The Complexity of Facilitating Networks of Open Innovation



Three examples of what (not) to do

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Summary

This thesis observes three network initiatives, called OpenAlps, smart businessIT and TTC, which all focus on implementing open innovation as a tool for economic enhancement of SMEs in their respective region. Thereby the research question is how networks overcome SME-typical barriers to open innovation and why this is not always successful despite acting as a neutral intermediary as suggested by Lee et. al (2010). Identified from the literature typical barriers are time, human resource and financial constraints as well as the fear to lose intellectual property and the need to concentrate on opportunities of exploitation. In order to answer this twofold research question a theoretical framework has been designed to guide the first, exploratory part of the research. Hereby three main categories have been retrieved from literature, which are (1) networks, (2) intermediaries, and (3) SMEs. Within these categories several variables guide the deductive approach. The second part of the research question proceeds in an inductive way first operationalizing Tuckman and Jensen's model for group development (1977) to encompass the issues caused in a social dimension of these networks. Additionally geographic communities and a culture of cooperation are identified as relevant factors in the early stage of open innovation network development. Due to the fact that this thesis focuses on the initial stage of open innovation network development, the picture drawn does not represent the whole complexity of the issue. Nonetheless this thesis can contribute to a thorough understanding of the importance of rooting an initiative for open innovation profoundly both within the operating intermediary networks as well as within the network area.

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List of abbreviations

ERDF	European Regional Development Fund
ICT	Information and communications technology
IP	Intellectual Property
MNC	Multinational corporation
P&G	Procter & Gamble
SME	Small and medium-sized enterprise
TTC	Top Technology Cluster

1. Introduction

Over the last years various forms of cooperation between companies, organizations, research and development (R&D) institutes and other market players have appeared on the business scene. Since 2003 this new phenomenon has received a name: open innovation (Chesbrough et al., 2006). Open innovation, as opposed to closed innovation, has developed as the new paradigm in innovation theory. Most known are Chesbrough's writings on the opening of the innovation funnel, which describe the change from a traditionally company centered innovation process to an innovation process that also relies on outside knowledge. There is a range of famous examples of open innovation in large multinational companies such as LEGO (Piller, 2005) or Procter & Gamble (Dodgson, Gann, & Salter, 2006) which for both resulted not only in a strong increase in turnover, but also helped to overcome economically critical incidents. The list of different and new innovation methods hiding behind the term open innovation is long: Lead-user method (Hippel, 2005), pyramiding (Poetz & Prügl, 2010), crowd-sourcing (Ahrweiler, Pyka, & Gilbert, 2011; Sloane, 2011), broadcast search (Jeppesen & Lakhani, 2009), living labs (Konsti-Laakso, Pihkala, & Kraus, 2012), university cooperation (Ahrweiler et al., 2011), and design thinking (Brown, 2008; Kelley & Littman, 2001) are only a few of these.

Contrary to an existing perception, open innovation is not only a phenomenon for theory or the exclusive league of resourceful multinational corporations (MNCs), but instead it is becoming increasingly relevant for small and medium-sized enterprises (SMEs). However, since open innovation in the context of SMEs is still a fairly new development, it offers a very interesting realm of observation due to the manifold possibilities and approaches to implement it. Hence for this thesis, three open innovation networks, called OpenAlps, smart businessIT and Top Technology Cluster (TTC), which are targeting SMEs in Germany, will be analyzed in order to gain a deeper insight into this topic. Despite the importance of this topic, not many SMEs presently achieve to initiate these new innovation processes on their own. Therefore economic policies start focusing on strengthening and connecting SMEs. For instance with its strategy paper "Horizon 2020", the German government emphasized the development of SMEs and released various economic policies focused on improving innovation practices and prerequisites particularly during the financial crisis from 2007-2009. While the EU supports similar developments on a regional level through various funding programs, local organizations, networks and clusters are busy putting these policy impulses and funding possibilities into action.

Among other objectives, networks have realized the importance of cooperation and knowledge exchange especially between SMEs. Within the various projects resulting from this realization also open innovation plays an increasingly important role which is illustrated by the three open innovation projects under scrutiny in this master thesis. This is mainly due to the encompassing characteristics of open innovation. Essentially open innovation claims that not the amount of top researchers and the amount of R&D expenses decide on the innovative market leader, but that the capacity to most efficiently combine internal R&D with external knowledge is the future key to competitiveness (Chesbrough, 2011). These rather resource-efficient characteristics of open innovation can be particularly relevant for SMEs, which often suffer from strong resource constraints (Lee et al., 2010). Especially due to these barriers, the value of network or cluster initiatives has been increasingly recognized. Lee et al. (2010) for instance argue that an intermediated network model is the best way to introduce SMEs to open innovation. Hereby the intermediary or broker takes on a mediation and management role without having an invested interest himself.

While there is literature to support this claim (Ollila & Elmquist, 2011; van de Vrande, de Jong, Vanhaverbeke, & de Rochemont, 2009), there is a debate on how to go about intermediary management in open innovation initiatives targeted at SMEs. As typical barriers to open innovation initiatives in SMEs have been identified time, human resource and financial constraints, as well as fear of loss of intellectual property (IP) and a need for exploitation opportunities (Lee et al., 2010; Narula, 2004; van de Vrande et al., 2009; Vanhaverbeke, Vermeersch, & De Zutter, 2012). The research question of this paper is therefore as follows: How do networks which start open innovation initiatives with a focus on SMEs overcome aforementioned typical barriers, and why are these networks not always successful although they act as neutral network intermediaries as suggested by Lee et al. (2010)? In particular this thesis will observe the initial stage of setting up open innovation initiatives looking at factors influencing success or failure and thereby follow both an exploratory and explanatory approach. Therefore this thesis will analyze the three open innovation initiatives, OpenAlps, smart businessIT and TTC. All three initiatives are based in Germany, two in the German Federal Land Baden-Württemberg and one in North Rhine-

Westphalia. By analyzing these three open innovation initiatives, this paper will increase the knowledge on open innovation management by intermediated networks targeting SMEs.

The remainder of the paper will first look at existing literature on open innovation, networks and dynamic capability of companies. Hereby it will formulate a number of theoretical assumptions which will form part of the analytical framework guided by a sound research methodology. In the following the data of the three projects gathered during empirical research will be analyzed through the framework developed before. Before concluding this thesis the findings will be discussed and recommendations introduces as to why Lee et al.'s (2010) theory of the intermediated network model does not always lead to successful open innovation projects

2. Literature Review

This chapter will provide the ground for much of the theoretical and empirical work of this thesis. Therefore it will proceed in four sections and start out by introducing the historic development of innovation theory from Schumpeter in the early 20th century to Chesbrough in 2003. Having shed light on the historical and theoretical aspects of innovation, this chapter will look at its practical sides: which techniques of open innovation exist; what does it look like in company reality; how and why does this practice differ between large companies and SMEs¹; and lastly, what is important for SMEs to succeed with open innovation? As established before, one way for SMEs to conduct open innovation is by participating in open innovation will be inspected in the third section of this chapter. Lastly, a few existing models of intermediated open innovation networks will be presented in order to introduce a frame of reference for analysis.

2.1 From Schumpeter to Chesbrough

Theory of innovation is a relatively new branch of economic theory and has been sparked by Joseph Schumpeter in 1934. This section will look at the development of innovation theory from Schumpeter to the introduction of the open innovation paradigm by Chesbrough. In order to create a better understanding of innovation, both the concept of innovation space will be used to exemplify options to innovate, as well as the concept of the (opened) innovation funnel to create a company-based view on innovation.

In order to understand the novelty of the concept of open innovation and the challenges it poses to firms, it is important to give a short overview of the historical development of innovation theory and practice. The first and for a long time most influential scholar to analyze innovation systematically was Joseph Schumpeter (Drejer, 2004; Hasan & Tucci, 2010). In his work *Konjukturzyklen* from 1934 he analyzed the relation between innovation and economics describing it as: "[E]conomic development is driven by the discontinuous emergence of new combinations (innovations) that are economically more viable than the old way of doing things" (in Drejer, 2004, p.556). This process of recombination or, so to say, innovation results in constant economic development and forward movement, which Schumpeter also describes as a process of "creative destruction" meaning

¹ For the purpose of this thesis the European definition of SMEs will be used. A more detailed account can be found in Chapter 5.1.

that new innovations might render older innovations useless or void while simultaneously creating new opportunities (Tidd & Bessant, 2011, p29). Nowadays this link between innovation and economic development together with the notion of creative destruction is widely accepted (Schumpeter, 2010; Hasan & Tucci, 2010; Tidd & Bessant, 2011). In former times, Schumpeter's theory innovation had not been systemized but was seen as an act of genius and therefore judged as being unpredictable and hence unmanageable. However, by attributing a decisive role to the entrepreneur as the driving force in economic development, Schumpeter introduced manageability into the process of innovation (Drejer, 2004; Grupp, 1998). The most interesting aspect of Schumpeter's definition of innovation for this thesis is the relation between innovation and development. He argues that innovation inherently seeks to improve production and without this urge for advancement, the economy would remain in "equilibrium", meaning in a stand-still (Drejer, 2004, p.557).

Departing from the role of the entrepreneur in innovation, another influential economist of the 20th century, Peter Drucker, can be taken into consideration. He defines innovation "as changing the value and satisfaction obtained from resources by the consumer" and thereby adds a more consumer-centred notion to innovation (Drucker, 1985, p.33). Within the process of innovation, Drucker attributes the most important role to the entrepreneur while nonetheless realizing that entrepreneurs need to learn how to "practice systemic innovation" (Drucker, 1985, p.34). This means that the entrepreneur must be prepared to recognize innovation opportunity as well as to act upon it. Although Schumpeter held a similar view in his early writings, later he theorized that innovation had become increasingly institutionalized and incorporated in business routine, so that the preeminent role of the entrepreneur lost dominance (Drejer, 2004). The role of the entrepreneur in innovation is still strongly discussed among scholars, with some arguing that the relevance of the entrepreneur depends on the company size (Gruenberg-Bochard & Kreis-Hoyer, 2009; Marcati, Guido, & Peluso, 2008). This will be discussed in combination with SMEs and their characteristics later in this chapter. Summing up, there has been a development from innovation as an uncontrollable act of genius to innovation as a complex, but manageable concept.

Having provided an abstract concept of innovation, this thesis will now analyze where innovation can take place. Originally, Schumpeter realized that innovation does not only focus on new product development, but can appear in different firm sectors. Hereby he named five different areas of innovation internal or related to the firm. These areas are firstly product innovation, secondly process innovation, thirdly market innovation, fourthly input innovation, and fifthly organizational innovation. While product and service innovation are fairly self-explanatory, namely referring to the development of a new product or service, process innovation describes "a new method of production". Furthermore market innovation is identified as the "opening of a new market" and input innovation as "a new source of supply raw material." Last but not least organizational innovation is "the carrying out of a new organization of industry" (in Drejer, 2004, p.556). Even though this perception of innovation is yet referred to by some authors (Drejer, 2004; Ettlie & Rosenthal, 2011; Hipp & Grupp, 2005), this thesis will rely on the contemporary notion of 'innovation space' introduced by Bessant and Francis (2005). This newer concept is chosen due to a process- and company-oriented notion of innovation, which provides a better basis for understanding company needs. The concept of innovation space will be looked at in the following paragraph.

The concept of innovation space (Francis & Bessant, 2005; Tidd & Bessant, 2011) describes the dimensions throughout which a firm can innovate. Essentially the underlying notion of innovation is pragmatic: "Definitions of innovation may vary in their wording, but they all stress the need to complete the development and exploitation aspects of new knowledge, not just its invention" (Tidd & Bessant, 2011, p.16). Here Tidd and Bessant (2011) introduce the interesting difference between invention and innovation. While the former might be a singularly brilliant idea, it is mostly doomed to be a failure if not a system of exploitation, including management, production, marketing, distribution, and other aspects, turns inventions into innovations. On the basis of a similar definition, Francis and Bessant (2005) introduce four areas in which innovation by a firm can take place. They call these areas "the 4Ps" (p.172), which stands for product or service, process, position, and paradigm innovation. According to the authors, the latter two types of innovation are mostly ignored albeit their importance for company strategy. Here position innovation describes entering a new market with an existing product and paradigm innovation concerns a profound change in firm convictions. Despite the fact that the boundaries within the innovation space are not always clear, this tool can nonetheless help to gain a better insight into the innovation and exploitation possibilities open to firms. The following paragraphs will give a deeper insight into the areas described in innovation space.

The difference between product (Löfqvist, 2010; Brettel & Cleven, 2011) and service innovation (Cheng & Krumwiede, 2012; Drejer, 2004; Ettlie & Rosenthal, 2011; Hipp &

Grupp, 2005; Wooder & Baker, 2012) has been focused on by several authors. Generally speaking, product innovation concepts are more developed and more sophisticated since firm practice and academic research has focused on product and technology development rather than on service innovation (Drejer, 2004; Evangelista & Vezzani, 2010; Wooder & Baker, 2012). While service innovation theory is still in an elementary state, the literature on product and manufacturing innovation has advanced much deeper into management choices (Brettel & Cleven, 2011; Chang, Chang, Chi, Chen, & Deng, 2012; Löfqvist, 2010). Löfquist (2010) for instance analyses the product and process novelty specifically in SMEs. Hereby he develops different models of design processes depending on the novelty of the product or the novelty of the novelty of product or process. Apart from giving a good view onto product innovation process innovation within one firm.

With regards to process and position innovation, Evangelista and Vezzani (2010) look at different innovation modes and the relation to economic performance measured by growth in sales. One of the main findings is that "innovation beyond the technological domain provides a much richer and complex picture of firm's innovation strategies and performances" (p.1262). While investigating this, the authors found four modes of innovation of which they call the first three product, process and organizational innovation. The last mode, which supposedly is the most successful one in relation to firm performance, is a mix of the three prior modes. Hence Evangelista and Vezzani contribute through investigating innovation from a holistic firm perspective arguing that a firm succeeds best when aligning the entire company strategy with regards to innovation. Hence strategies characterized by the joint introduction of product, process, and organizational innovations have been found to give to both product and service innovating firms a competitive advantage. Interestingly, Vanhaverbeke notes on the same line of thought that SMEs need to align their complete firm strategy with their innovation strategy due to characteristics unique to SMEs (Vanhaverbeke et al., 2012).

As last part of the innovation space, paradigm innovation is an abstract term to review. It describes the internal change of attitude of a company, as for instance in the example of Procter & Gamble which will be looked at later in this section. In this case the entire firm changed its attitude towards innovation from being essentially closed and internally oriented to opening up innovation strategy to include external innovation (Dodgson et al., 2006). This,

for instance, is a paradigm change. Tidd and Bessant put it this way that space and boundary conditions change as in a process of creative destruction, hence new convictions develop which render former paradigms obsolete (2011). However, the lines are rather blurry and every paradigm innovation carries signs of one or more innovation areas. Next to introducing these four areas, innovation space also gives room to the distinction between incremental and radical innovation. Supposedly incremental innovation, meaning continuous and frequent, is more common than radical innovation, meaning for instance development of new technologies. Nonetheless every once in a while there are discontinuities in the market or society which require radical innovation of companies in order to survive (Chesbrough et al., 2006; Tidd & Bessant, 2011).

