, and the lack of awareness of others with similar interests render, for example, idea generation difficult (Lesser and Fontaine, 2004). In the case organisation, the matrix organisation and geographical distances were barriers to tapping into the creativity of the employees. This means that supporting collective creativity requires tools and a way of action in the organisation. In the case organisation, the construction of the method was done bottom-up, taking advantage of employees' creativity. A special brokerage function was developed to connect different employees, groups or departments and to make them aware of the interests and difficulties of the other group and to transfer best practices (Burt, 2004). This substudy indicates that there is a need of brokers acting in a bridging role not only outside the organisation but also inside the organisation. The main findings concerning factors supporting creativity and collective creativity in the organisation are given in Table 9.

Table 9. Characteristics of a creative organisation.

<b>Characteristics of a creative organisation</b>	
Strategy	The organisational strategy gives direction to the activities and development of the organisation and its units, departments, teams and individuals. An explicit innovation strategy or a strategy with a clear focus on innovation is an important factor influencing creativity in organisations. A strategy with an emphasis on innovation communicates the need for creativity and innovation in the organisation.
Organisational culture	Organisational culture affects how employees value creativity. Organisations may also have several subcultures. The challenge is to get different kinds of subcultures to interact with each other and to have a shared experience of pulling together.
Leadership	It is unlikely that creative outcomes will be realized without support from organisations and organisational leaders. To provide this support, leaders could set goals for creativity. This means that the leadership must be clear about the need for creativity and the types of creativity that best suit the organisational goals. Leaders may also encourage employees to use all the potential of internal creativity.
Methods	Creativity needs formal and informal methods for soliciting interaction. Methods are tailored according to the specific needs and context of the organisation in question.
Roles	Individual and collective creativity could be supported by different kinds of roles, such as internal brokers and activators.

### **9.1.2 External creativity: How do organisations use external knowledge to support collective creativity in their innovation processes?**

Just as organisations need outside sources of knowledge, they also need outside sources of creativity. In the vein of open innovation, it is possible to distinguish between internal and external creative capabilities which are available for an organisation. The first substudy focused on internal creativity, which refers to the creative capabilities of the internal stakeholders of the organisation, such as individuals and groups, e.g., employees. External creativity stands for the creative capabilities of those individuals, groups, and organisations that contribute to defined projects with their creative capabilities as non-members of the organisation in consideration (Steiner, 2009). As a consequence, it is important in open, practice-based innovation to ask how the interplay between

internal and external creativity can be best designed. The important question is also whether organisations should do this themselves or whether they would benefit from external brokers.

Substudies 2, 3 and 4 underline the importance of the innovation potential hiding in the structural holes of regional innovation systems. These substudies support the assumption that distances could be used as a source of innovation. The substudies give practical implications on how it is possible to exploit different kinds of distances knowingly. Successful innovation under complexity and uncertainty can be achieved through collaborative approaches that integrate knowledge inside and outside the organisation. These studies underline especially the importance of brokerage functions in open, practice-based innovation in order to create possibilities for collective creativity. A summary of the main findings of these substudies is given in Table 10.

According to the results, the brokerage function is essential in exploiting the different kinds of distances. Distances between potential innovating partners may be too large, but the skills and knowledge to use ideas or tools of open, multi-actor innovation may also be missing. For example, in the fourth substudy, brokerage was in a key role in the construction of an open customer-driven idea generation platform. It is very likely that without outside brokerage, the organisation would have not even begun such an endeavour. The challenge of the case organisation of the fourth substudy was that it was locked in specific exchange relations and its network was characterised only by strong ties. By utilising brokerage functions, the external knowledge and weak ties were brought to the idea generation process.

Brokerage as a process includes different kinds of activities which demand different kinds of brokerage skills. Therefore, there is a need to divide the brokerage functions into process and session brokerage (Substudy 2). In fuzzy front end of innovation, brokerage functions include building ideation arenas which are based on cognitive cross-fertilisation and enhancing individual and especially collective creativity with the help of creativity methods and boundary objects (Substudy 3; Substudy 4). Process brokerage includes the management of the whole process and includes, for example, reducing the organisational and cultural distances during the preparatory phase. Session brokerage, on the other hand, refers to the facilitation of the idea generation. A session broker's goal is to develop an understanding between the participants and shorten the cognitive, communicative and social distances in particular (Substudy 2; Substudy 3).

The results of third substudy support the cognitive-social-motivational view of ideation arenas. According to this view, idea generation is a cognitive process which is strongly moderated by social and motivational factors (Paulus and Brown, 2007). To use distances as a potential for creative ideas and possible innovations, there is a need for different kinds of roles to make collective creativity possible. Collective creativity should be supported by three kinds of expertise during the practice-based innovation process: representatives of the organisations who possess the inside expertise and outside experts and brokers whose expertise is related to the management and facilitation of the practice-based innovation process.

Because of the heterogeneity of the participants, it is crucial to establish a trustworthy atmosphere, which helps different actors to overcome their reluctance to take part in a creative process. If there is no trust, divergent perspectives and ideas will not be shared. It can be first perceived as difficult to establish trust in a group where the members do not necessary know each other. The presence of session brokers is important in this respect. Facilitation must be done in such a way that it establishes, nourishes and maintains a climate that is appropriate for the group to succeed. Much of the work of the brokers should have been done before the idea generation session, which emphasises the preparatory phase before the actual action phase in brokerage. The preparatory phase involves problem construction and it provides the context for the application of other processes in the collective creative problem-solving. The way the problem is constructed will have a marked impact on creative production and solution generation (Mumford and Connelly, 1991).

According to the substudies, cognitive cross-fertilization could happen face-to-face (Substudy 3) or virtually (Substudy 4). Virtuality places new demands on brokerage functions. The results of the fourth substudy reflect the difficulty of brokerage in a virtual environment. The absence of social proximity may cause challenges in idea generation, which may be seen as lack of commitment to participate or withdrawing from idea generation in the middle of the process. This also raises the question of how to motivate the participants to take part in virtual idea generation. Different users may participate for different reasons, and are thus also motivated by different factors (Antikainen, Mäkipää and Ahonen, 2010), and this should be taken into account in planning the virtual idea generation session. An ideal situation is where all parties perceive the benefit from the collaboration, in the long run at least.

The fourth substudy also raises the question of how too large a distance could be shortened by other kinds of proximities. In virtual idea generation, cognitive distance could probably have been

decreased by social proximity (Boschma, 2005), for example, by including face-to-face meetings. In virtual co-creation, it is an issue of how well participants are able to communicate their knowledge with other participants with different backgrounds and knowledge. This indicates the importance of the design and functionality of the virtual platform, but motivational and social factors are equally as important in virtual co-creation.

Table 10. Summary of the findings of the substudies concerning how organisations use external knowledge to support collective creativity in their innovation processes.

Substudies	Findings
Collective creativity and brokerage functions in heavily cross-disciplined innovation processes	<p>The brokerage function aims at increasing the absorptive capacity and bridging social capital in the potential innovation networks. The brokerage function includes the following features:</p> <ul style="list-style-type: none"> <li>• It aims at bridging different distances between the innovating partners</li> <li>• It is a process rather than individual actions</li> <li>• The brokers are often experts in no particular discipline</li> <li>• It enhances widely used idea generation methods through a careful broker's interventions in the ideation process</li> <li>• Brokerage may not only span the distances between innovation partners but also lessen the in-house hindrance and resistance to radical innovation</li> <li>• Brokerage also enables the flexible use and variation of versatile creative methods</li> <li>• It is asking questions rather than giving answers</li> </ul>
Innovation sessions as sources of new ideas	<p>The findings support the cognitive-social-motivational view of brainstorming. Idea generation is a cognitive process which is strongly moderated by social and motivational factors.</p> <p>To use diversity as potential for creative ideas and possible innovations, the study highlights the need for different kinds of expertise roles to make collective creativity possible. Collective creativity should be supported by three kinds of expertise: representatives of the organisations who possess the inside expertise and outside experts and brokers whose expertise is related to the management and facilitation of the innovation process.</p>
Brokerage functions in a virtual idea generation platform: Possibilities for collective creativity?	<p>Brokerage was in a key role in the construction of an open customer-driven idea generation platform.</p> <p>The substudy reflects the difficulty of brokerage in a virtual environment and raises the question of how to motivate the participants to take part in virtual idea generation. The challenge of brokerage functions is to create a situation in which all parties perceive to benefit from the collaboration.</p> <p>Stronger brokerage in the owner organisation before idea generation would have been essential in order to communicate more fully the need for open innovation and train the internal brokers for their role.</p>



### 9.1.3 Brokerage functions: How can collective creativity be skilfully enhanced by brokerage functions?

Open and practice-based innovation processes place many new demands on innovation activities and the need for skilful brokerage is becoming increasingly well known. Only a few individuals are born brokers; usually they have to be trained. The previous substudies describe the demanding environment and challenges for brokers in open, practice-based innovation activities. The last substudy gives new light to the strengths and weaknesses of brokerage activities, and particularly the challenges felt by the brokers at the individual level. The innovation brokers' own perceptions concerning their functions and roles in innovation promotion were investigated. Table 11 shows how the brokers defined their qualities, characteristics of the creative interventions, ways to make distances closer and the operations field. Successful brokerage and the related improvement of absorptive capacity require a holistic approach to the entire innovation process and its wider environment.

Table 11. Innovation brokers' own perceptions concerning their functions and roles.

<b>Innovation broker</b>			
<b>Qualities</b>	<b>Creative interventions</b>	<b>Innovation broker's ways to make distances closer</b>	<b>Operations field</b>
<ul style="list-style-type: none"> <li>• being motivated</li> <li>• curiosity</li> <li>• bravery</li> <li>• passion, enjoyment</li> <li>• tenacity</li> <li>• permissiveness, open-mindedness</li> <li>• an open person him/herself, a good self-esteem</li> <li>• rich in ideas</li> </ul>	<ul style="list-style-type: none"> <li>• disturbing</li> <li>• questioning</li> <li>• focusing</li> <li>• motivating</li> <li>• external and independent knowledge</li> <li>• analogy and metaphors</li> </ul>	<ul style="list-style-type: none"> <li>• conscious distancing</li> <li>• freedom from bias</li> <li>• analogies and metaphors</li> <li>• provocative questions</li> <li>• careful preparation</li> <li>• using different experts</li> <li>• doing things together</li> <li>• getting to know different types of people</li> <li>• being systematic</li> <li>• a clear strategy</li> <li>• being flexible</li> <li>• utilising social and communicative closeness</li> <li>• an attitude that accepts difference</li> <li>• a sense of the situation</li> <li>• the ability to dig out the best from everyone</li> </ul>	<ul style="list-style-type: none"> <li>• Inside the University of Applied Sciences, for example between departments or between students and the personnel</li> <li>• At the interface of the University of Applied Sciences and other organisations</li> <li>• Outside the University of Applied Sciences, for example between different companies</li> </ul>

Table 11 shows that brokers need qualities such as curiosity, open-mindedness and a good self-esteem. To facilitate creativity at the organisational and regional level, a broker may use different kinds of creative interventions to question the traditional ways of doing. One of the tasks of the broker is to make distances closer, for example, by using different experts, getting to know different types of people, doing things together and by being flexible.

As a result of this substudy, five central roles are defined for knowledge brokers:

- policy executor
- creative actor
- shaper of organisations
- crosser of distances
- sniffer of the future.

As a policy executor, a broker's role is to manage different kinds of partnership. In managing a partnership, the key position is held by different value networks that illustrate the whole formed by many actors having different backgrounds, know-how and roles. This is close to what Burt (2004) suggested, saying that brokers should focus on establishing ties to other disparate or disconnected groups, exploiting the structural hole, so that they can then bring together members of two groups who would otherwise be more difficult to connect. But the role is more than just bringing people together; it is also about managing these relationships.

The knowledge brokerage operations are executed in a social operations environment that consists of different actors and different innovative networks. Through the trust that the broker gains, s/he can combine the quite different actors and motivate them to stand behind common goals. The knowledge broker therefore has to learn how to manage differences existing in his/her operational environment. The broker must utilise the innovation potential contained in distances and solve problems caused by the distances that are related to, for example, interpretability and a common language.

The creativity of a knowledge broker differs from the kind of creativity that is usually associated to single-person creativity. It implies making possible and developing the necessary creativity and new type of thinking needed in the innovation process. The knowledge broker does not have to be the one with the largest amount of ideas, but above all to help others to perceive and produce creative

solutions to give rise to possible innovations. The knowledge broker does not gather knowledge and clients only for the needs of her/his own institution, but the brokerage operations are interdisciplinary. The external interfaces can be divided into two groups. On the one hand, there is the client organisation that is the premise of the innovation process, and on the other hand, there are those expert organisations from which services can be bought or which fund operations.

The knowledge broker is most of all an actor in a regional innovation system. As an innovation policy instrument, brokerage functions are aimed at improving especially the component of potential absorptive capacity at the fuzzy front end of innovation processes. This substudy stresses that the successful innovation promotion and improvement of absorptive capacity require a holistic approach to the entire innovation process and its wider environment. The knowledge broker is a person who utilises information produced elsewhere and ties it to regional development. One of the tasks of the knowledge broker is regional impacting. In this task, it is important to build links and sensors also outside of the region and absorb national and international knowledge from where it is found and bring it into the region to be utilised. Knowledge brokers are in a very important position at the interface of knowledge production and its utilisation in interpreting and contextualising foresight knowledge produced elsewhere, and in tying it into innovation processes executed in the region. In this foresight task, the knowledge broker has to take into account the uniqueness of the region.

## **9.2 Conclusions**

### **9.2.1 Role of collective creativity in practice-based innovation**

It is essential to consider the different factors that influence individual and collective creativity in innovation activities, because eliminating the obstacles to creativity is one of the vital elements in maintaining the innovative capability at the organisational and also regional level. However, there is the danger of thinking about creativity too mechanically. In order to gain a holistic understanding of creativity in innovation, the need to consider the interdependences between factors and levels is to be understood. This means that individual and collective creativity support each other and there is no confrontation between them. One of the challenges in using collective creativity in innovation activities is that creativity is still mainly understood only as individual creativity. This indicates that all possibilities of collective creativity are not used.

This dissertation does not support the assumption that organisations could be creative only by hiring people who are creative. Quite simply, the recruitment of certain types of employees or the implementation of particular practices will not guarantee creativity in the organisation. Implications of this dissertation include understanding the meaning of the social context in the organisation to develop methods and ways of doing to support individual and collective creativity. Employees in the organisation are influenced by the others inside and outside the organisation and also by contextual factors such as leadership style and organisational culture. It can be inferred that employees' creativity may benefit from formal or informal social interaction with diverse others, for example with the customers. In other words, employees should be encouraged to develop weaker relationships. However, this mixing should be done in a dedicated manner because too much social distance can be detrimental to collective creativity. The organisation's challenge is to design the environment and methods to maximize the collective creative achievement while taking individual differences into account. One implication of this dissertation is that creativity as a social construct is understood and experienced differently in different organisations and these differences should be taken into account. For example, the use of practice-based innovation tools requires that they are tailored according to the specific needs and context of the organisation in question.

One of the challenges in collective creativity is how to motivate people to engage in a collective creative process and make them see that their contribution has a meaning. This question could be divided into two parts. Firstly, how to motivate the participants to decide to take part in the collective creativity process, and secondly how to motivate the participants during the process so that they act as a collective. This dissertation recognised several motivational factors in collective creativity, such as the possibility to see generated ideas develop further, well planned collective creativity processes, the possibility to meet and discuss with people with different kinds of background, a feeling that the issue is important, and that the participants feels that they are in the right place. The motivational factors are related to how actors see the value of social interactions. For example, if the temporal distance is too large, it would not motivate actors to participate in collective creativity because the possibilities of the creative interaction would be realized too far ahead in the future.

### **9.2.2 Distances as a source of creativity in practice-based innovation**

Creativity is closely related to knowledge. Practice-based innovation is typically based on Mode 2 knowledge production. Following the distance and proximity concepts, the definition of Mode 1

coincides with the image of knowledge production where actors are cognitively, socially and geographically proximate. Mode 2, by contrast, favours cognitive distance, cross-organisational co-operation, open networks with weak ties, and crossing of regional boundaries. This is related to the discussion about regional versus non-regional relations of innovation actors. Practice-based innovation highlights the need for non-regional relations to support innovation at organisational and regional levels. The role of non-regional relations is especially important in situations where the necessary expertise is missing in the region. However, in practice-based innovation, a question is not so much about geographical distance or proximity but rather about the balance between different kinds of distances and proximities between potential innovation partners.

The source of collective creativity in practice-based innovation could be found in different kinds of distances, like cognitive, social and organisational - between individuals, groups, departments, organisations and networks in the region or outside the region. For example, organisations with different kinds of knowledge bases could offer potential for innovation. These organisations may be located close to each other geographically, but there can be cognitive distance between them. This cognitive distance could be considered as potential for innovation. That way, geographical proximity is neither a necessary nor a sufficient condition for innovation, as stated also by Boschma (2005) and Rallet and Torre (1999). In practice-based innovation, it is not a question about regional versus non-regional relations but about regional and non-regional relations that support innovation. How these relations are constructed is related to the needs of the innovation actors in a given situation.

As there are distances between organisations, there can also be distances between employees and departments in the organisation which may be considered potential for innovative ideas. This also means that concentrating purely on individual creativity is seldom sufficient for creating successful innovations. Additionally, the increasing complexity of most potential innovations requires collaborative creative efforts that often exceed the boundaries of the organisation and call for the involvement of external expertise. In a group context, diversity between group members is considered as potential for creative ideas in practice-based innovation. Diversity may also lower creativity in the group because of cognitive interference and social inhibition. The implication of this dissertation is to use facilitators or session brokers to support group creativity. The facilitation of the group work focuses on shortening social distances between participants so that the group could better use cognitive distance as the source of creativity. A facilitator could use different creativity methods or boundary objects to allow the necessary flows of information to take place

and to establish a trustworthy atmosphere, which helps group members to overcome their reluctance to take part in a creative process.

The expertise in practice-based innovation could be divided into internal expertise and outside expertise, and expertise that could facilitate the interplay of these previous kinds of expertise, i.e., brokerage expertise. These different kinds of expertise should be somehow overlapping because the cognitive distance should not be too large in order to allow participants to communicate, understand, absorb and process new information successfully (Boschma, 2005). In practice-based innovation, one can talk about networked expertise (Hakkarainen et al., 2004; Reilly, 2008). In practice-based innovation, expertise is not embodied in a single individual but it is possible to create collectively through processes of reflective dialogue. On the basis of this, it is argued that collective creativity is a process oriented by a common interest or concern and cultivated by different kinds of expertise of communities and their networks.

### **9.2.3 The model of brokerage functions in practice-based innovation**

In creating possibilities for collective creativity in practice-based innovation, the brokerage functions have an essential role. Earlier research on brokers has mainly concentrated on studying them in private organisations (Hargadon and Sutton, 1997; Cillo, 2005; Verona, Prandelli and Sawhney, 2006). In practice-based innovation, brokerage functions are useful in private and public organisations. The results of this dissertation imply that brokerage functions could be worthy of consideration in supporting innovativeness in public organisations.

The public sector has traditionally been rather slow and inflexible to renew its functions and react to changes in the outside world (e.g., Pihkala, Harmaakorpi and Pekkarinen, 2007). However, nowadays many public organisations are forced to critically examine their practices. For example, in Finland, municipal economies face hard times due to, for instance, a shortage of labour. Sufficient resources and their proper use can be enhanced by developing cooperation between municipal administrative fields and by different actors agreeing on their mutual responsibilities (e.g., Parjanen and Harmaakorpi, 2006; Parviainen et al., 2007; 2008). In addition, there is increased pressure to discover new ways for the public and private sectors to co-operate in service production and enhance public-private partnerships. One of the challenges in public organisations is how to

involve users in their innovation processes (Hennala, 2011). These challenges could be tackled with the help of brokerage functions.

However, brokerage functions in private and public organisations do not fundamentally differ from each other - i.e., making external relations available to the organisation, enhancing communication, learning and other forms of interaction and creating an atmosphere that stimulates knowledge sharing. However, understanding the type of innovation and the economic logic in public organisations is essential for the success of brokerage functions. In public organisations, innovations are typically service innovations, new organising models or new ways of doing things (e.g., Hennala, 2011; Pekkarinen, 2011). Also, the economic logic of innovation in public organisations differs in an important way from the logic of private organisations. While the purpose of companies is to earn money and to increase the profits for the shareholders, the aim of public organisations is to use the funds allocated to them with an excellent price-quality ratio.

Brokerage functions in practice-based innovation have some similarities with earlier studies about brokers in private organisations. According to practice-based innovation, brokerage is a process, not an individual act. The models of technology and knowledge brokerage also support the idea of brokerage as a process (Hargadon and Sutton, 1997; Hargadon, 2002). Practice-based brokerage highlights distances as a source of creativity, which resonates with the idea of Hargadon (2002) that innovation potential is found in recombining existing ideas from other domains. Earlier research has also recognised different kinds of types of brokers. Verona, Prandelli and Sawhney (2006) introduced the concept of virtual knowledge brokers, and Cillo (2005) acknowledged different types of internal brokers. In practice-based innovation there are also different kinds of brokers and they act in different contexts.

Based on the findings of the substudies, the following model of brokerage functions in practice-based innovation and especially in the fuzzy front end of innovation is formulated. According to the model, the results of brokerage functions are based on different elements. These elements are the context of brokerage and the roles, tasks, skills and capabilities of brokers. Figure 6 shows the elements of brokerage functions in practice-based innovation.

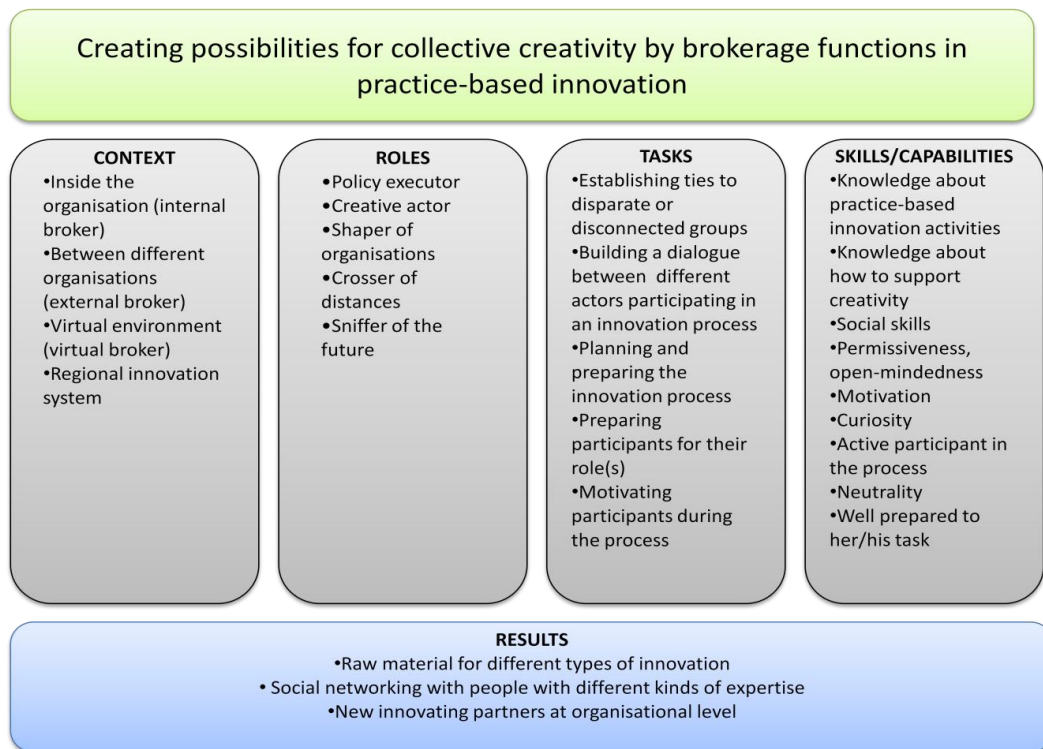


Figure 6. The model of brokerage functions in practice-based innovation.

This dissertation recognises a different kind of context where brokerage may happen in practice-based innovation activities. Internal brokerage is needed inside the organisation where different distances create problems in communication, knowledge sharing and innovation (Substudy 1; Substudy 5). Internal brokerage creates possibilities for collective creativity by promoting open communication and knowledge sharing between different departments and communities of practice in the organisation, including everybody in the innovation process to present challenges or suggest new ideas, bringing different kinds of expertise together to solve common problems and by creating a climate that facilitates creativity and innovativeness. The challenges of an internal broker are related to the fact that people usually perceive in their environment things which strengthen already existing matters or ways of doing. In organisations, things are often done in a familiar manner. This is especially true if the operations have been successful in the past. In innovation processes, it is central that the internal broker gets people to perceive things in a new way.



In practice-based innovation, the external brokerage functions relate to the providing of the links, knowledge sources and tools so that organisations can accelerate and increase the effectiveness of their innovation processes. External entities can include suppliers, experts, customers, universities, research institutes, partner companies or even competitors. Both an internal and external broker may act in a virtual environment.

There has been a significant and rapid increase in the use of virtual teams by organisations, and it is anticipated that the related need for virtual brokers will also increase. Advantages of virtual teams are, for example, collaboration across distances and flexibility in work hours and job design (Martins, Gilson and Maynard, 2004). However, virtual teams and virtual idea generation do not come without disadvantages. Like conventional teams, virtual teams consist of real people who interact in a virtual environment. To be able to interact in a virtual environment, participants will need to gain the skills necessary to use the technology effectively with the support of the organisation and within the availability of resources (Arnison and Miller, 2002). These issues should also be discussed before virtual brokerage is utilised. Also brokers should consider how appropriate it is to use virtuality. For example, Arnison and Miller (2002) remind that conventional face-to-face teams endeavour to increase their productivity by utilising some of the technology and characteristics of virtual teams. In the same vein, in brokerage functions, technology may be used to support face-to-face innovation activities.

A virtual environment may demand special skills from brokers - related to facilitating creativity in the absence of social proximity. Brokers should understand the technology infrastructure, how to use software tools to enhance team performance and creativity, how to manage an anonymous environment, and how to provide participation and feedback to team members. Virtual environments challenge the management of the team. For example, establishing trust in a virtual team is considered challenging because social cues of doubt or disapproval, such as body language or other gestures, are not available in a virtual environment (Cascio and Shurygailo, 2003). Thus virtuality may cause social distance (Lojeski, Reilly and Dominick, 2006). This could impact individuals' willingness to trust other participants in virtual idea generation.

It has been suggested that in a virtual environment, many proximity effects may be reached by bringing participants together at regular time intervals for both formal and informal events. Face-to-face meetings would add informal communication to idea generation, which in turn would enhance interaction and creativity (Leenders et al., 2002; Leenders, van Engelen and Kratzer, 2003). An

implication of this dissertation is that in virtual brokerage, one should consider using face-to-face meetings to motivate participants to share their knowledge and activate them to participate during the virtual idea generation process. For example, in the beginning of virtual idea generation, face-to-face meetings could focus on shortening social distance between participants. During the idea generation, face-to-face meetings could include experts' presentations or discussions with specified a theme that could bring greater cognitive diversity to the idea generation.

In practice-based innovation activities, different forms of proximity and distance are emphasised in different situations. At the same time, it is possible that these forms are interrelated so that one slightly inadequately or totally lacking form of distance or proximity may be strengthened or replaced by other forms of distance or proximity. In this dissertation, different forms of distance and proximity were used as a tool to analyse brokerage functions in practice-based innovation activities. This dissertation does not commit itself on what the right amount of distances is (see Knoben and Oerlamans, 2006), and it acknowledges that in practice, drawing the lines between the different dimensions of these concepts may be very difficult, but identifying and discussing them is useful both in a theoretical and practical sense.

Brokerage as a delicate act (Kimble, Grenier and Goglio-Primard, 2010) includes taking into account many factors related to an organisation's cultural readiness to open innovation or its absorptive capacity, and distances as a framework for brokerage could help this. Table 12 introduces some example questions to be considered prior to a broker's intervention in a client organisation. It is essential that brokers consider these questions together with representatives of the client organisation(s) and figure out the possible challenges and potentials for brokerage functions, available resources and the vision of brokerage intervention. In addition, brokers should also consider what kinds of skills and capabilities are needed in the intervention.

Table 12. Questions for brokers to be considered.

<b>Distance/Proximity</b>	<b>Questions to consider prior to a broker's intervention</b>
Cognitive	What kind of knowledge bases does the client organisation have? What kind of knowledge is missing? How many different kinds of perspectives are needed for that missing knowledge? What kinds of possibilities does the organisation have to identify and exploit that missing knowledge?
Functional	What functional distances are possible to cross? How is the challenge of the client organisation solved in different fields? Are there possibilities for benchmarking?
Communicational	How should the need for open innovation activities be communicated to participants? What kind of communication channels are the most appropriate to communicating with different actors? How often should communication with different actors take place during the process?
Social	How well do the participants know each other? Do they trust each other? Are there any conflicts? Is there something else in the client organisation that could affect the will or possibilities to innovate? Are they used to working with external brokers? How committed are they to work together? Are participants familiar with the methods of brokers?
Cultural	What kind of innovation activities has the client organisation had? What are the values of the organisation? How does the organisation value creativity and innovation? Who are involved in innovation activities in the organisation?
Organisational	What kind of ties does organisation have? What kind of interaction is there, for example, between different departments? How does the organisational structure support creativity and innovativeness in the organisation? How does the organisation share information?
Temporal	How does the organisation perceive the future? What is the vision of the innovation activities? How far could the vision be targeted? How much time do the actors have to participate to different kinds of activities?
Geographical	How are the actors located? Where can meetings and sessions be held? Where can external experts be found? Is it possible to use virtuality?

#### **9.2.4 Brokerage functions as a dialogical process**

In creating possibilities for collective creativity, brokerage functions in practice-based innovation are related to the facilitation of social interaction that supports the moments of collective creativity. In the model of collective creativity (Hargadon and Beckhy, 2006), the role of brokerage functions is to facilitate “help asking” and “help giving” activities by focusing on establishing ties to other disparate or disconnected groups, exploiting the structural hole, so that brokers can then bring together members of two groups who would otherwise be more difficult to connect (Burt, 2004). To facilitate reflective reframing, brokerage functions mediate between different distances, increase mutual understanding and broaden perspectives. In practice this means building communities of interest (Fischer et al., 2005) where there is cognitive distance between the participants but they share a mutual challenge. In this, brokers need know-who kind of knowledge which, according to Jensen et al. (2007), refers to the DUI mode of learning. This kind of knowledge is tacit and often highly localized.

Bringing people together means that brokers have a strategic position on who they connect and when. For example, during the innovation session process all participants are not present in every meeting or session, but brokers could influence who are invited and participate during the different phases of the process. However, in practice-based innovation the brokerage functions are not to generate the ideas themselves but to facilitate other actors in the innovation system to generate ideas (Substudy 1; Substudy 3; Substudy 5). Based on this, brokers could also be seen as experts connecting others to foster creativity and innovation. Brokerage functions do not only include gathering knowledge and making networks for the purpose himself or his organisation’s purposes. Instead, brokerage functions are an essential part of a regional innovation system. At the regional level they have the possibility to reinforce those activities that create possibilities at the regional level. This indicates that brokerage functions in practice-based innovation could be considered dialectic (Lingo and O’Mahony, 2010). This means that during the innovation process, brokers adopt a strategic position of controlling when and how parties engage with the collective creative process to aid the generation of creative ideas. At the same time, brokers connect others to build trust and create an environment that facilitates creative contributions at both individual and collective levels. The role of the broker is to facilitate the generation of a dialogical process between the stakeholders.

During this dialogical process, there is a need for different kinds of brokerage roles. The roles identified in this dissertation are partly similar to Howells' (2006) innovation intermediation functions. Brokers are brokers of future-oriented information and knowledge into practical innovation processes. A system producing future-oriented information and knowledge must support the knowledge brokerage system so that the brokers will acquire the kind of information and knowledge that they can feed into innovation networks as they operate as regional facilitators of practice-based innovation operations. As to the role of a crosser of distances, the different types of distances and proximities require somewhat different skills, and the research results showed that there is no "common truth" about them but that they need to be identified in each case. In the other roles, the elements of distances and proximities are also present; for instance, the sniffer of the future has to cross temporal distance, among others. However, the roles depend on whether it is a question of a process or service innovation in the public sector or in the private sector.

Developing and improving the absorptive capacity of innovating organisations is at the heart of practice-based innovation. Practice-based innovation focuses on how to combine different kinds of knowledge and capabilities that reside within the organisation or different organisations. Partnering organisations always have different kinds of knowledge, skills and capabilities and are confronted with the distances between them. Organisations with strong open innovation practices and increased absorptive capacity can span larger distances. As a result, they are better equipped to explore new areas that are not directly related to their core technology (Nooteboom et al., 2006). By contrast, in a strongly inward looking organisation, the poor fit with open or practice-based innovation may prevent open innovation from being effective (Huizingh, 2011).

Brokerage may not only span the distances between innovation partners but also lessen the in-house hindrance and resistance to innovation. The commitment of the participants to practice-based innovation activities is especially important. For example, if the commitment of the client organisation and its management is too limited, it affects the organisation's learning process and will most probably affect the way in which the results of this process will be utilised in the future. One reason for low commitment may result from low absorptive capacity. From the lack of the owner organisation's commitment arises also the managerial question of how to inspire and motivate the personnel to interact with parties other than traditional collaborators. This highlights the importance of being aware of cultural thinking frames (Salaman and Storey, 2002) that could hinder creativity. It is possible that the problems are easy to identify, but the will and skills to

actually do something about them may be lacking. In these kinds of situations, brokerage functions should take into account the cultural distance (Substudy 4).

### **9.2.5 Social and cognitive brokerage**

Brokers also need different kinds of skills. Especially social skills are highlighted during the innovation process. One important aspect of brokerage is building trust between the participants in the process. When parties in the networks trust each other, they become more willing to share their knowledge without worrying that they will be taken advantage of by others. Especially in a conflict situation, social skills of the broker are emphasised. In practice-based innovation, it is crucial to allow the necessary flows of information to take place but also to establish a trustworthy atmosphere, which helps different actors to overcome their reluctance to take part in a creative process. In practice-based innovation activities, the problem or challenge is approached from several cognitive perspectives, and there can even be cognitive dissonance between different points of view. If there is no trust in the group, divergent perspectives and ideas will not be shared.

