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Author: Holzmann, Thomas O.
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Part IV:
Innovation intermediaries as matchmaker

6 Innovation intermediaries and open innovation

The following chapter gives insights in the innovation process in networks and how innovation intermediaries contribute to efficient matchmaking. It contributes to the current discussion in academia about the functionalities of innovation intermediaries and their role in along innovation processes. Chapter 6.1 is based on a conference paper and chapter 6.2 is an extended and improved version for journal publication.

6.1 Revisiting the rationale of innovation networks

Regional innovation systems struggle to live up to certainly exaggerated expectations despite high effort into facilitation of innovation network collaboration and cluster forming. As well, innovation performance remains difficult to measure. Facilitation is the aim of many institutions like technology transfer centres, living labs, incubators, or business idea competitions. In this chapter, a study of seven action research cases is presented from which I argue that a result or "deal-flow" rationale of innovation networks mobilizes stronger engagement of stakeholders than the facilitation rationale. Innovation processes on network level then can be designed to coordinate seamless deal-flows. The practical contribution of the chapter is that innovation intermediaries can derive a sustainable value position as innovation process managers. The chapter revisits the concrete intermediary function of "matchmaking" as innovation process design.

6.1.1 Introduction

Much has been said about innovation as the driving force of economic development and the role of collaborative networks to increase innovation activities in a region. Policy makers and universities as well have tried much in practice to facilitate innovation in networks; in the hope to create “Silicon Valley’s”. While much has been achieved, we need to acknowledge that the often exaggerated public expectations have not generally been met and results are difficult to support with hard facts. Innovation performance remains difficult to measure, from
which some suspect that there might not be much outcome at all. Especially in the current times of public austerity policies such doubts are especially dangerous for the many innovation intermediaries that depend on public funding to sustain their activities.

The aim of this paper is to explore routes to a more sustainable collaborative innovation model. This research is motivated from the sustained general belief in the value of collaborative innovation, for example under the title of open innovation, which is not affected by the doubts about its current implementation through public organization. In order to gain in-depth understanding of the motivations to engage in collaborative innovation we have undertaken seven action research studies over the past four years and in different settings of start-up firms, of networked small and medium sized firms, and collaboration between large and small firms. The study was based on the assumption that innovation is “a creative process engaging a variety of activities, participants and interactions the outcome of which is a technological product or process” (Marinova & Phillimore, 2003, p. 44) and that all action intervention should contribute to creating a seamless process flow.

The learning from the study is that those cases did progress well in which the outcome was associated with a clear economic value or “deal” and in which this deal is not only an abstract vision but related through process steps back to each individual partner in the collaboration. From planning action interventions we experienced that the engineering and executing of such collaborative innovation processes is conceptually and practically underdeveloped. The contribution of this work to academia therefore is process integration of existing knowledge on innovation facilitation functions. The contribution to practice is a new business logic for intermediaries as innovation process managers that derive their value proposition from holding a portfolio of deals. Such rationale would pave the way to measuring the performance of innovation networks as network portfolio value.

The paper is structured as follows. We set the scene by a short literature review on innovation processes in networks, their management...
and institutional support to then introduce setting, method and data of the action research study. Learning from the study is presented in the discussion section. The paper concludes with directions for future work.

6.1.2 Literature review about innovation process management

Innovation can be seen as a process similar to other business processes (Hammer & Champy, 1993) so that techniques of processes and quality management are applicable (Benner & Tushman, 2002). Like other processes innovation is enabled by promoters from all hierarchical levels (Fichter, 2009; Witte, 1973) who can be compared with supply chain managers and quality managers. They actively conduct distinct functions and link them into processes. More generally spoken, promoters are process managers and co-ordinators of each single process and therewith contribute to generating seamless process flow towards the output.

Supply chain and quality management literature has further developed how advanced process understanding leads to faster work flow, lower cost and/or better quality level and thus higher performance. As for supply chains, open innovation involves external partner in the process chain and their seamless integration into the process flow is as important as process integration inside the firm (Chen & Paulraj, 2004). The process concept has a connotation of efficient management when detailed understanding of the process logic allows the development of dedicated management tools and techniques and continued process improvement (Deming, 1986).