This section has started by drawing an abstract picture from historic perceptions of innovation to more and more detailed and firm specific aspects of innovation. Even though this paragraph will not go into the details of innovation processes within a firm, it will look at a broadly accepted concept, the innovation funnel, in order to provide a better understanding both of innovation within a firm and of the changes brought about by open innovation.



Figure 2.1: The closed innovation funnel based on Chesbrough (2006)

As illustrated above, the traditional concept of innovation suggests that innovation takes place internally to the firm. However, this company focused type of innovation has been confronted increasingly with changing global circumstances which traditional innovation theory cannot encompass satisfactorily (Chesbrough et al., 2006). In 2003, Henry Chesbrough finally created the term Open Innovation Paradigm and developed a theory for the changing

Figure 2.2: The open innovation funnel based on Chesbrough (2006)



innovation practices. With this open innovation paradigm he argues that global circumstances inhibit successful operation under traditional premises solemnly. Macroeconomic facts such as (1) increasingly spreading knowledge of business processing, (2) low cost production in developing economies of the world, and (3) shortening product life cycles challenge the concept of the closed or company focused innovation funnel. These characteristics of the global economy lead to what he calls the "commodity trap" which inflicts product manufacturing companies by disallowing them to develop a sustainable competitive advantage (H. Chesbrough, 2011, p.9). Among other factors the recognition of these macroeconomic changes led Chesbrough to develop the Open Innovation Paradigm. Thereby he defines open innovation as "the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively" (Chesbrough et al., 2006, p.1). This attitude stands in sharp contrast to the

earlier understanding of innovation which was strictly concentrated on internal R&D as well as internal paths to market.

2.2 Putting Open Innovation into Practice

This section will shortly introduce a selection of methods of the wide range of open innovation techniques. Consequently a few examples of open innovation in large companies and SMEs will be introduced and later on analyzed by looking at differences between these two types of market players. Thereby one crucial characteristic for benefiting from open innovation will be recognized: absorptive capacity. Absorptive capacity describes the ability to take in and use external knowledge and will be discussed in the end of this section.

In order to conduct open innovation, various new innovation techniques have been developed, such as: lead-user method, meaning the concentration on a group of users with extreme needs (Hippel, 2005); pyramiding, reaching the expert on a topic by building on contacts of other users (Poetz & Prügl, 2010); crowd-sourcing, relying on a mass of people and ideas (Ahrweiler et al., 2011; Sloane, 2011), living labs, the testing of new products in an environment simulating real-life conditions (Konsti-Laakso et al., 2012); broadcast search, bringing together solution seekers and problem solvers through online platforms (Jeppesen & Lakhani, 2009); university cooperations (Ahrweiler et al., 2011), and design thinking (Brown, 2008; Kelley & Littman, 2001) are only a few of these. Most open innovation methods seek to either innovate at a lower cost through cooperation, to innovate better or more radically through the use of external knowledge, to innovate more user-centric, to reach a larger audience for problem solving, or to fulfill several of these aspects at the same time.

Over the last years, several large companies introduced open innovation to their innovation strategy, such as P&G and LEGO. Struck by economic hardship, the former realized that it "did not listen to, and learn enough from, the outside world" (Dodgson et al., 2006, p.337) and therefore was losing out on innovative and economic potential. As a consequence, P&G introduced a strategy called 'Connect and Develop' which aims at bringing internal knowledge together with the greater pool of external knowledge (Dodgson et al., 2006). The aim was to enlarge the amount of problem solvers working for P&G without incurring the costs of hiring more researchers. LEGO, on the other hand, was exposed to severe IP loss, due to an incident of hacking which unwillingly opened up a product development program to the worldwide web. Instead of faring a war on the hackers and trying

to – probably hopelessly – protect its IP, LEGO decided to channel the situation by purposefully opening up the development program to the internet community. Nowadays, LEGO profits largely from fan-based product development, which turned out to be a vivid, cheaper and user-centered source of product development ideas (Piller, 2005).

Using open innovation will facilitate technological development and sharpen the focus on customer needs. By referring to the theories of Peter Drucker, Chesbrough (2006) argues that it is not the product in itself, but the utility it creates which provides value. Changing the innovation paradigm in a company, such as demonstrated in the case study on P&G, from closed to open innovation requires major changes in the firm's strategy, organization, technology and last but not least, innovation practices. While there has been a lot of literature on open innovation processes in big companies (Chesbrough, 2011), SMEs have been neglected for a long time (Lee et al., 2010; Ollila & Elmquist, 2011). Due to abundant financial resources and a wide access to knowledge many large companies got a head-start in the open innovation trend (Dodgson et al., 2006; Chesbrough, 2010). SMEs on the other hand are faced with financial and human resource constraints as well as a strong sense of IP and therefore follow this trend slowly and skeptically (Lee et al., 2010; Narula, 2004; van de Vrande et al., 2009).

Having looked at two famous examples of large companies involved in open innovation, this paper will now shed light upon the situation of SMEs with regard to open innovation. According to several authors there has been conducted only limited research on open innovation in SMEs so far (Lee et al., 2010; Vanhaverbeke et al., 2012). Hence many questions are still open. Nonetheless, Vanhaverbeke (2012) introduces three important aspects: first of all he argues that open innovation in SMEs differs quite substantially from open innovation in large companies and therefore findings such as the ones in the last paragraph cannot be generalized to SMEs. Secondly, he finds in his research that SMEs are not interested in open innovation as just one new means of innovation, but "[i]nstead, smalland medium sized companies engage in open innovation as a consequence of their search for major changes in their business model" (p.9). Hence open innovation in SMEs has to be viewed in relation to firm strategy and business models, while larger companies might use open innovation as a means to reach a strategic objective. Thirdly, innovation in business models through open innovation can create new revenue streams for SMEs through for instance technology cooperation with other companies (Vanhaverbeke et al., 2012).

While the first section of this literature review observed innovation areas and processes within a firm, the following section will now analyze which characteristics and capabilities allow SMEs to benefit from external knowledge inflow. Hereby factors playing a role are organizational culture, e.g., ambidextrous or specialized companies (Ferrary, 2011), and organizational capability, such as the capability to absorb external knowledge and to adapt to new opportunities (Chang et al., 2012; van de Vrande et al., 2009). Naturally, open innovation bears challenges and problems for companies. While these have largely been left apart in the literature, van de Vrande et al. capture some of these. While they realize a whole range of problems with regard to a variety of open innovation methods, the most prominent have been "organizational and cultural issues" (2009, p.453) related to the cooperation with external partners. Additionally the authors realize that there is a divergence between small and medium-sized companies with the latter being increasingly more involved with open innovation practices. According to van de Vrande et al. small enterprises are often missing the necessary resources to engage in open innovation practices. Complementarily Chang et al. (2012) do not elaborate on the barriers to open innovation, but on the specific organizational capabilities necessary to bring established enterprises to be radically innovative. Despite the tedious explanations on the relation between innovation capabilities, dynamic capabilities and organizational capabilities, Chang et al. recognizes absorptive capacity as essential for innovative capability of a firm. This concept of absorptive capacity will be looked at in more detail beneath.

Absorptive capacity is "a set of organizational routines and processes by which firms acquire, assimilate, transform, and exploit knowledge to produce a dynamic organizational capability" (Zahra & George, 2002, p.186).² This being the accepted description of absorptive capacity, the concept has been operationalized with varying aspects whereby the main focus of this section will be on the use of absorptive capacity in SMEs (Bougrain & Haudeville, 2002; Gray, 2006; Gruenberg-Bochard & Kreis-Hoyer, 2009; Muscio, 2007). Several findings have been overarching in these papers; firstly, there is agreement that human capital plays a

²Looking at the firm level, an essential characteristic for learning from external knowledge is the so called absorptive capacity (Cohen & Levinthal, 1990; Todorova & Durisin, 2007; Zahra & George, 2002). According to Zahra and George, absorptive capacity is "a set of organizational routines and processes by which firms acquire, assimilate, transform, and exploit knowledge to produce a dynamic organizational capability" (2002)p.186). Hereby, so Zahra and George, several factors play a role which influence if absorptive capacity leads to actual exploitation and commercialization of external knowledge (realized absorptive capacity) or if the company does not use the external knowledge which it has incorporated (potential absorptive capacity).

big role in the development of absorptive capacity (Bougrain & Haudeville, 2002; Gray, 2006; Gruenberg-Bochard & Kreis-Hoyer, 2009; Muscio, 2007). While the former three authors point to the importance of qualified and continuously trained employees, Gruenberg-Borchard and Kreis-Hoyer (2009) mention especially the decisive role of the entrepreneur. This latter view reminds of writings by Drucker, who holds the entrepreneur to be the most important factor in innovation and needs to learn how to "practice systemic innovation", meaning that the entrepreneur must be prepared to recognize innovation opportunity as well as to act upon it (Drucker, 1985, p.34). While the relevance of either the one or the other might depend upon the specific situation, the result seems to be in line with Cohen and Levinthal (1990), namely that the degree of prior knowledge or the learning capability is essential for the development of assimilation and exploitation of external knowledge.

As mentioned already by van de Vrande et al. (2009), company size is a relevant factor in innovation activity focused on external knowledge absorption. In particular, the literature accounts for a break in absorptive capacity on the verge between small and medium firms. Thereby Gray mentions specifically "smaller microfirms and self-employed" (2006, p.357) while Gruenberg-Horchard and Kreis-Hoyer (2009) frame their research by only looking at companies with ten or more employees. When looking at the impacts of firm size specifically, it is argued that small enterprises depend more on the personality and ability of the entrepreneur, while medium sized enterprises draw strength from the SME-typical advantages such as flexibility, employee commitment, efficient intra-firm communication, short decision channels, etc. Apart from the factors mentioned above, the concept of absorptive capacity is of course not exhaustive of the possible influences on the ability of SMEs to absorb and exploit external knowledge. Brettel and Cleven (2011), for instance, analyze why some companies use external knowledge in the product development while others shy away from using this means. Hereby they argue that the innovation culture of a company has significant influence on the use of external knowledge for innovation. In the same line, Denham and Kaberon (2012) argue that organizational culture is the core element to allow a culture of innovation.

Some authors argue that innovation can be divided into exploration and exploitation, which refers to two stages of innovation (Francis & Bessant, 2005; Lee et al., 2010; Tidd & Bessant, 2011). While the first stage concentrates on traditional R&D, for example the development of a new technology, the second stage focuses on the commercialization of the

product or the exploitation of the innovation "for market opportunity" (Lee et al., 2010, p.292). According to Tidd and Bessant (2011), exploration and exploitation are equal to radical and incremental innovation and, as established before, these innovations require different support systems:

The above-mentioned tension comes because the organizational routines needed to support these activities differ. Incremental exploitation innovation is about highly structured processes and often high-frequency small-scale innovation carried out within operating units. Radical innovation, by contrast, is occasional and high risk, often requires a specific and cross-functional combination of resources and a looser approach to organization and management (Tidd & Bessant, 2011, p.257).

Due to the lack of financial and human resource, innovation in SME should arguably concentrate on the exploitation stage. Hence one way for SMEs to integrate external and internal knowledge is by participating in innovation networks (Lee et al., 2010). Characteristics of networks and challenges of participating in such will be discussed in the following section.

2.3 Networks for innovation

Having concluded in the section above that one way for SMEs to implement open innovation is through networks, this section will analyze which network characteristics are relevant for conducting open innovation and which role intermediated networks or third parties play in this process. Going more into extremes, Konsti-Laakso et al. consider that SMEs can only conduct innovation through the use of networks, so to say as a "prerequisite for innovation" (2012, p.94). However, networks pose again new challenges which need to be taken into consideration to prepare for successful open innovation projects. These issues can be characteristics of the network, e.g. its density or openness and the intensity of the network ties (Hemphälä & Magnusson, 2012), as well as its organization (Lee et al., 2010). Furthermore, the type of network and its influence on innovation capability (Narula, 2004; Hemphälä & Magnusson, 2012; Jørgensen & Ulhøi, 2010; Konsti-Laakso et al., 2012), the outward circumstances when establishing networks and lastly the reflection of these issues in the execution of the network are important aspects.³

One important aspect of managing an innovation network is the network strategy, i.e. ensuring that all network members follow the same objective (van de Vrande et al., 2009). Similarly Vanhaverbeke argues that SMEs align their entire company strategy if they opt for implementing open innovation due to lack of resources (2012). While there is a number of possible strategies, the need for SMEs to focus on exploitation, hence the commercialization of innovation, has been argued before (Lee et al., 2010). Ferrary (2011) lifts this notion from a firm level to a network level. He finds that companies gain a greater competitive advantage if they are embedded in an innovating knowledge network while simultaneously following a company strategy of exploitation, meaning a strategy of acquisition and development. Despite the robustness of the findings, there are a few shortcomings in his work which do not allow generalizing it to SMEs without restraints. These are for instance the exclusive look at big companies with many resources. Secondly, the study is placed only in one industry, the telecommunication industry, as well as researching only one network, Silicon Valley in USA, which is an extreme case and can hardly be generalized or compared to small innovation networks in Germany. However, points to be retrieved are that a diverse network offering economic opportunities is more likely to develop a progressive dynamic.

Another network factor is the question of time for the success of networks. Supposedly, early network relationships, meaning contacts established at an early stage of the firm's life, are very influential for "learning and knowledge activities conducive to building innovation capacity" (Jørgensen & Ulhøi, 2010, p.402). It should be taken into consideration that the company researched operates within a new market, m-commerce, which might have created a unique collaboration environment. Therefore it is unclear if the findings also hold for SMEs and companies operating in other realms.

The characteristics of the network itself influence network relationships, innovation and intensity of results. Hemphälä and Magnusson (2012) for instance focus on the degree of

³Innovation, to a large extent, is a social and communicative process. Hence, interaction between individuals constitutes an important aspect of innovation activities, potentially influencing the emergence of ideas as well as their further refinement and realization. Thus, it is hardly surprising that a considerable body of [network] literature highlights the importance for information flow, exchange of ideas, access to resources, etc. (Hemphälä & Magnusson, 2012, p.3).

openness or density of the network and its results in innovative capacity. An open network is hereby defined as lose ties or participants coming from different industry sectors, while a dense network describes close relationships between participants, e.g. members within one company or members within the same industry sector. The findings suggest that open networks are more suitable to facilitate radical innovation whereas dense networks are more appropriate for incremental innovation. Therefore it is advisable to define the type of innovation aimed at in order to decide on the suitable network structure (Hemphälä & Magnusson, 2012). Additionally, Konsti-Laakso et al. (2012) look specifically at the network characteristics making participation worthwhile for SMEs. One decisive finding is the importance of adequate network partners as well as the role played by the innovation network facilitator and intermediaries (Konsti-Laakso et al., 2012).