The brokerage functions in practice-based innovation are based on diversity, which provides access to varied networks but also the ability to understand and structure innovation problems from complementary perspectives, stimulating the establishment of connections to solve the innovation problem in efficient and creative ways. A good broker is, above all, excited and well prepared for her/his task. The broker is not necessarily an expert in the subject of the practice-based innovation process. Instead, the broker's knowledge and skills are more related to the management of the innovation process. This means an ability to understand practice-based innovations and their characteristics and sources, and an ability to create a dialogical process with the client organisation and other stakeholders and to translate innovation problems into a structured project with the vision and ability to understand the necessary capabilities, skills and knowledge to solve the problem. The broker needs a broad knowledge base to be able to formulate the theme and challenges of the innovation process and select the right participants for the process and train them for their roles. That way it is possible to divide the brokerage functions in practice-based innovation into social and cognitive brokerage (see Figure 7). In social brokerage, the question is to reduce social distance between the participants during the innovation process, whereas in cognitive brokerage, it is a question of using cognitive distance as a source of creativity and innovation.

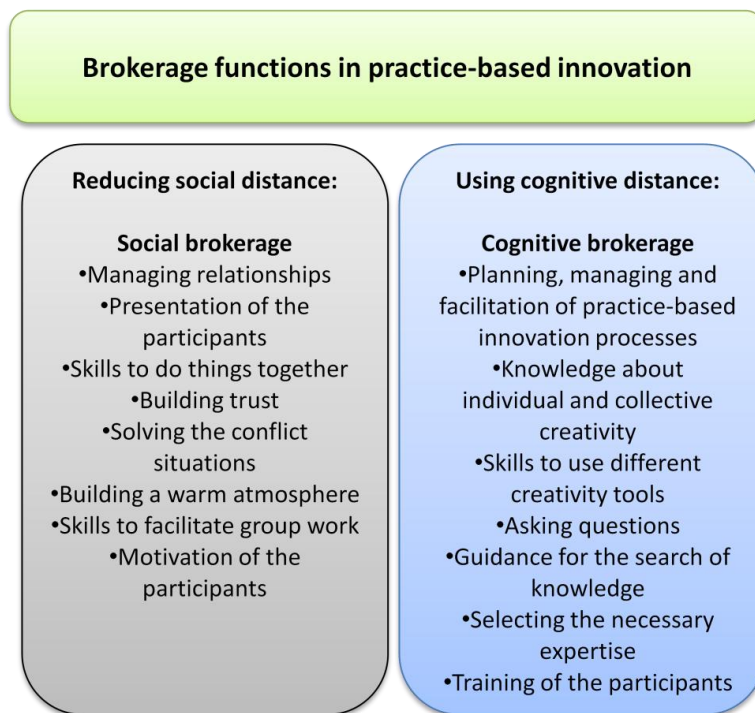


Figure 7. Social and cognitive brokerage in practice-based innovation.

Brokerage expertise is not routine expertise where old models are applied to new situations but more and more creative, constantly developing expertise. Brokerage expertise is based on social and cognitive brokerage. Brokerage expertise also includes an ability to question one's own know-how and live with the possibility of failure. One must also constantly develop one's own know-how and expertise. Brokers must also develop and learn new skills and maintain a base of knowledge because the broker's creativity is based on perceiving connections among different fields of knowledge and operations. New methods, tools and techniques are constantly being produced to support individual and collective creativity. The ability to engage a dialectic approach in brokerage could also be considered a type of social skill (Lingo and O'Mahony, 2010).

#### 9.2.6 Brokers as actors in regional innovation system

The results of brokerage functions are raw material for different types of innovations. According to Finke (1995), the best possible type of ideas for an organisation are ideas that are highly

imaginative and highly connected to current structures and ideas because these ideas are implementable. The practice-based innovation tools concentrate on the amount of ideas and also on the ability to implement them. This means that highly unrealistic ideas, for example, have a role in practice-based innovation. The generation of these kinds of ideas may have a role in creating a relaxed and fun atmosphere in the idea generation session. That way this dissertation supports the observation in the study of Antikainen, Mäkima and Ahonen (2010) that collective creativity is also fun.

In practice-based innovation activities, the ideas (generated in the present dissertation in innovation sessions and through the innovation catcher) could be divided into ideas that are valuable (1) at the individual level, creating possibilities for employee-driven innovations, and ideas that are useful (2) at the organisational and (3) regional level. At the organisational level, these ideas create possibilities for product, process and organisational innovations. At the regional level, the ideas are related to the question of how to organise co-operation and networking so that they give possibilities for system innovations. Practice-based innovation activities also create possibilities for networking and long-term innovation processes. This implies that in the regional innovation system, brokers create connectedness within the system, and have a role in creating new possibilities and dynamism within the system. Brokers in practice-based innovation contribute to reducing uncertainty in the fuzzy front end of innovation processes where there is a high risk of failure, which would preclude potential innovation partners from innovating. Brokers may also offer new and different kinds of methods to connect a heterogeneous group of actors and to explore and exploit weak ties and structural holes in the regional innovation system.

The regions meet the challenge of combining the aspects of proximity and distance in practical policy solutions. All innovation activities, as well as the policies supporting them, must be able to balance the contradictory purposes of proximity and distance. A successful innovation policy has to include the mechanisms for enhancing cognitive diversity, openness of the innovation networks and the ability of an innovation network to connect to the regional and non-regional knowledge bases. Brokers can more neutrally balance between proximity and distance than parties that have a stake as sources or carriers of innovation in the subsequent innovation process. However, there is always a risk that the broker may become a more or less “hidden messenger” for another party, which can be detrimental to the broker’s credibility and legitimacy. At regional level, there is a need to realize that brokers cannot be used as a pre-specified and pre-defined instrument, as they are typically involved in multi-stakeholder processes.



The phenomenon of collective creativity depends on the actions of help seeking, help giving, reflective reframing, and reinforcing in organisations (Hargadon and Beckhy, 2006). The idea could be also applied to regional level. The role of brokers could be seen as facilitating help seeking, help giving and reflective reframing activities between different innovation actors in the region. Such actions are often constrained by different kinds of distances that keep innovation actors from tapping into each actor's expertise and experiences. To succeed in these activities, brokerage functions should be reinforced at the regional level. It is unlikely that organisations will seek help from others or offer help in other organisations' efforts if brokerage functions are not valued in the region. The role of brokers in facilitating collective creativity could be defined, for example, in regional innovation strategies.

Because regions differ from each other, it is essential to map and diagnose the strengths and weaknesses of the regional innovation system in order to develop a clear vision of which weaknesses to tackle or which strengths to highlight and what kind of innovation ambition there is in the region. This also includes defining what kind of brokerage functions there are in the region and how well these functions correlate with the needs and vision of the region. However, brokers should be given considerable freedom to explore new options and establish new linkages, and not be tied to prescribed schemes and determined performance indicators. At its best, foresight in innovation activities is a brokerage act in which future knowledge is absorbed into utilisable innovation knowledge (Uotila, 2008).

For the success of brokerage functions it is essential that organisations have possibilities to use brokers in their innovation activities and are willing to use them. This means that brokerage functions should be made a visible and essential part of regional innovation activities. It is essential how well the actors of the regional innovation system and the innovation actions themselves are known, and how well the actors know other actors contributing to innovation systems outside the region. Brokerage functions are supported by active communication networks both inside and outside the region. To function, the communication networks require communicative skills, common language and common experiences (Aula and Harmaakorpi, 2008).

At the regional level it is also important to consider how to evaluate brokerage functions. There are difficulty of assessing the contribution of innovation brokers though conventional forms of impact evaluation. This is because the primary work of brokers is to improve the quality of interaction, and this includes many intangible contributions to make interdependent actors and networks collaborate

effectively. This means that effective evaluation of brokers would require the development of indicators to measure processes like network formation. This would include both quantitative and qualitative measures. Also the regional context where brokers operate is essential to take into the consideration in evaluations of brokerage functions.

## **10 Reflections of the dissertation and avenues for future research**

### **10.1 Reflections of the dissertation**

Reflections on how the chosen research strategy can achieve validity and reliability forms an important part of any rigorous research. These concepts are rooted in a positivist perspective. The definitions of reliability and validity in quantitative research reveal two strands: Firstly, with regards to reliability, whether the result is replicable. Secondly, with regards to validity, whether the means of measurement are accurate and whether they are actually measuring what they are intended to measure. However, the concepts of reliability and validity are viewed differently by qualitative researchers, who strongly consider these concepts defined in quantitative terms as inadequate for qualitative research. In other words, these terms as defined in quantitative terms may not apply to a qualitative research paradigm. (Golafshani, 2003.)

The objective of reliability is to be sure that other researchers could follow the same procedures as described by an earlier investigator and conduct the same case study and arrive at the same findings and conclusion (Yin, 2009). This relates to the concept of a good quality research when reliability is a concept for evaluating quality in a quantitative study with a “purpose of explaining”, while the concept of quality in qualitative study has the purpose of “generating understanding” (Stenbacka, 2001, p. 551). To ensure reliability in qualitative research, examination of trustworthiness is crucial (Golafshani, 2003). Several procedures have been conducted to ensure trustworthiness in this dissertation. The research data and the ways in which they were collected have been described in Chapter 8. Each substudy also includes a description of the research process and an analysis was attempted to do so that a reader can evaluate how and in what terms it would be possible to transfer the findings of this dissertation or parts of them to other settings. The collected data such as the interviews, observations and the results of the questionnaires have been documented and made available for other researchers. The substudies also use direct citation to show how the theory, data and conclusions resonate with each other.

In the positivist approach to research, there is the belief that knowledge can be gained by objectivity. It is possible to observe facts without bias or preconceptions. However, according to the social constructionist perspective, this belief has been disputed – people, including researchers, cannot be totally objective. A researcher is very likely to hold some position when they are conducting their research because people construct their own versions of reality. Social

constructionism values multiple realities that people have in their minds. According to Denzin and Lincoln (2000), every study is a social construction which is constructed by the researcher. The research is an interactive process shaped by her or his personal history, biography, social class and by those of the people in the setting. The researcher of this dissertation has also participated in other practice-based innovation projects than those that have been studied in this dissertation. These projects have naturally have had an impact on how the researcher interprets the themes of this dissertation.

Research as a social construction also means that the study could form during the process and it cannot be planned in accurate detail beforehand (Denzin and Lincoln, 2000). This research process has also not been pre-planned with strict research questions. Instead, the process could be described as flexible, iterative and curious for new possibilities. It included some re-evaluations and definitions made on the way. In fact, the structure of the thesis as an article-based collection gave the flexibility needed for these kinds of decisions. However, the overall objective of the research is followed. Collective creativity in innovation activities has been the research theme from the beginning, but the literature review and the process of conducting the substudies have changed the research plan during the process. For example, the role of individual creativity at the beginning of the research process was minor. But the understanding that without individual creativity there is no context for collective creativity and vice versa extended the role of individual creativity in this dissertation. As Chaharbaghi and Cripps (2007) note, it is the balance between the individual and the societal that makes collective creativity meaningful. Collective creativity is not simply the sum of individual creativities, but rather intensifies and multiplies them in meeting a challenge of common concern.

The traditional criteria for validity find their roots in a positivist tradition (Golafshani, 2003). Validity determines whether the research truly measures that which it was intended to measure or how truthful the research results are. This dissertation uses triangulation to ensure the validity of the findings. Triangulation refers to the use of more than one approach to the investigation of a research question in order to enhance confidence in the ensuing findings (Silverman, 2006). In this dissertation, triangulation was achieved mainly in two different ways. Firstly, so-called data triangulation was achieved through multiple data sources and methods. Employing multiple methods, such as observation, interviews and questionnaires lead to a more valid, reliable and diverse construction of realities. The data sources included, for example, the employee level in the organisation, participants of face-to-face and virtual idea generation sessions, and knowledge

brokers. This sample could be considered extensive. It included representatives from different occupations in different industries and from employee and management levels. In the fourth substudy, there were participants who were retired and also participants who were students. In the second and third substudy, some of the experts participating in the innovation sessions were from outside the region. However, conducting one substudy strictly at the management level would probably have given information from an additional perspective.

Another kind of triangulation that was applied during the research process was the concept of researcher triangulation. The data were collected and in many cases also analysed through the shared expertise of other researchers, and the final interpretations are outcomes of an interactive and collaborative process. That way it was possible to avoid too subjective views and bias. For example, in interviews the themes and example questions were done together in a research group to avoid leading or ambiguous questions. It should also be noticed that data were not only gathered for the purpose of this dissertation. The data were collected for both development and research purposes. This means that the interviews also included themes that were not necessarily directly related to collective creativity. This could be considered an advantage because overlapping themes made it possible to interview the participants from several perspectives. Moreover, the interviews were conducted by several researchers and the researchers had meetings during the interview process to consider how the interviews have succeeded and whether there have been any problems or whether there are any questions missing. However, the data were analysed both individually and also in the collaborative discussion where the final interpretations were developed.

The aforementioned research situation also affected the role of the researcher. This meant that the researcher had a double role as a researcher and a developer. This developer role was the strongest in the first substudy, which could be considered action research. The role of the action researcher differs from the traditional role of the researcher. The action researcher stands with and alongside the organisation or the group under study. The researcher is not an objective observer or an external researcher. According to Berg (2001), the researcher contributes expertise when needed as a participant in the process. He also considers the role of an action researcher more value-laden than the roles and endeavours of other more traditional researchers because the researcher is a partner with the study population. The approach a researcher takes when conducting action research must be more holistic, encompassing a broad combination of different kinds of aspects of relationships and interactions between the researcher and the stakeholders in the project. (Berg, 2001.) In first substudy, roles like planner of the intervention, facilitator of the sessions, listener of the

participants, observer of the meetings and sessions, synthesizer of data and reporter of the results were identified.

Concerning the second and third substudies, the researcher participated in planning and organizing many of the innovation sessions in several roles, for example, as a process broker, session broker, observer, and secretary. In the innovation session process studied in this dissertation, the researcher participated in planning of the innovation session and acted as a participant-observer in the innovation session. In the fourth substudy, the role of the researcher was highlighted. The researcher did not actively participate in the development process, for example, the planning of the process or meetings with the client organisation. She had access to the virtual idea generation platform and was able to observe the idea generation. She also had the possibility to comment on the questionnaire and to add some creativity related questions there. In the last substudy, the researcher was one of the planners of the brokerage training. She also participated as a teacher in one training session, planning the content and group works with another researcher. She also participated in every training session as an observer making notes.

One criterion for a good case study is that it is well bounded (Eriksson and Koistinen, 2005). The purpose of this dissertation is to study collective creativity in practice-based innovation and especially the role of brokerage functions in creating possibilities for collective creativity. In this dissertation, a complex phenomenon has been studied in the context of the Lahti region, Finland. The selection of the case study design naturally brings forth limitations as far as the generalisation of the results of the dissertation is concerned. Yin (2009) argues that case studies are only generalizable to theoretical propositions and not to populations or universes. He explains that the purpose of case studies is in analytical generalisation to expand theory and not in statistical generalisation. Stake (1995) notes that case study design is not to be chosen to optimise the production of generalisation. Instead, a particular case is chosen to study what it is and what it does and not how it is different from others (Stake, 1995). In this dissertation, the focus is on telling how collective creativity is supported in the Lahti region by brokerage functions. Even though innovation is often a territorial phenomenon, seeing that the innovation process contains assets that are place-specific and which cannot easily or rapidly be created or imitated in places that lack them, this dissertation gives implications for how other regions could take advantage of brokerage functions in supporting collective creativity. Using the concept of distance, the more the regions differ, the more there is to learn, but the more difficult it becomes to learn as well (see Knobens and Oerlemans, 2006).

A good study makes contributions. This dissertation contributes to research literature on collective creativity and brokerage functions in innovation activities. Theoretically it produces new information about the characteristics of collective creativity. It also defines challenges and possibilities of innovation activities using the concepts of distance and proximity. Compared to earlier literature (e.g., Gertler, 1995; Bathelt, Malmberg and Maskell, 2004), this dissertation values the role of distance as a source of creativity especially in fuzzy front end of innovation. It also suggests possibilities and implications for organisations how they could support their collective creative processes either to support internal creativity or use external creativity. That way this dissertation gives answers on how to do open innovation. Open, practice-based innovation activities require managers to make decisions in developing innovation activities in a more open and interactive direction. Questions such as when, how, with whom and with what purpose and in what way should they co-operate with outside parties will rise when organisations are opening their innovation activities (Huitzingh, 2011).

This dissertation makes contributions at the organisational and regional level by giving new information about the role of brokerage functions in enhancing creativity and innovativeness in the region. It also gives information about practice-based innovation activities, such as different kinds of innovation tools and their role in facilitating collective creativity in innovation activities. This dissertation highlights especially the role of brokerage functions in facilitating creativity in organisations and between organisations in practice-based innovation. The results of this dissertation offer new knowledge that may be used in the future in, for instance, the planning of training for brokers-to-be, or even university education in various fields.

## **10.2 Suggestions for future research**

The conclusions and limitations of this dissertation bring forth some fruitful and interesting possible avenues for future research. This dissertation focused on the Lahti region, and on how brokerage functions facilitate collective creativity processes in the region. Future studies would include conducting the same kind of research in other regions in Finland and also abroad. Comparative studies would give new information about how different regional innovation systems facilitate collective creativity and what kind of roles brokers have in the system. According to Doloreux (2002), without comparison between different regional innovation systems it is difficult to fully understand and capture the degree of application of the regional system approach and its potential

impact on regional development in different regions. Comparative case study methods allow for a more thorough investigation with respect to the normally hidden variables. The observation of a phenomenon in one case can raise questions as to why it does not occur in another. (Doloreux and Parto, 2005.)

Leaders and their experiences about collective creativity were not studied as a separate group in this dissertation. However, the role of the leaders to support collective creativity in the organisation was acknowledged in the first substudy. According to the study of Bissola and Imperatori (2011) concerning Italian fashion and design firms, managers focus their practices on individual creativity and demonstrate knowledge of and emphasis on the principles of organisational design to sustain individual creativity. They share the idea that creativity is a matter of individual skills, therefore organisational practices have to enhance and support individual creativity. According to these managers, creativity is mainly considered an individual attribute and, as such, cannot be organised collectively. Future studies could include studying how leaders themselves define collective creativity and what kind of possibilities they see in supporting collective creativity in their organisation or in its networks. What possibilities do they have to facilitate the help seeking, help giving, reflecting reframing and reinforcing activities in order to create possibilities for collective creativity? What kind of bridging role can the leader have, for example, in co-operation between departments? How can the leader act as a broker? How does the status of the leader affect the success of brokerage functions?

Creativity has often been seen as something valuable and reachable. However, not much research has considered the negative side of creativity or collective creativity. Hargadon and Beckhy (2006, p. 497) write that “collective creativity can also have costs as well as benefits”. Creativity is generally seen as a desirable process within an organisation, but it can affect the efficiency of existing processes (Gilson et al., 2005). This raises the question as to in what kind of situations collective creative interaction is desirable. How is this issue seen by the leaders or, on the other hand, by employees?

In the context of open innovation, one could also consider what the cost of unsuccessful open innovation activities is and how to overcome them, especially in an organisation that has no or low previous experience about open innovation. How should the organisation or leaders encourage employees to participate again and learn from mistakes? Related to this one important question at the organisational level is how to reward collective creativity. Generally speaking, different reward



systems in organisations have been based on individual rewarding, but in the case of collective creativity, it is impossible to trace the idea to one person who should be rewarded. In open innovation, this question should also be enlarged to considering how to reward those participants of the open innovation activities who are not members of the organisation, such as customers and experts.

Brokerage functions are often associated with the concept of power. According to Oke, Idiagbon-Oke and Walumbwa (2008), the broker uses both personal power bases like referent, expert and information power and position power bases like reward, legitimate and coercive power. It would be interesting to study how brokers in practice-based innovation activities use power, and how these different power bases probably differ according to the broker or the situation. In practice-based innovation, brokers connect different kinds of actors together to facilitate innovation processes at the regional level. In order to do this they have to influence actors to join common collective creativity processes. Especially in fuzzy front end of innovation, it is not necessarily clear as to what the advantages of the process are for each actor, and also factors such as downsizing, a poor economic situation or regression may affect the willingness of regional actors to join common innovation processes.

On the other hand, the way in which brokers use power in fuzzy front end of innovation would probably affect further phases of the innovation process and its success. Innovations are dependent on knowledge integration across disparate groupings, but power or politics affect the ways in which people form and co-ordinate networks, and groups or networks coalesce around an idea or interpretation. Is it always so that the “best idea” wins? According to Swan and Scarbrough (2005), political dynamics are not only about the resource power of managers at the organisational level but also relate to the power effects of networks which extend inside and outside the innovating organisation. That way the power dynamics of a regional innovation system and its institutions may affect the innovation activities at the organisational level, for example, the kind of resources the regional system offers for the actors of the system. On the other hand, this also shapes ways in which brokers may act in the system. So, what are the political dynamics that shape practice-based innovation and what kind of effects do these dynamics have for the implementation and diffusion phases? Do brokers recognize these political dynamics or do they take these for granted?

All the substudies of this dissertation offer potential for further studies. The substudies belong to the fuzzy front end of innovation, so it would be interesting to study how these processes have

succeeded. For example, in the first substudy the case organisation experienced larger organisational changes right after the end of the innovation catcher project that concentrated on enhancing employee creativity and innovativeness. How did these organisational changes affect the implementation of the ideas generated? Which ideas were possible to implement, which ideas were modified and which were abandoned? This substudy, as also the fourth substudy, highlights the importance of leadership in innovation activities. In future studies concerning these cases, it would be interesting to follow up on whether the leadership behaviour changed after the idea generation phase. Have new leadership styles evolved to support creativity in the organisation in the first case organisation? Or, how did the limited commitment of the owner organisation of the fourth substudy affect the organisation's learning process and ways in which the results of the process were utilised?

The substudies about the innovation session method raise the question of how to measure the success of practice-based innovation tools. During the innovation session process, different kinds of ideas were generated for individual, organisational and regional levels. How can the collective creativity be measured during the process? How can the role of brokers in the process be evaluated? Or how can the effects of the brokerage on regional innovation activities be evaluated? Developing measures of collective creative performance could allow the comparison of, for instance, different innovation tools. The measurement system should dig into understanding the dynamics of knowledge brokerage operations and not only measure visible results stemming from the R&D operations, but take into consideration the effects of brokerage functions on, for instance, the innovation culture in the region and in the organisations involved in the operations.

It would also be interesting to study how brokerage functions differ during the innovation process. How well are brokerage functions suited for integrating or implementing collectively generated ideas? Also distances may indeed be differently accentuated during the various stages of innovation processes, and this may change the character of brokerage. Further studies could also concentrate on how brokerage functions differ in different types of innovation processes, for example, differences in product and service innovation processes. Brokers' challenges may be far greater in the case of process and service innovations in the public sector than in a "straightforward" product innovation in the private sector. Again, however, the variety of cases is immense; a product innovation may contain characteristics of a process and service innovation, as well. These are important areas for future empirical studies. Different types of innovation processes may have different demands for the skills and capabilities of the broker. In future studies it could be valuable to study those situations where there is a need to combine different broker roles, for example internal and external roles.

As shown in this dissertation, brokers' roles and functions are demanding, and different kinds of competences and skills are needed. Practice-based innovation processes place many demands on innovation activities and the need for skilful brokerage is becoming increasingly well known. The limitations and impacts of the brokers' work as well as additional needs for training are yet to be studied. At the individual level, their personal qualifications are an extremely important basis for their interaction with other individuals and other levels, which is why their perceptions should be listened to when designing future training, for instance. Also the special needs for internal and virtual brokerage should be considered when designing this kind of training.

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## Part II: Articles





**Article 1:**

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# Experiencing Creativity in the Organization: From Individual Creativity to Collective Creativity

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## Abstract

Creativity is a component that enhances the ability of organizations to retain their competitive advantage as well as to stay ahead of their competitors. For creative organizations, the ideas and insights of their employees are of crucial importance. Most of the creativity research concentrates only on individual aspects of creativity. This paper also stresses the collective aspect of creativity in the organization. It studies how employees experience creativity and in what way they would support creative processes in their organization. The research material is from an action-based research project that tries to reveal innovation potential in all levels of the organization. According to the results, there is room for creativity in every job. However, creativity and especially the collective aspect of creativity in the organization are undervalued, though most of the work in the organization needs the expertise and creativity of many employees. This study also introduces the employee-driven way to support collective creativity in the organization.

**Keywords:** creativity, collective creativity, employee, knowledge, innovation, diversity

## Introduction

In today's business world, innovations provide companies with major opportunities and advantages. Innovation can be defined as the outcome of a set of activities that use knowledge to create new value to those benefiting from its use (de Sousa, 2006). It is commonly accepted that innovations are brought forward in an interactive process of knowledge generation and application. Organizations need to generate knowledge, facilitate the sharing of knowledge, and apply the knowledge so that the organization can generate innovation. Innovative organizations use knowledge creatively. Creativity is the component that enhances the organizations' ability to retain their competitive advantage as well as to stay ahead of their competitors. For this type of organizations, the ideas and insights of their employees are of crucial importance. However, much innovation potential remains unexploited because organizations assign the responsibility of getting new and implementable ideas only to the R&D functions (Axtell et al., 2000; Chesbrough, 2003; Tidd, Bessant, & Pavitt, 2001).

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To remain competitive, organizations need their employees to be actively involved in their work and try to generate novel and suitable products, processes, and approaches (Shalley & Gilson, 2004). Many achievements in companies involve collaboration between many creative individuals, each with varying knowledge, skills, life experi-

ence, perspectives, and expertise. These kinds of collectives can tackle multi-faceted challenges that cannot be met individually. Nowadays we do not only speak about individual creativity but also about collective creativity (Hargadon & Beckhy, 2006; Sawyer, 2006). Collective creativity can be defined as creative processes leading to creative products that are the results of interaction between two or more people. In collective creativity, it is impossible to trace the source of new ideas to an individual. Instead, creative activity emerges from the collaboration and contribution of many individuals, thereby blurring the contribution of specific individuals in creating ideas.

In this study, the focus is on investigating the concepts of creativity and collective creativity in the context of promoting the employees' creativeness and innovativeness. The research problem is: how to enhance collective creativity in the organization. The research questions are: how do the employees themselves perceive creativity in their work place, and in what way would they support creativity and especially collective creativity in the organization? The case study is based on empirical data from an action research based process conducted in one private company.

## The Creation of New Knowledge

An organization's success and survival depend on its capability to create new knowledge and then innovation. Knowledge is an organization's most valuable resource because it embodies intangible assets, routines, and creative processes that are difficult to imitate. According to Nonaka and Takeuchi (1995), successful companies are those that consistently create new knowledge, disseminate it widely throughout the organization, and rapidly include it in new products. These characteristics define a "knowledge creating" company, whose business consists solely of continuous innovation. The key to success in a knowledge company is to build the intellectual capital that will create core competencies and distinctive products that will lead to superior results. Everybody is a knowledge worker in a knowledge creating company, where inventing new knowledge is a way of behaving. The central activity of a knowledge-creating company is to make personal knowledge available to others. This takes place continuously and at all levels of an organization.

A constructivist view of knowledge focuses on the intraorganizational processes through which new knowledge is generated and has highlighted the importance of both social practices within which new knowledge is created and social interaction through which new knowledge emerges (Tsoukas, 2009). More specifically, Nonaka and his associates (Nonaka & Takeuchi, 1995; Nonaka & Toyama, 2005) have proposed the socialization externalization combination internalization (SECI) model of knowledge creation. The core idea of the model is that "knowledge is created through the interaction between tacit and explicit knowledge" (Nonaka & Takeuchi, 1995, p. 62). Knowledge creation involves the creation of new concepts through dialogue and the management of conversations. Moreover, they have highlighted the use of figurative language and the combination of concepts to create new ones, in different parts of the knowledge creation process. For example, through metaphors people put together what they know but cannot yet put in words. (Nonaka & Takeuchi, 1995, p. 86; von Krogh, Ichijo, & Nonaka, 2000.)

Uotila, Melkas, and Harmaakorpi (2005) have offered an extended SECI-model. They emphasized the need to deepen the future orientation of the SECI model by adding two new knowledge conversion modes into the model. The added modes focus on self-transcending knowledge, a concept introduced by Scharmer (2001), who defined it as "tacit knowledge prior to its embodiment" — the ability to sense the presence of potential, to see what does not yet exist. Two additional modes were named the visualization and potentialization modes. The visualization mode is the conversion from self-transcending to tacit knowledge through visions, feelings, a mental model, etc. The potentialization mode is the conversion from tacit to self-transcending knowledge by sensing the future potentials and seeing what does not yet exist.

Most innovation happens at the boundaries between disciplines or specializations (Carlile, 2002, 2004; Johansson, 2004; Leonard, 1995). Carlile (2002, 2004) has shown how the creation of new knowledge is facilitated when knowledge boundaries are crossed. Working across boundaries is a key ingredient in competitive advantage and also explains why innovation is difficult to create and maintain. The level of novelty will determine the complexity of the knowledge boundary. As the level of novelty increases, the associated path-dependent nature of knowledge may have negative effects, making knowledge sharing and creation difficult. Leonard (1995) considers mechanisms for importing and absorbing knowledge, transferring knowledge across the organization, and developing new knowledge bases. She also introduces the notion of “creative abrasion”, where different knowledge bases are brought together through open discussion between individuals with different perspectives. If the potential conflict is successfully managed, it could lead to new, creative and exciting ideas. However, creative abrasion does not happen automatically. It is designed into the organization, for example by maintaining a diverse mixture of different skills among employees.

## The Creativity Approach

Creativity is closely related to knowledge (Leonard & Sensiper, 1998). From the innovation perspective, knowledge provides the organization with the potential for novel action, and the process of constructing novel actions often entails finding new uses or new combinations of previously disparate ideas (Hargadon & Sutton, 1997; Weick, 1979). In organizations, creativity is the process through which new ideas that make innovation possible are developed. Current views on organizational creativity appear to focus largely on outcomes or creative products. A creative product has been defined as one that is both novel and original and potentially useful or appropriate to the organization (Amabile, 1996; Mumford & Gustafson, 1998). Additionally, at least for companies, creative ideas must have utility. They must constitute an appropriate response to fill a gap in the production, marketing, or the administrative processes of the organization. Organizational creativity is the creation of a valuable, useful new product, service, idea, procedure, or a process by individuals working together in a complex social system. Therefore, creativity could be seen as an important organizational capability (Amabile, 1998), a possible source of organizational effectiveness (Woodman, Sawyer, & Griffin, 1993), and a source of competitive advantage (Leonard & Sensiper, 1998).

Research on creativity at the organizational level can in general be divided into two categories: the characteristics of the members of the organization and the characteristics of the organization that facilitate and nurture employee creativity. An employee’s engagement in innovative work behavior requires the employee to be both able and willing to be innovative. Employees may exhibit creativity by developing new knowledge, advancing technologies, or by making process improvements that will lead to innovations. Employee innovativeness can be defined as engagement in innovative behavior related to the innovation process (de Jong & Kemp, 2003; Parzefall, Seeck, & Leppänen, 2008). Amabile (1997) writes that expertise, creative thinking skills, and motivation, when mixed together, identify the level of creativity within an individual. The expertise component includes memory for factual knowledge, technical proficiency, and special talents in the target domain. Creative thinking means that an individual is able to see things from more than one perspective and is able to question the existing working models. If problems are solved the way they always have been solved, it blocks creativity and prevents new ideas from penetrating. Creativity and innovativeness require a certain level of internal force that pushes the individual to persevere in the face of challenges in creative work (Shalley & Gilson, 2004). The task motivation component determines what a person will actually do (Amabile, 1997).

## Experiencing Creativity in the Organization

According to Nayak (2008), a major limitation of the individual creativity research is its reliance on studies of the psychology of the creative person. Researchers have uncritically drawn on creativity studies that are based on artists, poets, and children to see whether organizations have an impact on creativity. By posing the question in this manner, researchers have axiomatically constructed the organizational setting as inhibiting creativity. In other words, they assume that outside the organizational environment, creativity would have flourished. Nayak investigated creativity in a large UK supermarket retailer undergoing major change and transformation. His findings show that in a creative organization, managers rely on their own values and beliefs. Awareness of personal morality as an important dimension of experiencing organizational creativity can contribute towards a better understanding of how and why a reconstruction of an organization along creative lines may succeed or fail.

In many studies managerial behaviours have been connected to employees' creative performance. Leaders may support employees' creativity by allocating resources. One of the most valuable resources that leaders may allocate in order to foster creativity is time (Mumford & Gustafson, 1988). Access to funds, materials, facilities, and information also supports creativity (Amabile et al., 1996). Leaders can also influence creativity in the way they design work groups. According to research (Amabile, Conti, Coon, Lazenby, & Herron, 1996; Milliken & Martins, 1996), work groups conducive to creativity have diversely skilled members, an openness to new ideas, interpersonal trust, commitment to the work, and communication where members constructively challenge each other's ideas. In particular, diversity in group composition provides potential for innovation (e.g., Johansson, 2004; Paulus, 2000). Innovations involve the challenge of enabling renewal based on diversity and facilitating the integration of knowledge in a creative way. Job characteristics that relate to creativity, including complexity, autonomy, variety, and feedback, also support creativity at the work place. Also supportive leadership is positively related to employee creativity (Oldham & Cummings, 1996). Leaders may provide encouragement for creativity by valuing individuals' contributions and showing confidence in the work group (Amabile et al., 1996).

Organizational factors such as structure and culture may play a more important role in predicting the realization of innovations than in influencing the employee tendency to produce creative and innovative ideas (Axtell et al., 2000). Open, flexible structures, decentralized decision-making, and low hierarchical levels favor innovation. Organic structures allow diversity and individual expression and they are well suited to the initiation phase of the innovation processes. The possibility for employees to interact with people from different departments could provide information that is beneficial for the generation of ideas. In particular, information from employees with more diverse expertise provides connections to more remote facts and perspectives (Madjar, 2005). Flexible structures are also often more conducive to open and effective organizational and inter-departmental communication. On the other hand, some level of stability, clarity, and coordination is needed. If formal mechanisms are absent, communication comes to depend solely on the discretionary and ad hoc effort of the organization members, which may not be sufficient (Parzefall et al., 2008.)