In innovation systems stakeholders collaborate or interact via processes which can be seen as linking mechanisms. Systems theories are popular in explaining how innovation evolves through interactions between the partners of the system (Edquist, 1997; Lundvall, 2010). Inter-connectedness is described to produce synergies for the individual partner and the system as a whole if these can systematically be inter-connected through structured processes. In the words of A. Van de Ven innovation management is the “managing of new ideas into good currency” and fundamentally a problem of process understanding.
(Van de Ven, 1986). His study was focused on processes within organization. Further process models of competency rallying in stable networks (Katzy & Crowston, 2008) and in the context of short-term open innovation (Chesbrough, 2003) apply the systems view on collaborative settings.

Fichter (2009) introduced “networks of promoters in communities” for collaborative innovation processes and herewith points to the fact that structured processes in systems do not emerge by themselves, but have to be designed and managed. This often is the role of intermediaries. The intermediary is the communicating entity between stakeholders of an innovation system, as stakeholders typically have the problem of finding the right innovation collaboration partner (Shvaiko, Mion, Dalpiaz, & Angelini, 2010). Therefore, commercial and public funded innovation intermediaries, like business incubators or living labs, emerged to overcome this obvious need in open network structures (Hargadon & Sutton, 1997; Howells, 2006; Lopez-Vega & Vanhaverbeke, 2009). Howells broadly defines the role of “intermediaries” as to “perform a variety of tasks within the innovation process”.

Bessant and Rush identify consultancy services as main function of intermediaries “which help to bridge the gap between technological opportunity and (often poorly articulated) user needs (Bessant & Rush, 1995, p. 101). Klerkx and Leeuwis also describe the danger of various gaps among innovation system stakeholders that can lead to innovation system failures and less performance. They call for “systemic intermediaries who connect the different components of international, national, sectoral and/or regional innovation systems” (Klerkx & Leeuwis, 2009, p. 850), but they neither give an answer about how the connection could be done in detail nor a description about the intermediated innovation process.

Looking in the existing literature of process management and intermediaries, there seems to be an unclear understanding of what the role of intermediaries is. Various terms are used in the studies and multiple distinctions between types of intermediaries and their role as agents in the innovation system and their function within the innovation process are developed (Howells, 2006). Most of them focus on information
scanning and communication as main functions but leave it open, whether an intermediary is a passive service institution or an active promoter or process manager. Do they only transfer knowledge and technology from one party to the other or do they also offer individual services to the stakeholders? Lopez and Vanhaverbeke identify as significant future research question “how do companies identify, select and interact with innovation intermediaries?” Does the intermediary have a more passive facilitating role or are intermediaries process manager and active promoter with a distinct capability of identifying and linking partners in the innovation process? The impact of intermediaries on the innovation process is also under-researched (Batterink, Wubben, Klerkx, & Omta, 2010; Pittaway, Robertson, Munir, Denyer, & Neely, 2004).

In conclusion this literature research indicates a growing interest in collaborative innovation since the 1990s (Fichter, 2009) where the interdependences in the innovation process chain are still not well understood (Batterink et al., 2010; Pittaway et al., 2004). Especially the pre-collaboration phase with the search for and matching of potential partners is little researched for innovation partnerships. This is in contrast to supply chain management literature which provides various supplier selection models (Giunipero, Handfield, & Eltantawy, 2006; Luo et al., 2009; Wu, 2009).

6.1.3 Research methodology

The study follows an action research design (Susman & Evered, 1978) where the researchers are embedded in real projects and interact in real-life settings to help solving problems and learn from this experience (Ottosson, 2003). We have engaged in seven cases in varying settings to experience different phases and instances of the collaborative innovation process:

- Two cases were start-up teams that were supported in presenting their product ideas to a business idea competition, the European Satellite Navigation Competition ESNC, in 2006 and 2008 respectively. In the consecutive process of developing and testing prototypes and early market introduction included collaboration in the regional Living Lab
as was reported earlier (Katzy & Turgut, 2010). The linking of innovation instruments, namely early idea capturing through an idea competition with prototype development support in the next phase gave rise to more structural project cooperation of ESNC and Living Labs.

- Three cases were generated from a dedicated ESNC Living Lab prize. The three winners of the competition were supported in finding the most suitable Living Lab Europe-wide for their prototype development and testing. These cases focus on the selection and match making process.