As mentioned before, one of the biggest barriers to successful innovation for SMEs is a lack of resources and organizational capabilities especially with regard to the management of external contacts (Lee et al., 2010; Narula, 2004). Therefore, Lee et al. suggest that SMEs overcome obstacles to open innovation when participating in intermediated networks, meaning a collaboration of SMEs organized by a neutral third party. Despite the novelty of the topic, there is some research on the role of third parties in the (open) innovation process (Hemphälä & Magnusson, 2012; Howells, 2006; Lee et al., 2010; Ollila & Elmquist, 2011; van de Vrande et al., 2009). In order to generalize Lee et al.'s (2010) findings it would be necessary to look at cultural and social perspectives in order to account for the substantial differences between Korean and German firm settings. Nonetheless, Ollila and Elmquist (2011) support the above findings arguing that managing open innovation without an intermediary creates strong challenges. Hence open innovation networks managed by key role participants themselves pose problems for the management as well as for efficiency of the innovation platform due to a confusion of the role played by the company organizer (2011).

Trying to provide a common ground on which to analyze the role of third parties, Howells looks into "the role of intermediaries in innovation" (Howells, 2006, p.715). Hereby he finds that intermediaries have come to take on more complex roles than usually expected. Tasks reach from innovation management over participation in knowledge processing and research to validation and commercialization (p.720). Hence the brokerage role of intermediaries has increased significantly. While Howells arguably includes too many aspects of innovation intermediaries in his concept, the findings are nonetheless valuable for the understanding of the role of intermediaries in innovation networks.

2.4 Models of intermediated networks

Having glimpsed at the complexity of networks and network management, this section will analyze which model of intermediated networks reflects and adequately incorporates the complexity of innovation network management. One basic attempt to structure the tasks of intermediaries has been conducted by Lee et al., who categorize it into direct support (creating a network database, constructing a network, managing the network) and indirect support (furthering a culture of collaboration, facilitating collaboration) (2010). By adhering to these tasks, the authors argue that an intermediary can help SMEs to overcome their lack of resources, which, according to their findings, mainly show themselves in the exploitation stage of innovation. Supposedly an open innovation network can therefore be particularly attractive when it focuses on the back end of innovation, namely the commercialization stage.

After looking at various innovation intermediaries, also Chesbrough (2010) tries to break down the open innovation intermediation process into generalizable steps. Hereby he puts special emphasis on the protection of IP, which supposedly is the biggest barrier to innovation cooperation,⁴ but this danger and fear of IP loss or the problem of "accessing external information" (p.137) is one issue which intermediaries need to solve. Therefore he develops a five step scheme to be taken into consideration by intermediaries: (1) "define the problem", meaning to identify the specific innovation issue; (2) "managing and protecting identity", meaning for instance at which point in the process can the intermediary reveal the identity of the participants; (3) "demonstrate the value of [intermediary] services"; even though intermediaries can construct the set-up, it is not guaranteed that a successful innovation will result; (4) "fostering a two-sided market", referring to the question of how intermediaries can stir the development as to ensure sufficient demand and supply in the market, or in other words, how can they provide commercialization options; (5) "establish a strong, positive reputation", meaning that intermediaries need to gain trust and confidence to

⁴ He argues that companies have difficulties setting up cooperation themselves, due to the Arrow Information Paradox, which states that one actor needs to offer such an amount of internal and sensitive information in order to convince the other actor of the benefits of cooperating so that the second actor might as well use this information himself without cooperating at all (H. Chesbrough, Vanhaverbeke, & West, 2006; H. Chesbrough, 2010).

work with the companies (p.137-139). Although this five step approach seems sensible, it has been developed with large companies in mind. Hence when analyzing the intermediated networks for SMEs, not all aspects might be equally suitable.

Introducing something less abstract, Bullinger et al. (2004) suggest innovation networks to follow the roadmapping methodology which is a tool used in internal innovation practices. Basically this methodology describes an iterative process which requires the development of several roadmaps both for the network and the companies. It should touch upon the "innovation core, i.e. products, services and processes" (p.3350) in order to develop a firm strategy that can then be adjusted within the network. According to Bullinger et al. "[t]he adaptation process is an iterative process amongst all network partners with several feedback loops and adjustment activities" (2004, p.3350). Within this process, the members supposedly enjoy a socializing procedure enabling conflict-free cooperation. While this methodology describes a sound execution mechanism, which allows a clear moderating and organizing role for the intermediary, it can be doubted if this process is adequate for a network of SMEs. As argued before, SMEs operate under tight resource limitations and obtain the greatest benefit through concentration on exploitation. Since the roadmapping methodology involves a considerable amount of planning and iterations from all network participants before actual innovation takes place it does not seem suitable for SME innovation network management.

Another suggestion by Dooley and O'Sullivan orients itself at the innovation funnel and argues that each progressing level longs for more "structure of the innovation process" (2007, p.414), unfortunately without going more into detail on the question of execution. Furthermore, the authors develop a number of requirements for establishing a network such as hand-selecting members to the network, clarifying "ownership of intellectual property" (p.403) beforehand, providing an enabling communication infrastructure, and aiming at longterm cooperation. These requirements supposedly build the basis of a stable network through which the wider innovation process at the innovation funnel can occur. For the purpose of this thesis the concept of the innovation funnel already aims too far into the innovation process. Nonetheless the mentioned requirements, albeit surely not exhaustive, give a fairly good introduction to relevant points for network establishment. Despite the benefits of network participation, this practice has its price, especially for SMEs. As Narula (2004) points out, the amount of physical and financial resources required to participate in one or even more networks is significant. Additionally, being part of a network does not guarantee the success of innovation, it can even pose the danger of IP loss. Even Lee et al. (2010) argue that joining an intermediated network has to be evaluated carefully depending on the type of IP involved.

3. Operationalizing Theory for Open Innovation Networks

The former chapter laid the ground for defining an operationalized frame in which this thesis will operate and conduct the empirical analysis. However, not every aspect of theory mentioned neither can nor should be tested for within one empirical work. Therefore in this chapter several assumptions will be deducted from the literature review in order to guide the analysis. Recalling the research question as *how networks starting open innovation initiatives focused at SMEs overcome typical barriers such as lack of time, resources, fear of loss of IP, etc. and why this is not always successful despite acting as neutral network intermediary as suggested by Lee at al (2010), it is clear that this thesis aims at taking both and exploratory as well as explanatory approach to open innovation network theory and the possible divergence to the reality of open innovation initiatives targeting SMEs. Therefore this operationalized framework will take into consideration network and network intermediary as well as a few selected company characteristics in order to provide an explanation and a guideline for the success or failure of an innovation network.*

There are four main assumptions underlying the research question and underlying the theoretical framework. The first one establishes that out of changing economic circumstances SMEs will need to rely on open innovation in order to stay competitive (Chesbrough et al., 2006; Vanhaverbeke et al., 2012). Secondly, due to their lack of resources SMEs can only conduct open innovation by participating in open innovation networks (Lee et al., 2010; Ollila & Elmquist, 2011). Thirdly, open innovation networks should be guided by a neutral intermediary in order to avoid management problems (Ollila & Elmquist, 2011) and lastly open innovation initiative should focus on exploitation and commercialization in order to provide an immediate benefit for SMEs (Lee et al., 2010). Apart from these main assumptions it is important to deduct an adequate and measurable framework under which empirical data can be categorized and analyzed. Therefore the beneath section will introduce several variables retrieved from the literature review. These will then be analyzed in the empirical research.

As the varying theories have been discussed in the literature review, this thesis retrieves certain assumptions surrounding the topic network, intermediaries, and participating SMEs. From these three categories, which have been identified as the most relevant topics in the creation of open innovation networks several subcategories are retrieved to guide the analysis. These subcategories are:

- **Network:** Objective and goal, structure, means of selecting and choosing members, strategy, operative approach, type of network relationships, type of innovation
- **Intermediaries:** type of intermediary, role of project partner, tasks of project partners, felt progress of project, type of cooperation, communication with companies, climate of trust
- SMEs: reaction of SMEs, reasons to join / not to join a network, time investment, treatment of IP, type of company, position of participant, industry sector, absorptive capacity, commercialization opportunities

Even though all aspects discussed in the literature review have some relevance for open innovation networks or initiatives focused on SMEs, it needs to be taken into consideration that not all of these can be analyzed within one set of empirical research. Since this thesis tries to understand the perspective of neutral intermediaries, also the theory will be operationalized with this in mind.

3.1 Network

The objective of the network should be defined clearly so that all network partners and participants will be able to direct their actions towards the same goal (van de Vrande et al., 2009; Vanhaverbeke et al., 2012). This is particularly important to ensure a smooth project management. Furthermore, having mentioned the objective of the open innovation network it is interesting to review what specific type of innovation, i.e. radical, incremental, product/service, process, position or paradigm, the network is aiming at. Due to the link between characteristics of networks and innovation outcome discussed in the former chapter, the coherence between innovation objective and network structure is highly relevant (Hemphälä & Magnusson, 2012; Löfqvist, 2010). Hereby it has been argued that dense networks rather facilitate incremental innovation, while open networks might enable radical innovation. Hence the type of innovation envisioned should be matched with the network structure established.

Furthermore several authors (Konsti-Laakso et al., 2012; Dooley & O'Sullivan, 2007) mention the importance of selecting participating companies or organizations carefully to make the network more attractive for participation, to combine complementing skills, as well as to ensure smooth cooperation. Additionally to selecting members offering complementary

skills it is also important that the network in general provides opportunities for innovation exploitation. Despite the fact that this has been mentioned by several authors (Lee et al., 2010; Ferrary, 2011) the means of providing exploitation opportunities remain fuzzy and not always tangible. How exploitation opportunity might be applied practically will be a point for observation. Lastly the protection of IP (Chesbrough, 2010; Dooley & O'Sullivan, 2007) as well as a general climate of trust between the network members is an essential prerequisite for open innovation management (Ollila & Elmquist, 2011).

3.2 Intermediary

One of the basic assumptions of this thesis is that open innovation networks should be organized by a neutral third party (Lee et al., 2010), a so called intermediary whose role is unambiguous, meaning that there is no suspicion of hidden agendas or other compromising issues (Ollila & Elmquist, 2011). While the networks for research have been selected with this criterion in mind it will nonetheless be interesting to see if this neutral role is perceived equally by network partners. When analyzing the role of intermediaries also the specific tasks, e.g. innovation management, knowledge processing, research, validation, commercialization, etc. are essential due to their increasing scope (Howells, 2006). Once single tasks and roles have been identified, it can be analyzed in how far any of the previously discussed intermediary processes encompass the observed practices (H. Chesbrough, 2010; Bullinger et al., 2004; Dooley & O'Sullivan, 2007; Lee et al., 2010).

Whereas the above mentioned points describe very technical aspects of the concept innovation intermediary, it will particularly be interesting to look at social dimensions between the network partners, i.e. communication and cooperation, since the empirical research will provide direct contacts with intermediaries. Thus to verify observational impressions, personal satisfaction with the progress of the project as well as with the cooperation with other project partners can be looked at.

3.3 SMEs

Many of the previously discussed aspects affect the participation of SMEs in open innovation networks. Despite economic developments which favor open innovation as well as a long list of supposed benefits (Vanhaverbeke et al., 2012; H. Chesbrough et al., 2006) there exists also a lot of skepticism, fear and a long list of resource constraints by SMEs (van de 28 Vrande et al., 2009; Narula, 2004). Hence the reaction of SMEs towards open innovation will be observed in the networks. Apart from this reaction based on emotions, there are also a number of fact-outcome relationships that can be developed. These obstacles are the typical barriers which need to be overcome in open innovation networks: Firstly, due to time and human resource constraints, SMEs will not participate in open innovation networks if the method of cooperation is too time consuming (Narula, 2004). Secondly, due to financial constraints SMEs will not indulge in open innovation networks, if participation is too expensive (Narula, 2004). Thirdly, due to concentration on exploitation, SMEs will not participate if the advantage or benefit is not obvious (Tidd & Bessant, 2011). Forthly, due to fear of loss of IP, SMEs will not participate if treatment of IP is not clarified (Chesbrough, 2010; Dooley & O'Sullivan, 2007). Deducting from this the amount of time, human resources, and money necessary to participate as well as the fear to lose IP and competitive advantage are decisive constraints, whereas the possible benefits and options for commercialization might be used as positive motivation.

Leaving the typical barriers to open innovation, there are other points which network intermediaries need to take into consideration in order to set up networks successfully. One of these is for instance the strategy and the business model of the SME which supposedly should be aligned with open innovation (Vanhaverbeke et al., 2012). Furthermore, the age of companies might play a role in their perceptiveness of outward influences (Jørgensen & Ulhøi, 2010). Hence these might be important points when aiming at cooperation open innovation methods based on cooperation. Additionally, company size can act as a breaking point for participation in open innovation activities with ten employees being identified as the smallest possible size (van de Vrande et al., 2009). Lastly, even though there is hardly any literature on this, the respective industry sector should be taken into consideration when observing the willingness of companies to participate since there have been slight indications that the information and communications technology (ICT) sector might be more open towards cooperative models of innovation than other industry sectors (Jørgensen & Ulhøi, 2010; Ferrary, 2011).

Having convinced companies to participate some authors argue that not all companies have the same capacity to benefit from external knowledge inflows (Ferrary, 2011; Chang et al., 2012; van de Vrande et al., 2009; Zahra & George, 2002). While several concepts such as organizational culture, ambidextrous companies, innovation culture and absorptive capacity

were discussed, it is difficult to gain an insight in these company characteristics while being outside the firm. However, absorptive capacity has been broken down into several tangible facts. One of them is the degree of prior knowledge which can be influenced through continuous training of employees (Bougrain & Haudeville, 2002; Gray, 2006; Gruenberg-Bochard & Kreis-Hoyer, 2009; Muscio, 2007). Additionally, the size of SMEs plays a role for the capability to absorb and act upon external knowledge. Small SMEs, mainly up to ten employees, are perceived to be dependent on the innovativeness of the entrepreneurs, while medium-sized SMEs also function due to flexibility, employee commitment and short communication and decision channels (Gray, 2006; Gruenberg-Bochard & Kreis-Hoyer, 2009).

3.4 Operationalized Framework

3.4.1 Reflection of typical barriers

Having carved out the above discussed variables the analysis will proceed in three steps. In the first part the operational approach of the three networks will be looked at in order to create a basis for understanding. In the second part the analysis will focus on the exploratory question of how networks incite SMEs to overcome typical barriers of open innovation. Particularly the analysis will look at the constraints time, human resources and financials as well as fear of loss of IP and the type of exploitation opportunity offered. Hereby the analysis will observe in how far the open innovation initiatives reflect on these typical barriers in their set up. Thereby a ranking of initiatives will be developed. Table 3.1 will visualize the outcome.

	Time	Human	Financial	Protection of IP	Exploitation opportunities
OpenAlps					
smart businessIT					

TTC					
O = not reflected; + = minimally reflected; ++ = partially reflected ; +++ = fully reflected					

3.4.2 Remaining Obstacles: Model of Small Group Development

As a final stage of the analysis, this thesis will move to an explanatory level with the objective to find explanations or even a pattern as to why open innovation initiatives are not always successful despite acting as neutral network intermediaries as suggested by Lee et al. (2010). Hereby one aspect has caught attention during the discussion of influential factors on this chapter. Whereas most intermediary literature concern functionality (Lee et al., 2010) and operational approaches of intermediary networks (Bullinger et al., 2004; Chesbrough, 2010; Dooley & O'Sullivan, 2007), only few have in mind the relationships between intermediary networks and network members (Ollila & Elmquist, 2011). However, social dimensions between intermediary networks have so far not been taken into consideration. Social dimensions, especially with regard team dynamics and performance, can play a role in the construction of cooperation between intermediary networks. Therefore, this thesis will observe in how far remaining issues inhibiting success of open innovation initiatives can be operationalized through Tuckman and Jensen's model of group development (Tuckman & Jensen, 1977).