The concept of climate is used to refer to specific facets of organizational culture, for example a climate for psychological safety, service, initiative and innovation (Patterson et al., 2005). Psychological safety refers to a shared belief that an organization is a safe environment for taking interpersonal risks without needing to fear negative consequences (Edmondson, 1999). Empirical studies suggest that organizations with a climate for psychological safety are particularly conducive to innovativeness (Baer & Frese, 2003). The mechanism through which this occurs includes reduced risks through presenting new ideas, a higher level of job involvement, and better team learning. Morrison and Phelps (1999) suggest that an organizational climate that is considered safe and encourages risk-taking is important in motivating individuals to take initiative. Initiative

plays an important role in the innovation process: individuals with initiative are more likely to take an active approach to work, to go beyond what is formally required in their jobs and to have the persistence to follow their creative ideas through to implementation (Miron, Erez, & Naveh, 2004).

According to Hargadon and Bechky (2006), the literature on creativity in organizations is less concerned with action and interaction at the collective level than creativity at the individual level. Collective creativity occurs when social interactions between individuals trigger new interpretations and new discoveries of distant analogies that the individuals involved could not have generated by thinking alone. Such an approach differs from the existing research on creativity and innovation along two dimensions. Rather than focusing on the group and organizational variables that make up the ongoing context for creativity, this perspective recognizes the fleeting coincidence of behaviors that triggers moments when creative insights emerge. And rather than viewing this eureka moment as the sole province of individual cognition, this perspective focuses on those insights that emerge in the interactions between individuals.

Table 1 introduces literature related to collective creativity. These studies highlight the importance of group and organizational creativity as well as the relationship between the different levels of creativity within the organization. For example, Woodman et al. (1993) give a central place to group creative performance in their model of organizational creativity. Oldham and Cummings (1996) highlight the organizational context that enhances creative achievement. They conclude that to promote organizational creativity, management should consider both personal and contextual factors in order to increase creativity. According to Bharadwaj and Menon (2000), both the individual and organizational creativity mechanisms can lead to innovation in companies. Based on the above studies, collective creativity does not diminish the importance of individual creativity. Without individual creativity, there is no context for collective creativity and vice versa. As Chaharbaghi and Cripps (2007) note, it is the balance between the individual and the societal that makes collective creativity meaningful. Collective creativity is not simply the sum of individual creativities, but rather it intensifies and multiplies them in meeting a challenge of common concern.

**Table 1: Literature related to collective creativity**

Study	Data	Results
Woodman, Sawyer and Griffin (1993)	Theoretical analysis	Full understanding of creativity in complex social settings requires going beyond a focus on individual actors and examining the situational context within which the creative process takes place. A variety of social and contextual influences affect creativity at the group and organizational levels. Many of these influences either constrain or enhance the creative performance of individuals and groups.
Oldham and Cummings (1996)	The research was conducted in two manufacturing facilities that produced component parts for technical equipment (171 employees).	According to the results, employees produced the most creative work when they had appropriate creative-relevant characteristics, worked on complex, challenging jobs, and were supervised in supportive, non-controlling fashion.
Drazin, Glynn, and Kazanjian (1999)	Theoretical analysis	Authors' proposal sustains the relevance of continuous interaction processes in creativity aimed at establishing the common patterns of reference and shared meanings necessary to overcome moments of crisis in collective actions.

Study	Data	Results
Bharadwaj and Menon (2000)	Data were gathered through a mail survey of key respondents in 750 business units of 500 corporations.	The study finds that organizational creativity mechanism and individual creativity mechanism can lead to innovation in companies. The study suggests that high levels of organizational creativity mechanism led to significantly superior innovation performance than low levels of organizational and individual creativity mechanism.
Taggar (2002)	The performance of 94 groups on 13 different open-ended tasks was studied.	The study shows that although it is necessary for a group to contain members who are creative, team creativity-relevant processes that emerge as part of group interaction are also important. Indeed, without this latter type of behavior, the benefits of putting together a group of highly creative individuals are neutralized.
Hargadon and Beachky (2006)	The model is grounded in observations, interviews, informal conversations, and archival data gathered in intensive field studies of work in professional service firms.	The study confirms the relevance of investigating the processes that lead to significant and valuable collective creative results and demonstrates that four sets of interrelating activities foster collective creativity (help seeking, help giving, reflective reframing and reinforcing).
Bissola and Imperatori (2011)	A grounded research design through six focus groups attended by 24 managers from 17 Italian fashion and design firms and 12 academics.	The results confirm that creativity is not only about creative genius, and designing potential for creativity is not a matter of linear correlation but includes a more sophisticated and integrative approach according to which individual creative skills, team dynamics and organizational solutions interact with each other to produce a collective creative performance.

## CASE STUDY: A Creative Organization

### Methodology

The case company is a Finnish telecommunications company providing high-quality, state-of-the-art voice, data, and mobile communications and TV services to private customers, organizations, and corporations. Over the last decade, the domestic business environment in mobile communications changed. Instead of innovation driven growth, the continuous deregulation of Finnish markets has led to exceptional price competition. The competition in voice call prices has led to decreased revenues, consolidation of players, and even exits from Finnish mobile markets. Decreased revenues in turn have led to cautious and slow investments in new technologies and slow development of new services. Telecommunications companies, like the case company, faced the fact that possibly they cannot charge anything for plain voice calls, so they have to find sound models of how to survive in the future (Janhunen, 2006).

The case company was established shortly before the turn of the millennium, and, in the beginning, the company was owned by approximately 40 Finnish telephone companies located all over the country. Preparations for opening a new, national mobile phone service were made during the year 2000. In 2007, the case company changed from a mobile communications operator into a major telecommunications company. The current company began operating in 2007, when its business operations merged with six telephone companies. Alongside its mobile communications



business, the company obtained a strong fixed-network business, including voice, data, cable TV, and information security services for both households and companies.

The data used in this study constitutes an action research-based development project called Innovation Catcher, which aims at revealing the hidden innovation potential at the different levels of an organization. Action research as a twofold methodological approach consists of two projects: the action project where action is generated, and the research project that intends to create knowledge about that action (Coughlan & Coughlan, 2002; Reason & Bradbury, 2008). The Innovation Catcher project in the case company was a part of a larger development process with the aim of building a more innovative organizational culture in the company. The role of the Catcher project was to find ways to facilitate the employees' creativity and make everybody a knowledge worker in the company.

The research material for this case was gathered at the end of 2008 and the beginning of 2009. The qualitative research methods consist of a semi-structured interview (Table 2), observation of the development sessions, and analysis of group works. The questions were made by several researchers and were based on the literature review. Some of the questions were chosen according to discussions with the representatives of the company. For example, the representatives of the company were talking about a need for a communal innovation culture. So, the researchers decided to include a question concerning how employees understand this kind of culture. As the interview process evolved and the understanding and knowledge of the researchers accumulated, some more specified questions were added to the semi-structured interviews. The researchers of the action research team conducted the interviews and the interviews were anonymous. There were 18 employee level interviewees. The interviewees were purposefully chosen all over the company to get the best possible overview of the ideas of the employees. The researchers made a summary of the main findings of the interviews which they introduced to the company representatives and also to the participants of the Innovation Catcher.

The data were analyzed according to the principles of qualitative content analysis. The coding scheme was derived from the data, previous related studies, and theories. It included categories such as creativity, motivation, organizational culture, expertise, ideation processes, and leadership. During coding more categories were generated or they were divided to several categories. For example, new categories were "help asking" and "help giving" and "expertise" was divided to "internal expertise" and "external expertise". A particular comment or answer was assigned to a single category or it was assigned to more than one category simultaneously. After coding, the properties and dimensions of the categories were explored and relationships between categories were identified. The purpose was to find similarities and differences in the data and produce a condensed description about how creativity is experienced in the organization. In the analysis of the data an especial attention was drawn to the challenges of creativity in the organization. Atlas.ti software was used to help to analyze the data.

**Table 2: Example questions**

Themes of the interview	Example questions	References
Background data	What is your job description? How long have you worked in this organization?	
Communal innovation culture	How would you define communal innovation culture? What kind of elements does an ideal working environment have? How do you motivate yourself? How would you define creativity? Do you need creativity in your work? What kills creativity?	Amabile (1996, 1997, 1998) Taggar (2002) Van der Panne, Van der Beers, and Kleinknecht (2003) Miron, Erez, and Naveh (2004) Shalley and Gilson (2004)
Co-operation between departments	What kind of co-operation is done between departments? Are there any problems in knowledge sharing between departments? What kind of problems? How would you develop the co-operation between departments?	Paulus (2000) Moanaert, Caeldries, Lievens, and Wauters. (2000) Keller (2001) Bechky (2003) Anderson, De Dreu, and Nijstad (2004) Bhirud, Rodrigues, and Desai (2005)
Leadership and management	Is it possible to manage ideation in the organization? Who are the right leaders in innovation activities? How do leaders give feedback? What kind of management style is the most suitable in supporting innovative culture?	Mumford and Gustafson (1988) Oldham and Cummings (1996) Mumford (2000) Mumford, Scott, Gaddis, and Strange (2002) Viitala (2005) Gumusluoglu and Ilsev (2008)
Idea generation process	Where do the good ideas come from? How is it possible to develop ideas further? How are the personnel motivated to present ideas?	Amabile (1996, 1997, 1998) Bandura (1993) Axtell et al. (2000) Bharadwaj and Menon (2000) Paalanen and Konsti-Laakso (2007)

In the analysis, three questions emerged: How to support creativity at work? How to manage creativity/innovation? What are the sources of ideas? Based on these questions, the research group and the key persons from the case company planned two development sessions. The interviewees and some of the representatives of the management participated in the sessions. In the development sessions the participants were in an active role. In the first development session the summary of the interviews was presented to the participants as a stimulus for idea generation. In this summary also findings from creativity and innovation literature were provided. The purpose of the first session was to specify the needed development targets related to the aforementioned questions. This was done collectively in groups. The questions were discussed by using the Learning Café method where every group generated ideas for every question. Every question had a separate table where groups visited and wrote their ideas on a big sheet of paper. Every table had a researcher who explained the question and if necessary, facilitated the discussion, for example by summarizing what the previous group had discussed or by asking specified questions. Due to this method, all participants were given the opportunity to actively take part in the discussion and give their opinions or make statements on the topic. At the end of the session, participants voted for the ideas they wanted to develop further in the next session.

The second session began with a short presentation on the innovation tool that has the purpose of supporting organizations to bring in new ideas from outside. This tool was not aimed at supporting creativity inside the organization, but in some sense it probably affected thinking, because the participants borrowed some elements of the tool into their constructed method. Before the participants planned the method to help idea generation and creativity in the company, they had a small group work about creative problem solving with specific roles. Every group defined their problem and roles by themselves. According to the discussions, those groups where there were participants from different fields succeeded better in developing new approaches to the problem. To facilitate the group work on the idea-generation method, the researchers had made some helpful questions, for instance what kind of roles are needed, what are the advantages of the method, what is the purpose of its use, what kind of problems or challenges there are in the development and use of the method. But the groups also had the possibility not to answer these questions. After the group work there were general discussions about issues that emerged during the group work. The group work sessions were documented and analyzed. The researchers also wrote a report of the sessions.

### ***Employees' Experiences about Creativity in the Organization***

Although the level of creativity required and the importance of creativity can differ depending on the task or job in question, there is room for creativity in almost every job (Shalley & Gilson, 2004), providing a foundation for organizational creativity and innovation (Amabile, 1997). Only one interviewee in the case company was skeptical about the need for creativity in his/her work. All other interviewees acknowledged the need for creativity in their work. Creativity was needed in every day work, for example when "tailoring the services to fit the customer's needs" or "finding the best practices and implementing them". Challenges that require creativity are (often) complex and ill-defined. One of the interviewees pointed out that creativity is needed to lighten one's own work: "when you are a little bit of a lazy person, you like to develop new ways of making your work easier".

The organizational changes in the company have emphasized the need for creativity in the organization. Even though the changes were considered necessary, they were not always a positive thing for the employees. Organizational changes lessened possibilities for collective activity in the organization because employees were unsure of whom to ask for help or they concentrated only on their own work. One interviewee explained, "I do have ideas, but I won't tell them to anyone". However, surprisingly many interviewees stressed the need for a positive attitude in complex situations. Attitude was mentioned directly in four interviews. Here are some comments made by the interviewees: "...to survive, I decided to concentrate on work and have a positive attitude" and "It is matter of attitude. Do you complain because you don't want any changes or it is possible to think that there is something good in the changes". None of the interviewees expressed totally negative or frustrated comments about the organizational changes.

At the time when the current company was founded, creativity and innovativeness were especially needed: "people were employed without clear job descriptions and everybody had to define his/her place in the organization". However, that time was also considered "a fruitful time to change things and do things in a different way". To change things was not necessarily easy to do because "there is a need to hold on to the old and safe practices even if they have not been a functioning solution in the changed situation". In this way, creativity forces individuals to step away from safe and familiar situations and to live with uncertainty (Shalley & Gilson, 2004).

In the case company, creative ideas came from a range of internal and external sources. The most common answer in the interviews was that everyday situations generate ideas at work and during free time. According to one interviewee, "these ideas do not always relate strictly to one's own work but are probably useful in other parts of the company". Another interviewee described these ideas as a source of incremental innovations: "most of these ideas and innovations are small

things, like developing every day work routines". Examples of external sources are seminars and conferences. Also the role of competitors and other stakeholders was acknowledged as a source of useful ideas. Acquiring external knowledge was appreciated: "... it should be encouraged more to be informed about what is happening in this branch".

According to Amabile et al. (2002), one of the most frequently cited factors necessary for innovativeness is sufficient time to think creatively and explore different perspectives. Nowadays employees are often time constrained, causing them to feel overworked and burned out. The increased workload and keeping with the timetables was seen as especially detrimental to creativity and innovativeness by the interviewees: "...it is really challenging to find the time to be creative because you have to keep to timetables and do routine work". The lack of time was mentioned in every interview. Also the shrinking of the work force in the company placed an extra burden on the remaining employees. According to the interviewees, the motivation in their work comes from "the challenges of the work", "the successes of the work", "feedback", or "when you have the possibility to show your expertise".

Creativity requires expertise. One cannot be truly creative unless one knows a good deal about a particular area (Amabile, 1998). People must actively acquire and work with knowledge if creative problem solutions are to be generated. In fact, one of the most noteworthy characteristics of creative people is that they have a substantial investment in expertise and the ongoing development of expertise (Mumford et al., 2002). Mostly, interviewees pointed to their own expertise rather than external expertise. In the data, there were 15 comments related to individual and five comments to external knowledge. The interviewees acknowledged that "you have to be good at what you are doing" to generate ideas that have utility for the company. Expertise was also seen as important in implementing ideas: "those who decide the further development of ideas should be experts in that area". In this sense, they highlighted previous experience as essential. Also according to the research, solving creative problems collectively in organizations relies on connecting past experiences to the problems of the current situations (Hargadon & Bechky, 2006; Hargadon & Sutton, 1997).

This also relates to the employee's absorptive capacity, which comprises "the ability to recognize the value of new, external information, assimilate it, and apply it to commercial ends" (Cohen & Levinthal, 1990, p. 128). The higher an employee's prior knowledge, the more easily he or she will assimilate new knowledge and utilize it. According to Cohen and Levinthal (1990), high absorptive capacities give rise to creative ideas because they increase an employee's ability to detect new linkages between previously unrelated units of knowledge.

The problems in the case company are highly complex, requiring multiple different forms of expertise; as one interviewee put it, "you can't be expert in every issue". As a result, creative work often requires collaborative efforts of different compositions. Diversity creates variations, meaning variations in perceptions, values, ideas, opinions, and methods. The only way to move ahead is to perform a continual breakout from the bounds of what was already known. Pursuing diversity is important because it helps generate and sustain organizational heterogeneity that could otherwise disappear out of pressures to conform (Muhr, 2009). According to the interviewees, this kind of heterogeneity existed only in the management level. In different kinds of development groups or teams, the advantage of having employees with different kinds of backgrounds was not used. However, the heterogeneity was considered useful in eight interviews and especially in the development of new products and services: "...I think that it would be most fruitful that people from all over the company would participate ... from sales and the technological department and from all over the company", or "when generating ideas, it would be good to have people with different kinds of expertise".

In the interviews, the most important environmental factors affecting creativity were leadership and the organizational atmosphere or culture. These were considered in every interview. The interviewees defined the common innovation culture as the common ideation between employees with diverse expertise, sparring and further development of ideas together. This indicates the wish and need to do things collectively. In the interviews this kind of culture was also related to the solidarity of the employees, which in turn would enhance ideation in the company. In addition to the exposure to diversity, previous research has also shown the importance of familiarity and trust for the effective use of diverse resources for innovative problem solving (Gruenfeld, Mannix, Williams, & Neale, 1996). At this point, the employees saw that there was no such culture. One interviewee said that “even though some of the changes are needed, they still cause friction because there does not yet exist a shared experience of pulling together.”

The advantages of collective activity or the need for that kind of activity was mentioned in every interview. Altogether, there were 35 comments in the interviews which were related directly to collective activity. In addition, there were comments related to help asking and giving, which are considered essential activities in collective creativity (Hargadon & Bechky, 2006). In over half of the interviews collectivity was mentioned several times during the interview. The interviewees, for example, acknowledged the collective nature of their accomplishments: “not many are capable of thinking about these challenges only by themselves”. It was also acknowledged that diversity, meaning, for example, different kinds of expertise, helps the ideation: “others with a little bit different expertise help to see the issue from another perspective”. Despite this, the interviewees described creativity as an individual endeavor, noting that “thinking on your own generates ideas”, “the poor product manager is thinking all by himself about what to do” or “I’ll do these things mostly by myself”. However, the need for collective creativity was obvious.

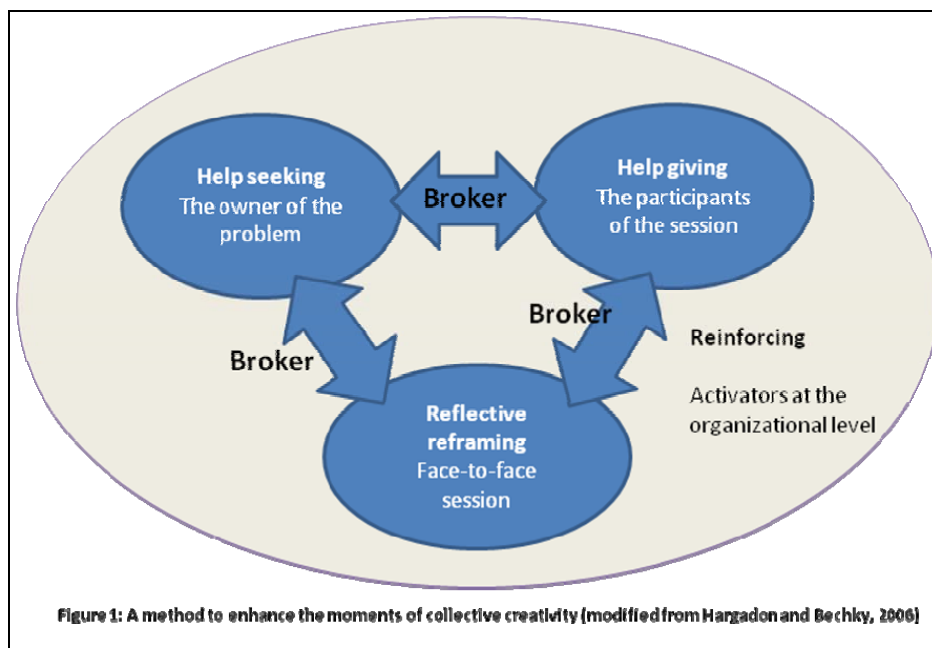
There were several reasons why there was so little collective activity in the generation and developing of ideas. It was considered time consuming, especially in this geographically distributed company. One interviewee said that, overall, discussion partners from different parts of the company would help in inventing new ideas and solutions, but “it is difficult to find the right person in a distributed organization”. Mixing did occur in some places in the company because people could mix with the help of routine interactions, an open office, or some subunits that were small enough that the same people could see each other daily. In almost every interview, the importance of informal meetings, café breaks, and corridor discussions in generating new ideas and changing the best practices was acknowledged. This indicates that creative ideas may be generated also by accident.

The interviewees felt that creativity or innovativeness were not valued in the strategies of the company, as one interviewee pointed out that “we are not really innovating at all”. Strategy and things related to strategy were mentioned eight times in the data even though it was not asked in the interviews. Nor was creativity encouraged by the leadership. All interviewees acknowledged that leaders have an essential role in facilitating creativity but none of the interviewees could exactly define how this could be done. However, the leaders were seen as having an important role in generating an atmosphere that encourages creativity and innovativeness in the company. This implies that managers, in addition to managing creative individuals in the creative process, should also focus their attention on reinforcing the interactions that turn individuals into creative collectives (Hargadon & Beckhy, 2006). In all interviews either feedback or motivation was considered as important methods for leaders in creating innovative atmosphere. Among the interviewees it was emphasized that “managing innovation should be done delicately, and you can’t lead people in the same way as you lead routine work” and “you should concentrate on the employees as individuals”. One of the things that the leaders should offer was resources, such as time. The leaders also have the responsibility to direct ideation to the right things. One possibility to direct creativity was “to develop methods or ways of doing to guide creativity and to pick out those ideas

that serve the benefit of the company”. Lack of suitable methods was seen in the interviews, because only one interviewee mentioned a method that was used in the company to support idea generation and knowledge sharing between employees.

### **An Employee-driven Method Facilitating Collective Creativity**

Based on the interviews carried out in the company, a face-to-face method was missing that would concentrate on idea generation, the further development of ideas, and knowledge sharing. The method should also take an advantage of the heterogeneity of the employees and their knowledge in the organization. In the two development sessions, the employees constructed a method to facilitate the collective creativity in the organization (see Figure 1).



The constructed method is based on an idea-generation session with defined roles. First, there is the “owner of the problem”. Instead of generating the idea or solution alone, he/she seeks help. To give help to the “owner of the problem” the face-to-face idea generation session is conducted with the help of a “broker”. The session would be more or less a spontaneous gathering of employees around a particular problem. It is not assigned by leaders, nor need they be involved in the process. It is important to try to organize it within a short period of time. The purpose of the session would be to link the different kinds of knowledge of the organizational members to the current problems faced by the owner of the problem. In the session, the duty of the owner of the problem is to explain the problem and its background to the participants of the session. He is also responsible for developing the idea further after the session.

The session takes place in situations when any one employee does not hold all of the necessary knowledge to construct a creative solution and the potential for a creative solution requires the skills of multiple participants. The session provides a shared context for “creative abrasion” (Leonard, 1995), where employees can interact with each other and engage in dialogue. During this dialogue the participants create new points of view. Eventually they integrate their diverse individual perspectives into a new collective perspective. This dialogue can and indeed should

involve conflict and disagreement. It is such conflict that pushes the participants to question existing premises and make sense of their experience in a new way (Nonaka & Takeuchi, 1995, p. 86; von Krogh et al., 2000).

To find creative ideas and fresh possibilities, the participants saw that the problem should not be too familiar to the participants of the session. Diversity will increase the likelihood of creative new knowledge emerging at the session because heterogenous groups of employees can offer applications of expertise from a variety of areas, and this enhances fresh thinking and promotes integration across the traditional borders in the company. That is why the participants of the session should include employees with different kinds of experience and expertise. These “experts” should view the problem from different angles. The creative potential of the experts may actually be dependent on not knowing exactly what is possible. This enables them to think outside the box. Priming can, in fact, reduce creativity, as the participants tend to be preoccupied with already-known solutions (Dahl & Moreau, 2002; Marsh, Bink, & Hicks, 1999).

This method has similarities to the model of collective creativity proposed by Hargadon and Beckhy (2006). In their model, there are four sets of interrelating activities that play a role in triggering the moments of collective creativity: (1) help seeking, (2) help giving, (3) reflective reframing, and (4) reinforcing. Help seeking describes activities that occur when an individual who either recognizes or is assigned a problematic situation actively seeks the assistance of others. In the method of the case company, this role is played by the owner of the problem. The broker and others who will take part in the session represent the willing devotion of time and attention to assisting the work of others. The role of the broker, according to the participants of the development sessions, was seen as challenging and essential to the success of the method. The duty of the broker is to build a heterogeneous group around the problem and facilitate its work. He would first prepare the session and then facilitate the idea-generation session. In sum, the duty of the broker is to generate possibilities for help seeking, help giving and reflective reframing activities.

The broker should be partly an outsider to the problem under consideration so he can bring fresh ideas and also help others to think outside the box. The role of the brokers was actually considered so central in the process that they would need some kind of training for their work. The participants also saw that the broker’s personal characteristics are relevant to how the broker will succeed in his work. Idea generation sessions are cognitive processes which are strongly moderated by social and motivational factors (Paulus & Brown, 2007). For example, the social skills of the broker are emphasised in conflict situations (Parjanen, 2012). To help with using the method, there should be a broker pool in the company. There should also be brokers from different departments: production, the technological department, sales, and customer service.

The moments when the participants in social interactions make new sense of what they already know comprise a third important aspect of collective creativity that Hargadon and Beckhy (2006) call reflective reframing. The session itself is the arena where the reflective reframing is possible. When the participants come together in collective problem-solving efforts, one person often has a good understanding of the problematic situation, while others have potentially relevant ideas and experiences to contribute. The locus of creativity in the interaction moves to the collective level when each individual’s contributions not only give shape to the subsequent contributions of others but, just as importantly, give new meaning to others’ past contributions (Hargadon & Beckhy, 2006).

According to Hargadon and Beckhy (2006), reinforcing activities are those that support individuals as they engage in help seeking, help giving, and reflective reframing, and as a result, they are also critical in enabling those moments when collective creativity emerges. The social interactions that shape collective efforts involve more than just directly bringing people together; the interactions that give meaning and value to these collective efforts were also important (Hargadon

& Bechky, 2006). In the case company, the method was supported by the activators who operate at the organizational level. Their duty is to actively recognize possible problems and enhance the use of different kinds of idea generation and creative methods, including the method constructed in this study. They would also be aware of what kinds of solutions are considered, how they have succeeded, and who have been involved in the process. This kind of activity would increase the organizational memory. It was also noted that the management should support its implementation and use of the method.

Several advantages were seen in this method. The method would increase communication in the organization. It would also teach the employees to think more outside the box, enrich understanding in the company, and add openness to the company. Those who were more optimistic saw that it directs the employees to also think about future potentials and see what does not yet exist. In general, the use of the method would also support innovation activities. Especially the brokers would bring the needed broadmindedness to problem solving, and that would in turn increase the innovativeness of solutions when it is possible to examine an issue from multiple perspectives. The use of the method would also help to see the linkages and causal connections between different issues and problems. The biggest challenge in the development and use of the method was that it might be considered more as nonsense than as real work in the company. The company values more straightforward activities where effectiveness is easily shown. That is why the evaluation of the method and its results were seen as essentially important.

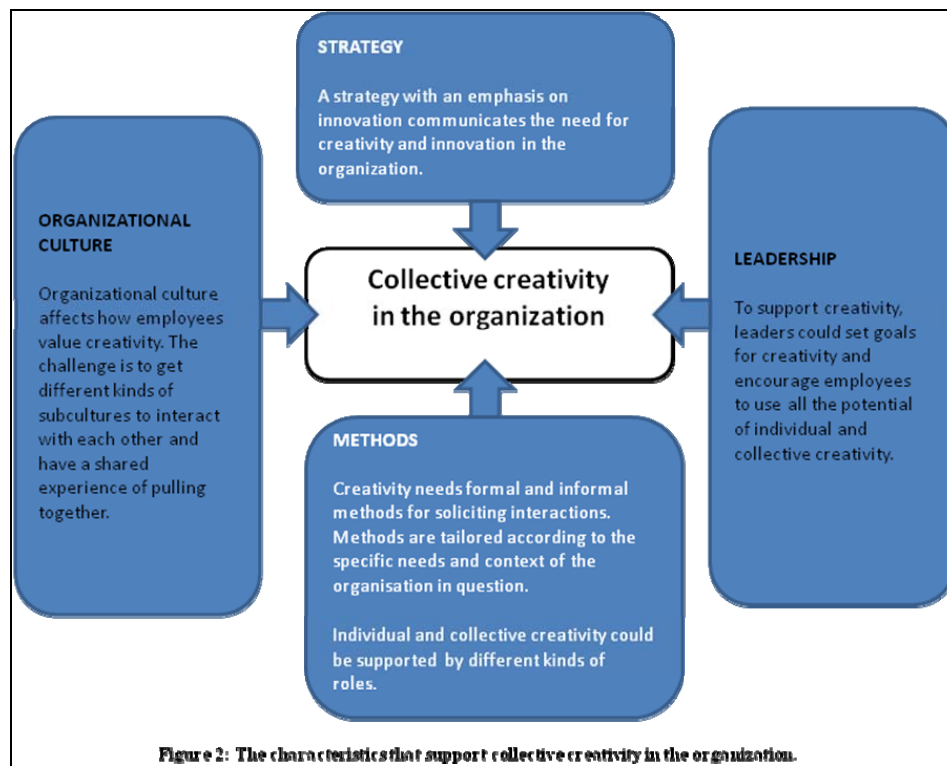
## Discussion and Conclusion

Tidd et al. (2001) emphasize that if an organization innovates by relying only on certain talented individuals, it fails to utilize the creativity of the rest of the organization, not to mention that the others are not committed to developing the ideas further. In the case company, the tightened competition forced it to find new ways to survive. Technological product innovations were not enough to stay in competition; instead, the need for improvements in services and organizational innovations were acknowledged. In this situation, the management wanted to figure out the potential of the employees to participate in innovation activities. According to the results of this study, the employees are willing to participate in innovation activities. However, creativity in the organization does not happen automatically, but it needs to be maintained and supported. This study also supports the idea that creativity exists in different types of work and is not restricted to a specific kind of work, such as work in research and development departments. This means that creative work that benefits the organization may be generated by employees in any position or job and at any level of the organization (Axtell et al., 2000).

Work places are becoming more and more complex, and performing different tasks in the organization requires increasing skills and expertise of many employees. This is particularly highlighted in the telecommunication industry. According to the survey of Leppimäki, Tammi and Meristö (2004), where the Finnish ICT sector's expectations from employees in the near future are examined, new skills required by the ICT firms, besides a specific educational degree, are often qualities of personal nature. Factors such as attitudes, worldview, or personal communication skills are more important than before when firms are recruiting new staff. The desired skills reflect the changes taking place in the ICT sectors' operational environment. Perhaps things like entrepreneurship and communication skills are emphasized just because the ICT firms are operating in a more and more networked world and the focus of the business is shifting towards consumer markets. This shift reflects the need to utilize the creativity of whole of the organization. Growing complexity of problems also implies that employees do not always have the knowledge and individual skills to generate creative solutions on their own. Collective creativity becomes necessary to produce creative outcomes (Hargadon & Bechky, 2006) to benefit the organization.



Although individual employees still play an important role in explaining creativity in the organization, today creative outcomes are explained as being the results of social interaction and collaborations (Perry-Smith & Shalley, 2003; Woodman et al., 1993). Therefore, to promote creativity in an organization, it may be important to understand, catalyze, and support the individual aspect of creativity, as well as the collective aspect. A diversity of perspectives can be a possible source of creativity because innovation is often dependent upon dissimilar knowledge and skills (Boschma, 2005; Leonard, 1995; Parjanen, Harmaakorpi, & Frantsi, 2010). However, in the case company, creativity is mainly understood as an individual endeavor and the potential of collective creativity was not understood. This was surprising because the employees acknowledged that social interactions facilitate the emergence of new ideas and innovation. They were missing formal and informal ways to share knowledge, develop ideas, and learn from each other. This controversy could partly be explained by the fact that innovation activities were previously carried out only in the R&D departments and the potential of other employees was not acknowledged. The many organizational changes have also affected at least partly the willingness of the employees to share ideas with other employees.



The employees recognized several characteristics to support creativity in the organization, which are described in Figure 2. An organizational strategy gives direction to the activities and development of the organization and its units, departments, teams, and individuals. An explicit innovation strategy or a strategy with a clear focus on innovation is an important factor influencing creativity in organizations. A strategy with an emphasis on innovation communicates the need for creativity and innovation in the organization. To promote collective creativity in the organization,

the role of the leaders was considered essential in the case organization. Also Amabile (1998) writes that creativity is truly enhanced when an entire organization supports it. In a geographically distributed organization such as the case company, leaders should encourage employees to collaborate so that the expertise behind the creativity is heterogeneous. The leaders' behavior has an effect on how the employees regard creativity. Especially the role of the leaders was considered important for setting goals for creativity. This means that the leadership must be clear about the need for creativity and the types of creativity that best suits the organizational goals. There is also a need to communicate the need for creativity to the employees. Shalley (1995) found in her study that when individuals are told that creativity is important, they are more likely to behave creatively. This implies that if collective creativity is valued in the organization, employees are more likely to behave collectively.

In the case company the employees were missing procedures and methods to support individual and, especially, collective creativity and were willing to participate in developing these methods in the company. One way to involve the employees in creative processes is to give them the autonomy to define the ways and methods of how this should be done in the organization. Empirical evidence supports the positive relationship between autonomy and innovation. Autonomy and control over one's work have been found to correlate positively with employee engagement in innovative behaviors (Axtell et al., 2000; Shalley, Gilson, & Blum, 2000). The employees may also be considered experts of their own work and that way they are the best experts in defining the ways to support creativity at an individual and collective level.

Organizations need to be able to capitalize the diversity among their employees. However, organizations may face barriers to tapping into the diversity of their employees. Issues such as geographic distance, differences in organizational subcultures, and the lack of awareness of others with similar interests render, for example, idea generation difficult (Lesser & Fontaine, 2004). In order to create possibilities for collective creativity, it could also be beneficial to have different kinds of roles in the organization. In the case organization, a special brokerage function was developed to connect different employees, groups, or departments and make them aware of the interests and difficulties of the other group and transfer best practices (Burt, 2004). This study implies that there is a need for brokers acting in a bridging role not only outside the organization but also inside the organization. It was also acknowledged that the role of the broker is demanding and should be supported by an activator at the organizational level.