- Two cases are open innovation cases where established large firms systematically search for small innovative partners, in particular start-ups. One is an innovation marketing project for identifying new market niches, the other a manufacturing project for process innovation. The researcher is involved as intermediary in the search of and matching the partners for specified innovation projects of established firms.

Data collection in the study is accomplished in several ways. Structured and semi-structured interviews were undertaken at several points to understand the network situation. Minutes of meetings and field notes from attended meetings and bilateral interactions as well as document analysis of email conversations, project plans, and similar documents were undertaken. Action reflection cycles were established in form of regular meetings by the research team, the authors. The study is designed so that the research scope enhances by iterative learning cycles over time (Kock et al., 1997).

6.1.4 Discussion

From our action research studies we take three learning: (1) The collaborative innovation process must be the leading perspective and needs to be better understood; (2) Especially matchmaking between the partners and through it the coordination of the innovation process is an important capability; (3) Mobilization to engage in the innovation process is driven by the concrete prospect of deals. We conclude from these experiences that innovation intermediaries face the expectation to become process management service providers.
Process perspective as leading focus of actively engineering intermediaries

In the ESNC cases, participants and a specific Living Lab collaborated for the purpose of prototype development because of occasional acquaintance. Even though the actual outcome of this collaboration was only for one of the teams fully successful, the idea to combine the winners of a business plan competition with the user-centric test-bed concept of Living Labs was perceived as a useful collaboration in the innovation process. The combination of the two steps into a process called “innovation highway” (Katzy & Turgut, 2010) was implemented in a project setting as “a seamless process of coordinated” activities in the various phases of the innovation process starting from idea recognition to new ventures creation (see GAINS project plan, p. 7). With support from the initiators three new collaborative innovation projects are launched.

Initially the collaboration between ESNC participants and Living Labs was expected to run autonomously in the future once it had been set-up and successfully demonstrated. However, the experience shows that collaboration partners have an essential demand for active matchmaking and process management. The innovation process to be boosted by means of collaborations in the network clearly needs active promoters and managers.

We observed similar challenges in the large enterprises as the need of a well defined process became also visible in the open innovation cases with an established company. Acting as intermediary, the researchers introduced after some learning cycles a defined process description for properly running the project.

“… I expect you to have a portfolio of start-ups and a structured process (...) like the professional agencies which already offer similar services …”

[meeting/ field note].
“… I need more transparency for a better understanding (...) how you systematize the profiling of our requirements and the search for new ventures. …”

[personal interaction/ field note]

The network comprises various innovation processes – individual and collaborative – that need to be initiated, coordinated, interconnected etc. in respect of an outcome that is visible and measurable. This role can be assigned to intermediary organizations to begin with (Batterink et al., 2010; Howells, 2006). We learnt that an even more active intermediary as process manager and deal-flow manager is requested, which is not described in the literature in detail.

Matching partners for collaboration and coordination of the innovation process

What we have seen in all cases is that an innovation process is established by matching the right partners for collaboration. The collaboration between participants of a business plan competition and Living Labs led to different outcomes for both teams: while it resulted in an efficient prototype in one case, the technical specification of the lab did not match the requirements of the other case and the innovation process was interrupted - and called for action by the intermediary. Based on the experience from the first two cases the evaluation basis of potential collaboration partners for the next three cases was enlarged to a European level and the process organized more precisely. Detailed criteria were established and the process was supported by the expertise of the “intermediary” organizations. The more successful the intermediary organizations match the collaboration partners the more visible outcomes of the collaborations will appear and demonstrate the efficiency of those intermediaries. We could not find detailed descriptions in the literature about qualified matchmaking of innovation partners, which is in stark contrast to the explicit articulation of the problem in practice:
“Our problem is not to find sufficient innovation partners; we need to understand how to find the right one, because searching for suitable partners interferes with the actual innovation!” [meeting minutes]

From the cases a further problem was identified, namely that searching the right partner is one problem, but that the selection decision is a complex group decision-making process. Hence, a future research area could be how social media are able to support and increase the likelihood of a proper matching. New processes with higher dynamics and technical support could be developed in order to overcome both the research and the practical gap. The social media aspect already figures out the network characteristic and could therefore be adopted to innovation networks.