This model (Figure 3.1) uses five stages called forming, storming, norming, performing and adjouring, to describe phases of group development. Firstly the forming stage describes how groups are formed (first quarter of circle), objectives and working modes identified, and "relationships with leaders" developed (Bonebright, 2010, p.113). The second stage, storming (second quarter of circle), is usually marked by group conflict and hostility between the group members. Thirdly, norming (third quarter of





circle) contains development of cohesion and acceptance between group members. Fourthly, at the performing stage (fourth quarter of circle) groups finally start to direct activity and energy in an efficient and synergetic way and can focus undisturbed by interpersonal or team

trouble on executing tasks. The last stage, adjourning, describes the termination of team work e.g. due to external circumstances (Bonebright, 2010; Gilley, Morris, Waite, Coates, & Veliquette, 2010; Tuckman & Jensen, 1977). Due to the fact that the empirical analysis observes open innovation initiatives that are still in a period of operation, this final stage is superfluous for analysis. Figure 3.1 visualizes the model.

4. Methodological framework

4.1 Methodology

In order to ensure the validity and reliability of the empirical research of this thesis, this chapter will develop the underlying methodology and the research method conducted. Since it is the aim of this thesis to give an exploratory and explanatory insight into the operation of networks initiating open innovation projects the research needs to be conducted under specific premises. Since particularly the relation between actors as well their conditioning by outside circumstances is assumed to be relevant, this leads to the assumption that success of open innovation initiatives is largely based on interaction between network partners. Therefore the research approach is based on a socially constructive ontology. The research set-up is twofold, consisting of 15 semi-structured, qualitative interviews were conducted. The first eight of these interviews were in-depths interviews targeting the intermediary organizations and lasting between 85 and 105 minutes, while seven were short interviews of two to five minutes. These short interviews complemented the second pillar of the research, which was a participatory observation conducted at one open innovation event. The research is based on a deductive approach for the exploratory analysis of how networks overcome typical SMEbarriers. Therefore the previously introduced operational framework has been introduced. Furthermore the explanatory question of why these networks are not always successful despite acting as neutral intermediaries as suggested by Lee et al. (Lee et al., 2010) follows an inductive approach with the objective to establish patterns from the observed practices.

Having explained the methodological approach of this thesis, the coming section will introduce the research method by looking at the selection of networks as well as the set-up of contacts and access to networks. It will then proceed to explaining the development of the interview questionnaire and the nature of the participatory observation. Subsequently, the type of qualitative data analysis will be discussed. As a last step, some points of critique will be introduced which need to be taken into consideration in order to assess the reliability of data.

4.2 Research Method

4.2.1 Selection of Networks

This thesis is based on an intense analysis of three open innovation initiatives called OpenAlps, smart businessIT and TTC. These three initiatives were all set-up by a German lead-partner though not focusing solely on Germany. On the one side the three open innovation initiatives have been selected due to their similarities regarding the basic assumptions which are the following: Firstly, all three initiatives primarily target SMEs. They therefore face similar challenges such as overcoming the previously discussed typical barriers of SMEs, as well as operative challenges such as recruiting and selecting member companies, communicating efficiently with companies and among each other, etc. Secondly, all lead partners of the initiatives are economic support networks and function as intermediaries offering services and support mainly to SMEs. Consequently, the intermediary networks have no own interest in resulting innovations. Thirdly, all initiatives use open innovation either completely or partially as an instrument to enhance local economy. Hereby all initiatives follow the idea that open innovation is useful and increasingly unavoidable to maintain the competitive capacity of SMEs. Hence, the basic assumptions of the theoretical framework are satisfied by the initiatives and thus analyzing these initiatives should provide comparable outcomes.

Apart from similarities based on theoretical assumptions, the initiatives also resemble each other with regard to their project length, three to four years, and starting points, January to July 2011. However there are also differences which have to be taken into consideration. Hereby it is noteworthy that the initiatives focus partially on different industry sectors. This means that characteristics inherent to industry sectors might lead to incomparable outcomes. Furthermore, the lead and project partners vary in the degree of experience in cooperation for innovation as well as for instance the degree of experience in EU project execution. Additionally the amount of project partners differs between three, nine, and nineteen, which might influence the comparability of cooperation. Finally, two projects, OpenAlps and TTC, are cross-border initiatives and hence also operate outside Germany while smart businessIT is solely based in the German Federal Land Baden-Württemberg. However, this thesis bases its research on the analysis of three networks in order to obtain a wider picture as well as to be able to cross-cut information, thereby find regular patterns and thus establish a basis for validity of generalizability of findings.

4.2.2 Set-Up

The three open innovation projects have been identified through a profound process of scanning Germany's network, cluster, and innovation landscape both through a web based keyword search and through national and federal network and cluster catalogues such as Kompetenznetze Deutschland⁵ and Clusterdatenbank Baden-Württemberg.⁶ Finding adequate case studies was complicated particularly by two circumstances: Either networks for innovation do not use open innovation or they are still in a premature phase and refuse collaboration. For example OpenAlps had been identified as suitable network and contacted via email as early as July 10th 2012. However, after an initial phone conversation, the responsible lead partner commented the project status as too early to provide valuable insights. The same response was initially given by the City of Aachen who was contacted on behalf of TTC also on July 10th 2012. Despite a thematic fit of these two open innovation initiatives, collaboration was refused. Only after more research and an adaptation of the research question which shifted the focus from SMEs to the operating networks itself was it possible to gain access to the networks. Interestingly under the changed premises smart businessIT was identified by one project partner herself as suitable case study. Being located in a hub of network activities in the same building in Stuttgart, this project partner of smart businessIT established the contact to the second German project partner of OpenAlps. From the very beginning this partner had an intrinsic interest in the research of this thesis in order to gain a deeper understanding of the project OpenAlps. Having obtained the support of one partner of each project, accessibility of all (German) project partners was ensured. Hence a period of around three months elapsed between establishing first contact and conducting interviews with the respective organizations.

Once suitable open innovation initiatives had been identified and collaboration was agreed upon, project partner organizations were contacted. In the case of OpenAlps and TTC, which both work together with project partners abroad, the focus was placed on the German partners. Thereby the intention was to talk to one person, possibly the main responsible, from each (German) partner organization. This was only successful in the case of OpenAlps. Due to similarity in names and inconsistent depiction on the web page, the difference between the lead partner of smart businessIT, CyberForum Service GmbH, and the project partner and

⁵ Kompetenznetze Deutschland: <u>http://www.kompetenznetze.de/</u> as of 01-12-2012.

⁶ Clusterdatenbank Baden-Württemberg: <u>http://www.clusterdatenbank-bw.de/</u> as of 01-12-2012.

local network CyberForum e.V. was only clarified during the interviews and could not be followed up anymore. In case of TTC the responsible of the fourth German project partner, Regina e.V., was not available for an extended period of over a month and could therefore not be interviewed. For these different reasons, the final outcome are eight semi-structured indepth interviews. However, it has to be noted that the interview at TTC partner LifeTec Aachen-Jülich e.V. turned out to be an ad hoc group interview with two employees of this organization, although the second employee only participated in the interview between 1:15h - 1:50h were conducted. Of these interviews seven were one-on-one with responsible project partners, while one was one-on-two. The interviews were held in German.

4.2.3 Interview questions

The interview questions, to be found in the Appendix 9.1, were guided by the theoretical assumptions discussed in Chapter 3 and therefore divided into three thematic clusters: network, intermediary, and SMEs. In the first segment of question, a general understanding of the open innovation project, the type of innovation method envisioned, and the innovation aimed at as well as the general operational approach were targeted. Examples of questions in this section are:

- (4) What type of innovation should be reached or enhanced?
- (5) How does the project want to reach this?
- (9) How do you recruit new project members / companies?

By this, information on the relation between the type of innovation, innovation methods, as well as network characteristics was sought. Having thereby gained an understanding of the open innovation initiative, the next segment of questions retrieved information on the social dimension of working in this project both between project partners and between participating companies. Examples are:

- (17) What is your task in the project?
- (23) How do you see the tasks of the other project partners?
- (24) How does cooperation between project partners function?
(27) How do you interact with companies?

These questions were designed to obtain cross-cutting data between the project partners. This means that potential differences between a project partner's own understanding of her or his tasks and the perception of others were detected. In addition, open questions such as

(19/20) What is going well / not so well in the project?

(22) Are you happy with your role in the project? What would you like to change?

gave the interviewees the opportunity to tell his or her own general perception of the project without being directed to specific aspects through the question. Finally in the last segment, the interaction between the intermediary network and SMEs was targeted. Particularly the awareness of the discussed typical barriers – time, human resources, money, IP loss, and exploitation opportunities – was tested. Hereby the questions operated on two levels: firstly on a general level, and secondly on a project level. Examples are:

(32) Which fears do SMEs have when they get in touch with open innovation?

(29) What are reactions of SMEs to the project?

Lastly, questions with regard to exploitation opportunities, both financially and knowledgewise, were asked in order to account for the assumption that SMEs only participate in open innovation activities if there are clear exploitation opportunities.

4.2.4 Participatory observation

Additionally to the semi-structured, in-depths interviews, the empirical work is also based on a participatory observation at the first e-health lab taking place on October 9th, 2012, organized by OpenAlps. Hereby the observational focus was especially targeted at the set-up and communication of open innovation as well as the reaction of participants to this. Having the format of an open brainstorm and idea generation discussion, active participatory observation was possible. In order to add to the observational perception of participant's reaction, a short semi-structured interview guide was designed and posed to participants at different points during the e-health lab. Hereby the questions were designed to firstly capture the momentary spirit and reaction to open innovation, but secondly also to verify certain assumptions with regard to company characteristics. Such characteristics are the degree of prior knowledge, company size, company position of participant, and motivation for attendance. The assumptions have been retrieved from the literature. The questions can also be found in the appendix. Hereby of the eight external people attending, seven could be interviewed.

4.2.5 Qualitative Data Analysis

The qualitative data of the eight in-depths interviews was analyzed based on the preconceived assumptions which served as a provisional coding and hence followed the larger structure: network, intermediary, SMEs. Within this structure, the data was grouped according to the question and the underlying assumption and then condensed to emphasize the critical aspects of the data. During this analysis and condensation of data, some questions were identified to be repetitive and/or superfluous and to not produce new insights. Examples are question 15 to 17 or questions 34 to 36, which were therefore merged into one respective amount of data. In additional to eliminating questions and merging data, new insights were created which had not been accounted for in the operationalized theory. From these insights, new data blocks were designed which evolve around the following themes: setting-up and project bureaucracy, cultural differences, companies in crisis, and future perspective. The data was subsequently organized in a table which facilitated both vertical, meaning project internal analysis, and horizontal, meaning cross-project analysis. Thereby information was identified, evaluated for its coherence and relevance by comparing it to insights provided by other interviewees and, in case of divergence, cross-validated through data given by a third interviewee. The complete condensed table of data can be found in Appendix 9.3. Moreover, data from the participatory observation has been analyzed through the use of analytical notes and summaries, whereas the seven short interviews underwent a coding exercise.

4.2.6 Critique

Despite the general positive outcome of the empirical research, there are some drawbacks which should be discussed. First of all, as mentioned shortly before, not all German project partners were interviewed. This is the case for CyberForum e.V and Regina e.V.. In the case of CyberForum e.V. this is probably not problematic due to the similarity in tasks to the other project partners as well as the similarity of the organizational background to the lead partner and mother company, CyberForum Serviec GmbH. However, in the case of Regina e.V., the additional interview could have created valuable new insights especially with regard to the operative success of the ICT group of TTC. Also the data could have been used

to cross-validate information given by the project partners City of Aachen and LifeTec Aachen-Jülich e.V.. A deeper insight into why the life science sector of TTC seems to be lagging behind the rest of the project could thereby possibly have been provided.

Secondly and in a similar line, information on OpenAlps should be verified by a third source. However, due to the fact that there are only two German organizations working on this project, their statements stand against each other. Thirdly, there have been some operational difficulties throughout the empirical research. After the initial two interviews, which also functioned as pilot interviews, the semi-structured interview guideline was adapted in wording. Furthermore, two organizations were willing to contribute with only one hour for the interview so that questions had to be selected by relevance. This could push the retrieved data into certain directions. Lastly due to a very condensed interview and observation schedule between October 2nd and October 11th 2012, the amount of time for reflection between interviews and observation was very limited and could hence have negatively influenced the profoundness of data. However, this has been counteracted to a certain degree through interview summaries made between the meetings.

5. Setting the Scene

In order to understand and to contextualize this thesis adequately, it is essential to gain knowledge on the economic and political situation of SMEs in Germany as well as to obtain an understanding of the open innovation initiatives that will be analyzed. Therefore this chapter will set the scene for the coming analysis by firstly explaining the position of SMEs in the German economy, and secondly by reflecting on the negative self-perception of this strong economic group and discussing in how far this is supported by statistical data. Having hence analyzed the importance of SMEs for the German economy, this chapter will move to assess current policies on innovation on a German level as well as introducing two EU funding programs underlying two of the three open innovation initiatives. Lastly this chapter will introduce the three open innovation initiatives to be analyzed: OpenAlps, smart businessIT, and TTC.

5.1 SMEs in Germany

While the disadvantages based on lack of resources are generally the same for all SMEs worldwide (Lee et al., 2010), it is nonetheless necessary to look at the specific national economic and political situation of SMEs in Germany. Even though this thesis focuses on German SMEs as participants in open innovation initiatives, it will nonetheless employ the European definition of SMEs since also the respective funding programs of the initiatives in question follow these guidelines. Hence a firm belongs to the category SME if it employs "fewer than 250 persons" and has "either an annual turnover not exceeding 50 million euro, or an annual balance sheet total not exceeding 43 million euro" (European Commission, 2005). Within the term SME, the EU definition divides furthermore between micro-, small- and medium-sized companies with the thresholds of less than ten, less than 50, and less than 250 employees, respectively (European Commission, 2005).

Traditionally, SMEs have been a stronghold of the German economy (BMWI, 2012b). As statistics from the IfM Bonn show, 99,7% of all registered German companies have been SMEs in 2009 producing 39,1% of the annual turnover, as well as providing jobs for 60,8% of all employees subject to social security contribution (IfM Bonn, 2011). In early 2012, the German chamber of industry and commerce (DIHK) finds that the sector of SMEs holds an overall positive attitude towards the economic development in 2012, even though slightly less optimistic than in 2011. Throughout the statistics, SMEs are catching up or even equaling out with their larger sized competitors in terms of economic growth. Despite the positive outlook,

the DIHK report also identifies future risk factors, particularly stressing the rising cost of energy and raw materials as well as the unstable economic policy of the German government caused by the Euro crisis (DIHK - Bereich Wirtschaftspolitik, Mittelstand, Innovation, 2012).⁷

Reflecting the above described findings on a larger scale, the Innovation Union Scoreboard, an innovation measurement tool funded by the European Commission, gives a good indication on the current stand in European comparison⁸ and demonstrates two tendencies for Germany. One is the sharp decline in non-R&D innovation expenditure by 4.8% in comparison to the previous year. Additionally it can be observed that Germany has a below-average performance in "SMEs collaborating with others" (European Commission, 2012d, p.29). These are interesting developments when considering them from an open innovation perspective, because open innovation is often non-R&D focused, but concentrates on innovation of services and the development of synergies (Chesbrough, 2011; Chesbrough, 2010).