In the future studies, it is relevant to study how the ideas of the employees were implemented in the company. Quite soon after the end of Innovation Catcher, the company had large organizational changes where, for example, those who participated in the project were relocated. The case company also gained 200 new employees as a result of the acquisition. This has probably affected how the results of Innovation Catcher have been implemented. However, the case company has continued to focus on well-being at work and employee motivation. The goal is to work towards creating and maintaining a strong and coherent internal culture. It has enhanced its leadership model, which builds on the current organization by adding more detail to role, responsibility, and task descriptions. It has also developed a model of "company peers", which has similarities with the brokers and activators of the constructed model. Peers are a staff network of volunteers who advise their peers, channel information, organize events, and work towards improving team spirit. It would be interesting to study the roles of the company peers and define what kind of brokerage functions they probably have.

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## Collective Creativity and Brokerage Functions in Heavily Cross-Disciplined Innovation Processes

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### Abstract

The centres of collective creativity tend to be at the intersections of different domains. Based on this, distances between innovating partners can be considered as sources of innovation. However, the literature usually emphasises the advantages of proximity. Proximity may, however, also have negative impacts due to the problem of lock-in – meaning a lack of openness and flexibility. This article takes the changed pattern of innovation as a point of departure: innovations are seen to emerge in nonlinear processes, often combining very diverse knowledge bases. Structural holes in networks of innovation systems are especially fruitful for innovation. In theoretical discussion, this article presents seven dimensions of distance: cognitive, communicative, organisational, functional, cultural, social, and geographical. In attempts to create innovation, different kinds of distances would need to be exploited knowingly. The study uses the experiences of the case study to answer how it is possible to span the structural holes in cross-disciplined multi-actor innovation. According to the experiences, the brokerage function is essential in exploiting the different kinds of distances. Indeed, it was necessary to define two brokerage functions: process brokerage and session brokerage.

**Keywords:** innovation, collective creativity, structural hole, brokerage, innovation session

### Introduction

Innovations are widely seen as the driving force of economic growth and competitiveness. An organisation's success and survival depend on its capability to create new knowledge and, then, innovation. The concept of proximity is used in many different ways in literature dealing with, for example, innovation studies, organisational science, and regional science (Knoben & Oerlemans, 2006). The literature usually emphasises advantages of proximity. Proximity is seen as an important precondition for knowledge sharing, knowledge transfer, and technology acquisition (Gertler,

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1995). The different dimensions of proximity reduce uncertainty, solve problems of coordination, and facilitate interactive learning and innovation. Proximity may, however, also have negative impacts due to the problem of lock-in – meaning lack of openness and flexibility (Boschma, 2005).

The literature has not paid attention to the role of distance in innovation, de-

spite scholars researching innovation being unanimous about the huge innovation potential in combining different fields of knowledge (cf. e.g., Dosi, 1988; Johansson, 2004; Pekkarinen & Harmaakorpi, 2006). Another widely accepted fact is that innovation processes are increasingly nonlinear and interactive, including innovating partners with varying backgrounds (cf. e.g., Edqvist, 1997; Harmaakorpi, 2006; Kline & Rosenberg, 1986; Lundvall, 1992). In order to foster innovation and strengthen competitiveness, it becomes important to integrate different types of knowledge, competences, and experiences into a cooperative perspective. Networks can be considered as sources increasing an organisation's and region's innovative capabilities (Reagans & McEvily, 2003). In linking networks and innovations, the heterogeneity of resources is essential (Oerlemans, Meeus, & Boekema, 2001). Innovations thus need also elements of distance and these distances can be considered as a source of innovation.

The facts are clear, but it is far from clear how co-operative innovation processes, including innovating partners with very different backgrounds and interests, can be conducted successfully. It is very difficult when heavily cross-disciplined partners aim to take part in networked innovation processes. The difficulties increase when the innovating partners include members with scientific and practical knowledge interests (cf. e.g., Harmaakorpi & Mutanen, 2008; Uotila, Harmaakorpi, & Melkas, 2006). This article attempts to shed light on the problems and outlines methods applicable in such situations. The main research question to be answered is: what are the forms of distance in structural holes in cross-disciplined multi-actor innovation, and how can the spanning of the structural holes be facilitated by brokerage functions? The experiences gained when applying the Innovation Session Method in the Lahti Region, Finland are used to illustrate the article.

## Question of Collective Creativity

Since creativity applies to all areas of life, most definitions of creativity tend to be somewhat abstract. Usually, creativity refers to something both new and, in some sense, valuable. Thus, it is seen as an important outcome of a system. According to Amabile (1997), creativity is the production of new, appropriate ideas in any activity, from science to the arts, education, business, and everyday life. The ideas must be different from earlier ones and appropriate to the problem or opportunity presented. Creativity requires knowledge and the ability to apply that knowledge in new ways and usually across a variety of disciplines. Creativity is often based on borrowing, copying and combining old ideas. Weick (1979, p. 252) describes creativity as putting new things in old combinations and old things in new combinations.

Creativity is sometimes inaccurately used as a synonym for innovation. Whereas creativity refers to pure ideas, innovation is the successful translation of ideas into tangible products or intangible services. Not all creative ideas are innovative. Creativity is one of the many critical factors behind innovation. The ability to stimulate innovation is highly dependent on the stock of creative ideas that are available for feeding innovation. Creative ideas are born out of conscious, semiconscious, and subconscious mental sorting, grouping, and matching. Interpersonal interactions at the conscious level stimulate and enhance these activities. This interplay between individuals appears to be essential for innovation (Leonard & Sensiper, 1998, p. 115.).

The source of creative achievements is no longer just individuals but increasingly also groups of people. Most creative pursuits in business and industry involve individuals working together to solve problems they cannot solve alone. Creativity does not happen inside a person's head, but in the interaction between a person's thoughts and a socio-cultural context (Csikszentmihalyi, 1996).

Collective creativity describes the phenomenon where concepts emerge in people's minds through interacting with knowledge. Thus, creative activity grows out of the relationship between an individual and his or her work, and out of the ties between individuals. The locus of creativity

in the interaction moves to the collective level when each individual's contributions not only shape the subsequent contributions of others, but, just as importantly, give new meaning to the past contributions of others (Hardagon & Bechky, 2006, p. 492.).

Creativeness in social settings can be divided into company and networking level pursuits. According to social learning theory, hidden agendas, biases, and inadequate understanding detract from the rationality of organisational level efforts at innovative renewal. Learning at the organisational level is a collaborate endeavour in which members generate new ideas by sharing their knowledge and interacting with each other. The more radical and risky ideas are, the more organisational resistance and hindrance to open interaction increases (Bandura, 1997). At the networking level, the challenge is to get heterogeneous hastily formed groups to work together, share ideas openly, and create radical ideas. In research unit and company collaboration, partners may overrate each other's capabilities, which can easily cause friction and misunderstanding between partners. Multi-party co-operation demands flexibility and success depends strongly on the functioning of each of the internal networks (Håkansson & Snehota, 1995).

### **Problems of Collective Creativity in Structural Holes**

The centres of creativity tend to be found at the intersections of different domains, where beliefs, lifestyles, and knowledge mingle and allow individuals to see a new combination of ideas with greater ease (Csikszentmihalyi, 1996, p. 9). Thus, people tend to be attracted to groups made up of members similar in some way to themselves, and relatively few people are capable of bonding different groups together. If group selection favours those who are similar, it reduces the diversity of the members. Homogenous groups often reach solutions more quickly and with less friction along the way. Homogenous groups do little to enhance expertise and creative thinking. Everyone comes in with a similar mind-set and leaves with the same (Amabile, 1998.) Behaviour and opinions are usually more homogenous within than between groups, so people connected across groups are more familiar with alternative ways of thinking and behaving (Burt, 2004).

The term *structural hole* refers to the social gap between two groups. Structural holes often are the weak connections between clusters of densely connected individuals (cf. Granovetter, 1973; 2005). Networks with an abundance of structural holes create opportunities for the new combination and recombination of ideas. For example, cross-discipline groups of individuals can offer applications expertise from a variety of areas. This enhances learning opportunities and fresh thinking and promotes integration across traditional borders. According to Burt (2004), structural holes lead to good ideas. People surrounding structural holes have different interests and perspectives and use different concepts and language. Success in innovation is seen as depending upon the flexibility of the organisation and the ability to interact with outside organisations and third parties (Gellynck, Vermeire, & Viaene, 2007.)

The main problem in utilising the innovation potential in structural holes stems from the diversity or "distance" between the innovating partners. This distance can take different forms: cognitive, communicative, organisational, social, cultural, functional, or geographical distance (cf. Harmaakorpi, Tura, & Artima, 2006). The main problems faced when spanning the structural holes can be tackled through this taxonomy.

Cognitively close individuals are able to assume certain common knowledge that does not need to be defined. Cognitive distance refers to differences in knowledge bases. Two actors can be cognitively distant for two main reasons: i) they know different topics; ii) they have different levels of knowledge on the same topic (Albino, Carbonara, & Petruzzelli, 2007). Boundary-spanning reflects the understanding that members with different backgrounds operate from different perspectives underpinned by distinct cognitive structures (Fong, 2003). Effective interaction relies on, and may be thwarted by, the ability to interact across the cognitive boundaries that underlie dif-

## Collective Creativity and Brokerage Functions

ferences (Carlile, 2002). Cognitive diversity will increase the likelihood of creative new knowledge emerging in groups. Through the interaction of diverse knowledge groups, there is the potential to overcome the factors constraining the development of new knowledge (Mitchell & Nicholas, 2006, p. 69). Too little cognitive distance means a lack of sources of novelty, while too much cognitive distance implies problems of communication (Nooteboom, Vanhaverbeke, Duysters, Gilsing, & van den Oord, 2006).

The ability to communicate and exchange ideas is an important part of the creative process. Within groups, the term interaction is used to describe the use of language and other symbols to develop an enriched and shared understanding. Communication can easily be misunderstood or misinterpreted. People often discuss problems in a language they mistakenly assume everybody in the group understands. The participants' success in reaching a common creative vision, exchanging creative ideas, and evaluating them depends on the ability of the group to devise a shared language, which is an essential asset in developing a common understanding. To the extent that people share a common language, this facilitates their ability to gain access to people and their information. In order to combine the information gained through social interaction, the different parties must have some overlap in knowledge (Nahapiet & Ghoshal, 1998, p. 254) or there must be someone who translates this knowledge so that it is relevant to the others.

The development of emergent knowledge is vital for creativity and innovation, but sharing, exchanging, integrating, and creating knowledge can be difficult. Organisational distance refers to the difficulty in coordinating transactions and exchanging information within and between organisations. Knowledge transfer across organisational boundaries can be characterised by false starts, different interpretations of the same idea, and disruptions (Zellmer-Bruhn, 2003). But too much organisational proximity is accompanied by a lack of flexibility. There is a risk of being locked-in in specific exchange relations, and this may limit access to various sources of information. The search for novelty often requires going outside the established channels (Boschma, 2005).

Functional diversity refers to actors' different areas of expertise. Members of different functional communities do not necessarily understand each other because they do not interpret knowledge in the same contexts. Functionally close actors act in areas of expertise close to each other - for example, in the same industry (Harmaakorpi et al., 2006). Similarities in knowledge and experiences facilitate the acquisition and development of new knowledge.

The importance of functional proximity is based on the concept of absorptive capacity. This means the organisation's ability to recognize the value of new, external knowledge and to assimilate and apply it (Cohen & Levinthal, 1990). If actors are functionally far from each other, there is more to learn and there are more possibilities for innovations, but the distance also means that it is more difficult to learn. The concept of functional proximity seems similar to cognitive proximity. But cognitive proximity is a much broader concept that refers to the extent to which actors can communicate efficiently, whereas functional proximity refers to the extent to which actors can actually learn from each other, what they exchange, and the potential value of these exchanges (cf. Knobens & Oerlemans, 2006).

While organisational and functional distances refer to the relationships between institutions, social distance is about the relationships between people. Lack of trust can prevent people from asking questions or volunteering information. The potential for increased competition is another reason people avoid sharing what they know. Social cohesion around a relationship can ease knowledge transfer by decreasing the competitive and motivational impediments. When individuals believe in freedom of expression and value the understanding of diverse viewpoints, they engage in behaviour that is more effective for creating knowledge (Mitchell & Nicholas, 2006, p. 71).

On the other hand, too little social distance in an economic relationship may weaken the innovative capacity of organisations due to an overload of trust. A closed network system may incur opportunity costs because outsiders with new ideas and knowledge are denied entry. Long-term relations or relations with too much commitment may lock members of social networks into established ways of doing things at the expense of their own innovative and learning capacity (Boschma, 2005).

How organisations view knowledge sharing and creation seems to be dependent on their organisational culture. Every organisation and even their subunits have a culture of their own, which influences how their members think, feel, and act. Cultural distance refers to differences in these cultural habits, rules, and values. Understanding is also always cultural. The creation of knowledge is therefore a complex process involving the understandings of different organisational cultures and subcultures (Beckhy, 2003). Cultural assumptions, beliefs, and values can be deep-rooted within the members of the organisation and cannot be easily changed. Cooperation will develop more easily between members of the same organisation or the same innovations network (Rallet & Torre, 2005). The challenge for collective creativity is to get members of different organisational cultures to interact with each other.

The geographical distance, which means the physical distance between actors, can be a barrier to creativity and innovation. Although proximity facilitates interaction and cooperation, it does not automatically produce innovations. The geographical distance does not necessarily mean that people in the groups are unaware of one another, but because they are not in contact, they do not know what the others are doing. Geographically proximate actors may be cognitively too distant to cooperate. There must be someone who brings them together and motivates them to work together. One of the challenges in collective creativity is simply to motivate people to be creative. Even where opportunities for the exchange of knowledge exist and people anticipate that value may be created through interaction, those involved must feel that their engagement in the knowledge exchange and combination will be worth their while (Nahapiet & Ghosal, 1998, p. 249). Most people need encouragement before they realise the benefits of discussing ideas outside their regular work group.

## Brokerage Functions

In sum, the difference between the innovating partners is often so large that a special interpretation function is needed. Burt calls this special function information brokerage in the structural hole. The information brokerage could occur by (i) making people on both sides of a structural hole aware of the interests and difficulties of the other group, (ii) transferring best practices, (iii) drawing analogies between groups ostensibly irrelevant to one another, and (iv) making syntheses of knowledge interests (Burt, 2004).

Actors who have suitable connections can act as brokers between the clusters or groups. Burt suggests that brokers focus on establishing ties to other disparate or disconnected groups, exploiting the structural hole, so they can then bring together members of the two groups who would otherwise be more difficult to connect (Burt, 2004). A structural hole indicates that people on either side of the structural hole have access to different flows of knowledge (Hardagon & Sutton, 1997). It is proposed that structural holes have both positive and negative influences on creativity and innovation.

Brokers support innovation by connecting, recombining, and transferring to new contexts otherwise disconnected pools of ideas (Verona, Prandelli, & Sawhney, 2006). Multiplex relationships, especially with individuals holding broker positions within these networks, are perceived to be important to innovative behaviour (Shaw, 1998). Whilst spontaneous co-operation between organisations can occur, it appears that some kind of brokerage intervention can help co-operation,

for example, by advising on the advantages of co-operation, giving information, identifying opportunities, catalysing discussions between different actors, or bringing companies together.

Two very useful concepts when considering brokerage functions in regional innovation systems are bonding and bridging social capital (cf. Tura & Harmaakorpi, 2005). Bridging social capital creates bonds of connectedness formed across diverse horizontal groups, whereas bonding capital only connects members of homogeneous groups (Granovetter, 1985; Putnam, 1995). This division of social capital into bridging and bonding types becomes crucial in assessing regional innovativeness, since both are essential to build an atmosphere of trust and proximity in each innovation network and keep them open to allow the necessary flows of information to take place. Bridging social capital, with the element of distance, is seen to be positive because it brings the individual innovation networks into trusting interaction enabling, for example, an increase in the absorptive capacity benefits of the structural holes of these networks. Burt's (2004) definition of the "social capital of brokerage" is very similar to that of bridging social capital.

## **The Case Study**

### ***Innovation Session Method***

The Lahti Region aims at being a leading area in practise-based innovation activities in Finland. In the Region, the framework of network-facilitating innovation policy has been developed to promote practice-based innovation activities (cf. Harmaakorpi & Tura, 2006). The innovation session method is an essential part of the policy aiming to create an environment where structural holes are spanned and new innovation networks formed (cf. e.g., Aula & Harmaakorpi, 2008; Harmaakorpi & Tura, 2006.) During 2004-2008 there have been almost 80 innovation session processes. The results of the innovation session processes have included new business ideas, service concepts, enhanced products, product development projects, operations models, clarifications, and strategies (Pässilä, Frantsi, & Tura, 2008). Each innovation session process is always planned individually considering the organisation's background and needs. The normal procedure of triggering new innovation processes is as follows: the innovation experts in the intermediate organisations approach local companies and analyse their possible future trajectories and the knowledge needed to reach those trajectories. This analysis often reveals some structural holes to be spanned. The innovation session method is an integrated process with planning, acting, and implementing.

The culmination of the innovation session process is a one-day long innovation session. The participants of the innovation session include experts from the companies, top-level experts often from the world of science, and members of the intermediate organisations. The purpose is to combine regional and inter-regional expertise to enhance the company's innovation activities. Experts give the possibility of examining the issues from an alternative viewpoint. The combined input from the companies and the experts, together with the facilitating team of a creativity operator and group brokers, is used to generate ideas for innovation for the company to consider. An innovation session begins with introductory speeches given by the experts chosen to fit the theme of the day. After the introductory speeches, the creativity operator promotes interaction between the participants in order to discover the innovation potential lurking in the structural holes. The aim is to find 2-4 potential ideas to pave the way for new networked multi-actor innovation processes utilising collective and creative knowledge production.

In the Lahti Region, the innovation session method development has taken three major steps in the development of methods, group settings, and the role of brokerage. The first phase experiments were designed as a combination of individual and group creativeness utilising progressive ideation methods. Progressive methods, by repeating the same steps many times, generate ideas in

discrete progressive steps. In the sessions, groups were randomly formed and based on each individual's interest in the issues. During the second phase, groups were formed according to the heterogeneous combinations of networking partners, but brokerage was not systematically used. The main techniques were progressive and partly hybrid, aiming at combining the expertise and ideation in small group settings. Hybrid methods like synectics combine different techniques to address varying needs at different phases of ideation (Shah & Vergas-Hernandes, 2003). During the third phase, the innovation session development group began employing brokerage in a more systematic way. The brokers were placed in advance into specific task groups and acted as facilitators in group settings. During this final development phase, brokers took a more active bridging role in company briefing meetings and pre- and post session processes. The broker's role also changed to become more proactive and even provocative in the one-day sessions.

Thus, the innovation session method has experimented with various social approaches and creative working methods to combine the existing knowledge of scientists and the practical approaches of company experts. Additionally, the brokerage has enabled the use of a wide variety of techniques simultaneously in a one-day session compared to sessions involving a company and one facilitator. Understanding the importance of the brokerage function has been the key to successful innovation sessions. During the first two phases the method was very vulnerable: success seemed to depend more on chance than on some predictable results, and the structural hole was often not properly spanned during the session. Since launching the brokerage function in the sessions during the third phase, and especially since widening the brokerage to a comprehensive way of action in the whole process, the success of the sessions has increased remarkably. Therefore, it was necessary to define two brokerage functions: process brokerage and session brokerage. These observations were based more on perceptions and feelings of members of intermediate organisations. So, there was a need to study brokerage functions in more detail.

### **Methodology**

Case studies are used to organise a wide range of information about a case and then analyse the contents by seeking out patterns and themes in the data (Tellis, 1997). In general, a case study strategy is preferred when the researcher seeks answers to how and why questions, when the researcher has little control over the events being studied, when the object of study is a contemporary phenomenon in a real life context, when boundaries between the phenomenon and the context are not clear, or when it is desirable to use multiple sources of evidence (Yin, 2003). The research questions of this study are:

what are the forms of distance in structural holes in cross-disciplined multi-actor innovation, and

how can the spanning of the structural holes be facilitated by brokerage functions?

The case study research involves an in-depth, longitudinal examination of a single instance or event: a case. The case company of this present article is the medium sized manufacturer Stala, which manufactures stainless steel sink units and sink bowls for domestic kitchens, as well as waste sorting systems. Stala has been active in regional innovation development, has utilised innovation development services actively on several occasions, and has been involved in every recent step in regional innovation policy development during the last ten years. Stala has been involved with the innovation session method in all three development phases. The first aimed at finding product innovation in nano-technology, recycling, and ageing. The second session focused on nano-technology, and the third on e-business. This study summarizes the findings of the third innovation session process.

Qualitative researchers tend to collect data in the field at the site where the participants experience the issue or problem under study. This up-close information gathered by actually talking to

## Collective Creativity and Brokerage Functions

people directly and seeing them behave and act within their context is a major characteristic of qualitative research (Creswell, 2007). The data collection in case study research is typically extensive, drawing on multiple sources of information, such as observations, interviews, documents, and audiovisual material (Creswell, 2007; Eriksson & Kovalainen, 2008). For example, Yin (2003) recommends collecting six types of information: documents, archival records, interviews, direct observations, participant-observations, and physical artefacts.

This study uses qualitative methods to gather data from multiple sources during the innovation session process. The data include documentation, a questionnaire, and observation. The documents of the pre-session and the session are analysed. These include the PowerPoint presentation of the creativity operator in the pre-session, the structure of the session, and the PowerPoint presentations of the experts in the session. The general conversation and group works of the innovation session were documented and analysed. The documentation was prepared by a member of the intermediate organisation. She was not involved in the actual innovation session process in other ways. The first stage of the analysis concentrated on the identification of the different kinds of distances during the innovation session process.

During the second stage of the analysis, the researchers tried to deepen the analysis by identifying the ways the brokers acted in order to bridge these distances. Observational evidence is often useful in providing additional information about the topic being studied (Yin, 2003). To increase the reliability of observational evidence, the innovation session was observed by two observers. Both observers wrote a report about their observations of the innovation session. One observer observed the session at a general level. The purpose was to observe what happened during the innovation session and how participants behaved during the session. She sat in a corner of the room so that she could easily see what was happening in the session. During the ideation phase, she was walking around the groups but did not interrupt the group work. According to her own opinion, her presence did not disturb participants. Perhaps in the beginning of the session some participants were curious about her role. The other observer was actively engaged in group work while at the same time observing and evaluating group processes and procedures. Participant-observation is a special mode of observation in which the observer is not merely passive. Participant-observation provides certain unusual opportunities for collecting case study data, but it also involves problems (Yin, 2003). During the innovation session, this meant having two roles at the same time and it is possible that the participant-observer may not have sufficient time to take notes and participate in group work.

The experiences of the brokers of the intermediate organisations were collected by using a questionnaire with open questions. The questionnaire was sent by email to six brokers after the innovation session and they had a couple of days to answer it. All those brokers participated in the innovation session. Brokers who were involved in the innovation session process but did not participate the innovation session were excluded. The brokers had previous experience about innovation session processes. Presumably, brokers compared the Stala innovation session process with other innovation session experiences when answering the questionnaire. The answers were collected in one document and analysed. The questions were:

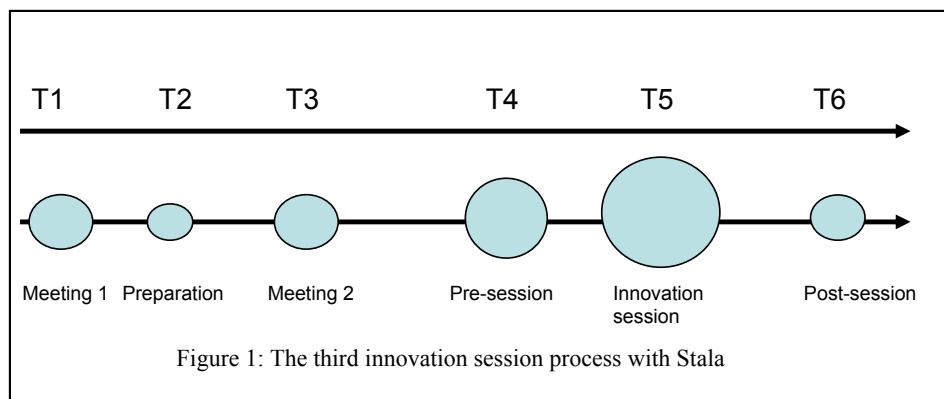
1. Common observations of the session?
2. How did the composition of the session function? How did the participants take part in the session? Was the atmosphere in the session innovative?
3. What kind of results did the innovation session have? Are there possibilities for further processes?
4. What were the reasons the innovation session was successful or unsuccessful?
5. How would the respondent develop the innovation session process further?



Qualitative researchers try to develop a complex picture of the problem or issue under study. This involves reporting on multiple perspectives, identifying the many factors involved in the situation, and generally sketching out the larger picture that emerges. Researchers are bound not by tight cause-and effect relationships among the factors, but rather by identifying the complex interactions of factors in any situation (Creswell, 2007). All three authors took part in the process in different roles and had many informal conversations with members of the client organisation and the intermediate organisation during the process. These conversations have also had an impact on the evaluation of the process.

### ***The Innovation Session Process in a Case Company***

In terms of brokerage and spanning the structural holes, the Stala case represents the development in its development phases. The third innovation session process with Stala is depicted in Figure 1. The size of the ovals in the figure indicates the importance of the occasion to the success of the innovation session process. For example, the size of the oval of the pre-session is based on its importance being a “testing laboratory” for ideas about the theme and working methods of the session generated during meetings. In addition the number of the participants is larger in the pre-session than in the meetings involving also those who have not participated in the planning of the session before.



The proposal to arrange the third innovation session emerged in a discussion between the intermediate organisation Lahti Science and Business Park and Stala. The first meeting (T1) was held between the process broker from Lahti Science and Business Park and the company’s R&D manager. In the meeting, the structural hole was revealed between the company and the e-business and it was selected as the innovation session target area. E-business was seen as a possibility to increase business and promote internationalization. Shortening product life cycles combined with changing customer needs were seen as new challenges for the current business. Nowadays, customers want faster and easier service. They also need information about the product after they have bought the product. The e-business topic was also selected because the case company did not know about e-business possibilities. To shorten the cognitive distance between the experts and the management, the preparatory phase of the third session was prolonged. In addition, the longer preparatory phase made it possible to commit the management better to the process.

After the theme was selected, the process broker Lahti Science and Business Park arranged a preparation meeting (T2) with experts and scientists to discuss the relevant technology to find the

## Collective Creativity and Brokerage Functions

needed expertise in e-business solutions. Two process brokers and a technology expert held the second meeting (T3) at Stala with the R&D manager to set the session goals and determine the necessary expertise and framework for the session. The process broker and Stala's R&D manager organised a pre-session (T4) with representatives of the company management, university researchers, and Science Park brokers. During the pre-session, the goals of the innovation session were clarified, experts and participants were selected, and the working questions for the groups were prepared. It was decided that every group had a different topic, and that there would be a session broker in every group. The brokers were not experts in e-business. The themes of the group were the added value of e-business, new business possibilities in customer e-business, and the earning logic of e-business. Practical things such as who is responsible for invitations and where the session will be held were also decided.

Before the beginning of the session (T5), the creativity operator and the session brokers had a short meeting about the content of the session. One of the brokers rearranged the tables and chairs to better fit the group discussions. The participants arrived to the session a little late. Every participant signed non-disclosure agreements. According to the brokers some of the people did not really know why they had come and were sceptical. One broker described the atmosphere being too formal. At this moment some of the brokers were worried about the success of the session and were relieved that the group work started up without friction. As one broker wrote in his answer, *"The session succeeded even though I had doubts in the beginning of the session."* According to the observer the atmosphere improved when the introducers of the session arrived and it was possible to start the session. The session was opened by the creativity operator and the representative of the case company. To reduce the social distance, everybody introduced him or herself to the group and told about their latest experience in e-business.

The first introductory speech concerned the current state of e-business, its possibilities and effects on business. The introducer was from The Finnish Electronic Commerce Association, the purpose of which is to follow, promote, coordinate, and support the development of electronic commerce. The topic of the second speech was how to use the internet in sales, and it concentrated more on the consumer's standpoint. This speaker was from the Finnish Information Society Development Centre. The Centre promotes the efforts of its public and private sector members to create viable tools and expertise for use in the information society. Both of the introducers came from outside the Lahti Region. During the introductory speeches the participants listened carefully and took notes. After the first speech, the session brokers had to open the discussion in the groups but after the second speech the participants started to discuss spontaneously.

After a short discussion in the groups there was an interactive panel discussion. The purpose of the panel discussion was to activate the general discussion and also introduce the other experts and their fields of know-how in e-business. They were mainly researchers from local university units whose research interests lie in information society, web-based communication, and organisational and interpersonal communication. The questions to the panellists were first prepared in the groups, which reduced the social distance between the participants. The panel discussion focused mostly on how it is possible to strengthen the brand of the company by e-business. To explain their views, the panellists compared how the buying of training shoes from eBay does not affect the brand of the training shoes. So, by doing this they reduced the functional distance between the case company and other manufacturing companies using e-business with different products. The case company had not realized to examine the e-business experiences of other companies because of the functional distance.

There were three groups in the session, each comprising company members, experts, and a session broker who facilitated the group work. One broker described his group, *"The group was very skilful and self-guided. As a facilitator, my role was to collect the generated ideas and ensure that the group was following the given instructions."* This comment demonstrates the need for a bro-

ker even in groups which are capable at group work. The idea generation started with individual brainwriting. Each group member wrote down ideas silently on paper. After a while, the person passed the paper to his or her neighbor who used the ideas already written as triggers for, or stepping stones to, some new ones. In the observed group, the members of the group found it hard to generate ideas alone. Nor were they interested in working pairs. The session broker asked how they would like work and they were unanimous that the best possible working style for them was to discuss about the topic together. The collective idea generation concentrated first on large quantities of ideas and building on each others' ideas. The group built their ideas on those ideas generated in individual brainwriting, and they also helped the ideation with working questions prepared in the pre-session. The session broker was also permitted to suggest ideas. She tried to encourage members to generate wild and exaggerated ideas by suggesting these kinds of ideas herself. The input on the wildest ideas came from the session broker or the travelling expert. Ideas were written on Post-Its by group members or the session broker. After the quantity phase of ideation, the ideas were grouped and analysed.

The social distance diminished during the group work. This was seen in that, for example, the discussion changed from a polite and peaceful discussion to a more friendly and loud one. Members became more trusting of each other and presented more radical and also provocative ideas. In addition, members did not always wait for their turn to speak. Because the groups comprised of members with different backgrounds, there were cognitive and communicative distances. For example, most of the Stala members had a technological background whereas the experts were researchers or experts in communication or e-business. Despite these differences, the members used the same kind of language in the observed group. Only some concepts were opened and clarified. Especially the broker was active in asking the meaning of concepts. One of the experts asked many questions from the representatives of the case company which helped the understanding in the group. He gave examples and made comparisons. He also specified the conversation, and in fact the group spent all of their time discussing the topic of their group work. To interact across cognitive distances, various drawings and illustrations were used. One of the group members had a laptop and he clarified his point of view by showing an example from the internet. Because the session was arranged at Stala premises, the representative of Stala introduced kitchen accessories to the group.

Each group presented their group work, and there was a chance for comments by experts and other participants. Every group paid attention to the possibility to increase the value of the product with different kinds of services which are possible to add to the product through e-business. In addition, different kinds of responsibility and partnership issues and the brand were considered in the groups. Every group emphasised the need to consider the end-users' role in developing the products and ways to distinguish the company from others.

Table 1 summarises the phases of the innovation session and the observers' interpretation of the brokerage function. In practice, drawing the lines between the different dimensions may be very difficult, but the table illustrates the main distances to be reduced during the different phases. For example, building an open atmosphere is essential in all these phases because it makes it easier to decrease the cognitive distance during the ideation phase. In a trustful atmosphere, volunteering information and asking is easier. When examining Table 1, the different types of stimulation of the participants is vital. This stimulation may be opinions or the ideas of experts or it can be creative working methods. Some people are simply more creative than others (Woodman, Sawyer, & Griffin, 1993) but creativity can be stimulated and enhanced, for example, by various creativity methods. According to one broker, *"The visits of the travelling expert stimulated the group work by introducing new viewpoints."*

<b>Table 1: Reducing distances by session brokerage in each phase of the Stala innovation session.</b>			
<b>The phase of the session</b>	<b>What happened?</b>	<b>Distance to be reduced</b>	<b>Observers' interpretation of brokerage function</b>
Warming up	<ul style="list-style-type: none"> <li>▪ The creativity operator explained the meaning of the session.</li> <li>▪ The representative of the case company introduced the company and its challenges.</li> <li>▪ Participants introduced each other to their groups and the facilitator introduced the members of the group to all.</li> </ul>	Social distance	Building an open atmosphere by connecting participants to each other and to the challenges of the company.
Introduction speeches	<ul style="list-style-type: none"> <li>▪ 2 experts held introductory speeches.</li> </ul>	Cognitive and functional distances	Transferring information from other areas.
Panel discussion	<ul style="list-style-type: none"> <li>▪ The experts and some of the representatives of the company formed the panel.</li> <li>▪ The participants could put up questions to the panellists.</li> </ul>	Social, cognitive, and functional distances	Establishing ties between the company and the experts.
Idea generation	<ul style="list-style-type: none"> <li>▪ Individual brainwriting and collective brainstorming</li> <li>▪ Creativity operator gave the main instructions and session brokers facilitated the group work.</li> </ul>	Cognitive, communicative and social distances	Encouraging the participants to think outside the box with the help of creativity methods and for example provocative questions.
Analysing and grouping the ideas	<ul style="list-style-type: none"> <li>▪ Collective group work with the help of the session broker.</li> <li>▪ The travelling expert and creativity operator visited the groups.</li> <li>▪ Presenting the group work.</li> </ul>	Cognitive, communicative and social distances	Combining the generated ideas and solutions.
The results and further plans of the case company	<ul style="list-style-type: none"> <li>▪ The representatives of the case company introduced their ideas about the session and its results. They also told what is going to happen next.</li> <li>▪ The creativity operator closed the day and gave thanks to the participants for their effort.</li> </ul>	Social distance	Motivating the company and the participants to develop the generated ideas further.

However, the exposure to ideas from other group members and the use of creative methods may be at least as important in creative idea generation (Couger, Higgings, & McIntyre, 1993). Thus, the significant benefit of sharing ideas with others is that it should increase the chance that one will come across ideas one would not have thought of in a solitary idea-generating session. These

ideas may in turn stimulate additional novel ideas (Paulus, 2000). One of the session brokers described the innovativeness of his group by saying "...that questions of radical innovation were not raised. It was more like putting different kinds of concepts, assumptions and questions into the same framework." He quoted one of the group members who said that all these things were somehow familiar to him, but they had now put these familiar things into new framework and the picture looks new.

According to the brokers the session was successful for several reasons. Most of the brokers indicated that the innovation session succeeded because the case company had a clear and focused target for the innovation session. The focused target was result of the long preparatory phase, which helped the representatives of the case company to have pre-understanding about the issue. They were also committed to the process and they actively took part in the general discussions and group work during the innovation session. As one of the brokers put it, "*The representatives were committed to the process which helps the deepening of the issue during the innovation session.*" Brokers also referred to previous innovation sessions and according to them the "*familiarity with the innovation session also promoted its effective use.*" The social distance between the representatives of the case company and most of the brokers was reduced already during the previous innovation session processes. In addition, the right people were invited to the session. One of the brokers observed that, "*There were no participants who had been obligated to participate in the session.*" Creativity needs freedom. If participants are forced to participate, they will probably lack motivation and creativity. Several brokers emphasised that the experts were interested in the topic and understood their role in the session. This can be seen as a result of successful brokerage before the session. It is the brokers' duty to explain the meaning of the session and the challenge of the client organisation and to make sure that they have understood their role. The compositions of the groups were also well-designed and functional. One broker wrote that, "*The group composition was fantastic: two experts and two from the company*" and another that "*groups were productive.*" A summary of the answers to the questionnaire is given in the Appendix (Table 3).

After the innovation session (T6), the process broker, who also participated in the innovation session as a session broker, the e-business expert, and the R&D manager met again and agreed to start an e-business project in the Stala kitchen unit. As a result of the innovation session, the case company started the e-business about a year after the session. The session gave the terms as to what kind of business the company wants to be in and what kind of partners it wants to have in e-business. According to the company, the session opened doors to research and technology about which it had no previous knowledge.

The special focus on reducing the "distances" between innovating partners in each phase of the Stala innovation process is depicted in Table 2. The table demonstrates that brokerage is a process. During that process, different kinds of distances are accentuated differently and should be reduced at the right time. In the beginning of the innovation session process, it is essential to reduce the organisational, cultural, and functional distances by process brokerage. This means introducing other ways of thinking and doing. It should be noticed that brokerage may not only span the distances between innovation partners, but also lessen the in-house hindrance and resistance to innovation. Reducing these distances makes it easier to reveal the hidden innovation potential during the process. The table also illustrates the importance of reducing the social distance, which should be taken into consideration during the process. Innovation is always a social process. It is also noticed that the need to reduce the geographical distance was not necessary until the innovation session because of modern technology.

Table 2: Reduced distances by process brokerage in each phase of the Stala innovation session process.							
	Cognitive	Communicative	Organisational	Social	Cultural	Functional	Geographical
T1			x	x	x	x	
T2	x	x	x				
T3				x		x	
T4			x	x	x	x	
T5	x	x		x		x	x
T6			x	x			x

## Discussion

According to the experiences in the Lahti Region, the potential innovating partners in the innovation environment might be unable to even begin the development due to the overly large distances between the partners. This kind of situation was present in our case study, too. The company was interested in starting e-business but they had no expertise in it. E-business was in any case considered a possibility to increase business. The cognitive distance between the case company and e-business expertise was too long. An innovation process can end before it has started, even if the innovation potential in the structural hole is obvious. The brokerage function in such a situation needs to tackle all the potential forms of distance to be successful.

The evidence has clearly shown that individual ad hoc innovation sessions are inadequate when trying to span the structural holes. Spanning a structural hole is clearly a process rather than an individual action, even if the one-day innovation session is its cornerstone. It is highly improbable that the innovating partners “find” each other in one day without careful preparation and a well-prepared script. In the case study, one of the reasons the innovation session was considered successful was the long preparatory phase before the session. During that time, the focused target of the innovation session process was constructed together with representatives of the company and brokers of the intermediate organisations. The intensive preparatory phase gave possibilities to find the right kind of experts and prepare them. It also gave possibilities for the case company to commit to the process and get a pre-understanding about the issue. Because the innovation session is a process, different kinds of brokerage roles are needed. This also indicates that for reducing different types of distances, different kinds of skills are needed. A successful innovation session needs both process brokerage and session brokerage.

A one-day innovation session normally requires several months of work to be successful. The process brokerage includes the management of the whole process. Reducing the organisational and cultural distances is important before the session. In a strong corporate culture there is the danger that people may adopt fixed mind-sets to solve problems. Once the company is locked into a culture that has proven itself to be successful in the past, it will be difficult to convince its members to adopt alternative ways of doing things in the organisation (Tan, 1998, p. 24). The process broker has to have the courage to introduce alternative ways to construct the theme of the innovation session. For example, if organisations are allowed to choose experts for the innovation session themselves, they will usually choose experts they already know well or who belong to the same functional community. The case company did not have strong or weak ties with possible e-business experts. Therefore, the innovation session process probably hastened the start of the company's e-business significantly.

According to Burt (2004), structural holes lead to good ideas, but there is no evidence that those ideas lead to implementation efforts or success. The people surrounding structural holes have different interests and perspectives. Such unconnected people are more difficult to mobilise or coordinate around new ideas. A process broker can also help coordinate the after session processes.

Session brokerage refers to the facilitation of the innovation session. A session broker's goal is to develop an understanding of the session and shorten the cognitive, communicative, and social distances between participants, in particular. Communication can be impaired for cross-disciplined innovation groups by the differences in the group members' professional vocabulary and the concepts they use.

The goal of identifying opportunities and generating ideas is to become completely open to all possible alternatives. This goal is virtually impossible to meet because people put up barriers when socialising. The innovation session always begins with an introduction of the participants and a warm-up exercise to lighten the atmosphere. Experience has shown that it is good that participants have same status. When the managing director is in the same group with shop floor employees, especially in a hierarchical organisation, it may cause unnecessary tension and hinder group work. In the case study, the compositions of the innovation session groups were prepared beforehand and the group members had the same status, which helped the group work for its part. Every group had company members and experts.

What kind of expertise is needed in the brokerage functions? In the case study the brokers were not experts in e-business. Their expertise was related to managing the different phases of innovation session processes. Experience has shown that it is similar to that of lawyers (Heiskanen, 1992). Lawyers are hardly ever experts in the cases they tackle. However, they normally have the experience of many cases and the ability to gather the evidence to solve the case problems. Brokers need a variety of skills, knowledge, and experiences to help a group do its work and free itself from the barriers of creativity. Only a few individuals are born brokers, normally they have to be trained. There is a need for further studies and discussion concerning a broker's abilities and training. The methodological distinction between process and session brokerage also needs further discussion.

Questions seem to be an effective way of bringing the partners on opposite sides of a structural hole closer, and the Lahti Region is applying the interrogative model of inquiry for this purpose (cf. Harmaakorpi & Mutanen, 2008). The model has its origins in theoretical philosophy. Collective creativity also involves considering not only the original question, but also whether there is a better question to be asked.

## Conclusion

This article underlines the importance of the innovation potential hiding in the structural holes of regional innovation systems. It stresses the importance of distance as a source of innovations. New measures are needed to be able to exploit this potential by collective innovation. These measures are closely related to aiding collective creativity in a very cross-disciplined multi-actor environment. According to the case study of this article a special brokerage function is needed.

This brokerage function aims primarily at increasing the absorptive capacity and bridging social capital (related to the social capital of brokerage) in the potential innovation networks. According to the experiences of the case study the brokerage function includes the following features:

- It aims at bridging different distances between the innovating partners.
- It is a process rather than individual actions.
- The brokers are often experts in no particular discipline.

## Collective Creativity and Brokerage Functions

- It enhances widely used idea generation methods by careful broker's interventions in the ideation process
- Brokerage may not only span the distances between innovation partners, but also lessen the in-house hindrance and resistance to radical innovation.
- Brokerage also enables the flexible use and variation of versatile creative methods.
- It is asking questions rather than giving answers.

The findings of this study support the assumption that distances could be used as a source of innovation. It gives practical implications on how it is possible to exploit different kinds of distances knowingly. It also gives more information about the role of the brokers in innovation process. A criticism of the case study methodology is that its dependence on a single case renders it incapable of providing a generalized conclusion. Limitations of this study are also related to the generalisation of the case study. Our case study concentrated on the fuzzy front end of the innovation process in a medium sized private sector company. Distances can be used as a source of innovation in other kinds of organisations, too. We can also assume that the bigger the distance is, the more essential it is to use the brokerage function. But based on this study, we cannot say how different kinds of distances are accentuated for example in public sector organisations and whether we need a different kind of brokerage there.

We can also raise the question about how the brokerage functions differ during the innovation process. Distances may indeed be differently accentuated during the various stages of innovation processes, and this may change the character of brokerage. Future research should also study whether brokerage belongs mainly to the fuzzy front end stage of an innovation process, or whether it is needed also in later stages. Particular challenges posed by different types of innovation processes, such as process, service, and product innovation processes, should also be looked into in detail in order to obtain results clarifying brokerage functions. User-driven innovation also places many new demands for brokerage and should be included in future research directions.

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## Collective Creativity and Brokerage Functions

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## Appendix

<b>Table 3: Summary of the answers to the questionnaire for the brokers.</b>	
<b>Question</b>	<b>Summary of the answers</b>
General observations	The innovation session was considered successful. Most of the brokers described it as good or successful. One described it as routine, but good. The beginning of the session was seen as a critical point because there were some participants who did not know what was happening and the atmosphere was suspicious. The minutes dragged by. Despite of the difficulties in the beginning of the session, the group work started without any great friction.
The composition of the participants, atmosphere, and innovativeness	All participated in the innovation session. Participants concentrated on the theme of the innovation session and were willing to follow given instructions.  Experts were diverse, but they expertise was overlapping. They were capable of presenting what they know. One expert received criticism because his presentation was too long and had too much statistical information.  The groups were seen as balanced. There were differences in the groups' working styles. One group was considered as quiet and the members turned the problem over in their minds. Another group was loud and the members were "fooling around" a lot during the ideation phase.
Results of the session	According to the brokers, there were possibilities for further innovation or development processes. The company will not change its basic business, but they will prepare an e-business strategy and start projects around e-business. There were also some incremental development ideas which should be studied. One broker saw that there could be possibilities for new innovation session processes in the future with the company.

Collective Creativity and Brokerage Functions

<p>Success or lack of success of the session</p>	<p>Capable groups, interested experts, a clear and focused target, and the commitment of the company were mentioned as main reasons why the session was considered successful.</p> <p>According to one broker, the session would have been more successful if it had been arranged outside the company. The timetable was also too tight at the end of the session and there was too little time to figure out what was going to happen next.</p>
<p>Further development</p>	<p>Almost all the brokers saw that the panel discussion was functional and should be developed further. According to one broker the panel needed some sharpness and suggested that some of the themes or questions should be given to the panellists beforehand.</p> <p>In addition, the beginning of the session was considered as one of the development targets. For example, there should be more time for the participants to get to know each other and also for a creative warming up exercise in the beginning of the session.</p> <p>Some brokers missed more stimulation like pictures in the ideation phase and more moving around and less sitting around the table.</p>

### Biographies



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**Article 3:**

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## Innovation sessions as sources of new ideas

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**Abstract:** Sustaining open innovation requires better understanding of how collaborative efforts of contributors yield collective creativity. This article examines the possible creativity in innovation session groups and demonstrates that under the right conditions the exchange of ideas in groups may be an important factor for enhancing innovation. An innovation session is a process which concentrates especially on how to get external knowledge to the organisation. This study uses the experiences of the participants of innovation sessions to answer the questions of how to support organisations to bring in new ideas from outside and how to promote collective creativity in group context.

**Keywords:** collective creativity; innovation; diversity; idea generation; idea; knowledge; innovation session; brokerage function; learning.

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## 1 Introduction

Organisations have to continually expand their capacity to be creative and innovative. Innovation is closely related to organisational learning which is defined as acquiring new knowledge and enhancing existing knowledge. The only way to sustain competitive advantage is to ensure that organisation is learning faster than its competitors (Wickramasinghe, 2008). According to the philosophy of open innovation, organisations can and should use external and internal ideas and paths to market, as they look to advance their technology (Chesbrough, 2003). At the centre of the open innovation philosophy is how organisations use ideas and knowledge of external actors in their innovation processes (Laursen and Salter, 2006). Active inquiry of external sources of knowledge is necessary in order to maintain organisational competitiveness (Phusavat

et al., 2009) because it is not possible that every organisation can possess all needed knowledge for successful operations or innovations (Kess et al., 2008).

Opening up the innovation process requires a set of instruments. Those tools, for example, enable customers to create their own products or enable organisations to integrate external problem solvers or idea creators to innovation process. Gassman et al. (2010) call this the tool perspective in open innovation. In the Lahti region of Finland one practical tool supporting open innovation in organisations is the innovation session method. The method concentrates on the fuzzy front-end of innovation: coming up with good ideas.

In rapidly changing environments, the complexity of problems requires solutions that combine the knowledge and abilities of people with diverse perspectives. However, while the collective nature of creative accomplishments has been acknowledged and different group sessions are often promoted as important vehicles for the development of creative ideas, research on creativity has centred primary on the individual (Hargadon and Bechky, 2006). Also, many studies indicate that people in face-to-face brainstorming meetings are less efficient at generating ideas (Sutton and Hargadon, 1996). The objective of this article is to describe the innovation session method as a way to support organisations in bringing in new ideas from outside the organisation. This article concentrates especially on those elements that support collective creativity in innovation session groups.

## **2 The network of collective creativity**

In the network era, creative achievements like innovations are increasingly accomplishments of many people. The complexity of problems transcends the individual human mind, requiring not only individual but also collective creativity. Collective creativity is an approach of creative activity that emerges from the collaboration and contribution of many individuals. In collective creativity each individual's contributions inspire the others to raise the bar and think of new ideas. Together the individuals create for example a novel emergent product, one that is more responsive to the changing environment and better than what anyone could have developed alone (Sawyer, 2006).

Researchers have begun examining networks as possible sources of diverse knowledge and consequent creativity (e.g., Burt, 2004; Perry-Smith, 2006). Innovation networks, such as links to customers, manufactures, suppliers and research institutes, consist of network ties, which can be described by strong and weak ties. Stronger relationships involve a high level of emotional closeness and relatively frequent interaction and reciprocity (Granovetter, 1973). These strong ties are easier for innovations, because they normally include a relatively high amount of trust, common aims, and the same kind of language to communicate. However, weaker relationships, involving comparatively low levels of closeness and interaction, may be beneficial for creativity. The heterogeneity and non-redundancy expected of weak ties help explain why they are associated with enhanced creativity (Perry-Smith and Shalley, 2003). Weak ties are more likely than strong ties to be non-redundant connections between two disparate social groups. Information travelling through weak ties is more likely to originate from the outside of one's immediate social circle. This information may not necessarily be creative in nature, but it is less likely to be repetitive. Exposure from weak ties may serve as a seed that causes a person to pursue previously unexplored directions or provide a

spark that propels a person to integrate new ideas. In addition, a person cannot easily, without reflection, decide what is consistent with the approaches and perspectives of all his or her contacts. In this case a person is forced to think in broader terms and must combine these differing approaches in a unique way (Perry-Smith, 2006).

It is important to differentiate creativity from innovation. Much of the research has defined creativity as an outcome, focusing on the production of new and useful ideas concerning products, services, processes, and procedures (Amabile, 1996; Ford, 1996; Oldham and Cummings, 1996). Creativity could range from suggestions for incremental adaptations in procedures to radical, major breakthroughs in the development of new products (Mumford and Gustafson, 1988). While the constructs of creativity and innovation are closely related, they are different. Creativity differs from innovation in that innovation refers to the implementation of ideas (Amabile, 1996; Mumford and Gustafson, 1988). The products of creativity, like new ideas and concepts, serve as raw material for innovation. Creativity is often a necessary condition for innovation, although not a sufficient one, since many creative ideas may not be commercially feasible or cannot be developed further.

Burt (1992, 2004) has developed the ‘strength of weak ties’ argument further by arguing that innovations are most likely discovered in structural holes. The term ‘structural hole’ refers to the social gap between two groups. Structural holes are the weak connections between clusters of densely connected individuals. Actors who have these connections can act as brokers between the clusters or groups. Burt (2004) suggests that brokers focus on establishing ties to other disparate or disconnected groups, exploiting the structural hole, so that they can then bring together members of the two groups who would otherwise be more difficult to connect. A structural hole indicates that people on either side of the structural hole have access to different knowledge flows (Hargadon and Sutton, 1997). Networks with an abundance of structural holes create opportunities for the novel combination and recombination of ideas.

### **3 Creativity in innovation session groups**

#### *3.1 Innovation session process*

Open innovation is a phenomenon that has become increasingly important for both practice and theory over the last few years (Enkel et al., 2009). The innovation processes of an organisation also need to be adapted to the changing characteristics of innovation activities, where external knowledge and actors are part of the processes to an increasing extent. One example of an open innovation tool that draws on input from outside parties is the innovation session method.

According to Tidd et al. (2005) organisations have to manage four phases that make up the innovation process. Organisations have to:

- 1 scan and search their environments to pick up and process signals about potential innovation
- 2 select from this set potential triggers for innovation
- 3 resource the option – providing the knowledge resources to exploit it, implement the innovation

- 4 learn from progressing through this cycle so that they can build their knowledge base and improve the ways in which the process is managed.

The innovation session method is usable in phases 1 and 2. In product development this phase is also often called fuzzy front end innovation (Koen et al., 2002), which according to Khurana and Rosenthal (1998) includes product strategy formulation and communication, opportunity identification and assessment, idea generation, product definition, project planning, and executive reviews.

**Figure 1** The phases of an innovation session process (see online version for colours)

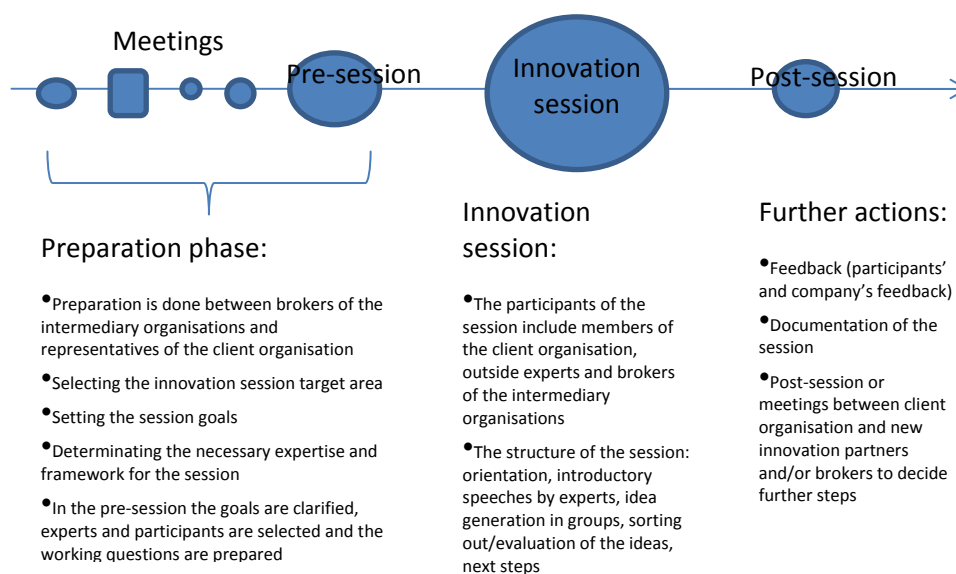


Figure 1 presents the phases of innovation session process. Each innovation session process is always planned individually by an intermediary organisation and a client organisation. The culmination of the innovation session process is a one day long innovation session where the combined input from the organisations and experts, together with the brokers, is used to generate innovative ideas for the organisation to consider.

There were 80 innovation session processes during 2004–2008. These innovation sessions concerned, for example, new ways to organise business-oriented conferences in Päijät-Häme Region, possibilities of ventilation technology to get a good night's sleep, new solutions to raw material shortage in fibreboard industry, public and private partnership possibilities between retail trade and a municipality, formulating a strategy for health-promoting sports in Päijät-Häme Region, a new service concept for occupational healthcare, new business possibilities in robotic technology, the functionality and design in future in-doors and the earning logic of an advertising agency. The results of the innovation session processes have been new business ideas, service concepts, new or enhanced products, process developments, product development projects, operations models, clarifications and strategies.

### 3.2 *Structure of innovation session*

The innovation session can take place in the premises of an organisation, but usually it helps the idea generation to arrange the innovation session somewhere else than in the organisation premises. When innovation sessions are organised outside the work environment, participants may better understand that their participation is needed for a whole day. The innovation session is arranged in a room, large enough for several groups to work and discuss without being isolated from the other groups. Practice has proved that an ideal innovation session group consists of five to seven persons. A too large group inhibits the group members' ability to communicate with everyone else in the group and there is also the danger that the group becomes divided into sub-groups. There is less chance to contribute to group discussion in larger groups and it is easier for some individuals to dominate discussion than in smaller groups (Pennington, 2002). Members of smaller groups have a better chance to participate in group work and the management of the group is easier.

An innovation session always begins with the presentation of the day, participants and working methods. Usually the creativity operator who is the main facilitator of the day explains the purpose of the innovation session and the structure of the day. After that there is usually a small warm-up exercise to lighten the atmosphere, to help the members of the group to get to know each other better, to activate creative thinking and to focus on the theme of the day. These exercises are fun, simple and non-competitive.

After introductory speeches given by the experts chosen as being suitable for the theme of the day, the creativity operator promotes interaction between the participants in order to discover the innovation potential lurking in the structural holes. The aim is to find two to four potential ideas to pave the way for new networked multi-actor innovation processes utilising collective and creative knowledge production. The purpose of innovation session groups is to produce creative and innovative ideas and solutions to the issue of the day. Innovative creativity calls for group members to examine the issue from an alternative viewpoint. At its best the group achieves something that individuals working alone could not achieve. It is presumed that groups bring to the task or problem solving something more than the contribution of any individual.

Different methods are used to help idea generation and creativity in the innovation session groups. Usually these are a combination of individual and group creativeness utilising progressive ideation methods and partly hybrid methods aiming at combining the expertise and ideation in small group settings (Parjanen et al., 2010). It is essential to change these methods during the session, for example, altering between group and individual brainstorming because not all individuals will be equally stimulated by group interaction and people think differently. Some involve staying in a field similar to the ongoing stimuli, while others tend to shift to dissimilar fields (Paulus, 2000).

The participants are invited to voluntarily attend the innovation session by the intermediary organisation. Creativity needs freedom. If participants are forced to participate, they will lack motivation and creativity. Participants are divided beforehand into groups as heterogeneous as possible, because heterogeneous groups are more familiar with alternative ways of thinking and behaving (Burt, 2004). The innovation session group consists of members of the organisation, outside experts and a session

broker who facilitates group work (Parjanen et al., 2010). The members of the organisation are not from the same section or department. An example of group composition is presented in Figure 2.

**Figure 2** Example of the group composition from an innovation session concentrating on e-business possibilities (see online version for colours)



A group must have a common purpose or goal and they must work together to achieve that goal. The goal brings and holds the group together. The goal of an innovation session group is to create a pool of candidate ideas for further evaluation and, ultimately, implementation. It is important that every member of the group has a clear understanding of the task. The creativity operator explains the working instructions and usually there is also written instructions in every group. Every group has a broker who helps the group to understand their common objectives and assists them to achieve them.

Some people are simply more creative than others (Woodman et al., 1993), but creativity can be stimulated and enhanced, for example, with various creativity methods. However, the exposure to ideas from other group members and the use of creative methods may be at least as important in creative idea generation (Couger et al., 1993). Thus, the significant benefit of sharing ideas with others is that it should increase the chance that one will come across ideas one would not have thought of in a solitary idea-generating session. These ideas may in turn stimulate additional novel ideas (Paulus, 2000). In an innovation session a group is in interaction with other innovation session groups, a creativity operator and experts. The creativity operator is circulating bringing different views, questions and perhaps ideas from other groups. Some experts may also change groups during the day.

## **4 Findings about collective creativity in innovation session groups**

### *4.1 Research strategy*

The case study is a research strategy which focuses on understanding the dynamics present within single settings. As Stake (1995) observes, a case study is concerned with the complexity and particular nature of the case in question. One of the most important questions is what can we learn from the case. In this study the case study is used in an instrumental way (Stake, 1995) in order to better understand the elements of collective creativity in an innovation session and to some extent also to explain linkages between theory and practice. A case study strategy is preferred when the researcher seeks answers to how and why questions (Yin, 2003). The research questions of this study are how to support organisations in their innovation activities to bring in new ideas from outside the organisation and how to promote collective creativity in group context.

The background material of this study consists of different kinds of documents generated in pre-sessions and innovation sessions, like the structures of the sessions, presentations of experts, group works and summaries of the sessions. Researcher also took part in some of the sessions. To analyse the experiences of the participants, 293 feedback questionnaires from 20 innovation sessions were analysed. These sessions were held during 2007–2008. This period was selected because the method had experimented major development phases by 2007. The period also contained both private and public sector sessions. During that time there were twelve sessions in the private sector, five in the public sector and three were network or partnership sessions. Participant feedback was collected right after the sessions using a questionnaire, which consisted of 14 statements. The respondent could indicate to which extent he/she agreed or disagreed with each statement, using a rating scale from 4 to 10. The open questions inquired the good and bad qualities of innovation sessions and how the respondents would improve the sessions.

Also six interviews were held. Three of the interviewees represented a company in which the innovation session was successful and three represented a company in which the innovation session did not meet the set targets. These semi-structured interviews were part of a larger research project and one theme of the interviews concerned the experiences of the innovation session. Questions in this particular theme concerned, for example, why the organisation decided to organise an innovation session, did the interviewee participate in the planning of the session, what kind of a role did the experts have during the process, how creativity was boosted during the session, what were the results of the session and how could the interviewee improve the innovation session process. The interviews were analysed with the help of Atlas.ti software.

### *4.2 Analysis of the collective creativity of the innovation session groups*

The culmination of the innovation session process is a one day long innovation session, where idea generation is mostly collective. It is crucial for the success of the innovation session that groups interact well and are creative. Many respondents defined group work and discussions as one of the most positive things during the innovation session. Discussions with experts and colleagues from other departments gave new viewpoints and chances to think outside the box. Different types of knowledge, experience and points of view opened the conversation and forced to think in broader terms. Based on the

answers, creative ideas and solutions were regarded as the products of collective processes. It was impossible to trace the source of new ideas to an individual. In the answers the generator of the ideas was always in passive ‘ideas were generated’.

According to Hargadon and Bechky (2006) the locus of creativity in the interaction moves to the collective level when each individual’s contributions not only shape the subsequent contributions of others, but, just as importantly, give new meaning to their previous contributions. Regarding the moving of creativity to the collective level the respondents described that the session ‘gave opportunities to question own perceptions’ and gave ‘knowledge about what others are thinking’. According to one respondent “the session made him to ask questions from himself about how he understands the issue and how he is ready to develop it or to be developed.”

According to the feedback responses new ideas were generated during the innovation session. These ideas could be divided to ideas which are valuable to the participants themselves or ideas which were considered useful for the client organisation or for the larger network (Table 1).

**Table 1** Level of ideas generated in the innovation sessions

<i>Level of ideas</i>	
<i>Individual</i>	Ideas related to own work New methods and thinking about how to be a leader Ideas that motivate and inspire Tips how to develop own work
<i>Organisation</i>	Product ideas New perspectives to product development processes Concrete development ideas Possibilities for innovations Courageous beginnings for ideas Ideas for new projects Ideas to deepen the theme of the innovation session Business ideas Ideas that give possibilities to develop business to new branches Ideas related to productisation Ideas for operational models New methods for marketing
<i>Network</i>	Ideas on how to develop cooperation with key persons Project ideas between different actors Ideas for writing a common strategy for the region

In the individual level the ideas were related to one’s own work and how to develop it further. The respondents also indicated that one result of the session was that it helped them to understand better others’ points of view and their understanding widened. Table 2 shows that the respondents thought they had new ideas from the session but they were little sceptical about whether the session generated promising ideas for the organisation. On the other hand, in the open answers the respondents indicated that the



session generated ideas related to for example products, projects, business and cooperation (see Table 1).

**Table 2** Statement averages

<i>Statements</i>	<i>Average</i>	<i>Max</i>	<i>Min</i>	<i>Mode</i>
I felt that I was in the right place.	8.56	10	4	9
There were right persons in the innovation session.	8.34	10	5	9
The introductory speeches were of high level.	8.43	10	5	9
The introductory speeches were interesting or useful from the point of view of my work.	8.18	10	4	8
The method of work was meaningful.	8.28	10	5	8
The group pulled together.	8.46	10	4	9
Methods of work helped the development of a trustful atmosphere between participants.	8.62	10	6	9
Methods of work helped an open and creative search of ideas concerning new products, services or solutions.	8.44	10	4	9
I had new insight and ideas from the session.	8.24	10	4	8
New, promising ideas for the company were generated.	7.98	10	4	8
My expectations for the session were fulfilled.	8.29	10	5	8
With the help of the session, new partners or possibilities for cooperation were found.	7.53	10	4	8
It is possible that long-term innovation processes will be generated.	8.14	10	4	8
It is possible that new products, services or businesses will be created.	7.98	10	4	8

Based on the answers, the creativity in innovation sessions could be defined as new ideas, new ways of thinking or doing things in the organisations. These can be the raw material for various innovations: technological, social and organisational. Respondents usually indicated the quantity of ideas as ‘a lot of ideas’ or ‘some new ideas’. That is why many also considered the documentation of the ideas important. Mostly the ideas were seen incremental, and some respondents indicated that it is too early to say what kinds of innovations are possible. Some time after the sessions interviewees estimated that “let’s say that the session generated about 15 trends of ideas... of which about half is under continuous consideration” or “there are less than five ideas that are concretely developed further.” Ideas were also implemented as was seen in the interviews: “right after that (session) a new product was developed and actually after that more new products were developed...” The participants also succeeded to generate wild or perhaps radical ideas which were seen in citations “...there were all kinds of crazy ideas and I’m still laughing when thinking about them” and “not all these ideas are possible to implement.” This also demonstrates the difference between creativity and innovation. An idea can be creative but not necessarily innovative if the adoption or implementation is not possible.

For the functioning of the session it is important that right kind of people are present. According to the statements the respondents considered that the participants were of the right kind and that especially they themselves were in the right place. If a group has the range of skills and knowledge required for a particular problem area, it is likely they can tap this diversity to come up with a broader range of ideas than those with more limited

diversity in knowledge (Paulus and Brown, 2007). One interviewee explained that "...it is possible to express ideas that nobody inside the company has not thought about. In that sense it is really good that there are people from different fields who can ask stupid or wise questions". Another interviewee noticed that because of the outside participants the members of the client organisation took a different role than what they have in the meetings inside the company. When the same people are together, the members of the group create certain roles based on, for example, hierarchical status or know-how, "but when there is an outsider in the group, these roles dim".

In the open answers, heterogeneity of the participants was noticed. The heterogeneity was also connected to different kinds of ideas and possibilities. Many pointed out that there were 'different kinds of people' and 'different kinds of ideas'. One interviewee told that "it was nice that there were people from other companies and from totally different branches and it generated the kind of conversation that has not been previously had" and a respondent stated that "a wide range of people from various backgrounds has a chance to see new possibilities."

One of the main challenges in idea generation is the need to escape stereotypical thinking and increase creativity. Escaping stereotypical thinking is not necessarily complicated as one interviewee noticed "we (client organisation) do not decide the order of the session, which also brings a different kind of tone... we maybe too easily do things in a way we have got used to... but when things are done a little bit differently or in a different order or with different methods, it brings versatility". The role of creative methods during the session was seen, firstly, to help the development of an open and trustful atmosphere and, secondly, to boost creative thinking. One respondent commented that the methods used brought "an innovative and artistic way of thinking to work". But it should be noticed that creative methods should be chosen according to the theme and participants, as one respondent put it: "these methods should not be exaggerated...this (method) is good but not in here". In a few answers the respondents indicated that these kinds of methods should also be used in the future in the own development teams and meetings of the organisation: "this idea is very good... this cross-fertilisation and it should also be done in the company..."

A positive atmosphere contributes to a positive and creative state of mind. According to the respondents, idea-generation was helped by a relaxed atmosphere and informality. The respondents described the atmosphere with expressions like 'enthusiasm of people', 'cheerful atmosphere', 'positive feeling', 'innovative conversation' and 'good spirit'. One interviewee stated that "it is like in work in general that if you don't find a moment to relax, it is not possible to generate new products or something new, so that kind of creative laziness is needed". A right kind of atmosphere and creativity also had correlation according to another interviewee: "... of course, in creativity you have to find a relaxed, comfortable state of mind for everybody, so that ideas flow free. Usually it is an unrelaxed, bad feeling or atmosphere that kills creativity..."

In the feedback answers and in the interviews the role of the experts was seen crucial. The advantage of experts was considered to be that as an outsider he does not know the problems and annoyances of everyday work. One interviewee told that "someone who has worked here for 30 years could easily give you ten reasons why this idea will not succeed ... but when there is an outsider, he would not have this kind of burden..." Another pointed out that "people should also look outside the company and not only think that I myself am the best expert". The role of the experts was seen as "to question and to spar us (client organisation) to see certain new possibilities". The role was seen

less as a generator of ideas than as someone who facilitates the company members to generate ideas themselves, questioning the existing ways of doing and thinking. One interviewee was wondering the role of the experts as follows: "I do not remember that any idea would have been generated by the experts and maybe it is not the purpose. It is enough that they can ask stupid questions once a while... perhaps they may have an idea, but you can't expect that".