Having looked at the economic situation and tendencies in innovativeness, it is interesting to also look at the self-perception of SMEs. In 2006, the annual meeting of entrepreneurs and experts on medium-sized businesses, the Expertenforum Mittelstand, discussed innovation power and innovativeness of German SMEs. During this conference, a break was detected with the former self-perception of Germany as a 'nation of inventors', as common word has it. In the post-conference report, Berger sums up that this is caused by a number of developments of both national and global perspective (Berger, 2006). According to the discussion there is a general trend towards "continuous improvement instead of flashes of genius" (p.13) which is in accordance with the increase of incremental innovation in comparison to radical innovation as discussed in the chapter 2 (Chesbrough et al., 2006; Tidd & Bessant, 2011). As one main outcome, the Expertenforum Mittelstand concluded that on a national level the citizen's critical attitude towards innovation is a major stagnation factor. Hereby they argue that innovation is not seen as an unambiguously positive development anymore. Apparently the potentially destructible force of some innovations, such as negative aspects of atomic power or danger to the environment, have instilled a rather skeptical attitude

⁷ Note that both the IfM and the DIHK follow the German definition of SME, which includes companies fewer than 500 employees. This has to be taken into account when reading these prognoses.

⁸ According to the latest eddition German technological innovation potential has improved in 2011 (European Commission, 2012a). This European Commission instrument to compare EU member states' innovation behavior allocated a third place to Germany among the most innovative European countries.

towards innovation which is difficult to overcome. Moreover the tendency to secrecy and isolation within firms is a big hindrance to a "creativity-friendly climate" (p.20). Hence the expert forum concludes that generally speaking company cultures need to open up to change. Summing up, while the topic innovation is discussed in medium-sized businesses, there is a reflection on the increased obstacles towards innovation both globally as well as internally to the company.

5.2 German and European Funding Programs

Having explained the general situation of SMEs in Germany, this thesis will now proceed to introduce innovation funding programs in Germany. Additionally the two EU funding programs which aim at increasing innovation and competitiveness and are the enabling source for the open innovation initiative OpenAlps and TTC will be introduced.

Table 5.1: Overview	of national	innovation	funding	programs	1999-2014 t	by the	Ministry of
Economy and Techno	ology						

Funding Program	Period	Objectives
PRO INNO PROgramm INNOvationskompetenz mittelständischer Unternehmen(BMWI, n.d.a)	1999 – 2003	 Improve innovative capacity of SMEs Increase international competitiveness of SMEs Increase growth and employment in SMEs
PRO INNO II(Braßler, Möller, & Voigt, 2008)	January 2004 - June 2008	- Sustainably support SMEs in strengthening innovativeness and competitiveness through innovation and technology
NEMO (Netzwerkmanagement Ost)(Braßler, Möller, & Voigt, 2009)	2002 – 2007	 Support construction of regional networks for innovation in the new federal states Strengthen market position of SMEs through supporting the use of external technology and business management services Increase technological competence of SMEs in new federal states
ZIM (Zentrales	July 2008 – December	 Nationwide support program open to SMEs from all industry sectors and cooperating R&D institutes

Innovationsprogramm Mittelstand)(BMWI, n.d.b)	2014	-	Previous support program PRO INNO included through one module for cooperation projects	
New innovation concept(BMWI, 2012a)	1 st June 2012	- - -	Enlarging ZIM budget Making it available to companies up to 500 employees Strengthen clusters Support international cluster development	

Influenced by the financial crisis, the German government has put special emphasis on supporting SMEs generally and their innovation processes in particular (BMWI, 2012b). Thereby the current main support program is the *Zentrales Innovationsprogramm Mittelstand* (ZIM) running until December 2014 (BMWI, n.d.b). Among other aspects it focuses specifically at enhancing cooperation between SMEs and R&D institutes. This has even been strengthened through the new innovation concept introduced by the Minister of Economy and Technology on June 1st, 2012, stressing the increased support for national and international cluster development. Through these programs the government supports its outspoken goal which is to ensure that Germany remains technology exporter number one in the world as well as improving its innovation economy as to compete with the globally leading industries (BMWI, 2012a). Table 5.1 shows an overview of the innovation funding programs from 1999 to 2014 by the Ministry of Economics and Technology. Throughout these initiatives, the cluster and cooperation aspect increasingly gains relevance on a national and international level.

Looking at the European level there is also strong recognition of the importance of innovation. Therefore the EU developed a new and simplified framework program for research and innovation called Horizon 2020 which will provide 80 billion Euro funding from 2014 to 2020 (European Commission, 2012b). Next to this strategy, the EU also enhances innovation as one means of regional economic development. Hence EU regional policy aims at "job creation, competitiveness, economic growth, improved quality of life and sustainable development" (European Commission, 2012e). Within this policy field, several funds have been set up with the aim to accomplish these objectives. Among these is the European Regional Development Fund (ERDF) which targets European territorial cooperation (European Commission, 2012c). In order to fulfill this goal, the ERDF designed various programs, two of them being INTERREG and the Alpine Space Programme. While the

former provides funding for the project TTC under version INTERREG IV A ending in 2013 (Euregio Maas Rhin, n.d.), the latter "is the EU transnational cooperation programme for the Alps" and thus is the sponsor of OpenAlps (Alpine Space Programme, n.d.).

This short overview demonstrated that SMEs are highly relevant to the German economy and thus there is a strong focus on enhancing innovation both on a national and European level. Having finally introduced two of the three relevant funding programs of this thesis, the next section will introduce the open innovation initiatives in detail. Map 5.1 gives an overview of the geographical location of the initiatives.

Figure 5.1: Geographical Overview of Researched Open Innovation Initiatives



5.3 Presenting: Open Innovation Initiatives

5.3.1 Open Alps

The official objective of OpenAlps is to "contribute to the strengthening of competitive capacity of SMEs in the Alpine region by supporting the integration of open innovation methods into the current innovation processes" (John, n.d.). Within this project the Alpine countries Germany, France, Italy, Austria, and

Table 5.2: OpenAlps			
Location	Alpine Sapce region: Germany, France, Italy, Austria, Slovenia		
Project partners	9		
Lead partner	IHKSchwarzwald-Baar-Heuberg,Villingen-Schwenningen, Germany		
Period	July 2011 – June 2014		
Funds	2,6 Million Euro		

Slovenia cooperate and constitute a cross-border initiative under the Alpine Space Programme of the EU ERDF. With regard to the Alpine Space Programme it has to be noted that not the entire country but only the mountain (or alpine) areas are eligible to funding from the program due to the identification of characteristically similar regions regardless of national borders. This geographical limitation leads, for example, to including the Southern third of the federal state Baden-Württemberg while excluding the rest of the state (Map 1). As usual for EU programs the projects spans a period of three years from July 2011 until June 2014. At the point of the interview the project has hence been operating for almost 15 months. For the total project period, the budget amounts to 2,6 Million Euro which is a combination of 76% EU funds and 24% national equity contribution.

In total there are nine project partners consisting of regional innovation and economic development agencies, one university, and one environmental foundation collaborating throughout the five countries. This means that all project partners are by definition neutral intermediaries whereas the regional innovation and economic development agencies even are networks. On the German side there are two partners, the chamber of industry and commerce of the respective alpine area (IHK Schwarzwald-Baar-Heuberg) and the Innovation Agency for ICT and Media (MFG) of the German federal state Baden-Württemberg. Rhe former is thereby also the lead partner of the project and hence the applicant to the Alpine Space Programme. Due to geographical accessibility, the analysis of this initiative is based on two

in-depth interviews with the German project partners and seven short interviews with participants of the first open innovation lab organized in October. The analysis furthermore includes observations from this open innovation lab.

5.3.2 Smart Business IT

The objective of smart business IT is threefold and contains "bringing together (1)business software providers and potential business software users to create innovative methods and products" for instance also by promoting living (2) supporting knowledge labs; transfer between the clusters by

Table 5.3: Project B			
Location	German federal state: Baden-Württmberg		
Project partners	4		
Lead partner	Cyber Forum Service GmbH, Karlsruhe		
Period	June 2011 – June 2015		
Funds	n.d.		

developing event series and road shows; (3) developing measures to fight the IT skills shortage in the state (Schermann, n.d.). The initiative covers the entire federal state Baden-Württemberg with the four project partners being spread out over the three main areas of the state, North-Baden, South-Baden and Württemberg. Hereby the partners are firstly the project leader, Cyber Forum Service GmbH in Karlsruhe, who is a local company offering services for IT software businesses; even though similar in name the local network, Cyber Forum e.V.⁹ acts independently from its mother company as the local network of the project¹⁰. Secondly the initiative includes the state-wide business association for IT companies, bwcon, in Stuttgart¹¹; and lastly a local network for media and IT (formerly known as media forum freiburg, mff), which was merged during the project period with bwcon and is now called bwcon-Südwest. Being funded by the federal ministry of science, research and art, the project period actually lasts for four years from June 2011 and thereby differs from the other two projects. The amount of funding is not known.

⁹ Cyber Forum Service GmbH [Note by author: Gesellschaft mit beschränkter Haftung – this is a German form of a limited liability company] is a service company supporting local IT companies. It has been constructed in combination with the Cyber Forum e.V. [Note by author: eingetragene Verein – one German legal form for officially registered non-profit organizations], which acts as local network for It companies engaging in business software production.

¹⁰ This project partner has not been interviewed and will therefore not receive a numbering for analysis.

¹¹ The same structure as described in the footnote above has also been chosen for the OpenAlps project partner, MFG, in Stuttgart and the smart businessIT partner bwcon. While the former is the state-funded media and IT innovation agency, the latter is a business association for IT, which also operates in conjunction with MFG.

5.3.3 Top Technology Cluster (TTC)

The objective of TTC is to enhance cross-border innovation cooperation in the Euregio

Maas-Rhine which is a border area between The Netherlands, Belgium, and Germany. Thereby TTC resulted from a process lasting since 2004 when the mayors of the regional capitals Eindhoven, Leuven, and Aachen decided to start cross-border cooperation due to strong and similar technological profiles. The project period of TTC started in January 2011 and will last for three years until the end of the year 2013. Hence the

Table 5.4: Top Technology Cluster					
Location	Euregio: border areas of Belgium,				
	Germany, Netherlands				
Project partners	19				
Project leader	AGIT				
Period	January 2011 – December 2013				
Funds	TTC: 5 Mio €				
	GCS: 5,5 Mio €				

project has already passed through more than half of its funding period. Due to bureaucratic difficulties the project was split up into two closely cooperating entities, TTC and *Grenzüberschreitender Cluster Stimulus* (GCS), which together combine a budget of 10,5 million Euro funded by the EU INTERREG IV A program. In total the project contains 19 project partners and focuses on four specifically strong industry sectors of the region: energy, life sciences, advanced materials, and ICT. There were three project partners interviewed: the lead partner AGIT, an economy support organization with strong focus on innovation and knowledge transfer, which is situated in Aachen in the German federal state of North Rhine-Westphalia. Further project partners are the City of Aachen, whose interest in this project is the enhancement of the energy sector area; LifeTec Aachen-Jülich e.V., which is the association for life science of the area; and lastly the regional industry association for IT, Regina e.V..

Having set the scene for analysis through this chapter, the thesis will now move on to analyze the above introduced open innovation initiatives. Thereby the analysis will proceed in three steps: by looking at the operational approach of each network; observing how the initiatives overcome typical barriers of SMEs to engage in open innovation; and lastly by looking at the remaining obstacles to success.

6. Analysis

In order to answer the research question, this section will proceed by first introducing the operational approaches and giving a short overview of the progress and success of the initiatives. Having set the basis for understanding, this thesis will proceed to answering the exploratory part of the research question, namely analyzing how the different initiatives tackle typical SME-barriers to open innovation. After this, the analysis will proceed to an explanatory level by observing why the initiatives are not always successful despite acting as neutral intermediaries as suggested by Lee et al. (2010).

6.1 Operational Approaches

6.1.1 OpenAlps

In Germany, OpenAlps focuses on two types of open innovation: The establishment of SME cooperation which is initiated through open innovation labs, and R&D cooperation initiated through a broadcast search platform. For the open innovation labs the German project partners decided to focus on e-health due to a strong local profile in this industry sector. Even though this analysis focuses on the activities taking place in Germany, the Alpine project partner regions also indulge in open innovation labs in the neighboring countries, though each with their own respective industry focus and individual open innovation method. Since one objective is to create open innovation pilot projects as well as internal knowledge on processes and successful practices, every open innovation method has been found to be adequate. While open innovation labs are physically limited to each project region, the online broadcast search platform aims at transnational open innovation cooperation. Therefore it will contain the possibility for SMEs from the Alpine Space region to insert technological problems requiring solutions which will then be visible to a global community of registered R&D institutes. As a means to facilitate operation of the broadcast search platform, private inventors and problem solvers are excluded from registration.

Besides the open innovation activities, the initiative also aims at building a data base of R&D institutes in the Alpine region which is supposed to give an added value to the online platform even after the project period has finished. This should then support the project partners in their regular task which is to provide local economic support. The online platform functions also as an information and contact point. Next to introducing open innovation, the initiative additionally offers these economic support activities to accompany SMEs on the innovation journey. Finally, the initiative plans to organize open innovation workshops both for SMEs as well as for policy makers and network organizers to spread the knowledge. Figure 6.1 gives an overview of the activities.

Figure 6.1: Operational Approach OpenAlps



The initiative is progressing with obstacles. The biggest stumbling block so far has been the loss of the Swiss project partner who left the project due to misunderstandings regarding the gaining opportunities. Being responsible for building the online platform, the partner wanted to introduce user fees for SMEs and project partners which is incompatible with the Alpine Space Programme guidelines. However, losing a partner responsible for one complete work package disrupted the entire project severely. After some discussion, the lead partner decided to take on the work package; however, this required a reorganization of the entire project both operatively and financially which consequently had to be approved by the Alpine Space program committee. Even though this disruption has been overcome, it leaves traces in the progress. In the process of reorganizing tasks, the lead partner gave up her share in organizing open innovation labs in Germany to the other German project partner. This partner is now work package leader for this task and responsible for ensuring that all partners organize these labs. Unfortunately, the topic choice e-health had been based on contacts and preferences of the lead partner which now leaves the German partner network with a focus in which it has no expertise. For this and other reasons, open innovation labs in the German Alpine space are progressing slowly. The first e-health lab has been cancelled once due to low registration numbers, and only eight SMEs attended the replacement event, equaling a turnout of two percent.