In choosing the right kind of experts it is not only a question about the experts' knowledge but that "there should also be a right kind of chemistry between participants". In some sessions the respondents paid attention to that certain knowledge was missing like: "more participants from industry" or "the representatives of companies were missing". Usually, when a session does not meet its targets, the outside experts have not been the right ones as one interviewee expressed: "...in choosing the experts... there should have been different kinds of solutions". But the interviewee also indicated the difficulty to select the right experts and continued that "on the other hand, you never know beforehand what a person knows or what he can do. Perhaps there are not better (experts) ones in the world".

The skills of the expert in presenting ideas so that they are relevant from the point of view of the organisation are crucial. Experts' presentations, according to the respondents, should be short and clear and should include new information or perspectives. In the answers the name of the expert was mentioned only if he/she had been very good or if he/she had not succeeded in his/her role. The expert was considered good if he/she had brought something totally new to the session, either his/her ideas were innovative or the way he/she presented them. One interviewee said that "it is really important that the people participating are of the right kind... time should be invested in preparing that". In their feedback, respondents emphasised that experts should be given enough information about the client organisation and the topics of the day beforehand. Table 3 sums up the role of experts during innovation session.

**Table 3** The role of the experts in innovation session seen by the respondents

<i>The role of the experts</i>
<ul style="list-style-type: none"> <li>• To bring in new kind of information to a client organisation</li> <li>• To ask questions</li> <li>• Questioning the existing way of doing things in the client organisation</li> <li>• To bring new insight and possibilities from other branches</li> <li>• Sparring to see new possibilities</li> <li>• Bring heterogeneity to the session</li> <li>• To be interested in the challenges of the client organisation</li> <li>• Playing with different kinds of ideas</li> <li>• Networking</li> </ul>

Respondents appreciated that the innovation session day is well prepared by the brokers. The programme should be varied so that it engages participants' attention. This also means that it should be possible to change the programme if it does not work as planned. Many references to the management of the sessions and the planned programme in the answers indicate that the participants want to have an impression that they have not come to an ad hoc occasion and their contributions could be considered valuable.

In the answers the brokerage function was considered essential: “The role of the broker was essential for the progression of the group work and achieving the results”. The broker is essentially a neutral person who supports the innovation session group throughout. The role of the broker is to keep the group on track and make sure that they do not deviate from their assigned goals. The broker should explain the instructions of the group work and he/she should never ‘give simultaneous tasks’. His or her task is to listen, clarify, question, summarise, observe and provide feedback. The broker is an active member of the group, but he or she intervenes in group work only when necessary. The role of the broker was seen essential especially in different kinds of problem situations as one respondent wrote: “if the group work is stuck, the broker should be more assertive”. Table 4 sums up the role of brokers before and during an innovation session.

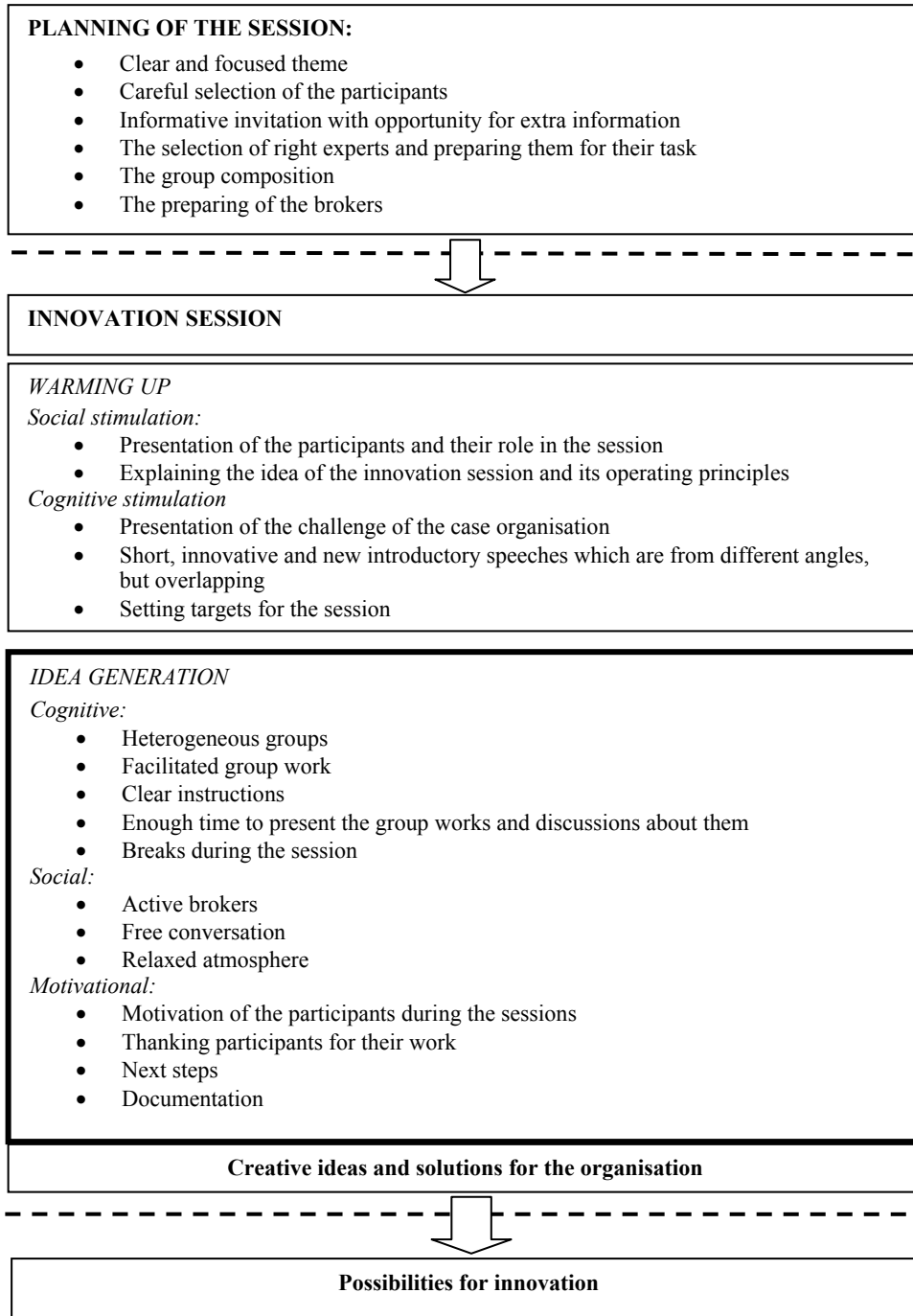
**Table 4** The role of the brokers in an innovation session process seen by the respondents

<i>The role of the brokers</i>
<ul style="list-style-type: none"> <li>• Building the dialog with the client organisation</li> <li>• Planning and preparing the programme</li> <li>• Being there for the client organisation during the innovation session process</li> <li>• Preparing the experts for their role during the session</li> <li>• Management of the session</li> <li>• Building open atmosphere</li> <li>• Familiarising the participants to each others and to the idea of the session</li> <li>• Keeping the group on the right track</li> <li>• Explaining the instructions for group work</li> <li>• Managing conflict situations in the group</li> <li>• Motivating participants during the session</li> <li>• Being a bridge or interpreter between different actors during the process</li> </ul>

One way to describe the brokerage is that it facilitates the innovation session by shortening the different distances, like social, cognitive and communicative, between participants (Parjanen et al., 2010). The social skills of the broker are emphasised in conflict situations. According to the feedback, group members who dominate the conversation prevent new ideas from emerging. One respondent was disappointed because “there were persons in the group who had long monologues and the broker did nothing to finish this monologue”. New ideas arise based on other people’s ideas as one interviewee pointed out that “we were exchanging views, everybody came up with something and that way the wholeness was generated”. The group interaction is beneficial when one group member primes another to think of ideas they would not have considered alone, at least not in the context of the task at hand. Several respondents also asked the question “whether all participants have a possibility to present their ideas” indicating that there are always persons who are more extrovert than others and they may have the power to choose the topics of conversation and ‘that can be inessential’. Also the size of the group was considered an important factor in group work. In some sessions respondents felt that ‘the size of the group was too big’ and it was difficult to have conversation. One interview indicated to communicative distance between company members and a university researcher when telling that “there were many people that

could not understand what he (expert) was speaking. I did know that it was Finnish, but I did not understand a word”.

**Figure 3** Elements supporting collective creativity during an innovation session



During the innovation session the broker needs to develop an understanding of the problem or the challenge of the day. In some answers the respondents mentioned the cognitive distance which inhibited generating ideas: "I did not have enough knowledge of the issue of the day" or "some background information could have been provided about the topic before the session". One interviewee described the cognitive distance and the role of the broker as follows: "the most difficult challenge is how to utilise this knowledge even a little bit better, that there should be an interpreter who would translate information into a common language". According to the responses, a good broker is above all excited and is well prepared to his/her task. In the answers there were no references that the broker should be an expert in the subject of the innovation session. Instead, their knowledge and skills were more related to the management of the innovation session process.

In the answers it was evident that creativity also needs time for the ideas to incubate. In some answers there were comments that there were enough breaks, but mostly the respondents would have liked to have more time to group work or they thought that "the day finished too quickly". Some recommended that "there should be another session in which it would be possible to concentrate more on concrete things". Some respondents also indicated that during the session the motivation of the participants is crucial. The participants need to be reminded 'why they are in the session'.

The findings of this study support the cognitive-social-motivational view of brainstorming. According to this view idea generation is a cognitive process which is strongly moderated by social and motivational factors (Paulus and Brown, 2007). In Figure 3 the main ideas presented by the respondents are grouped according to this view.

Because collective creativity takes place in moments when any one individual does not hold all of the necessary knowledge or expertise to construct a creative solution, the potential for a creative solution requires expertise and skills of multiple participants (Hargadon and Bechky, 2006). Cognitive diversity will increase the likelihood of new knowledge and ideas emerging in groups (Boschma, 2005). To use this diversity as a potential for creative ideas and possible innovations, this study highlights the need for different kinds of roles to make collective creativity possible. Collective creativity should be supported by three kinds of expertise during the innovation session: representatives of the organisations who possess the inside expertise, outside experts and brokers whose expertise is related to the management and facilitation of the innovation session process. These different kinds of expertise should be somehow overlapping because the cognitive diversity may not be too large in order to communicate, understand, absorb and process new information successfully (Boschma, 2005).

In an innovation session it is crucial to allow the necessary flow of information to take place but also to establish a trustworthy atmosphere, which helps different actors to overcome their reluctance to take a part in a creative process. In an innovation session the problem or challenge is approached from several cognitive perspectives and there can even be cognitive dissonance between different points of view. If there is no trust in the group, divergent perspectives and ideas will not be shared. This study supports the notion that social proximity may stimulate interactive learning and innovation because of trust and commitment (Boschma, 2005). It can be first perceived as difficult to establish trust in a group where the members do not necessarily know each other. The presence of brokers is important in this respect. Facilitation must be done in such a way that it establishes, nourishes and maintains a climate that is appropriate for the group to succeed. One of the challenges of brokers in collective creativity is to motivate people to

engage in a collective creative process and make them see that their contribution has a meaning (Amabile, 1997). Much of the work of brokers should have been done before the session, which is also pointed out by McFadzean and Nelson (1998) when they stress the importance of the planning stage of the facilitation because without careful planning the chances of success will be diminished.

## 5 Conclusions

Open innovation demand a higher involvement of external actors in an organisation's innovation process. Successful innovation under complexity and uncertainty can be achieved through collaborative approaches that integrate knowledge inside and outside the organisation. This study underlines the importance of brokerage functions in open innovation. In fuzzy front-end innovation, brokerage functions should include for example building ideation arenas which are based on cognitive cross-fertilisation and enhancing individual and especially collective creativity. According to the experiences gained from innovation sessions the following conditions influence the production of creative ideas in a group:

- The innovation session method integrates planning, acting and implementing. Careful preparing of the whole process by the brokers together with the client organisation is necessary.
- The session should have a concrete goal, which defines the questions and methods and motivates the participants.
- Selecting the right outside expertise helps to generate ideas. Experts make it possible to examine an issue from an alternative perspective.
- The group must be diverse. The purpose is to build as heterogeneous a group as possible, but keep in mind the functioning of the group. Group selection should be done before the session to ensure that groups can use different knowledge and experience. Diversity also forces members of the group to think in broader terms and combine differing approaches in a unique way.
- The presence of a broker in every innovation session group is essential. The role of the broker is to facilitate thinking outside the box. The brokerage functions concentrate especially on social and motivational factors during the idea generation.
- Creative methods should be chosen so that they vary and fit the theme of the day. Using creativity methods is not an end in itself and should be chosen according to the goal and participants of the innovation session.

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# Brokerage functions in a virtual idea generation platform: Possibilities for collective creativity?

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Abstract: The open innovation approach emphasizes the importance of service and product users as a source of novel ideas. An essential question is how user-driven innovation is conducted. Information and communications technology offers various new opportunities and means of acquiring information about users and engaging them in innovation activity. This study investigates brokerage functions in a virtual environment where people with diverse experience, areas of expertise and perspectives collaborate. The research question is how brokerage functions are able to create possibilities for collective creativity. The study focuses on the front-end stage of an innovation process: the ideation phase in a virtual idea generation environment, in which fruitful and fresh ideas based on users', or potential users', needs are sought for in order to support the innovation process.

Keywords: brokerage functions; collective creativity; distance; innovation; user-driven, virtuality; idea generation

## **Introduction**

Innovation refers to something new or renewed: products or services, processes, organizational forms, financial models, education and training or a workspace (Tidd, Bessant & Pavitt 2005; Reichstein & Salter 2006; Bygstad and Lanestedt 2009). Innovations are widely seen as the driving force behind economic growth and competitiveness (Chesbrough 2003; Haga 2005). The most recent innovation models stress the need to open up the earlier often very sheltered innovation processes. Using a wide range of external actors and sources should help organizations to achieve and sustain innovation. (Chesbrough 2003; Laursen & Salter 2006).

According to the open innovation perspective, organizations must locate knowledge from a wide range of sources, even from individuals with a background and location that may appear less than obvious, but who nonetheless prove to be highly relevant when attempting to solve a specific challenge (Chesbrough 2003). Today, it is widely accepted that users, or user networks, are often a major source of innovation and have even been proven to be the principal driving force of many innovations in different industries (Lettl, Herstatt & Gemuenden 2006). User-driven innovation places the user in an active role in the innovation process, even to the extent that the entire process may primarily be motivated and driven by the user community rather than by any specific product or service supplier. Users are no longer just the targets of market research, sources of articulated needs, and absorbers of the ultimate innovations produced, rather, their expertise becomes instrumental in solutions development. (Prahalad & Ramaswamy 2004; von Hippel & von Krogh 2003; Breznitz, Ketokivi & Rouvinen 2008.)

An important question for the innovation process is how user-driven innovation is actually conducted. Modern communication technologies have enabled new ways for users to become more active. This article concentrates on the fuzzy front-end innovation process in a public sector organization. It was decided that idea generation would use a web-based environment that would involve both outside experts and the users, or future users, of the services. The idea generation was conducted by external brokers. This article investigates brokerage functions in a virtual environment and how they can create possibilities for collective creativity. To analyze the brokerage functions the concepts of distance and proximity are used as a framework.

### **Brokering distances**

Innovations are said to be created in a combination of different fields of knowledge (Leonard 1995; Johansson 2004; Uotila, Harmaakorpi and Melkas 2006). Innovations begin with creative ideas (Amabile et al. 1996) but while innovation results in part from creativity, the two are not interchangeable. Von Stamm (2003) sees the difference between these concepts in implementation. The development of an innovation depends on a good, creative idea and the successful implementation of this idea.

Researchers have begun examining social networks as possible sources of diverse knowledge and, consequently, creativity (Burt 2004; Perry-Smith 2006). A social network refers to a set of actors (e.g. people, organizations) and ties representing some relationship, or lack of a relationship, among them. The ties are often characterized as

strong or weak (Granovetter 1973). Granovetter (1973) proposed that weak ties are more likely to connect different social circles and be the source of non-redundant information, whereas strong ties are likely to be connected to themselves and thus provide redundant information. Weak ties allow for diversity, a prerequisite for innovation, and bring the network members into contact with other, less familiar actors.

Collaborating with different actors should substantially enhance creativity and innovation, due to the amount and variety of knowledge to be shared, thereby enabling the actors to fulfil their initial resource and skill endowments. In order to collaborate, people need not agree on individual objectives and their knowledge must differ to make collaboration meaningful. Diversity in innovation is associated with the number of actors who are involved in the process and the degree to which their knowledge, skills and behavioural norms differ. Diversity provides knowledge, expertise, problem-solving approaches and other resources that, combined in novel ways, produce innovation. (Nooteboom & Gilsing 2005; Perry-Smith 2006.) However, diversity may also reinforce miscommunication and contrasting goals (Muhr 2009).

A solution to this dilemma could be to approach diversity using the concepts of proximity and distance. In the literature, it is often argued that the more proximity there is between actors, the more they interact and innovate (e.g. Gertler 1995; Bathelt, Malmberg & Maskell 2004). However, proximity may also have a negative impact on innovation, namely the lack of diversity (Boschma 2005). Because of this, creativity and innovation also need distance, i.e. diversity in knowledge, skills, expertise and experience. In



innovation processes it is essential to find the right balance between distance and proximity.

In the proximity concept, proximity often actually means the geographical proximity of actors in an innovation process. Distance is relative to the means of transport or the perception of distance by actors (Rallet & Torre 2005). However, proximity or distance can also take different forms:

- Cognitive proximity/distance captures the tension between actors with different knowledge bases (Boschma 2005). Cognitive distance will increase the likelihood that new creative knowledge emerges (Mitchell & Nicholas 2006).
- Communicative proximity/distance indicates the ability to communicate and exchange ideas (Parjanen, Harmaakorpi & Frantsi 2010).
- Organizational proximity/distance indicates the level of integration of the actors in the innovation process. Organizational distance indicates no ties between actors, whereas organizational proximity indicates only strong ties between actors (Boschma 2005).
- Social proximity/distance refers to the embeddedness of social relations between actors (Boschma 2005). The notion of social proximity comes close to the concept of social capital as defined, for example, by Tura and Harmaakorpi (2005) and Burt (2004).
- Functional proximity/distance refers to the actors' different areas of expertise. Functionally close actors act in closely related areas, for example, in the same

industry (Harmaakorpi, Tura & Artima 2006; Harmaakorpi, Tura & Melkas 2011).

- Cultural proximity/distance refers to differences in the cultural habits, rules and values of the actors. When organizational cultures are similar, organizations are expected to interact more easily and effectively (Knoben & Oerlemans 2006).
- Temporal proximity/distance refers to temporal complexities, such as differences in the ability to imagine potential futures and make use of future-oriented information generated in foresight activities (Parjanen, Melkas & Uotila 2011).

The distances may be considered as the sources of creative ideas and innovations, but these distances may be so great that a brokerage function is needed (Burt 2004; Hargadon & Sutton 1997). People who act as brokers help the innovating actors of a network to cross greater distances (Parjanen et al. 2011). The ideas from one group or organization might solve the problems of another, but only if connections between existing solutions and problems can cross the distance (Hargadon & Sutton 1997). Brokerage functions might also be useful within the boundaries of an organization. Internal brokers are individuals or teams who manipulate knowledge to facilitate the internal transfer of knowledge between different groups or communities (Cillo 2005).

Distance might generate such a large number of possibilities for creative ideas and innovations that it possibly reduces momentum for action and limits individual behaviour (for example, due to information overload). In this sense, brokers can act as intelligent change agents that stimulate distance and increase the number of external exchanges in a

focused way, inciting innovation while creating momentum for action (de Sousa 2006). Brokers are those entities (organizations and individuals) that facilitate the sharing of different kinds of knowledge between knowledge sources and knowledge needs.

### **Creating possibilities for users' creativity in virtual co-creation**

Open innovation models stress the importance of using a broad range of knowledge sources for an organization's innovation activities. The open innovation approach also includes different aspects of "user-orientation" in innovation processes. This phenomenon has many names: user-driven innovation (von Hippel 2005), user involvement (Alam 2002; Magnusson 2003) co-creation (Prahalad & Ramaswamy 2004) or participatory innovation (Buur & Matthews 2008). However, they all share a common feature: the end-users, or customers, are not passive objects in an innovation or development process but rather active participants (Breznitz et al. 2009). More specifically, the user is thought of as a co-producer and idea generator for new products or services (Prahalad & Ramaswamy 2004; von Hippel 2005).

Co-creation generates possibilities for collective creativity (Sanders & Stappers 2008). Collective creativity is an approach to creative activity that emerges from the collaboration and contribution of many individuals. Collective creative pursuits involve individuals working together to solve challenges and create innovations that they could not do as individuals (Hargadon & Beckhy 2006; Sawyer 2006). In collective creativity one individual does not possess all the information needed in creative problem solving

(Hargadon & Beckhy 2006). According to Kozinets, Hemetsberger and Schau (2008), collective consumer creativity is based on the assumption that more consumers or users, with diverse backgrounds and experiences, will offer a greater variety of ideas proposed as solutions to the problem or challenge.

There is consensus about the valuable input of users in the early phases of innovation, especially in incremental innovations (Lettl et al. 2006). Past research has identified at least two main benefits to involving users in the ideation phase: their ideas have a higher perceived user value and, under certain circumstances, they have more innovative ideas (Kristensson, Gustafsson & Archer 2004). Being asked to come up with ideas without any restrictions can stimulate creativity. The creative potential of the users may actually be dependent on not knowing exactly what is possible, enabling them to think outside the box. This theory is supported by psychological experiments, the results of which have shown that priming can, in fact, reduce creativity, as participants tend to be preoccupied with extant solutions (Dahl & Moreau 2002; Marsh, Bink & Hicks 1999).

In the physical world, co-creation often requires geographical proximity or personal interactions with customers and/or users. These constraints limit the number of customers that the organization can have a dialogue with. However, virtual environments allow the organization to engage with a much larger number of customers without significant compromises in the richness of the interaction. A virtual team is generally defined as a functioning team that relies on technology-mediated communication while crossing several distances; such as, geographical, temporal, or organizational (Martins, Gilson &

Maynard 2004). The development of technical tools, enabling efficient work across geographical distances and organizational borders, has promoted the use of virtual teams as an organizational and technical solution for organizing innovation (Lampela 2009).

With virtuality it is possible to overcome some of the problems related to face-to-face idea generation. Production blocking occurs when an individual is unable to express ideas to the rest of the group because they are waiting for an opportunity to speak and subsequently the idea is forgotten. Additionally, an individual might start thinking about a proposed idea, thereby forgetting his own (Pennington 2002.) Writing ideas down, as opposed to talking about them in groups, eliminates the problem of production barriers since individuals do not have to wait their turn and can generate ideas at their own pace. The written format may also reduce evaluation apprehension since it eliminates the need for public speaking and is more anonymous. (Paulus 2000.)

Virtual environments also bring challenges. For example, Antikainen, Mäkipää and Ahonen (2010) stress that achieving motivation of the participants in a virtual environment is especially demanding. In general, in order to be motivated it is important to feel that the issue is important (Antikainen et al. 2010). However, users engage in virtual co-creation for several reasons: curiosity, dissatisfaction with existing products or services, an interest in innovation, to gain knowledge, to present ideas or for monetary reward (Füller 2010). The users' motivation may also stem from a belief, or a feeling, that they are able to influence the organization to incorporate, for example, certain product features that have some special value for them (Lundkvist & Yakhlef 2004). According to previous studies, monetary incentives are not so important (Füller 2010, Antikainen et al.

2010) and carry the risk of increased participation but without collaboration (Antikainen et al. 2010).

Virtuality may also cause social distance (Lojeski, Reilly & Dominick 2006). This could impact on individuals' willingness to trust other participants in virtual idea generation. Lynn and Reilly (2002) found that members of virtual teams reported lower levels of trust and that these lower levels of trust correlated with lower levels of innovation. It has been suggested that in a virtual environment many proximity effects may be reached by bringing participants together at regular time intervals for both formal and informal events. Face-to-face meetings would add informal communication to idea generation, which in turn would enhance interaction and creativity (Leenders et al. 2002; Leenders, van Engelen & Kratzer 2003).

## **Case Study: The senior welfare centre concept**

### ***Idea Generation***

The case study in this paper is part of the research project called "The Senior Welfare Centre Concept". The initiator is a foundation partly owned by the city of Lahti, Finland. The foundation provides homes for ageing people and the challenge they faced was that their service concept no longer corresponded to the needs of their future customers, who will be wealthier and demand better quality and services. Over the years, the foundation has modified its operations, but the operational concept of the service centre had not been

radically renewed for some 15 years. The development efforts of the foundation had always been based on experts' views and on the presumption that customers do not have relevant information to offer.

The case organization wanted to replace the old, closed development and innovation mode with a more open way of generating ideas involving the more heterogeneous knowledge bases of the different stakeholder groups and the weak ties of the idea-generating network. The role of the brokers of the intermediary organization was to facilitate building a new, more open and broad innovation domain by exploiting the principles of the open innovation paradigm in a virtual environment for idea generation. In other words, brokers were to facilitate the reduction of the organizational distance by bringing more weak ties to the case organization's network.

Thus, in renewing the service concept it was deemed important to consider that the economic wealth of the ageing people, and their demands and expectations concerning services, will increase in the long term. In terms of temporal distance, the organization wanted to adopt a more proactive strategy to the future.

Virtual idea generation was organized by brokers in co-operation with the management of the case organization. The purpose was to use different kinds of distances as the source of creative ideas. Correspondingly, participants with three different profiles were invited to the network: ageing people, design students (who would later participate in the implementation of the service concept) and experts on ageing. Amabile's (1997) theory of creativity as a

function of three components was adapted when choosing the participant profiles. It includes three major components of individual creativity: expertise, creative-thinking skills and intrinsic task motivation. These are all necessary for creativity in any given domain.

The expertise component includes memory for factual knowledge, technical proficiency and special talents in the target domain. Expertise is the foundation for all creative work as one cannot be truly creative unless one knows a good deal about a particular area. The expertise component was represented by experts on ageing, selected from different fields so that there were cognitive distances between them but they were functionally close.

A person with a high level of expertise will not produce creative work if creative-thinking skills are lacking. These skills include cognition inclined towards adopting new perspectives on problems, employing techniques to explore new cognitive pathways and the persistent, energetic pursuit of work. Design students represented the creative-thinking skills component. Their role was to introduce alternative ways of thinking and, hopefully, to stimulate each others' creativity with different kinds of ideas about future possibilities in senior welfare centre. In this way the brokers use temporal distance as a source of creative ideas. In one study, it was found that when participants imagined themselves adopting a distant perspective it enhanced problem solving, compared to when they adopted a near perspective. It was further found that when the participants were asked to produce more creative solutions, adopting a distant perspective generated more abstract creative solutions (Förster, Friedman & Liberman 2004).



Expertise and creative-thinking determine what a person is capable of doing. The task motivation component determines what a person actually will do. When investigating what kinds of conditions are favourable for creative performance, Amabile (1997) found that intrinsic motivation has a positive effect on creativity, while extrinsic motivation had a negative one. Ageing people represented the task motivation component.

The intention was to have weak ties between the three groups, offering lots of potential for new ideas. Because of these distances, the brokers' active facilitation of virtual idea generation was needed. A fourth group, the Owners, also participated. However, their role was not to present ideas, but to be curious, pose questions and to learn more about user involvement and their needs in order to share that knowledge in their organization. In this way their role was close to Cillo's (2005) internal broker.

The ideas were collected using a virtual platform, where the participants were able to read each other's ideas, comment on them and add new ideas. Feedback questions, amplifications and modifications further increase the value of ideas (Bhirud, Rodrigues & Desai 2005). Individuals could give examples, raise different issues, make certain perceptions more visible, and provide alternative situations and comparison points which all support individual (Madjar 2005) and collective creativity (Hargadon & Beckhy 2006).

The web-based idea platform generated for this purpose was officially open to all participants during the first two weeks of December 2007. However, due to differences in

the participants' ICT skills, the platform was opened three weeks in advance for those needing assistance using the system. Those with lower ICT skills were supported by third sector project workers, who helped them with ICT at their home. Those participants, who were able to use ICT independently, were taught to use a web-based environment during a half-day training session.

The idea generation was facilitated in two ways by the brokers. First, technical assistance was provided to the participants. For example, if the participants had technical problems, such as having trouble logging in, they could contact the broker. Second, the brokers participated in idea generation. They stimulated the participants into interactive idea generation, for example, by linking together ideas presented by different participants and by asking activating questions during the process. The brokers also managed the whole process, from planning idea generation to inviting the participants and analysing the results.

In idea generation, the well-being centre concept was divided into five fields: housing services, rehabilitation services, services for physical well-being, nutrition and restaurant services, and the wider environment. In the idea generation platform, each component group of the concept to be developed was allocated its own space for writing ideas. To help idea generation, there were activating questions like: "What do you see, hear, feel, smell?" or "What would you like to do?".

Idea generation was also supported by using two fictional characters called Martta and Onni. The characters Martta (female) and Onni (male) had background stories and were developed to enhance the creativity of the participants. This comes very close to perspective-taking, as presented by Huber and Lewis (2010). According to them, perspective-taking involves placing oneself, either cognitively or emotionally, in the role or situation of another. It is thought to arouse empathy and create positive attributions about the other's behaviour and outcomes and facilitate social integration by reducing stereotyping and increasing helpful behaviour. According to the field studies of Hargadon and Beckhy (2006), the help seeking and giving behaviour enables collective creativity.

These background stories could also be considered boundary objects. Boundary objects are artefacts that link different sets of diverse interests; they are the physical or virtual entities that allow groups to coalesce and form stable, if transitory, working relationships. They allow coordination without consensus or shared goals, as boundary objects permit an actor's local understanding to be reframed in the context of a wider collective activity (Bechky 2003).

### ***Methodology***

The data of this study consists primarily of a survey conducted at the end of 2007, after the idea generation, and additionally of the results of idea generation. The Internet-based (Webropol) survey questionnaire was sent to 47 participants by e-mail and the response rate was 60 per cent. The respondents were 18 women and 10 men, aged 20–77 years old and the majority (60%) of them were potential customers of the well-being centre. The

questionnaire asked about their experiences of virtual idea generation, such as why the respondent participated in idea generation or what restricted their participation. The questionnaire was multiple-choice, with the final choice being "other" followed by a space for respondents to answer in. The last part of the questionnaire comprised 25 statements, where the respondent could choose a number to indicate how much he or she agreed or disagreed with each statement, using a scale of 1 to 5 (strongly disagree, disagree, neutral, agree and strongly agree) adapted from the Likert scale. The level of analysis concerns the distributions of the responses. The additional data consists of the ideas mass created in the idea generation platform. The unit of observation/analysis is a single comment written by an idea generator, at any one time, with her/his nickname. The comments written by brokers have been omitted from the dataset.

### ***Experiences of idea generation***

Altogether 83 people were invited to participate in idea generation for the service concept of the well-being centre for ageing people. Seventy per cent were ageing people because their opinions on the service concept were considered the most valuable. Fifty-seven per cent participated in idea generation, each participant producing at least one written comment. In terms of quantity, the idea generation network around the service concept could have been more productive. The participation percentage was surprisingly low considering that the invitees' willingness to participate was for the most part confirmed beforehand.

In the senior welfare centre concept, the main reason why people participated in idea generation was because they were invited and they, or their relatives, were using the services or would use those services in the near future. Thus, the participants could be described as intrinsically motivated (Amabile 1997). The respondents, both the ageing people and others, also participated because they were curious or because idea generation was interesting. One respondent wrote that, "It is important to develop and renew the life quality of senior citizens." One had become acquainted with this kind of senior welfare centre and thought that, "It will correspond to future centres."

Over 80 per cent of the respondents were interested in participating in such idea generation again. Ninety-six per cent of the respondents considered that customers' ideas and opinions are useful, especially in developing public services. They also saw that their effort was important in implementing the senior welfare centre concept. The ageing people were more positive (69%) than the others (27%) about the importance of their effort. About 80 per cent of all respondents believed that some of the ideas would be used in implementing the senior welfare centre concept. The respondents said they would not be disappointed if their ideas were not used. However, 25 per cent of the ageing people, and 18 per cent of the others, felt that they would be disappointed if their ideas were not implemented. The participants did not believe that a reward would have motivated them to generate more ideas. Participating in such idea generation was perceived as being similar to having the right to vote and it is possible that therefore the respondents did not expect any reward.

The main reason for declining to participate in idea generation was the lack of time. Some of the respondents were on holiday and could not access the Internet. The second biggest reason was the technical problems of the idea generating program. For example, the answering fields were often locked and it was impossible to write down ideas. According to one respondent, he was interested to read other people's answers before writing down his own but "It was not very easy to do so and I became frustrated and gave up." It can be argued that production blocking was caused by technical problems.

The respondents noticed that others generated ideas that they had not generated themselves. According to the respondents, it was easy to think of ideas. A total of 228 ideas were generated in the idea generation process but the number of actual ideas was, however, much bigger because most of the statements written contained more than one issue that could be considered as a development idea. Here are some examples of the ideas presented:

*"I suggest that there should be a room with at least two beds which is possible to rent to family members. Nobody wants to miss out on family visits just because he or she lives in sheltered accommodation."* (Number 40)

*"I like the idea of hobby activities with kindergarten children."* (Number 66)

*"The Club of Gourmet Gentlemen could cook and serve independently and at the same time keep other residents amused."* (Number 142)

*"In the garden you could go for a saunter and there could be equipments for physical activity especially planned for the elderly."* (Number 237)

A little less than 80 per cent of all idea statements were written by ageing people (Table 1). This figure corresponds to the percentage of network invitees and participants that were ageing people.

**Insert Table 1 here**

Only 8 per cent of the respondents had difficulty generating ideas. According to some respondents, “the target (centre and services focused on) was not clear” or “I did not know precisely what the limits of the project and the well-being centre were”. This was related to the fact that the participants intentionally weren’t told a target. This was due to the aforementioned findings in earlier research that too much guidance regarding, for instance, practical limitations resulted in less innovative ideas than if people freely pioneered in their ideation.

The original goal was that the participants could interactively construct “idea pyramids”, and that reading other people’s ideas would stimulate everyone’s imagination. However, the technical characteristics of the platform did not support creative interaction; rather, it guided the users to write and read the ideas in a linear fashion. Stronger brokering could probably have affected the generation of interaction between the participants, because the participants were very active in responding to the questions posed by brokers. However, reading other people’s ideas seemed, at least to some extent, to inspire others to participate. Differences of opinion about food especially stimulated indirect interaction between the participants, as can be seen from the following:

*“I would like there to be ethnic foods, such as Thai food, available occasionally as well.”*

(Number 107)

*“Safe and familiar home-cooked food, and [there] could be a diet option as well...”*

(Number 123)

Almost 90 per cent of the respondents would have liked to have had some face-to-face discussions about the subject with other people during virtual idea generation. There were face-to-face meetings before idea generation, where the targets of the idea generation and practical issues were explained. Presumably, the sense of belonging to a virtual community would have been strengthened with face-to-face discussions and thereby increase their willingness to share their knowledge. However, the participants did also interact directly with one another on the idea generation platform. Approximately 10 per cent of the statements contained elements that could be seen as direct interaction with other participants. Below is an example of giving feedback and developing an idea further:

*“Martta would like to bring her own burnet rose to some corner of the yard...”* (Number 220)

*“The burnet rose is a good idea. Some other old perennials could bring back memories as well...”* (Number 221)

Over 80 per cent of the respondents felt that it was easier to generate ideas anonymously than by using their own name. During idea generation, participants were allowed to use



either their real names or pseudonyms and all used either their first name or a pseudonym. Most of the respondents also believed that they had already expressed their ideas in face-to-face idea generation, however, 19 per cent of the respondents did not give the same ideas that they had in a face-to-face situation. It is also possible that the characters of Onni and Martta made it easier to express uncertain ideas. Especially for younger participants, it is possible that these characters gave them the chance to generate ideas as somebody else, rather than as themselves. Surprisingly, the idea statements were divided almost evenly between the “Myself” context (49%) and the “Martta and Onni” contexts (51% in total) (see Table 2).

**Insert Table 2 here**

Almost 40 per cent of the questionnaire respondents said that the characters of Martta and Onni encouraged them come up with new ideas, while 26 per cent replied that the characters had no such effect. The fictional characters even inspired some slightly risqué wishes, as can be seen from the following:

*“Martta would like a jacuzzi and beautiful music. Relaxation provided by a handsome, well-built young man.”* (Number 154)

On the idea generation platform the service concept was divided into the previously mentioned five fields. Interestingly, housing services, rehabilitation services, other

services for physical well-being and nutritional and restaurant services each triggered almost exactly the same amount of idea statements, i.e., 50-56 inputs each. The wider environment, which had been placed last in the linear writing order, differed from the others in that it triggered approximately half of the amount of idea statements than the others (30 inputs). When examining the material at the level of the individual, approximately one third of the idea generators wrote ideas for 1-2 fields, while 40 per cent responded to 4-5 fields. Based on these results, it could be argued that dividing the well-being concept into smaller sectors for idea generation purposes was a successful choice of action that increased the level of detail, or variation in the content, of the ideas.

The idea statements were written during the whole two-week idea generation period, but the intensity of the writing varied remarkably during the different stages of the process. The most intensive writing phase of ideas took place at the beginning of the idea generation process. During this phase, more than half (57%) of all the statements were written. In the middle of the process, some 17 per cent of the idea statements were generated. The intensity of the writing increased again during the final stage of the process, during which more than one fourth (26%) of the statements were written. The fact that the virtual idea generation platform could be used independently of time and space seemed to support the ageing people's idea contribution activities. Approximately 15 per cent of the idea statements were written during weekends, this feature being mostly utilized by the ageing people. It was also noticed that, during weekends, ideas were mainly written down in the evening, or even at night (5 p.m. to 1 a.m.).

## Conclusion

Recent studies suggest that using a wide range of external actors and sources should help an organization to achieve and sustain innovation (Chesbrough 2003; Laursen & Salter 2006). In this case study, the use of external actors and sources was facilitated by brokerage functions. Brokering played a key role in the construction of an open, user-driven idea generation platform. It is very likely that without external brokering the organization would have not even begun such an endeavour. The case organization prior to the intervention was challenging, as it was both locked into specific exchange relations and its network only consisted of strong ties. Via brokerage functions, external knowledge and weak ties were brought to the idea generation process. The implication of this study is that one possibility for organizations to open up their innovation processes is to use brokers.

It can be argued that the inclusion of external knowledge, especially from potential service users, in the innovation process in question was a considerable success. This supports the findings of Lettl et al. (2006) regarding the valuable input of users in the early phases of the innovation process. The brokerage functions succeeded in bringing cognitive diversity to the innovation process. However, the interaction between the three participating groups remained rather minimal, meaning that the functional distance between participants was not crossed. This also limited the possibilities for collective creativity to emerge. It can be argued that the intention of utilizing the whole potential of weak ties, and especially functional distance as a source of creativity during ideation, was

not fully realised. This probably reflects the difficulty of brokering in a virtual environment.

An example of the challenge of the brokerage functions was the Expert group. This group only participated in idea generation at the beginning of the idea generation process. Since expertise is the foundation of creativity (Amabile 1997), it would have been important to have them participate during the whole process. Perhaps the Expert group did not conceive of this exercise as a “give and receive” learning process and, hence, an opportunity to renew one’s own expertise. Instead, they rather hastily “poured their expertise on to the plate and left the room”. From the point of view of brokering, this kind of behaviour, i.e., the withdrawal of one group from the process at a very early stage, is very challenging, since it is crucial that all groups remain active during the whole process. This also raises the question of how to motivate the participants to take part in virtual idea generation. It supports the observation in previous studies that different users may participate for different reasons and are thus also motivated by different factors (Antikainen et al. 2010; Füller 2010). So, the challenge of brokerage functions is to create a situation in which all parties perceive that they benefit from the collaboration, in the long run at least.

In contrast, the Student group wrote their idea statements halfway through the process and near the end. This may be due to the fact that there was a greater cognitive distance between the Student group, and the theme of the idea generation. Perhaps the students found it difficult to initiate ideas, finding it easier to “refine” and “further develop” ideas

presented by the other two groups. In order to do this, they had to wait until there were enough ideas generated by others. In this case cognitive distance could probably have been decreased by social proximity (Boschma 2005), for example by including face-to-face meetings in the process. In virtual environment different forms of proximity and distance are emphasised differently as compared with face-to-face idea generation. In brokerage functions one should consider how these forms are interrelated so that one slightly inadequately or totally lacking form of distance or proximity may be strengthened or replaced by other forms of proximity or distance.

The brokering also had difficulties in crossing the cultural distance. The commitment of the owner organization turned out to be too limited, which doubtlessly affected the owner organization's learning process and will most probably affect the way in which the results of this process will be utilized in the future. Stronger brokering in the owner organization before idea generation would have been essential in clearly communicating the need for open innovation and training the internal brokers for their role. Stronger brokering and more active participation on the part of the owner organization might have had an activating effect, at least on the two-way interaction, because the role of the Owner group on the platform was to respond to and ask questions about intriguing ideas. One implication of this study is that the success of the brokerage functions may be dependent how well they can diagnose the organizational readiness to use external knowledge sources in their innovation activities. Future studies would include how to evaluate this readiness and how to train managers and employees to get best possible advantage of open innovation activities.

In virtual co-creation, there is an issue of how well participants are able to communicate their knowledge with other participants with different backgrounds and knowledge. This indicates the importance of the design and functionality of the virtual platform, but motivational and social factors are as important in virtual co-creation. This case study stresses the importance of brokerage functions in virtual co-creation. The careful preparation of the collective creativity process, active participation of the brokers during the process and the use of the boundary objects and creativity methods are some of the ways of create possibilities for collective creativity in virtual co-creation.

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**Table 1. Percentage of idea statements by profile group**

<b>Profile group</b>	<b>Idea statements in total (%)</b>
Ageing people	77
Students	7
Experts	16
<b>Total number</b>	<b>228</b>

**Table 2. Percentage of statements given in the contexts of “myself”, “Martta” and “Onni” (of the 228 statements given)**

	<b>Total (%)</b>	<b>Ageing people (%)</b>	<b>Students (%)</b>	<b>Experts (%)</b>
Myself statements	49	50	60	39
Martta statements	33	32	33	37
Onni statements	18	18	7	24
<b>Total number</b>	<b>228</b>	<b>175</b>	<b>15</b>	<b>38</b>

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# Distances, Knowledge Brokerage and Absorptive Capacity in Enhancing Regional Innovativeness: A Qualitative Case Study of Lahti Region, Finland

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**ABSTRACT** *Scholars researching innovation are unanimous about the huge innovation potential in combining different fields of knowledge. Structural holes in innovation networks are especially fruitful in fostering new ideas and innovations. One problem in utilizing the innovation potential in structural holes stems from diversity or “distance” between the innovating partners. This study focuses on the concepts of distances, proximities, absorptive capacity and knowledge brokerage in relation to innovativeness in regional innovation networks. Knowledge brokers’ own perceptions concerning their functions and roles in innovation policy are investigated by means of a case analysis of Lahti region in Finland. This study uses the experiences of the knowledge brokers to answer the question of how regional innovativeness could be skilfully enhanced by brokerage functions—in particular, by utilizing distances and proximities. As a result of this study, five central roles are defined for knowledge brokers. Knowledge brokers’ roles and functions are demanding as recognized by the brokers themselves. Successful brokerage and the related improvement of absorptive capacity require a holistic approach to entire innovation processes and their wider environment.*

## 1. Introduction

Organizations’ success and survival are widely seen to depend on their capability to create new knowledge and then innovation. Knowledge is critical to the process of innovation. In order to foster innovations and strengthen their effectiveness, it becomes important to integrate different types of knowledge, competences and experiences in a cooperative perspective. Organizations have historically invested in large research and development (R&D) departments and/or projects to drive innovation and provide sustainable growth. This

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model is, however, eroding due to a number of factors. What is emerging is a more open model, where companies recognize that not all good ideas will come from inside the organization and not all good ideas created within the organization can be successfully marketed internally (Chesbrough & Crowther, 2006). The more open model involves the public sector also.

Networks can be considered as sources that increase organizations' and regions' innovative capabilities (Reagans & McEvily, 2003). As actors are seldom capable of creating all the new knowledge needed in generating innovations by themselves, networks play an important role as channels for new knowledge (Florida, 1995). Networks—through establishment of weak and strong ties (Granovetter, 1973) and bridging of structural holes (Burt, 1992)—can enhance the process of knowledge creation and sharing (Albino *et al.*, 2007).

In open innovation, it is far from clear how innovation processes including innovating partners with very different backgrounds and interests can be conducted successfully. People may have different interests and perspectives and use different concepts and expressions. These differences may prevent cooperation between potential innovating partners. In most cases, innovativeness depends on the innovation network's ability to interact rather than on an individual actor's progress in a particular scientific field (Tura & Harmaakorpi, 2005).

In this study, the focus is set on investigating the concepts of distances and proximities, knowledge brokerage and absorptive capacity in the context of promoting innovativeness in regional innovation networks. The research problem is as follows: how can regional innovativeness be skilfully enhanced by brokerage functions? The research question is as follows: how do knowledge brokers themselves perceive their roles and functions in innovation activities? This study contains both a theoretical discussion and a case description on knowledge brokerage efforts in a Finnish region, the Lahti region. The theoretical discussion provides the background for why the brokerage activities are considered as an essential component of regional innovation policy in the Lahti region. The case study is based on empirical data.

The scope of the research is restricted to regional brokerage efforts. The data were collected in the autumn of 2007 among brokers who participated in a special brokerage training. The results contribute to research concerning promotion of innovativeness and knowledge brokerage at individual, organizational and regional levels. Not much is known about the perceptions of brokers in innovation activities, especially those focusing on open and practice-based innovation rather than on the more traditional science and technology-based innovation. According to Reichert (2006, p. 39), a new knowledge broker profile is very similar to the

old 18th century host or hostess of a salon: smart intellectuals who love to discover nearly as much as they love the sharing of discovery, who not only have the talent for both, but also the communicative disposition and generosity to develop this combination into a human art form, a celebration of shared knowledge development.

Knowledge brokerage and knowledge brokers may also help to increase the absorptive capacity of different actors of a regional innovation system. But how they actually do it is still very much uncharted territory (Uotila, 2008).

The results of this study bring up novel knowledge that may be used in the future in, for instance, planning of training for brokers-to-be or even university education in various fields. Brokers' crucial qualities are such that they are becoming more and more important in today's work life in general.

## **2. The Nature of Regional Innovation Processes**

Achieving innovations was earlier seen mostly as a linear process leading from scientific work to practical innovative applications. Nowadays, this linear process rather represents an exceptional mode of innovation. New scientific knowledge will not automatically lead to an increase in innovation activities. Nor is it necessary for innovation to occur. Innovation can be triggered by other causes such as learning processes in production, new market demands or possibilities to apply novel knowledge in other contexts. The innovation concept is no longer restricted to radical or technical innovations only. Much of the innovation taking place today is incremental—improvement of existing products and services. Innovation is often a result of cooperation in normal social and economic activities (Schienstock & Hämmäläinen, 2001).

Jensen *et al.* (2007) have contrasted two ideal modes of innovation: the STI (science, technology, innovation) mode that is based on the production and use of codified scientific and technical knowledge, and the DUI (doing, using, interacting) mode that, again, is based on an experience-based mode of learning. The STI mode of innovation refers to the way firms use and further develop this body of science-like understanding in the context of their innovation activities. It relates to the use of explicit knowledge. The STI mode of learning—even if it starts from a local problem—will make use of “global” knowledge all the way through and, ideally, it will end up with “potentially global knowledge”. The DUI mode of learning most obviously refers to know-how and “know who”, which is tacit and often highly localized. While such learning may occur as an unintended by-product of the firm's design, production and marketing activities, Jensen *et al.* (2007) emphasize that the DUI mode can be intentionally fostered by building structures and relationships that enhance and utilize learning by doing, using and interacting. The DUI mode is closely related to the concept of practice-based innovation (cf. Harmaakorpi *et al.*, 2011).

Innovation is thus not a single event, but a complex, highly uncertain interactive process consisting of a variety of different activities (Schienstock & Hämmäläinen, 2001). Innovations are created in networks, where actors with different backgrounds are involved in the process. In a regional context, innovation is seen as a process embedded in a regional innovation system (Cooke *et al.*, 1998), which consists of innovation networks with various social relationships (Harmaakorpi, 2004, 2006). Social networks affect economical outcomes since the networks affect the flow and quality of information (Granovetter, 2005). In linking networks and innovations, the heterogeneity of resources is essential (Oerlemans *et al.*, 2001).

The relations between actors in networks can be described as strong ties and weak ties. Strong ties are characterized by common norms and high network density. These strong ties are easier for innovations, since they normally include a relatively high amount of trust, common aims and the same kind of language to communicate. Strong ties, however, add little value when one is seeking resources such as new knowledge,

because everyone within the network has access to the same resources (Granovetter, 1985).

When building up an innovation network, it is a question of seeking an appropriate balance between the ease of communication and the novelty value of knowledge or information mediated between the actors of this network. If network relations are tuned to specific trading partners, the diversity decreases and the adaptation of the organization to new trends and directions becomes difficult (Andersson, 2001). Over-embeddedness can reduce the flow of novel information into the network, because redundant ties to the same network partners mean that there are few or no links to outside members who can potentially contribute innovative ideas (Burt, 1992). Granovetter (1973) labelled this problem as the weakness of strong ties.

Weak ties are reported to be more fruitful for innovations than strong ties, because more novel information flows to individuals through weak ties (Granovetter, 2005). It is possible to maintain a larger number of weak ties than strong ties with the same amount of resources. Weak ties allow for diversity that is needed in innovations. Weak ties bring network members into contact with other less well-known actors. Acquiring new knowledge is often the result of interacting with new and different kind of people.

Weak ties can also be considered as “glue” that keeps a network together. Without them, the network will be split into several smaller networks. This became evident in a recent Finnish study, in which strong quantitative evidence for the weak ties hypothesis was provided (Onnela *et al.*, 2007). In their study, Onnela and his colleagues constructed a connected network of 3.9 million nodes from mobile phone records and measured tie strength using as proxies the aggregate call duration and the cumulative number of calls placed between the individuals over a period of 18 weeks.

Burt (1992, 2004) has developed the weak ties argument further by arguing that innovations are most likely found in structural holes. The term “structural hole” refers to a social gap between two groups. Structural holes often are weak connections between clusters of densely connected individuals. Networks with an abundance of structural holes create opportunities for new combinations and recombination of ideas. New ideas emerge from selection and synthesis across the structural holes, and an actor able to span the structural holes is at higher “risk” of having good ideas. A regional innovation system rich in structural holes offers a high level of opportunities for new networked innovation processes (Kallio *et al.*, 2010).

The weak links or structural holes enabling the biggest innovation potential are somewhat problematic for innovation processes. In order to be able to utilize the innovation potential in these structural holes, information often needs to be transferred between partners with totally different knowledge interests. This information transfer is easily hampered by distances in the innovation network, and in order to promote and facilitate information transfer between partners in the innovation network, it is important to acknowledge these distances and their origins (Uotila *et al.*, 2006).

### 3. Absorptive Capacity and Innovation

All innovation activities—understood as trying out a new opportunity or action (Witt, 1996)—involve generation and use of knowledge. Knowledge is often assumed to be the most valuable resource of an organization. Creation of new knowledge is conceptualized as recombination and exchange of existing knowledge (Teigland & Wasko, 2003).

Brökel and Binder (2007, pp. 155, 172) discussed two types of knowledge transfers: intended and unintended. In intended knowledge transfers, actors actively seek knowledge, whereas unintended knowledge transfers occur when an individual “stumbles upon” knowledge. Brökel and Binder focused on the tacit type of knowledge in innovation economics. Their research showed that knowledge-search processes of an individual are biased towards regionally available knowledge, and an agent’s social embeddedness fosters the overrepresentation of regional actors in his or her set of potential knowledge sources.

This categorization (intended–unintended) is related to, for example, the findings of Rondé and Hussler (2005). In their study dealing with knowledge flows and localized learning processes, they found results suggesting that competences dedicated to external interactions have a more important impact on innovation than internal competences. They also found that unintended knowledge flows have less influence on innovation than deliberate ones. Hence, their analysis advocated innovation policies dedicated to support networks of regional actors.

The case of organizations may be similar; the knowledge transfers of a firm, for instance, might well be intended or unintended. The concept of absorptive capacity becomes intriguing here. The concept was originally defined by Cohen and Levinthal (1990) as an organization’s ability to value, assimilate and apply new knowledge. Kim (1998) argued that absorptive capacity requires learning capability and develops problem-solving skills; learning capability is the capacity to assimilate the knowledge for imitation, and problem-solving skills are the capacity to create new knowledge for innovation.

Zahra and George (2002) defined two different types of absorptive capacity: (i) potential absorptive capacity is important in acquiring and assimilating external knowledge and (ii) realized absorptive capacity refers to the functions of transformation and exploitation of the knowledge that has been obtained. Both are important in regional innovation processes: potential absorptive capacity enables exploration of knowledge (often) over the weak ties of the innovation system, and realized absorptive capacity secures exploitation (often) in the strong ties of the networks. Absorptive capacity is crucial when pondering questions about brokerage functions in regional innovation networks; higher absorptive capacity enables easier crossing of structural holes in the innovation system. Brokerage functions might well aid transition from and combination of potential and realized absorptive capacity, for instance. The distinction between potential absorptive capacity and realized absorptive capacity is thus valuable for this study.

To understand the characteristics of absorptive capacity as a dynamic capability, a closer look has to be taken at its different parts: acquisition, assimilation, transformation and exploitation. Acquisition refers to an actor’s capability to identify and acquire externally generated knowledge that is critical to its operations. Assimilation refers to the actor’s routines and processes that allow it to analyse, process, interpret and understand the knowledge obtained from external sources. Transformation denotes an actor’s capability to develop and refine the routines that facilitate combining existing knowledge and the newly acquired and assimilated knowledge. Exploitation as a capability is based on the routines that allow actors to refine, extend and leverage existing competences or to create new ones by incorporating acquired and transformed knowledge into their operations (Zahra & George, 2002).

According to these definitions, absorptive capacity is like a funnel where potential absorptive capacity (visionary capability) secures the newness and diversity of the necessary knowledge, whereas realized absorptive capacity (innovative capability) stands for operationalization of the new knowledge in the existing processes in order to make the actual innovation take place.

Todorova and Durisin (2007) have presented an interesting interpretation of the concept of absorptive capacity. They criticized Zahra and George's (2002) model based on several points, with the main point being that the phases of absorptive capacity presented by Zahra and George (acquisition, assimilation, transformation and exploitation) are not consecutive, but alternative routes in a learning process (route one being acquisition–assimilation–exploitation, AAE, and route two being acquisition–transformation–exploitation, ATE). Todorova and Durisin (2007) also proposed that the moderating influence of social integration is likely to affect all components of absorptive capacity and to have either a positive or negative effect, depending on specific contingencies.

#### 4. Distances and Proximities as Sources of Innovation

The concepts of proximity and distance are used in many different ways in the literature dealing with, for example, innovation studies, organizational science and regional science (Knoben & Oerlemans, 2006). The literature usually emphasizes advantages of proximity. Proximity is seen as an important precondition for knowledge sharing, knowledge transfer and technology acquisition (Gertler, 1995). The different dimensions of proximity reduce uncertainty, solve problems of coordination and facilitate interactive learning and innovation. Proximity may, however, also have negative impacts due to the problem of lock-in—lack of openness and flexibility (Boschma, 2005). Innovations thus also require elements of distance. Seven dimensions of distance (and proximity) are presented in the following: cognitive, communicative, organizational, functional, cultural, social and geographical (cf. Harmaakorpi *et al.*, 2006). In addition, an eighth dimension—temporal distance—is proposed. In practice, drawing the lines between the different dimensions may be very difficult, but identifying and discussing them are useful both in theoretical sense and in practical sense.

##### 4.1 Cognitive Distance

Innovation researchers are unanimous about the fact that there is a lot of innovation potential in the combination of different fields of knowledge (e.g. Johansson, 2004; Pekkarinen & Harmaakorpi, 2006). Knowledge building and innovation often require dissimilar, complementary bodies of knowledge. Cognitive diversity will increase the likelihood that creative new knowledge emerges.

Two actors can be cognitively distant for two main reasons: (i) they know different topics or (ii) they have a different level of knowledge depth on the same topic (Albino *et al.*, 2007). Too little of cognitive distance means lack of sources of novelty, while too much cognitive distance implies problems in communication (Nooteboom *et al.*, 2007). In order to transfer new knowledge effectively, actors need to have at least partly similar, but not necessarily identical, frames of knowledge. Cognitively close individuals are able to assume certain common knowledge that does not have to be defined. Cognitive proximity facilitates effective communication, and people sharing the same

knowledge base and expertise may learn from each other, but too much cognitive proximity may be detrimental to innovation. It increases, for example, the risk of cognitive lock-in; routines within organizations or between organizations obscure seeing of new possibilities.

#### *4.2 Communicative Distance*

An ability to communicate and exchange ideas is an important part of creative and innovation processes. The term interaction is used to describe the use of language and other symbols to develop an enriched and shared understanding. People often discuss problems in a language (or manner) that they mistakenly assume everybody in the group to understand. They use, for example, various concepts that are not understood by everybody or the concepts may have different meanings in different areas of expertise.

Sharing of a common language facilitates people's ability to "gain access" to other people and the information that they possess. In order to combine the information gained through social interaction, the different parties must have some overlap in knowledge (Nahapiet & Ghosal, 1998, p. 254) or there must be someone who interprets this knowledge so that it is relevant to others.

#### *4.3 Organizational Distance*

The development of emergent knowledge is vital for innovation, but sharing, exchanging, integrating and creating knowledge can be difficult. Knowledge creation depends also on a capacity to coordinate the exchange of complementary pieces of knowledge within the organization and between organizations. Organizational distance is defined as the extent to which relations are shared in organizational arrangements. This involves the rate of autonomy and the degree of control that can be exerted in organizational arrangements. Organizational distance refers to the difficulty in coordinating transactions and exchanging information within and between organizations. There may be no ties between independent actors, or there is no possibility for interactive learning. If organizational proximity is high like in a hierarchically organized firm or network, there are only strong ties between actors (Boschma, 2005).

Organizational proximity is believed to be beneficial for innovations, because new knowledge creation goes along with uncertainty and opportunism. To reduce these, strong control mechanisms are required, and hierarchical organization or tight relationships within the organization can provide solutions to these problems. Too much of organizational proximity is, however, accompanied by lack of flexibility. There is a risk of being locked-in in specific exchange relations. Search for novelty often requires going out of the established channels (Boschma, 2005).

#### *4.4 Functional Distance*

Functional distance refers to actors' different areas of expertise. Members in different functional communities do not necessarily understand each other, because they do not interpret knowledge in the same contexts. Functionally close actors act in areas of expertise close to each other, for example, in the same industry (Harmaakorpi *et al.*, 2006).



Similarities in knowledge and experiences facilitate the acquisition and development of new knowledge.

The importance of functional proximity is based on the concept of absorptive capacity. If actors are functionally far from each other, there is more to learn and there are greater possibilities for innovations, but the distance also means that it is more difficult to learn. The concept of functional proximity seems similar to cognitive proximity, but the latter is a much broader concept that refers to the extent to which actors can communicate efficiently, whereas functional proximity refers to the extent to which actors can actually learn from each other: what they exchange and the potential value of these exchanges (cf. Knoblen & Oerlemans, 2006).

#### *4.5 Social Distance*

Economic relations are to some extent always embedded in social contexts, and social ties or relations in turn affect economic outcomes (Boschma, 2005; Granovetter, 2005). Relations between people are socially embedded, when they involve trust based on friendship, kinship and experience. It has been suggested that the more socially embedded the relationships of an organization are, the better is its innovative performance (Boschma, 2005).

The capacity of an organization to innovate may thus require social proximity. Social proximity may facilitate the exchange of tacit knowledge, in particular, because of trust-based relations. Lack of trust can prevent people from asking questions or volunteering in giving information. The potential for increased competition is another reason for people to avoid sharing what they know. Social cohesion around a relationship can ease knowledge transfer by decreasing the competitive and motivational impediments.

On the other hand, too little social distance in an economic relationship may weaken the innovative capacity of organizations due to an overload of trust. Closed network systems may incur opportunity costs because outsiders with new ideas and knowledge are denied entry. Long-term relations or relations with too much commitment may lock members of social networks into established ways of doing things at the expense of their own innovative and learning capacity (Boschma, 2005). The notion of social proximity comes close to the concept of social capital as defined, for example, by Tura and Harmaakorpi (2005) and Burt (2005).

#### *4.6 Cultural Distance*

How organizations view knowledge creation and sharing seems to be dependent on their organizational culture. Every organization and even its subunits have a culture of their own, which influences the ways in which their members think, feel and act. Cultural distance refers to differences in these cultural habits, rules and values. Understanding is also cultural. The creation of knowledge is, therefore, a complex process involving the understanding of different organizational cultures and subcultures (Bechky, 2003). Cultural assumptions, beliefs and values can be deep-rooted within the members of the organization and cannot be changed easily.

When organizational cultures are similar, organizations are expected to interact more easily and with better results, because common interpretations and routines allow them to interpret and give meaning to actions without making all these interpretations explicit



(Knoben & Oerlemans, 2006). Two members of one organization are close to each other because they interact and their interactions are facilitated by organizational beliefs, rules and routines that they follow. Cooperation will develop more easily between members of the same organization or innovation network (Rallet & Torre, 2005). The challenge in innovation activities is to get members of different organizational cultures to interact with each other. Cultural distance may also refer to multi-cultural or international organizations or work groups.

#### *4.7 Geographical Distance*

Geographical distance refers to the spatial or physical distance between economic actors (Boschma, 2005). The distance is also relative to the means of transport or the perception of the distance by actors (Rallet & Torre, 2005). Short distances facilitate face-to-face interactions and, therefore, foster knowledge transfer and innovation. Especially, the transfer of tacit forms of knowledge is easier when the distance is small (Boschma, 2005; Knoben & Oerlemans, 2006). Geographical proximity is most likely to stimulate social proximity, because a short geographical distance favours social interaction and trust building (Boschma, 2005).

Although proximity facilitates interaction and cooperation, it does not automatically produce innovations. Geographically proximate actors may be cognitively too distant to cooperate. Geographical proximity does not necessarily mean that people are aware of one another or that they are in contact with each other or know what the other person is doing. There must be someone who brings them together and motivates them to collaborate. Even where opportunities for the exchange of knowledge exist and people anticipate that value may be created through interaction, those involved must feel that their engagement in knowledge exchange and combination will be worth their while (Nahapiet & Ghoshal, 1998). Most people need encouragement before they realize the benefits of discussing ideas outside of their regular work group. Other forms of proximity may act as substitutes for geographical proximity. For example, organizational proximity enables coordination over long distances (Rallet & Torre, 1999, 2005).

Regions and organizations also need geographical openness. To avoid spatial lock-in, it is important to establish non-local linkages and provide access to the outside world. If regions become too inward looking, the learning ability of local actors may be weakened to such an extent that they lose their innovative capacity and cannot deal with competitive pressure (Albino *et al.*, 2007). Knowledge creation and innovation require a mixture of local and non-local relations (Oinas, 1999).

#### *4.8 Temporal Distance*

In addition to these seven distances presented (cf. Harmaakorpi *et al.*, 2006; Table 1), we propose yet another one that we label as temporal distance—referring to differences in the ability to imagine potential futures and make use of future-oriented information and knowledge generated in, for example, foresight activities. This temporal distance manifests itself in the ways in which actors perceive the future—in a reactive or proactive manner. Li *et al.* (2008) recently summarized just three independent dimensions of distant or local knowledge search: cognitive, temporal and spatial (geographical) dimensions. Their definition of the temporal dimension of knowledge search is, however, somewhat different from ours.

**Table 1.** Distances in innovation networks (adapted from Harmaakorpi *et al.*, 2006; temporal distance added)

Distance	Source	Innovation potential
1. Geographical	Physical distance between actors	Geographical proximity does not automatically lead to innovations, but it may, for instance, facilitate social proximity.
2. Cognitive	Differences in ways of thinking and knowledge bases	A certain degree of cognitive distance enables creation of new innovations.
3. Communicative	Differences in concepts and professional languages	When making a new idea understandable, concepts from other fields or sciences, for instance, may be utilized.
4. Organizational	Differences in ways of coordinating the knowledge possessed by organizations and individuals	An organization should have both strong and weak links in its network.
5. Functional	Differences in expertise in different industries or clusters	It is useful to obtain novel information also from outside of one's own field of operations. In such cases, the information often needs to be adapted to the field of operations in question.
6. Cultural	Differences in (organizational) cultures, values, etc.	The challenge is to get people working in different organizational cultures to collaborate.
7. Social	Social relationships and the amount of trust included in them	Innovations require interaction among different kinds of actors. Trust helps in creation of radical ideas.
8. Temporal	Differences in ability to imagine possible, potential futures	The challenge is to acquire and assimilate future-oriented knowledge so that it could be exploited in a proactive manner.

Existing literature related to knowledge transfer in networks only rarely makes a distinction between the concepts of “knowledge” and “information”. One exception is Howells (2002), who criticized the often used concept of “knowledge flow” for implying “too automatic a process” of knowledge transfer without addressing the role of individuals in that process. Instead, he argued that information is shared between individuals, and as a result of this sharing and contextualization, a change in the knowledge base of an individual or a group takes place.

In our view, in this context, making a distinction between the concepts of “information” and “knowledge” is not only fruitful but also very important. This distinction becomes evident when defining knowledge as interpreted, understood and internalized information in a certain context (for a detailed discussion on the hierarchy of data, information and knowledge, and quality dimensions associated with those, see Pierce *et al.*, 2006). It should be reasonable to argue that when actors in networks

communicate along strong ties and across short distances, then what is communicated are more “knowledge-like, ready-to-use inputs” for learning and innovation processes. On the other hand, when communication takes place across greater distances and along weak links, then what is communicated are more “information-like” inputs, and much greater effort and resources are needed in the interpretation process in new contexts—before these inputs can provide support for learning, new knowledge generation and innovation. People who act as brokers can provide the necessary extra resources, and thus they may help also the innovating actors of a network to cross greater distances.

Sorenson *et al.* (2006, p. 996) stated that even within the supportive infrastructure of an organization, receiving and building on new knowledge can prove to be difficult. Recipients assimilating new knowledge must namely actively process it by experimenting with its application to new problem domains and environmental contexts. Hence, the act of receiving and building on knowledge can be regarded rather as the beginning of a trial-and-error process than as “acceptance of a complete, well-packed gift”. Brokers’ challenges are thus numerous. A more appropriate analogy than a well-packed gift would perhaps be a set of “Lego” building blocks. The result may be exactly what the drawings attached to that set indicate, but the building process may also result in something totally different, depending on (contextual) needs, skills and imagination, and alike, of the constructors. Brokers may have a significant role during this “context-dependent construction act”, and they can also bring along their own building blocks or they might know where the necessary building blocks can be found.

In attempts to create new knowledge for innovation, different kinds of proximities and distances would need to be exploited knowingly (cf. Parjanen & Melkas, 2008). Major challenges in regional innovation activities lie, in our view, in (i) enhancing absorptive capacity in the region in question; (ii) finding a suitable mix of knowledge brokerage functions and (iii) skilful collection and utilization of knowledge from the region and from outside of the region. In the Lahti region in Finland, a special knowledge brokerage function and related training that may also respond to these challenges were designed and implemented. They are investigated in the empirical part.

## **5. Brokerage Functions in Facilitating Learning, Knowledge Generation and Innovation**

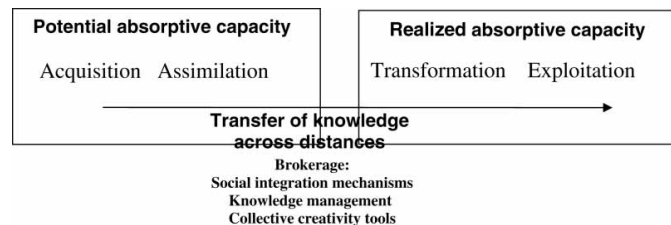
Partners participating in networked innovation processes on different sides of structural holes have different knowledge interests. They also have information of different qualities and achieved for their own purposes (Melkas & Harmaakorpi, 2008). The difference is often so great that a special interpretation function is needed—information brokerage in the structural hole (as called by Burt, 1997). A structural hole is an opportunity to broker the flow of information between people and control the form of cooperation that brings together people from opposite sides of the hole. However, brokerage means more than just linking together partners involved in an innovation process. It also includes the aspect of transforming ideas and knowledge being transferred and—at best—allows the widening of optimal cognitive (as well as social, cultural, temporal, etc.) distance between partners of an innovation process and enhances their absorptive capacity (Howells, 2006; see also Nooteboom *et al.*, 2007).