Despite the slow progress of the project and the low turnout at the e-health open innovation lab, the initiative has various merits. To begin with, the participants at the e-health lab were very enthusiastic and positive about this opportunity and enjoyed the possibility to identify one common problem, i.e. the vast amount of body-based health indicators and the difficulty to organize and process these indicators as one unit. In addition, ideas for solution were generated jointly and playfully. The spectrum of knowledge at this event was wide due to participants coming from different companies in different industry sectors. Another positive point is the success of events organized by the French project partner who has already organized several well-attended open innovation labs with a focus on the local wood industry. However, the topic choice e-health for the German open innovation lab appears to be flawed. As stated shortly above, this topic had been chosen due to connections of the lead partner to one strong local cluster on medical technology called MedicalMountains. While this might be a strong cluster in the area, it has also been identified by four interviewees independently as extremely closed and protective of its IP. While these characteristics would be sufficiently problematic to overcome if the lead partner were still functioning as the contact person, it appears to be a real obstacle after reorganization of the project tasks.

6.1.2 smart businessIT

This initiative follows three overarching goals of which only the first one includes open innovation. Here the approach is to match business software providers with business software users to "create a wide base of action for innovative methods and products" (Schermann, n.d.). As one means to enhance this exchange, the initiative focuses on living labs which are defined by the lead partner as "an environment for implementation in which on the one side providers can test their products and on the other side users can try out products or services and experience the effects" (G. Schermann, personal communication, October 8, 2012). Hereby smart businessIT follows four approaches: firstly, the initiative wants to raise awareness among SMEs about living labs by organizing information events. Secondly, it

seeks to create a list of all living labs within the federal state. Thirdly, it plans to develop best practices and recommendations for both living lab providers and users. Lastly, and most interesting for this thesis, it devises a funding program through which SMEs can apply for 50% refund of the costs of using a living lab. Apart from living labs, the initiative focuses especially at supporting networks and clusters in the federal state mostly by providing event series or road shows on topics of interest. According to the lead partner, these networking events where companies meet and exchange contacts and information can also be seen as open innovation. Figure 6.2 visualizes the operative goals of the initiative.





Despite the fact that the first events to inform about living labs and to sparkle knowledge exchange between IT providers and users have been organized, the initiative looks back at a year of struggles and stagnation. There are two main problems of which the first one was a very rushed and not well-developed application for funding. Consequently it encompassed too many objectives with too little specification and operative indications. The process of redefining objectives and developing work packages has lasted for several months and was still ongoing during the time of the interviews. Specifically problematic seemed to be the constant control through and interaction with the ministries which are the source of funding. All interview partners stressed the political dimension of the project. The second significant problem played an additional delaying factor in the development of strategy: competence rivalries between the project partners. Originally, the local network in Karlsruhe applied for funding with the ministries and received these funds with the task to operate on a federal state level. However, the project partner in Stuttgart is a state-wide operating network for IT and feels threatened in its competences. Only in April 2012, ten months after the project period started, this partner started cooperating after having hired a project manager for this initiative.

While smart businessIT is still in an early phase with regard to its actual operation, several preliminary conclusions can be drawn. One of them regards the strong influence of the ministry on the project as well as the political dimension of it, which resulted in severe stagnation and resignation. As the smallest project partner states: "I don't know in which state the strategy paper is currently. I stopped following at a certain point...I thought they first have to agree, they first have to know what they want" (K. Schwab, personal communication, October 9, 2012). The acceptance or rejection of the strategy paper by the steering committee which also includes members of the ministry will decide if the project is able to overcome this stagnation. Furthermore, the living lab approach to open innovation seems neither dynamic nor demand-based, but is a concept developed without the input or feedback by SMEs. Additionally, also the designed funding line aims at supporting the supply of living labs, not at satisfying a demand of SMEs to use these facilities. Hence the approach towards open innovation is artificial and might therefore not be very successful.

6.1.3 TTC

This initiative is the biggest and most elaborate open innovation initiative of the three researched projects. Its main focus is on initiating cross-border innovation cooperation by SMEs within the Euregio Maas-Rhine. Based on a benchmark report which revealed various strong industry sectors in the region, the project concentrates on the topics energy, life science, advanced materials, and ICT. In order to achieve cross-border cooperation within these industry sectors, the entire project structure has been created for this. As explained by the lead partner, the project can be imagined to be operating in three pillars. The first and smallest pillar aims at socializing and networking between SMEs and other interested

organizations of the project region. This is achieved through socializing events to general topics of interest, B2B matchmakings, and brokerage workshops. The second pillar aims at business development support which is a means to firstly get to know SMEs and to introduce them to the initiative; secondly to specifically invite SMEs to round tables that are profoundly prepared through a roadmapping process where participants also have the opportunity to present their ideas for innovation; and thirdly to motivate and accompany SMEs to apply for so called innovation vouchers worth 5000 Euro funded to one hundred percent by TTC. With these innovation vouchers, SMEs can start initial steps to innovation, i.e. feasibility studies, patent research, renting laboratory units to prepare for bigger innovation projects.

Officially, the project TTC only includes the first and second pillar for bureaucratic reasons and project complexity. However, originally TTC encompassed a third and financially largest pillar which provides cross-border innovation funds between 100.000 Euro and 250.000 Euro funding up to 50% of the innovation budget. Even though this third pillar is not part of TTC, the EU donor program agreed to create another project called *Grenzüberschreitender Cluster Stimulus* (GCS) complying with these exact functions and working together closely with TTC. The operative set-up can be seen in Figure 6.3.



Figure 6.3: Operational Approach TTC

After taking a long preparation time of two years, the project could start fairly quickly after having applied successfully for funding through the INTERREG program. Generally the project partners are very happy with the progress of the initiative which can also be quantified in numbers. Since April 2012, the initiative has received 12 applications for innovation vouchers of 5000 Euro each and 24 applications for the cross-border innovation fund. Since one criterion for successful application is to combine SMEs from at least two different project countries, the aim of the initiative, namely to enhance cross-border innovation cooperation, is well in progress.

6.2 Overcoming Typical Barriers

In this exploratory part of the analysis, typical open innovation barriers for SMEs, namely time, human resource, and financial constrains as well as fear of loss of IP and the need for innovation exploitation will be assessed and finally visualized. While these barriers have been identified already through literature, the selection of these criteria was supported also through the empirical data.

6.2.1 Time Constraints

Even though all interview partners stressed the limited time available to SMEs, this is reflected differently in the processes chosen by the initiatives. On the one side there are OpenAlps and smart businessIT who apparently have not taken this issue into consideration and display no awareness for time consumption through open innovation projects. Both networks limit their time calculation to socializing events and participation in open innovation labs, which they sum up to an attendance time of two to four hours, possibly adding time for preparation or follow-up. On the other hand, TTC has a very clear idea of time consumption through open innovation projects. In case of successful application to the cross-border innovation fund, which is the explicit goal of the initiative, innovation projects last 18 months, but TTC expects companies to take up to 21 months until finishing the project documentation. During these 18 months the amount of time put into innovation depends on the company and its stake in the process. Clarifying this stake and the role and commitment to the innovation project is channeled through the application process which requires a detailed project plan.

Hence it can be observed that within the projects there is a difference in how far time constraints are reflected onto innovation methods.

Having discussed the reflection of time constraints it is also interesting to look at the actual time consumption predictable due to the type of open innovation method chosen. Hereby, TTC gives clear indications on the type of commitment and time necessary to conduct a technological innovation through cooperation. Recalling that OpenAlps is aiming at two types of open innovation methods, namely open innovation labs leading to cooperation as well as broadcast searches, cooperation will probably require a similar type of commitment as in the case of TTC. Hence it will also be similarly time consuming. Unfortunately it could not be deducted how the innovation process initiated through the broadcast search should look like since the broadcast search platform had not yet been established at the time of the interviews. Nonetheless, in the most common form of broadcast search as for instance referred to by Chesbrough (2010), innovation takes the form of outsourcing the innovation process to the problem solver. Hence the time consumption depends on the amount of information exchange between the seeker and the solver during the process, but is generally less intense than cooperation for the solution seeking company. Lastly, looking at the open innovation method living labs it has been assessed before that living labs concentrate on commercial innovation by providing a pre-market testing phase. In itself this can be seen as an additional step before entering the market. However, in comparison to a failed market entry this investment of time might be small. Nonetheless, smart businessIT had so far no experience with living labs and could therefore not give any further indication.

Summing up, even though all initiatives are aware of SME time constraints, only one initiative has a clear idea of time consumption and length of commitment through innovation cooperation.

6.2.2 Human Resource Constraints

Despite the fact that literature connects human resources to knowledge capacity, when analyzing for human resource constraints as a barrier to open innovation a strong similarity to time constraints could be detected. Throughout empirical research the majority of interviewees argued that companies with full capacity utilization and a maximum workload are not willing or able to engage in additional resource consuming activities such as innovation. Hence human resource capacity is observed to operate as a function of time rather than as a function of knowledge as suggested by literature. Thus time intensive open innovation methods such as cooperation are also human resource intensive while both forms of contractual open innovation, i.e. broadcast search and living labs, do not require the same amount of human resource commitment. Interestingly, these two latter forms of open innovation are also friendly towards human resource constraints as a knowledge function. While the broadcast search explicitly aims at alleviating the lack of internal knowledge, living labs apply at a post-R&D stage and therefore intensive knowledge input has already taken place.

6.2.3 Financial Constraints

Generally speaking, project partners are aware of the importance of financial constraints of SMEs and have partially recognized funding opportunities as a tool to overcome this barrier. While OpenAlps promises SMEs to provide information about funding programs and to support the application writing program, both TTC/GCS and smart businessIT provide up to either 50% or 100% funding for the respective open innovation method. While smart businessIT is willing to support SMEs contracting living labs with 50% of the costs, TTC offers 5000 Euro (100% funding, no private capital contribution) to spark innovation. Furthermore, in cooperation with GCS, TTC offers between 100.000 and 250.000 Euro funding of innovation cooperation albeit requiring an equity ratio of at least 50%. Even though it sounds very sensible now, the project leader stressed that the idea to create a combined project set-up resulted out of eight years of experience working in the field of cross-border innovation cooperation. As stated by one TTC project partner, "You really have to wave with money to attract companies. If you only tell them 'Come, you can meet somebody here' nobody will show up" (C.Jansen, personal communication, October 11, 2012). Therefore all TTC project partners were very satisfied with the combined set-up of TTC and GCS which enabled the inclusion of substantial financial support. Hence it can be deducted that initiatives start using money incentives to attract SMEs to open innovation processes.

Despite this positive outlook, some issues remain. Firstly, not only does OpenAlps not include any financial incentives within its own program; it is also very vague and unclear about most aspects of innovation cooperation. After five hours of open innovation lab, the

organizers communicated poorly the possibility to help participants find a funding program. Secondly, smart businessIT uses the money incentive only as start-up funding and is not planning to create a continuous financial incentive. Additionally, this funding actually aims at benefiting the living lab providers by lowering the barriers for SMEs, thereby creating clients and through this spreading knowledge about living labs. The assumption behind this approach is that over time SMEs will recognize the advantages of testing products in a living lab before market entry and will be willing to invest in this without further financial incentive. It remains to be seen whether this strategy works out.

To put the whole matter in a nutshell, open innovation intermediaries are aware or even use financial incentives to incentivize SMEs to participate in open innovation projects. Nonetheless, there is still room for improvement in the communication and execution of financial instruments.

6.2.4 Fear of Loss of IP

Monitoring the fear of loss of IP and the aspect of trust within a project or cooperation, the most striking divergence between theoretical knowledge and practical action has been detected. Even though all project partners unanimously stress the utmost importance of IP protection and trust in open innovation, none of them see it within their responsibility or capacity to act upon this need for security. Even though the term non-disclosure agreement (NDA) was mentioned several times, none of the initiatives uses this tool. One project partner even exclaimed that information provided confidentially to the network intermediaries needed to be protected, "but if somebody tells his ideas at a round table meeting, that is his problem" (C. Roos, personal communication, October 11, 2012). Seeing that especially within TTC these round table meetings are the basis for cooperation and specifically designed to provide a trustful atmosphere, this attitude is surprising but not unusual. Even though two initiatives mentioned the possibility to offer information on IP protection, all network partners stressed that the innovating parties will need to find their own legally valid agreement on this.

Despite this general negligence it has been observed that the need for IP protection might also gain relevance at different points in the process and with different focus groups. Whereas protection of client IP is a precondition for using living labs, a broadcast search platform has to ensure that neither solution seeker nor problem solver will give away too much essential information as to make a contractual engagement unnecessary due to early revelation of central knowledge. Thus an early protection mechanism of both engaging parties is relevant which can later on be supplemented by a contractual agreement between the players. Lastly in open innovation cooperation, protection of IP does not set in during socializing or even idea exchange. Arguably adding IP protection at this stage might even disturb the playful everything-goes atmosphere observed at the open innovation lab. Nonetheless, moving on in the process it will be necessary to provide IP protection mechanisms to enable SMEs to reveal some of their core competences in order to realize the real potential for innovation.

With regard to fear of loss of IP it is apparent that open innovation initiatives for SMEs have not yet found adequate tools to facilitate IP protection or realized the potential of enhancing innovation processes through this. However, due to the diversity of open innovation methods there is also no single right way to protect IP or a point in time when to initiate this. Hence open innovation projects will need to find a customized solution.

6.2.5 Exploitation Opportunities:

Apart from the financial incentives mentioned above, there are also other means of exploiting network participation. Both OpenAlps and TTC aim at connecting SMEs with interesting partners, meaning either other SMEs or R&D institutions. Additionally, both initiatives want to connect organizations from the same industry sector or to interconnect with the ICT sector. As argued by one project partner from TTC, the industry sector of life science is varied to such a degree that "it is difficult to find two companies that are doing the exact same thing" (C. Roos, personal communication, October 11, 2012). Another project partner argued that competences have to vary to such a degree as to avoid competition in the project. Nonetheless, "every participant should receive his part of the cake" (N. Robertz-Peters, personal communication, October 4, 2012). Especially at the open innovation lab the variety of organizations attending was striking., varying from a rehabilitation clinic, a laboratory service, a health study provider, and a telecommunication company providing medical services to an app producer with interest to move into the e-health sector. Here the exchange of contacts, ideas and information was very vivid and participants seemed to appreciate and recognize the value of meeting organizations with an interest in the same topic but different

competences. Hence providing contacts to like-minded but differently equipped organizations is one option for exploitation that is used by open innovation projects.

Next to project partners offering value for exploitation, also the question of innovation objectives is relevant. This has been recognized by TTC and implemented through two application criteria which prescribe that the planned innovation must be both technological and have a market fit. Thereby the network ensures that companies do not conduct fundamental research but aim at objectives with clear commercialization value. While this is very obvious to TTC intermediaries, OpenAlps does not have clear expectations neither for the innovation result nor for the commercialization aspects of it. Instead the project leader describes her expectations for broadcast search as aiming at technological innovation and "nothing trivial" (M. John, personal communication, October 9, 2012). Despite this low level of clarification, both initiatives aiming at open innovation through cooperation realize that SMEs benefit from additional service offers such as finding project partners and application writing. As stated by one project partner, "In order to engage SMEs in open innovation they need some extra services, they need to be taken by the hand so they can lose their fears" (M. John, personal communication, October 9, 2012). Despite the various ways to provide exploitation opportunities, convincing SMEs of open innovation is easier if they already have an interest or an idea for innovation. This perspective has both been supported by evidence from interviews as well as by observation at the living lab.