Burt (2004) suggested that brokers focus on establishing ties to other disparate or disconnected groups, exploiting the structural hole, so that they can then bring together members of two groups who would otherwise be more difficult to connect. People on either side of a structural hole have access to different flows of knowledge (Hardagon & Sutton, 1997). Brokers support innovation by connecting, recombining and transferring to new contexts pools of ideas that would otherwise be disconnected (Verona *et al.*, 2006). Multiple relationships, especially with individuals holding broker positions within these networks, are perceived to be important to innovative behaviour (Shaw, 1998). While spontaneous cooperation between organizations can occur, it appears that a brokerage intervention can help cooperation, for example, by advising on advantages of cooperation, giving information, identifying opportunities, catalyzing discussions between different actors or bringing organizations together.

Social capital is a very useful concept in the consideration of brokerage functions in regional innovation systems (Tura & Harmaakorpi, 2005). Social capital affects knowledge creation and access to network resources (Nahapiet & Ghosal, 1998). Bridging social capital creates bonds of connectedness formed across diverse horizontal groups (weak ties), whereas bonding capital connects only members of homogeneous groups (strong ties) (Granovetter, 1985). This division of social capital into bridging and bonding types becomes crucial in assessing regional innovativeness, since both are essential to build an atmosphere of trust and proximity in each innovation network and keep them open to allow necessary flows of information to take place. Bridging social capital, with the element of distance, is seen to be positive, because it brings individual innovation networks into trusting interaction enabling, for example, increase of absorptive capacity of these networks (Tura & Harmaakorpi, 2005).

Zahra and George (2002) also suggested that there is a need for a special social interaction mechanism between assimilation and transformation processes related to absorptive capacity (Figure 1).

Howells (2006) discussed the issue of brokerage or social interaction with slightly different concepts, analysing the role of innovation intermediaries. He found innovation intermediation to have three natures: a function, a process and a relationship. Having reviewed a large number of studies on intermediaries, he noted that many studies stop at seeing the primary role of intermediaries as providing information scanning and exchange functions. There are some studies that emphasize the combinatorial role of intermediaries (Hargadon, 1998; Hargadon & Sutton, 1997): an



**Figure 1.** Absorptive capacity of knowledge in innovation processes (adapted from Uotila *et al.*, 2006; Zahra & George, 2002).

involved, sophisticated and proactive role with regard to technology and innovation (Howells, 2006).

Howells' case study organizations in the UK covered considerably more functions than originally conceived: (i) foresight and diagnostics; (ii) scanning and information processing; (iii) knowledge processing and combination/recombination; (iv) gatekeeping and brokering; (v) testing and validation; (vi) accreditation; (vii) validation and regulation; (viii) protection of the results; (ix) commercialization and (x) evaluation of the outcomes (Howells, 2006). Many of the functions are, however, sector- or organization-specific; for instance, functions (vi), (viii) and (ix) do not apply to all types of organizations. The functions identified by Howells are mainly related to companies. The functions also reflect different stages of a process of intermediation. Brokerage is seen in this list as one topic only, but in the present study, it is understood more widely, covering at least the first four functions of Howells' list, in some cases, also the last one—evaluation of outcomes.

Another way of breaking down knowledge brokerage is, in our view, to divide the theme into three levels of brokers: (i) a systemic level (an intermediary subsystem between knowledge-generating and knowledge-exploiting subsystems of regional innovation systems); (ii) an organizational level (organizational "roles", routines, networks, etc., as actors of regional innovation systems) and (iii) an individual level (personal capabilities, competences, networking abilities, etc.) (Uotila, 2008). The present study focuses on the individual level in particular.

Melkas and Harmaakorpi (2008) noted that in brokerage it is a question of working at many fronts in innovation networks. Emphasis needs to be on combining (i) development of loose virtual innovation networks; (ii) as far as possible, an explicit, systematic approach to planning and working on absorptive capacity and data, information and knowledge quality matters within the network in question and (iii) actual brokerage functions. When discussing brokerage functions, they particularly emphasized the hierarchy of data, information and knowledge as well as quality of those in attaining successful processes. Knowledge brokerage is claimed to be particularly challenging in the case of future-oriented knowledge (cf. Melkas & Harmaakorpi, 2008). Howells (2006), for instance, discussed foresight but not different types or categories of knowledge placing different demands on innovation activities.

## **6. Methods**

In the Finnish innovation context as well as in the Lahti region that is focused on in this study, two sectors stand out as particularly challenging: (i) the public sector (including, for instance, the large social and health care sector) and (ii) the small- and medium-sized enterprise sector. This study investigates a particular policy measure that was designed on the basis of needs and challenges of these important sectors/actors in the regional innovation system. It was also designed to help these actors in finding each other and the non-governmental third sector in innovation activities. This policy measure was a particular type of training for improving knowledge brokerage skills including abilities to utilize and benefit from distances and proximities. The training affected all the three levels of brokerage listed earlier: the systemic, organizational and individual levels. In this study, however, emphasis is put—in line with the research materials—on the individual level

of knowledge brokers' roles, functions, personal capabilities, competences and networking abilities. The other levels will be focused on in future research.

This study is based on the concepts of distances and proximities, knowledge brokerage and absorptive capacity in the context of regional innovation networks. The research problem is as follows: how can regional innovativeness be skilfully enhanced by brokerage functions? The research question is as follows: how do knowledge brokers themselves perceive their roles and functions in innovation activities? The scope of this study is restricted to regional brokerage efforts. The empirical data were collected in the autumn of 2007 among brokers who participated in a special brokerage training. The data consist of responses from the 23 participants in the brokerage training. They had learning tasks, did group work and participated in group discussions during and after the training. They also took part in designing guidelines for knowledge brokerage operations in the region. These discussions during and after the training were documented in memos and analysed qualitatively. The practical experiences concerning the training have been reported on also elsewhere (Parjanen *et al.*, 2008).

The 23 respondents covered the whole group of brokers trained. The participants in the training were teachers and managers of development projects from educational institutions and regional development agencies. The participants represented various fields from technology to social and health care and to environmental sciences, design and business development. The participants were selected on the basis of their own interest in brokerage and experiences in it. The training was conducted by Lappeenranta University of Technology's researchers specializing in innovation management, innovation policy, business, creativity, knowledge management, futures research and philosophy. The aim of the training was to give people—who already had gained some practical experience in acting as brokers—new ideas and insights into what the activities look like in a theoretical framework. The content of the training consisted of modules in the above-mentioned scientific fields.

Among the respondents, there were equal numbers of women and men, who were in their mid-career phase in the different fields. The thematic discussions and learning tasks focused on, for instance, their roles and experiences in brokerage, as well as on learning and organizational and professional development. For qualitative research, the participants' roles in the operational environment and the knowledge they had of the phenomenon being studied were central. In the collection of the data, both group discussions and individual learning tasks were utilized. The research data were analysed according to the principles of qualitative content analysis (deductive and inductive). The data were categorized according to various roles and functions in innovation activities that could be discerned in the responses. In this categorization, particularly the different distances (Table 1) were an important basis; which roles and functions would be needed to overcome and/or benefit from the distances and proximities in different environments?

After the first stage of the analysis—the identification of the roles and functions in brokerage—the point of view of distances was deepened by searching for links to distances and proximities. This was the second stage of the analysis. In this deepening of the analysis process and search for new analytical alternatives, an inductive process took place. Links to distances and proximities were sought for by utilizing concepts such as impacts, strengths, weaknesses, forms of existence, lacking forms of existence and prerequisites.

The background for why the brokerage policy has been adopted in the Lahti region is related to the fact that the region—that has some 100,000 inhabitants and no whole university of its own—applies a “network-facilitating innovation policy” (cf. Harmaakorpi, 2004, 2006; Schienstock & Hämäläinen, 2001). By means of this policy, the regional innovation system is being developed on the basis of regional resource platforms, which is beneficial to both the private and public sectors. A great deal of attention must also be paid to the inter-regional networking and accumulation of active communication networks to obtain the knowledge needed in the region (Aula & Harmaakorpi, 2008).

The brokers’ role is important as part of the regional network-facilitating innovation policy. They are supposed to act as links between (i) knowledge-generating and knowledge-exploiting subsystems and (ii) users and developers of innovation tools. Promotion of practice-based innovation processes is considered as particularly important in the region. Such innovation processes are based on identification and solving of practical problems and challenges in all fields—in contrast with the more traditional science and technology-based innovation processes. They are defined as “innovation processes triggered by problem-setting in a practical context and conducted in non-linear processes utilising scientific and practical knowledge production in cross-disciplinary innovation networks” (Harmaakorpi *et al.*, 2011). In such processes, there is a strong need to combine knowledge interests from theory and practice, as well as knowledge from different disciplines.

In addition to the brokerage efforts, regional university units and polytechnics have recently created a godparent professorship system. The goal of this two-dimensional approach is to launch and facilitate STI innovation processes to complement DUI innovation processes that are more common in the Lahti region due to the limited resources for R&D. Godparent professorships utilize the scientific and knowledge potential of professors of various universities for the benefit of the Lahti region. Knowledge brokers (researchers, university teachers and/or other persons with specific skills), together with godparent professors, are connected to projects, studies and development tasks. The specially trained brokers represent Lahti Polytechnic, universities and other interest groups, such as Lahti Regional Development Company, and Lahti Science and Business Park. With the help of this approach, it is possible to quickly obtain the personnel needed for an innovation process to solve problems and develop products and services into applications and commodities (Parjanen *et al.*, 2008).

## **7. Results**

### *7.1 Brokers’ Roles and Functions*

*7.1.1 Brokerage and innovation policies.* The interviewees described the regional innovation system by utilizing a biological concept as “modular”. Modularity implies that the whole stays fertile or functional even if it loses part of its whole; for example, a leaf falling from a tree does not signify the death of the whole tree. Likewise, in an innovation system, certain actors die and correspondingly others are born, but its innovation networks still remain robust.

According to the respondents, the knowledge broker strengthens relationships of research and education organizations to companies operating in the area and to actors in the public sector. One respondent said that along with long-term reliable partners, also new actors are needed to utilize the region’s innovation potential. The task of a knowledge



broker for his/her own part and together with other actors is to build an alluring and creative regional innovation environment that consists of different actors and networks. The knowledge broker is like a “key account manager”, whose goal is to make cooperation among different actors as easy as possible so that creativity, know-how and other resources can be gathered and channelled to develop regional innovative capability. While teachers at universities, for instance, are responsible for the product, that is, the know-how and expertise, a knowledge broker is responsible for customer relations: for acquiring new cooperation partners and, at the same time, investing in long-term development of cooperation relations.

In the interviews, knowledge brokerage was seen primarily as facilitating activities. One interviewee described brokers as “troublemakers who search for ideas in unorthodox contexts and the environment”. A knowledge broker’s task is to push actors more widely into the “innovation system tree”. As she/he emphasizes open innovation environments as sources of innovations, the knowledge broker also creates contact surfaces for processing practice-based innovation sketches coming from companies. As she/he operates in a practical context, the knowledge broker has a wider view of the birth process of innovations. She/he can, for example, emphasize the significance of shop-floor-level innovation operations as a source of innovations.

Networking is based on partnerships where different types of goals and operations are fitted together. In the interviews, it was emphasized that the aim of brokerage activities is to widen networks, not to limit or reduce them. Through networks, a knowledge broker is able to grab ideas and combine resources for, for example, starting a new business operation. In managing a partnership, the key position is held by different value networks that illustrate the whole formed by many actors having different backgrounds, know-how and roles. The roots of value networks such as different expert networks, companies’ business networks and research networks are in the innovation system. In knowledge brokerage operations, it is necessary to define those network actors with whom to operate, so that the networking will produce added value for the participating actors. Similarly, it is necessary to define the available resources, functions and areas of responsibility, so that it is possible—through innovation operations—to flexibly respond to the challenges of the practice-based innovation policy. One of the interviewees noted that at the moment, partnerships are most likely to be created with large companies, even those operating globally. The aim of polytechnics is, however, to concentrate their development inputs into the field of small- and medium-sized companies.

*7.1.2 Brokerage and creativity.* The creativity of a knowledge broker is not parallel with the creativity associated with producing art or culture. It implies making possible and developing—in oneself, as well as in others participating in the process—the necessary creativity and new type of thinking needed in the innovation process. According to one respondent, the knowledge broker may herself/himself be creative, but above all she/he must cultivate creativity in others and give space to it. The knowledge broker does not have to be the one with the largest amount of ideas, but above all help others to perceive and produce creative solutions to give rise to possible innovations. The knowledge broker thus needs situational sensitivity to recognize which play is currently being acted: who is the hero of the play and who is a background figure, and when does everyone need to step on stage. An interviewee noted: “The essential thing is to participate in ideation and ask inspiring questions that the broker herself/himself may not be able to answer.”



According to the interviews, the knowledge broker must be able to bear disorder in order to make creative activities possible. She/he must be sensitive to small and often apparent matters. Because of this, the knowledge broker must have good self-esteem so that she/he can mobilize others to stand behind common goals and operations. Bravery and tenacity are essential qualities (cf. Table 2). One has to question the existing thought and operations models and accept incompleteness and slow progress of matters.

New ideas arise from questioning of old manners and habits, and this is not necessarily supported by all. As noted by one interviewee:

One must dare and even want to “poke at different ant hills”. We operate in environments where people are generally speaking rather satisfied with themselves. We should be able to “shake up” such people in a positive sense and get them to work together to reach a common aim.

Bravery includes also an ability to question one’s own know-how and live with the possibility of failure. One must also constantly develop one’s own know-how and expertise. The broker’s creativity is based on perceiving connections among different fields of knowledge and operations.

Finding the inner creativity of an organization is the key to developing operations, since every organization needs the creativity of each of its workers in its operations. Knowledge brokers need to be able to support bringing out the creativity of individuals by helping to build a working climate and community that supports creativity. According to the

**Table 2.** Summary of participants’ group work on the training day on creativity in innovation processes (part of the knowledge brokerage training)

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Knowledge broker
<i>Qualities</i>
<ul style="list-style-type: none"><li>• being motivated (including internal and external motivation)</li><li>• curiosity</li><li>• bravery</li><li>• passion, enjoyment</li><li>• tenacity</li><li>• permissiveness, open-mindedness</li><li>• an extrovert and open personality, good self-esteem (including the ability to accept different views and change one’s own views)</li><li>• rich in ideas</li></ul>
<i>Creative interventions</i>
<ul style="list-style-type: none"><li>• disturbing</li><li>• questioning</li><li>• focusing</li><li>• motivating</li><li>• external and independent knowledge</li><li>• analogy and metaphors</li><li>• field of operations</li><li>• inside of one’s own organization; for example, between different departments and groups of people</li><li>• at the interface of one’s own organization and other organizations</li><li>• outside of one’s own organization; for example, between different companies</li></ul>

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respondents, the characteristics of a creative organization include a free, flexible atmosphere, trust, willingness to take risks and playfulness. In his/her operations, the knowledge broker understands that creativity does not automatically turn into innovations.

According to the interviews, creativity can be enticed by new impulses, such as new knowledge, thoughts, contacts, environment and changes. Creativity requires space for conversations and, on the other hand, for thoughts and ponderings. Only few people can come up with ideas during the working day, but ideas can sprout up during leisure time. What creativity requires is a state of inactivity that feeds creative thoughts. At the same time, it requires enriching interaction with different types of people. The organization's structures should support generation of immaterial social capital. The knowledge brokerage operation is not a separate task at work. According to one interviewee, a knowledge broker transfers attitudes and activities into her/his "teachship" at the polytechnic. In principle, a "small knowledge broker" should live inside each employee.

The brokers acknowledged that motivation is one of the most important factors in creativity, and it is decisive in what a person actually ends up doing. The organization's values, goals and missions can be built so that they motivate creativity. Creativity is not necessarily equal to delight, because it forces one to leave one's seemingly safe level of comfort. As a creative actor, the knowledge broker must work actively so that "bacteria" destroying creativity, such as short-term profit seeking, haste, routines and fear of humiliation, will not gain victory.

Creativity is perceiving, recognizing and giving of interpretation and meaning—a new type of combining of things and ideas. Creativity and the skills of creative thinking can be supported, stimulated and taught. From the point of view of the facilitator role of a knowledge broker, finding creativity is a total personal challenge. For instance, combining artistic as well as technical creativity and innovativeness is challenging. As put by one of the respondents:

The knowledge broker is skilled in creative methods. Ideas, passions, delights, motivation, disturbances and idleness transform into holistic actions in the space enabled by the broker. Actors and information targeted by the broker may end up being photographed or captured in drawings or concepts on little stickers. When visualised, common thinking becomes strengthened and leads to change. Creativity is in the actors: the broker makes it visible, audible or touchable.

*7.1.3 Brokerage and organizations.* According to the interviewees, people usually perceive in their environment things that strengthen already existing manners or ways of thinking or operating. In organizations, things are often done in a familiar manner. Especially if the operations have been successful, it is often difficult to perceive new possibilities and question accepted ways. According to the interviewees, in educational organizations, for instance, rapid changes should take place. Concepts and the way of teaching are outdated. Nowadays, people should be taught to observe the surrounding world rather than just take in book learning. In innovation processes, it is central to make the participants perceive things in a new way. At the same time, the knowledge broker has to admit that she/he also has a limited ability to perceive new things, no matter how skilful she/he is.

The knowledge brokerage operations strengthen the practice-based innovation operations taking place in the region in question. As the region does not produce as many

research activities as university cities, the innovation operations must have a strong connection to daily life. Two things are emphasized in open innovation processes: where the process comes from and how it is carried out. One of the interviewees emphasized that brokers need broad-based experience and especially knowledge about the business life. This helps in gaining credibility and finding a common language. The broker's expertise in, for example, companies' innovation processes was emphasized. The knowledge broker's job description is defined by the type of situation and environment she/he is operating in at a given time: is she/he operating, for example, at the interface of a university and the corporate world or within companies.

When she/he operates in the corporate world, the knowledge broker needs to know the companies' elements that support innovation processes and the challenges of open innovation operations. The organization's culture, for example, has strong ties to innovativeness. Increasing innovativeness often requires the elimination of structural barriers to increase creativity and flexibility. Organizations may react in different ways to information from outside of the organization, or they differ in their ways of being willing to question familiar ways of operating. The essential matter in the operations is making the innovation culture visible. Creativity and innovativeness should be visible in everyday activities, so that the workers notice which types of things and behaviour are respected in the organization. The knowledge brokerage operations should be open and cover all levels of hierarchy.

The opening up of innovation processes and their having multiple actors have led to the generation of a new type of expertise. Expertise can no longer be merely routine expertise when old models are applied to new situations, but more and more creative, constantly developing and networked expertise. According to the interviewees, one of the tasks of the knowledge broker is to fertilize and feed innovation processes, and in this work, the broker needs expertise. New knowledge and innovations are not created out of nothing, but a great amount of knowledge is essential, even if not all of it is finally used. New ideas are in many ways based on borrowing, imitating, and combining and additional refining of existing ideas. The newness of innovations is thus contextual, when part of the knowledge broker's job description is transferring of good practices.

An organization's climate depends on the people working there and the ways of communication. The sharing of information and knowledge must be truly open, and people must be able to comment on the content freely. Situations in which workers run into each other more or less spontaneously have an effect on how information is transmitted in an organization and if it is created and converted in the first place. The knowledge broker's task is to create these "collision places" both between companies and between companies and other organizations. According to the interviewees, the knowledge broker is a proactive gatherer of information, who distributes it for the benefit of all. She/he also publicizes the expertise and know-how of research organizations in companies.

One of the interviewees emphasized that adopting a new culture requires strong personal commitment and contributions to reforms. Decisive in knowledge brokerage is the ability to generate a culture of information and knowledge sharing. If all the time is spent on defending oneself, one does not want to express ideas to others to be further refined. The goal is an organization that in the midst of joy produces innovative thoughts. The premise of innovativeness is the desire for renewal, and for that joy, desire and belief are needed.

According to the interviews, the knowledge broker does not gather knowledge and clients only for the needs of his/her own institution, but the brokerage operations are interdisciplinary. The external interfaces can be divided into two groups. On the one hand, there is the customer organization that is the premise of the innovation process, and on the other hand, there are those expert organizations from which services can be bought or which fund operations. Leadership is an essential matter in knowledge brokerage operations. Knowledge brokerage operations need the presence of a leader who has both the authority to lead and a commitment to a goal. Trust in workers gives reliability to work. The permissive leadership emphasizes, among other things, a learning opportunity included in making mistakes. Mistakes have to be seen in the context of the operations. A mistake in one environment can be an innovation sketch in another environment.

*7.1.4 Brokerage and social capital.* Innovations have a strong social nature. Most innovations are born as a result of social and economic interaction. Into this interaction, people bring their vastly different knowledge, skills and experience. The knowledge brokerage operations are executed in a social operation environment that consists of different actors and different innovation networks. This also implies a change in the role of a teacher. The interviewees felt that converting teachers from “lonely plodders” to change agents who utilize collaboration is very challenging. For example, both theoretical and practical experts may participate in an innovation process. The knowledge broker’s goal is to create—among these different actors—a confidential and creative atmosphere, where the actors can collaborate and learn from each other.

One of the interviewees emphasized that it is not necessary to be personally involved in all kinds of networks, but the essential thing is to know different kinds of people who can provide information and answer questions if necessary. Innovation operations, like knowledge brokerage, deal much with social capital. Learning and doing together do not happen without trust, which is seen as the backbone of social capital. Exchanging knowledge is easier in confidential networks, and it is simpler to combine activities there. The task of the knowledge broker is to create trust among actors and foster its survival. Indeed, the tasks of the knowledge broker are illustrated by soundness, authenticity and consistency. Trust is thus based not only on the knowledge broker but also on the organization she/he represents.

Through the trust she/he gains, the knowledge broker can combine the quite different actors and motivate them to stand behind common goals. The knowledge broker thus has to learn how to manage differences existing in his/her operational environment. She/he must utilize the innovation potential contained in distances and solve problems caused by the distances that are related to, for example, interpretability and a common language (cf. Table 3). As she/he combines actors into a new group, the knowledge broker must interpret the differences among actors and support the actors in reaching a common understanding.

*7.1.5 Brokerage and the future.* The knowledge broker is a person who utilizes information produced elsewhere and ties it to regional development. One of the tasks of the knowledge broker is regional impacting. In this task, it is important to build links and sensors also outside of the region and absorb national and international knowledge from where it is found and bring it to the region to be utilized. Knowledge brokers are in a very important position at the interface of knowledge production and its utilization; in

**Table 3.** Knowledge brokers' views concerning crossing of distances (summary of group work on the training day on managing knowledge and the role of brokerage in innovation processes)

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Knowledge brokers' ways of crossing distances and making them smaller

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- conscious distancing
- freedom from bias
- analogies and metaphors
- provocative questions
- careful preparation
- using different experts
- doing things together
- getting to know different types of people
- being systematic
- a clear strategy
- being flexible
- utilizing social and communicative closeness
- an attitude that accepts differences
- a sense of the situation
- an ability to dig out the best from everyone

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interpreting and contextualizing foresight information produced elsewhere and in tying it into innovation processes executed in the region. In this foresight task, the knowledge broker has to take into account the uniqueness of the region.

Practice-based innovation operations are important because with mere knowledge innovations cannot be pushed into the field. The knowledge broker's task is to think about how new knowledge can be produced for the customer so that learning will be possible. She/he must sniff weak signals and relay future-oriented information. The knowledge broker needs information such as basic information for projects for envisioning and developing education, applying new technologies, defining companies' product and service markets, directing business opportunities, motivating change, developing future process methods and recognizing new customers.

Knowledge is always contextual. It transforms when being tied back to the user connection. In foresight processes, the actors must always rethink what it means "from our point of view". According to the interviewees, the knowledge broker must learn to think about matters from the company's point of view. The broker is not a know-it-all, who says where one must go or who is always ready with an answer to any question:

The knowledge broker's skill is to make the actors collide with each other without however immersing them. It is essential to give ideas and ask inspiring questions, although the broker may not know the answers her/himself. There are a lot of different fishes in the lake in the form of information and solutions—and in the same net, they make up a miraculous draught of fishes.

The broker is a parallel traveller, director, supporter, listener, endurer and arranger. One of the brokers described her function in the following way: "As a knowledge broker of health-enhancing physical activity I have crawled in many ponds as sensitive to

changes, flexible, creative and reflexive—designing situations and activities constantly in novel ways.”

The knowledge broker must not get completely involved with the R&D work of the customer organization. If one immerses oneself only in the matters of one’s own field, many things will remain unaided, and the sensitivity towards new things will decrease. The brokers acknowledged that their task is to start processes but not finalize them. The broker’s work is thus primarily focused on the start of the innovation process. If the knowledge broker joins in some very new type of process, and expertise is nowhere to be found, she/he must know how to envision and foresee what opportunities might exist.

In knowledge brokerage operations, “owning” future-oriented information and knowledge does not necessarily bring power and glory, but rather they are brought about by sharing, transmitting and combining information as well as by converting information into knowledge. The one who knows how to utilize information for the benefit of all “wins”. As put by one of the interviewees, who compared the brokers’ role with mermaids who swim at the surface of the ocean of challenges, changes and innovations:

There are many people rowing boats with different skills on the ocean. The boats appear to go into the same direction, but waves or other factors can make the boat go wrong. The boats have departed at different times from different places. No common goal has been agreed on. . . . There may even be ice on the ocean. . . . In the beginning, confusion is acceptable in the brokerage training. . . . After the beginning, one must soon fall in love with the ocean, become interested in boats and want to become a mermaid. . . . A mermaid as a knowledge broker is not a fortune-teller, but she/he keeps a crystal ball at the surface of the ocean. The ball mirrors novel—different and successful—future prospects for those who are collaborating. The future prospects lie in the region, in competence and innovation capabilities.

The knowledge broker must recognize where the information is and how it could be gathered. One must know how to widely observe the operational environment. According to the interviewees, it also has to be realized that the knowledge broker’s role changes in different environments from being a transmitter of information to being its analyser and converter. The knowledge broker does not need to be an expert in the matter at hand, but substance know-how is connected to knowing the characteristics of the innovation system and innovation processes. She/he has an understanding of the composition of innovation networks and the actors participating in them. As a sniffer of future information, the knowledge broker is first and foremost an advancer of regional visionary capability.

### *7.2 Summary: Brokers’ Opportunities in Innovation Processes*

After the first stage of the analysis—the identification of the roles and functions in brokerage—the point of view of distances was deepened by further focusing on links to distances and proximities. This was the second stage of the analysis. On the basis of the perceptions of the knowledge brokers in the training, five central roles were first named for them. The focus was on the individual level of the brokers as expressed by them. The central roles are those of a:

- policy executor,
- creative actor,
- shaper of organizations,
- crosser of distances and
- sniffer of the future.

These roles identified in this case study are partly similar to Howells' (2006) innovation intermediation functions. Knowledge brokers are, *inter alia*, brokers of future-oriented information and knowledge into practical innovation processes. A system producing future-oriented information and knowledge must support the knowledge brokerage system so that the brokers will acquire the kind of information and knowledge that they can feed into innovation networks as they operate as regional facilitators of practice-based innovation operations.

As to the role of a crosser of distances, the different types of distances and proximities require somewhat different skills, and the research results showed that there is no "common truth" about them, but they need to be identified in each case. In the other roles, the elements of distances and proximities are also present; for instance, the sniffer of the future has to cross temporal distance, among others.

This leads to the question of whether the character of brokerage changes during an innovation process. Distances may indeed be accentuated differently during the various stages of innovation processes, and this may change the character of brokerage. This is not reflected in Howells' (2006) categorization. Moreover, it is important in our view to recognize that in brokerage, the idea should not be to just broker the way of an innovation to the market but to help to see "possible worlds" and initiate processes; the innovation does not have to exist yet (as the concept of innovation intermediation appears to suggest). This was acknowledged by the brokers, too.

Does brokerage then belong mainly in the fuzzy front-end stage of an innovation process, or is it needed also in later stages? In the Lahti region, brokerage efforts are emphasized at the front-end stage (e.g. in practical innovation sessions that are organized), but brokerage may well have a significant weight during the whole process—for instance, if the absorptive capacity of a participating organization is weak. Elements and functions of brokerage could be looked into also in this regard (Table 4).

The examples in the cells are based on the research data and our knowledge of concrete innovation processes in the region. However, the roles depend on whether it is a question of a process or service innovation in the public sector or in the private sector, for instance, so these issues require future detailed analyses based on empirical data. Brokerage may also be internal or external by nature. The examples in Table 4 imply that brokers' challenges may be far greater in the case of process and service innovations in the public sector than in a "straightforward" product innovation in the private sector. Again, however, the variety of cases is immense; a product innovation may contain characteristics of a process and service innovation, too. These are important areas for future empirical studies.

## **8. Conclusions and Discussion**

Knowledge brokers' roles and functions are indeed demanding, as also recognized by the brokers themselves. The limitations and impacts of the brokers' work as well as additional



**Table 4.** Brokers' roles: stages of an innovation process, absorptive capacity and different innovations

Different types of innovations	Stages of an innovation process		
	Front end ("opening stage"): acquisition and assimilation of knowledge	"Selection stage" (selecting one of the alternatives for implementation): assimilation and transformation	"Implementation stage" (conceptualization, prototypes, marketing, etc.): transformation and exploitation
Product innovation (in the private sector)	Crosser of distances, sniffer of the future, creative actor	Crosser of distances, sniffer of the future	– (a minor role)
Process innovation (in the public sector)	Crosser of distances, sniffer of the future, creative actor, policy executor	Crosser of distances, sniffer of the future, creative actor, policy executor	Crosser of distances, policy executor, shaper of organizations
Service innovation (in the public sector)	Crosser of distances, sniffer of the future, creative actor, policy executor	Crosser of distances, sniffer of the future, creative actor, policy executor	Crosser of distances, policy executor, shaper of organizations
Organizational innovation (in any sector) (etc.)	Crosser of distances, shaper of organizations	Crosser of distances, policy executor	– (a minor role)

needs for training are yet to be studied. The research results shed new light on the strengths and weaknesses of brokerage activities and, particularly, on the challenges felt by the brokers at the individual level. The brokers need to walk on a tightrope between individual, organizational and regional levels. At the individual level, their personal qualifications are an extremely important basis for the interaction with other individuals and other levels, which is why their perceptions should be listened to when designing future training, for instance.

Open and practice-based innovation processes place many new demands on innovation activities, and the need for skilful brokerage is becoming increasingly well known. In the more traditional science and technology-based innovation processes, the likelihood of bumping into people coming from completely different fields and of views clashing is somewhat less in general. User-driven innovation also places many new demands on brokers. In fields other than innovation activities—in work life in general—qualifications that are associated here with brokers are becoming increasingly important.

In the future, brokers should see their roles in a wider sense outside of their own organization. The trainees studied here participated in training that was focused on external brokerage—roles that serve other organizations—but the trainees' views were still rather traditional in that they saw their role in their own organization as particularly crucial. This would be an area to be enhanced in the future. Brokers also have an important



role in that small- and medium-sized companies could increasingly become engaged in open innovation activities. As the phenomenon of sustainable innovation is rising in importance, brokers could serve as creators of a holistic view of what sustainable innovation is all about in a wide sense. In the Lahti region, brokers' role in securing transfer of scientific knowledge into the region is also central because of the relatively small amount of research activities being conducted in the region itself.

Future research concerning changes in knowledge brokers' own perceptions of their role after gaining additional experience in practice would be worthwhile. Particular challenges placed by different types of innovation processes such as process, service and product innovation processes should also be looked into in detail in order to obtain results clarifying the relationship between knowledge creation and conversion processes and knowledge brokerage. The different types or categories of knowledge placing different demands on innovation activities need to be taken into account, too. This, again, would help in practical endeavours to enhance regional absorptive capacity.

In this setting, in the Lahti context, the active promotion of brokerage functions as part of the regional innovation policy emphasizes the importance of intended knowledge transfer from other regions and is thus compatible with the findings of Bröker and Bindel (2007) and Rondé and Hussler (2005). As an innovation policy instrument, brokerage functions are aimed at improving especially the component of potential absorptive capacity at the fuzzy front end of innovation processes. Although the results presented in this study may already be of help in designing knowledge brokerage operations and innovation processes, at this stage, it is too early to evaluate the realized effects of brokerage on regional absorptive capacity, let alone on its different parts or alternative routes. Thus, further research is needed in order to get a more comprehensive understanding of this issue, too.

A step towards this direction would be the creation of a measuring system concerning the impact of the knowledge brokerage operations. The measuring system should dig into understanding of the dynamics of knowledge brokerage operations and not only measure visible results stemming from the R&D operations. Matters to be measured in the future could include the following, for example: (i) overall change in the innovation culture in the region and in the organizations involved in the operations; (ii) growth in the volume of user-driven innovation projects; (iii) growth in the volume of open innovation projects; (iv) growth in the volume of strategic alliances and (v) knowledge brokers' workload in strategic alliances. An interviewee noted on measurement that

It is challenging to develop measures for such unselfish and community-minded actions and roles as those of knowledge brokers. Projects and euros are easy to measure. Someone always has an initial idea, but usually its refinement into a project is the result of collaboration of many people. Fishing for points usually does not lead to the best outcome. One measure could be related to responding to external challenges, . . . It is easy to measure the actual number of strategic partners, but it is more challenging to measure quality of collaboration. Converting teachers to change agents is difficult to measure, because usually everyone wants to invent things by her/himself. Measures should not stiffen operations or guide them into unhealthy directions.

The importance of innovations is more and more being emphasized these days at various levels—national, international, regional and micro-level (individual organizations).

Successful knowledge brokerage and improvement of absorptive capacity may well be of great assistance, but they require a holistic approach to entire innovation processes and their wider environment.

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