Summing up, intermediaries actually recognize the added-value they are able to provide by connecting organizations that offer each other exploitation opportunity as well by offering additional services that accompany SMEs on the way to innovation. Both of these tasks are also at the heart of networks and economic support organizations as in the case of these initiatives. However, the importance of specifying the commercialization aspects of innovation is not similarly obvious.

6.2.6 Comparison

Moving to a comparative level, all project partners had a very clear idea about typical barriers to open innovation since they are confronted on a daily basis with the limited willingness of SMEs to commit to activities not related to core business activities. Despite this awareness of constraints, not all initiatives reflect this onto their operational approach. The strongest relation between awareness and reflection has been displayed by TTC. Although

proposing a very time- and human resource-intense approach, it counteracts this by offering strong financial incentives and clear opportunities for exploitation. A medium developed profile for open innovation can be attributed to OpenAlps. On the one hand, the initiative has good ideas aimed at providing exploitation opportunities through interesting contacts and additional services, but on the other hand the process between initiating open innovation and commercializing exploitation is not yet substantially developed. This is mostly due to missing experience in open innovation projects. Lastly, smart businessIT is still lacking experience in working with living labs and is waiting to receive feedback from SMEs. Even though it implements a financial incentive, this is aimed at supporting living lab providers and not at alleviating financial burdens of SMEs. Thus it has the weakest profile for conducting open innovation projects. Table 6.1 below summarizes the degree of reflection of barriers.

	Time	Human	Financial	Protection of IP	Exploitation opportunities
OpenAlps	+	0	0	+	++
smart businessIT	0	0	+	0	+
TTC	+++	+++	+++	+	+++
O = not reflected; + = minimally reflected; ++ = partially reflected ; +++ = fully reflected					

Table 6.1: Degree of reflection of awareness of typical barriers in the researched projects

Hence the realization resulting from this look at typical SME-barriers is that the research question – how do networks overcome typical SME-barriers to open innovation – might have been phrased too optimistically. The question is not, how they overcome typical barriers, but rather if they overcome typical barriers and the answer to this question will need to be given negatively in the majority of the cases. Nonetheless, there are some practices, mostly from TTC, which could be helpful in reaching the objective to overcome barriers. First of all, project partners need to obtain a clear idea of what the overall objective is and which implication reaching this objective brings for SMEs. Since in the case of OpenAlps one overall objective is to create open innovation pilot projects, hence time and human resource

commitment of SMEs will not be limited to participating in a workshop three to four times a year. Rather the intensity will be similar to the one envisioned by TTC. Having acknowledged this reality, it will be easier for the initiative to design specific supporting functions around the innovation projects. Instead of offering to search for adequate funding opportunity, OpenAlps could be more explicit providing a detailed list of funding programs, application criteria, deadlines, requirements, etc. With this in hand communicating financial exploitation opportunities might be more feasible.

With regard to protection of IP the results have been most conflicting. Even though all initiatives recognize the importance, not one acts upon it. Even if project partners feel overwhelmed by the task to ensure the protection of IP, they might nonetheless offer information activities. Possible forms would be either general information events or supplying and funding a legal advisor with expertise in this field. Taking into consideration Chesbrough's (2006) theory, the functional use of intellectual property rights, patents, licensing, etc. are essential for channeling open innovation. Guiding and accompanying this process might also prevent later problems regarding use and monetization of innovation. Lastly, this previous point, transitions smoothly into a further opportunity for exploitation. Although networks have best reflected awareness of exploitation opportunities onto the design of the projects, clarifying the use of IP might provide even better ideas on how to benefit also financially from an open innovation process. Overall it appears that better understanding of open innovation and clarification of the implications might help networks to overcome typical SME-barriers. However this might be a question of time and experience.

6.3 Remaining Obstacles: Model of Small Group Development

Having conducted the exploratory part of the analysis, this thesis will now move on to the explanatory part by looking at which other obstacles might inhibit open innovation initiatives from being successful. Thereby the various issues that seem to have been important were clustered into two main areas which tackle the initiatives as well as the operating actors in those initiatives. While the former easily suffers from set-up and operational issues, the latter can exert substantial influence on the process due to experience or the lack thereof in open innovation projects. As introduced before Tcukman and Jensen's (1977) stages of group development will be applied as a means to operationalize and understand the remaining issues. This concept argues that each group of people aiming at working together will set out on a circular path on the development to become a well performing team. This path includes four stages called forming, storming, norming and performing with each stage displaying specific characteristics and challenges of team dynamics (see Figure 3.1). The following paragraphs will analyze in how far the observed obstacles can be attributed to this concept of group dynamic.





In the forming phase all issues evolve around the initial application process. Although this application process should channel goals, objectives and stiles of cooperation within the initiatives smart businessIT did not go through a forming process due to time pressure. As the project leader remarked, "the application was knit with hot needles" (G.Schermann, personal communication, October 8, 2012), meaning that objectives were too broad and operative measures were not defined. Whereas TTC worked two years on the application to Interreg and

could thereby set the basis for successful working, smart businessIT has still been in the forming phase at the moment of the interview; hence 15 months after the start of the project period, the project partners were hoping that version 2.7 of the strategy paper would be accepted by the steering committee. Still being in the forming phase, smart businessIT was simultaneously confronted with typical storming issues such as leadership problems. Not having been "thought through" (G. Schermann, personal communication, October 8, 2012) in the application process, the state-wide network for IT, bwcon, was not willing to accept the leadership role of the local network and therefore blocked cooperation for about ten months. Figure 6.4 visualizes at which stage of Tuckman and Jensen's (1977) model smart businessIT are currently.

Since TTC and OpenAlps share some similarities, such as the cross-border aspect and aiming at cooperation as a means of open innovation, there is one striking difference. Whereas TTC based its decision for industry sectors on a detailed benchmark study of the strength of the Euregio Maas-Rhine, the German partners of OpenAlps selected the topic e-health without benchmarking either the whole Alpine space or the German region. Instead the decision for e-health was pushed by the project leader to concentrate on one city in the black





forest which clusters several world market leaders in e-health products. After the loss of the Swiss partner and the following reform of the project plan, MFG is now solely responsible for organizing e-health labs without maintaining adequate contacts. As the work package leader argues "maybe we do not have the right contacts" (V. Grillea, personal communication, October 2, 2012), which is supported by the low turnout of only eight participants at the open innovation lab. In this case the forming decision to concentrate on e-health had been based on one narrow advantage which now turns out to be an obstacle to success. Another aspect of Tuckman and Jensen's group development model is that the entrance or exit of team members changes the team dynamic to such a degree as to throw the team back to the forming phase (1977). This can be observed in the case of OpenAlps, who parted with the Swiss partner responsible for developing the broadcast search platform, an important work package. After this incident work packages had to be adapted and responsibilities as well as finances shifted. Both interview partners defined this as the main reason for the current delay in the project plan.

Moving on to the storming stage there are clear tensions visible between the two German project partners even though no open conflict has arisen so far. Possibly due to cultural differences – the project leader is German, the other partner has an Italian background – the same incidents are perceived and described very differently. One occasion, a project partner meeting where the organization of the midterm event was discussed, exemplifies this nicely. The project leader recalls:

I had sent the agenda for the meeting to all project partners asking them for feedback or changes. I had allocated ten minutes to her to present the concept for the midterm event award. Since she didn't send me any feedback, I didn't change this. Then at the event she behaved like a real Italian and instead of presenting a concept she asked everybody else how they would arrange this. This, of course, resulted in a fruitless discussion lasting one hour, which completely buste my meeting plan. I was very angry (M. John, personal communication, October 9, 2012).

The same incident from a different perspective:

[At the last project meeting] we had this interactive workshop with regard to the midterm event award and the project partners provided me with very good input. It had been clear that I would like to make the decision [on the award] in cooperation with the project partners, because in the end I will need the support from everybody [to organize this transnational event]. This has been very good (V. Grillea, personal communication, October 2, 2012).

These differences in operation result in underlying tensions between these two partners. While the project leader remarks that "the project partner is not doing enough" (M. John, personal communication, October 9, 2012), the project partner expresses that "the project leader is still in the process of learning how to organize project meetings and how to guide the team" (V. Grillea, personal communication, October 2, 2012). Thus it seems that OpenAlps is entering into a storming phase which might even be aggravated by cultural differences before entering

Figure 6.6: TTC's Group Development Process



into a norming and a smooth perfoming phase. Figure6.5 exemplifies the group development process inOpenAlps.

Last but not least (Figure 6.6), shedding light upon TTC, it appears that the forming phase has been conducted very carefully over a period of two years before applying for funding by Interreg. The storming phase, if at all stormy, has been surpassed within half a year of setting up the working structure which in comparison to the other projects has been a very smooth and quick process. Moving into the norming

and performing stage it is necessary to differentiate between the operating clusters. Whereas the energy cluster seems to have reached the performing stage with for instance two applications for innovation vouchers and one of these interested in applying for the next call for the cross-border innovation fund, the German partner for the life science sector is still figuring out how to augment participation of German SMEs and has not yet proceeded completely to the performing stage.

Having analyzed the four phases it is important to also take into consideration the role of what Tuckman calls "mature team members". Supposedly a mature team member can influence and guide the development of the team by shaping his own behavior according to the needs of the team. Comparing this to the situation of the three initiatives it is especially striking that the lead partner of TTC plays a strong role and might be identified as a mature team member. Being the lead partner, this innovation intermediary was very important for the development of a successful concept for the open innovation project. As mentioned before TTC and GCS are the results of an iteration process lasting for eight years. During this time the lead partner learned that financial incentives are essential to motivate SMEs to engage in cross-border activities. Furthermore, the iteration process involved conducting a benchmark study of the economic strengths of the region in order to focus energies to create a competitive advantage for SMEs and the region in general. Additionally the project employs so called Business Development Support (BDS) managers which concentrate on creating contact to companies, getting to know their needs and interests, connecting them to suitable innovation projects and accompanying them closely on their way to application for funding. Hence TTC found a way to provide additional services which both enhance the objectives of the project and facilitate engagement for SMEs. All of these aspects which contribute to the positive outcome of TTC have been learned and recognized through previous experience in cross-border projects which consequently supported the lead partner to use this knowledge to influence the forming and storming phase.

7. Discussion

After analyzing the empirical data particularly one characteristic of open innovation initiatives is apparent: their complexity. Even though similarities have been observed and some operational activities can be used as a template, the influencing factors are many and there is not one single reason as to why open innovation initiatives are not always successful despite acting as neutral intermediaries. This chapter will discuss the findings of the empirical research and thereby proceed in the following way. First the merits and limitations of operationalizing Tuckman and Jensen's model of group development in this context will be discussed. Secondly one of the reasons why using this model has limitations, namely geographical distance, will be looked at. Similarly not only geographic distance, but also a difference in the culture of cooperation might have influence the success of initiatives. Furthermore limitations with regard to the theoretical framework as well as the selection of empirical cases will be taken into consideration.

7.1 Stages of group development

Using Tuckman and Jensen's (1977) model of small group development to operationalize obstacles to the success of open innovation networks is a good means to break down a complex issue into smaller pieces which can each individually be handled more efficiently than the entire picture. As shown through the research hereby especially the forming stage is utterly important to the success of the network. If this is executed with care, as in the case of TTC, many time-consuming issues can be avoided later on. Similarly, all groups undergo a storming period at one point, as clearly indicated by smart businessIT and OpenAlps. However realizing this will help project partners to retain conflicts on a professional level and avoid causing long-term damage to work and personal relationships. Hence while the project partners of smart businessIT realized that conflicts are related to the political dimension of the project and caused by slighting bwcon's state-wide competence, the interpersonal relationship between the partners have been identified as good or even as "exceptionally well" (N.Schulz, personal communication, October 2, 2012). Hence in this case project partners have been able to retain the conflict on an organizational and professional level and are therefore no working on constructive solutions.

Comparing this to the case of OpenAlps, project partners seem to be in danger of reflecting the operational issues not only onto a personal level, but also to a cultural level as can be seen in the expressions "she is not doing enough" and "behaving like a real Italian"

(M. John, personal communication, 9 October 2012). It would hence be helpful if project partners would reflect on this tendency in order to redirect the conflict onto an issue-related level, such as for instance having selected a questionable topic focus. Thus keeping in mind Tuckman and Jensen's model of group development can help open innovation networks organized by several intermediary networks to either prevent or understand and console conflicts of team work. Even though this is not a solution to every problem, it can help to channel the social dimension of these initiatives and thereby reduce one layer of complexity.

Despite the merits of this model, there are also limitations to it. As stated above, the model is not a means to explain every aspect of open innovation networks, but can only facilitate cooperation and team work among the project partners. Hence, for instance the previously analyzed operational issues with regard to typical SME-barriers cannot be accounted for in this model. Additionally the original purpose of this model was to understand group development in a therapeutic setting (Tuckman & Jensen, 1977). Even though it has been transferred to many other settings and is now commonly used particularly in the field of human resource (Bonebright, 2010; Gilley et al., 2010), it had originally not been designed to operationalize geographically distant groups. Here it might be helpful to complement the model by looking into the growing literature on virtual teams or distant learning. Apart from the geographical distance the question is also what the self-perception of the geographically distant community and the feeling of identification with this community are. Hence the geographical distance might also carry a different psychological precondition which in each group or network needs to be clarified in order to use the model of group development efficiently. The next section will look specifically at this aspect of geographical and community differences.

7.2 Geographic communities¹²

By far the largest geographical area is encompassed in OpenAlps. Following the EU program for territorial development, the Alpine space spans around mountain areas in France, Germany, Italy, Austria and Slovenia. The assumption behind this program is to enhance geographically similar areas and to push their economic development. While this might be a sensible conclusion on a political level, it results very difficult to put into practice. Distances

¹² The geographical and community insights of the regions are based on several years of observation of the areas. The author of this thesis has grown up in the area of South-Baden in the German Federal Land Baden-Württemberg and studied for three years in the Euregio Maas-Rhine. Hence these observations facilitated elaborating on geographical communities.

are long, e.g. from Villingen-Schwenningen in the Black Forest to Lyon in France; circumstances are different both economically, e.g as Slovenia has formerly been part of socialist Yugoslavia, and industry-wise for instance with the French partner focusing on wood industry and the German partners on e-health. Additionally languages differ completely in each country and, last but not least, simply the fact that this is a strong mountain area might prohibit the establishment of a geographic community feeling. Thus creating a physical network for open innovation will be a challenging task within the project partner network. However managing transnational cooperation on an SME level seems to be fairly incompatible with regard to time, human and financial constraints of SMEs.

Having discussed the difficulties of creating a community in the Alpine space region, the situation is very different in the Euregio Maas-Rhine. The most striking difference hereby is the lack of mountains in comparison to OpenAlps. In fact, the biggest mountain in the entire area is the Vaalsberg, a hill of 323 meters, which is a well-known tourist attraction due to the fact that on its peak the borders of Belgium, The Netherlands and Germany meet and construct the 'Three-Country-Point'. This is characteristic of the entire region. As can be seen in Figure 5.1 physical distance between the countries is very small, infrastructure facilitates travelling between the countries, markets are open to each other. Additionally, language is not a barrier due to the similarities of Dutch and German whereas in Belgium several languages, namely French, Dutch and German, are spoken officially. Apart from this existing geographic community of the Euregio Maas-Rhein, the project TTC and its predecessors have also been working on enhancing cross-border cooperation since 2004. As a consequence the actors had time to establish a well-grounded base of cooperation both among the project partners as well as among SMEs. This culture of cooperation will be discussed in the next section.

Before moving to the next section on culture of cooperation, a short look will be given to smart businessIT with regard to geographical communities. Albeit being situated in one German Federal Land with the cooperating networks being located in relative proximity to each other, the initiative has divided the operating space into three areas, namely South-Baden, North-Baden and Württemberg, as explained before. This division, however, is not random, but is based on historical borders that have only been eliminated through merging the areas into one German Federal Land in the early 1950s. Traditionally there is a strong rivalry between Baden and Württemberg, also known as Swabia, which is still vivid among the people. It is therefore not unusual that some issues, particularly when carrying a political dimension or concerning the competence of Stuttgart, the capital of the Federal Land and seat of project partner bwcon, create a conflict in the region, which will in turn influence the culture of cooperation and should hence also be taken into consideration when setting up a state-wide network for open innovation.

7.3 Culture of cooperation

What has been termed culture of cooperation in the section above is not only describing the way in which project partners cooperate with each other – this falls under the model of group development discussed before - but also an expression of the motivation underlying the cooperation. Hereby especially the notions of bottom-up or top-down initiatives are relevant and can account partially for the success or failure of the networks. Starting with TTC, the project leader explained that TTC had started as a bottom-up initiative by the mayors of the three technological strong cities Aachen, Eindhoven and Leuven. Four years later, in 2008, after realizing the success of the cooperation, the decision was taken to widen the cooperation between the cities to encompass the surrounding regions. Although this was based on a top-down decision, the project partners worked on rooting this broadening as much as possible into the area by relying on a benchmark study that identified the strong industry sectors of the three areas. After another four years of operation, establishing contacts, and offering business support services, the decision was taken to lift cooperation to a new level by enhancing cross-border innovation projects. Especially in the Dutch and Belgium regions this has been embraced very well as stated by the project partners. For various cultural reasons German enthusiasm lacks behind. Nonetheless within the 24 applications for crossborder innovation, there are also 24 German SMEs involved. Hence being rooted in a geographical community and being focused on building on strengths of the area, has helped TTC to overcome many obstacles.

In turn looking at OpenAlps the arbitrary focus on e-health has been discussed and criticized before in this thesis. However, while this is a clear case of not demand-driven operation, this is only one example of many for top-down decision making in this initiative. Starting by the ambiguous choice of operational area, meaning the Alpine space, also the choice of using open innovation is not based on a deliberate desire by SMEs. As mentioned before, the OpenAlps lead partner had been contacted early on in the research process, in July 2012. At this moment she refused cooperation due to not being able to establish contacts to SMEs interested in the topic open innovation. Shortly before this refusal, the project partner

network had conducted a quantitative survey asking all SMEs in the respective networks about their opinion on and interest in open innovation. The survey results were dismissed because of lacking statistical significance due to a low number of answers. Therefore it is questionable if the project answers an existing need in the area by facilitating open innovation as a means to economic enhancement or if the project is rather designed as a purpose in itself but not with the audience, namely SMEs, in mind.

Asking this question for smart businessIT the answer contains several aspects. First of all the discussed political dimension makes it easily prone to being distant from actual market demands. Secondly the project aim is threefold, but this thesis has only looked at the aim concerned with open innovation. While the other two objectives might be need-based and strongly rooted in the project region, the approach to living labs as an open innovation tool for economic enhancement is completely based on theoretical assumptions. As mentioned several times by the lead partner, there has not been any previous input by SMEs with regard to designing the funding line for living labs. Since operation is just starting there has also not been any feedback with regard to this point yet. Hence the initiative's approach to open innovation is very much a top-down construct. If it will nonetheless meet a market-demand remains to be seen.

Summing up the above discussion it becomes obvious that facilitating open innovation networks or initiatives for SMEs is a complex task. Layers of complexity concern the social dimensions of group development possibly even with the added complexity of cultural differences. Additionally the location of networks and the underlying community spirit influences the motivation both of organizing parties as well as of participating SMEs. Finally, the level of decision-making, meaning a top-down or a bottom-up approach can influence the success of this type of initiative. As established before SMEs will only be willing to commit resources, meaning time, human resources and money, to a project that alleviates one of their burdens and thereby provides exploitation opportunities. Arguably this will be easier to ensure if the project takes a bottom-up approach which is rooted in the strengths, weaknesses and opportunities of the respective region. However, this thesis has shed light only on a small aspect of open innovation initiatives namely on the initial phase of cooperation. Hence aspects reaching into the norming and performing stage of Tuckman and Jensen's model have not been looked at in this thesis. This means that for instance all aspects concerning facilitation of actual innovation activities, either cross-border, state-wide, or transnational, have not been looked at by this thesis. With this first view on limitations, this thesis will now advance to the conclusion and provide a further view on both theoretical and empirical limitations.
8. Conclusion

8.1 Limitations of theory

Open innovation literature is still in an early stage particularly with regard to SME involvement. Among the existing work there is a notion of the facilitating nature of networks in conducting open innovation (Jørgensen & Ulhøi, 2010; Konsti-Laakso et al., 2012; Lee et al., 2010; van de Vrande et al., 2009), with some even arguing that SMEs are only able to conduct open innovation through networks (Konsti-Laakso et al., 2012). However, despite this strong emphasis of networks for open innovation, the debate with regard to managing these open innovation networks is still ongoing. For instance Lee et al. (2010) suggest that open innovation can be facilitated by a neutral intermediary who has no own interest in resulting innovations and only aims at economic enhancement of network members which in this case is SMEs. This finding has also been supported by Ollila and Elmquist (2011) who found specific difficulties in the execution of network and cooperation activities when being organized by a key participant. Hence this research set out to contribute with further insights to this field of open innovation network organized by neutral intermediaries particularly with regard to the initial stage of setting up these networks.

Despite this fit with existing literature, some theoretical choices of this thesis can be viewed critically. For example several assumptions of the exploratory part of the research question concerned the selection of members to the open innovation activity, which supposedly guarantees or enhances the success of open innovation (Chesbrough, 2010; Dooley & O'Sullivan, 2007; Konsti-Laakso et al., 2012). Following this assertion a whole list of assumptions has been devised regarding recruiting and selecting SMEs with regard to characteristics such as company size, innovativeness, expertise, and absorptive capacity. While this has certainly merits in an environment where open innovation is an accepted and sought after means to retain a competitive advantage this does not (yet) apply to the open innovation initiatives observed in this thesis. On the one side this is caused by the internal openness of the networks, meaning that for instance the chamber of commerce and industry is non-discriminatively open to every member company regardless of size, age, innovativeness, etc. On the other side as discussed before intermediaries are strongly confronted with skepticism and rejection of open innovation by SMEs. Therefore networks are not able to select companies due to characteristics, but are content with every company showing interest in or even willing to commit to the open innovation project. Hence the previously designed

assumptions regarding positive and negative characteristics of SME are mainly null and void in this context.

Furthermore one additional aspect of theory obstructed this thesis. While Lee et al. (2010) elaborated on the value of open innovation conducted by one intermediated network and Ollila and Elmquist elaborated on the difficulty if an involved company organized the open innovation network activities, none of the literature revisited accounted for open innovation initiatives organized for SMEs by several intermediated networks. Resulting from this there was a constant confusion of terms first during the field research, because all project members refused the term network for the open innovation projects, and secondly during the analysis because it has not been clear at which point network activities aimed at construction of open innovation cooperation can also be understood as intermediated networks with the theoretical meaning intended by Lee et al. (2010). Hence there is a need for further research with regard to open innovation initiatives for SMEs managed by several intermediated networks. Nonetheless this thesis has some merit in contributing to the understanding of this theoretical gap as well as in identifying important factors of the early development open innovation cooperation organized by several intermediated networks.

8.2 Limitations of case studies

Even though the case studies provided a deep insight into the early stage development of innovation cooperation organized by several intermediated networks, the selection of networks also limited this thesis. In particular this is the case for the project smart businessIT which had been identified by one project partner herself as fitting to the analysis. Even though this might be an adequate observation in the future, as of now the project is still concerned with setting up and organizing itself that there is no contribution as to practicing or facilitating open innovation that reaches deeper than socializing and network events. Additionally at the outset of the paper it had not been clear that smart businessIT only acts as a multiplicator of living labs but not actively involved in their construction etc. Hence the degree of involvement with open innovation methods differed in comparison to the other projects. Nonetheless it still provided a good insight into the difficulties of setting up cooperation projects organized by multiple intermediated networks and thereby even strongly supported the use of Tuckman and Jensen's model of group development (1977).

8.3 Concluding remarks

This thesis observed three network initiatives, called OpenAlps, smart businessIT and TTC, which all focus on implementing open innovation as a tool for economic enhancement of SMEs in their respective region. Thereby the research question has been how networks overcome SME-typical barriers to open innovation and why this is not always successful despite acting as neutral intermediated network as suggested by Lee et. al (2010). Thereby several typical SME-barriers had been identified from the literature. These were time, human resource and financial constraints as well as the fear to lose intellectual property and the need to concentrate on opportunities of exploitation. In order to answer the twofold research question a theoretical framework has been designed to guide the first, exploratory part of the research question. Hereby three main categories have been retrieved from literature, which are (1) networks, (2) intermediaries, and (3) SMEs. Within these categories several variables guided the research and led the deductive approach. The second part of the research question proceeded in an inductive way first operationalizing Tuckman and Jensen's model for group development (1977) to encompass the issues detected and related to a social dimension. Thereby this model has been found very helpful to analytically organize the development into stages with each stage bringing different challenges.

As further obstructing dimensions geographic communities and a culture of cooperation have been identified play a role in the early stage of open innovation network development. Hereby geographical communities emphasize the need to clarify the commitment to the geographical space as well as its perception by the targeted focus group. In the case of the researched networks only TTC and smart businessIT are based on geographic communities, whereas OpenAlps is an artificial construct. With regard to the culture of cooperation is has been concluded that open innovation projects for SMEs have a bigger chance of succeeding when being rooted in the region and being based on strengths and demands of the SMEs. This can also be described as a bottom-up approach which motivates SMEs to commit to projects despite the lack of resources. This has been the case for TTC but not for OpenAlps or smart businessIT. Hence it is also not surprising that TTC has been identified as the most successful open innovation project organized by multiple intermediated networks.

Due to the fact that this thesis focuses on the initial stage of open innovation network development, the picture drawn does not represent the whole complexity of the issue. Further research could and should be conducted with regard to facilitation of the actual innovation process through intermediated networks. Additionally also the aspect of monetizing jointly generated ideas and product development in the framework of open innovation projects organized by intermediated network, could be highly interesting. Nonetheless this thesis can contribute to a thorough understanding of the early stages of development of open innovation projects organized by intermediated networks.

9. Appendix

9.1 Overview Qualitative Interviews

	Semi-structured in-depth interviews					
	Name	Organization	Initiative	Date of Interview		
1	Valentina Grillea	MFG	OpenAlps	02.10.2012		
2	Melanie John	IHK Schwarzwald-Baar- Heuberg	OpenAlps	09.10.2012		
3	Gennadi Schermann	CyberForum Service GmbH	smart businessIT	08.10.2012		
4	Nina Schulz	bwcon	smart businessIT	02.10.2012		
5	Katja Schwab	bwcon (mff)	smart businessIT	09.10.2012		
6	Ralf Meyer	AGIT	TTC	04.10.2012		
7	Nora Robertz-Peters	City of Aachen	TTC	04.10.2012		
8	Carina Jansen	LifeTec Aachen-Jülich e.V.	TTC	11.10.2012		
9	Christa Roos	LifeTec Aachen-Jülich e.V.	TTC	11.10.2012		

Semi-structured short interviews					
10	Markus Gratzfeld	BitifEye Digital Test Solutions GmBH	OpenAlps	09.10.2012	
11	Malaika Lauk	StudyMyHealth.com	OpenAlps	09.10.2012	
12	Martin Liebrecht	Universität Ulm	OpenAlps	09.10.2012	
13	Andreas Schmitt	Medizinisches Versorgungszentrum Clotten Labor Dr. Haas	OpenAlps	09.10.2012	
14	Rüdiger Wörnle	Gesundheitsresort Freiburg	OpenAlps	09.10.2012	
15	Rolf Bittner	Nash Technologies	OpenAlps	09.10.2012	
16	Frank Glatt	Heidelberg Mobil International GmbH	OpenAlps	09.10.2012	

9.2 Semi-structured interview questions

Nr.	Questions			
	Network / Project			
1	What is the goal of the project?			
2	How is the project structured?			
3	Who finances the project?			
4	What type of innovation should be reached or enhanced?			
5	How does the project want to reach this?			
6	What type of events do you conduct within the project?			
7	How many events?			
8	Which companies are currently active members of the project?			
9	How do you recruit new project members / companies?			
10	Do you take into consideration the company strategy or motivation before accepting it to the project?			
11	How do you communicate the objectives of the project?			
12	Did you decide for a special method of open innovation? Why did you decide for this method of open innovation?			
13	Which other open innovation methods did you take into consideration?			
14	Did you include the opinion of companies when setting up the project? Are these companies participating in the project?			
	Intermediary / Project Partners			
15	How do you see the role of your organization in this project?			
16	Please describe the tasks of your organization in the project.			
17	What is your task in the project?			
18	Are you content with the progress of the project?			
19	According to your opinion, what is going well?			
20	According to your opinion, what is not going well?			
21	How could this unsatisfactory situation be changed?			
22	Are you happy with your role within the project? What would you like to change?			
23	How do you see the tasks of the other project partners?			
24	How does cooperation between project partners function?			
25	How could this cooperation be improved?			
26	What are the interests of your organization within this project?			
27	How do you interact with companies?			
28	Are you trying to establish a climate of trust within the initiative? How? Have you been successful?			
	SMEs			
29	What is the reaction of SMEs to the project and to the possibility to take part?			
30	Why do SMEs join/not join the project?			

31	How much time do they need to invest in participation?
32	Which fears do SMEs have when they get in touch with open innovation?
33	How do you act upon the possibility of intellectual property loss?
34	Which companies do you try to convince of participation?
35	Which characteristics does a participating company have on average?
36	Which company characteristics are important to include the companies into the project?
37	Who / which company position is participating in events from the initiative?
38	From which industry sector are the participating / targeted companies?
39	How is the relationship between companies?
	Do you take relationships between companies into consideration when choosing members for
40	the initiative?
41	In how far are participating companies complementing each other?
42	How are companies able to retrieve a financial advantage of participation at an early stage?
43	Do you assist companies in realising this financial advantage?

9.3 Table of qualitative data analysis¹³

¹³ In digital version Appendix 9.3 is added on an excel file.

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