**Demonstrating concrete prospect of deals for all stakeholders**

The essential capability of the intermediary is the translation of the deal to the individual needs of one stakeholder and at the same time to reasonably integrate the single contributions of the innovation network to the whole innovation process. The intermediary assures stakeholders that institutional interests occasionally should be deferred for the benefits of collaboration. The added value of collaboration must be visible and measurable in all phases of the innovation process. To motivate different stakeholders to get involved in the ESNC cases prize money was awarded to both partners of the collaboration. Although it had been a good incentive for starting this type of collaboration an independent and sustainable approach to cooperation along the innovation process chain should be developed.

As one case with the established companies did not hold out prospect outcomes, the innovation manager with the interest in fast deals stopped the project immediately. The manager was result oriented because the companies’ investment must have a real return. Thus no process flow emerges, if the deal cannot be made visible. It is therefore the function of the intermediary to make the deal visible. We suggest extending the definition of deals as a process output by the essential requirement of an economic value. This must be transferred to all
process steps. Intermediaries showing a portfolio of many successful deals will be perceived as efficient and capable innovation process managers. Therewith the performance of intermediaries can be measured and evaluated by the size of deal portfolios or the number of realized deals. Future research will address the question of how to establish those portfolios — in particular for not-commercialized intermediaries who are increasingly faced with funding scheme changing. Demonstrating deals to be generated from innovation collaboration strengthens the role of intermediaries and increases the impact of innovation networks in the long run.

6.1.5 Conclusions

The here presented study has a focus on implementation issues of collaborative innovation. Therefore an action study approach has been chosen to understand the innovation process from the inside.

We conclude from the study that a process perspective on collaborative innovation has potential to advance the understanding of phases of the innovation process in networks. Both our study and references to literature show that this understanding is in its infancy and requires more research to develop management tools. The innovation process in networks is distributed across multiple institutions. Our study showed that a seamless process emerges from the matching of partners into the seamless process and an active monitoring and management of the process operation. Concrete instruments such as idea competitions, living labs, or matching platforms do emerge but require more research to increase effectiveness.

Successful innovation creates value and a sign of maturing processes would be a more regular outcome of measurable value from portfolios of mastered innovation processes. A sustainable value proposition of innovation intermediaries would be the mastering of innovation processes and participation in the created value. Valued innovation portfolios would not only create a performance indicator for networks, participation in the value would provide intermediaries with alternative to public funding in addition. To make this possible will require the development of appropriate monitoring and valuation instruments.
Future research is necessary for an in-depth understanding of the innovation process in collaborations; therefore more action cycles and cases will be conducted within the next months. The matching capability also needs to be better understood for a more efficient and dynamic process management in collaborations.  

Acknowledgement

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6.2 A process view on open innovation coordination

The chapter reports an action study of seven innovation projects with collaborative partnerships in inter-organizational networks that are facilitated by innovation intermediaries. It contributes to open innovation literature the understanding of innovation processes as nested processes of co-creation on the one side and economic exchange on the other side. While innovation project management and (online) market places are well researched as distinct strategic positions, our observations suggest a third strategic position for innovation intermediaries as process coordinators with strategic innovation capabilities. The paper identifies matchmaking and innovation process design, management of collaborative projects, project valuation, and portfolio management as three strategic capabilities and identifies directions for future research on this emerging phenomenon.

6.2.1 Introduction

Within the scholarly domain of R&D management, open innovation (Chesbrough, 2003) is discussed as a strategy to increase returns from innovation through exchange across firm boundaries. Such exchange can be beneficial in both directions (Dahlander & Gann, 2010): out-bound through the independent external commercialization of internally developed intellectual property that does not readily find application in the firm’s own product portfolio for example through online market places like NineSigma; or, inbound, adoption of external developments benefits the firm’s products for example through online market places as Innocentive. In both cases the firm boundaries are opened up for innovation which is a recent development, but mainly to large firms. Small and medium sized firms (SMEs), whether they are in existence for a long time or have recently launched as start-ups, always had a stronger need to collaborate due to their lack of internal resources. While collaboration has formerly been looked upon as strategic necessity to compensate for the lack of resources (Das & Teng, 2013). Innovation Intermediaries: A process view on open innovation coordination. Technology Analysis & Strategic Management, 25(3): 295-309.29
The systemic setting for innovation, much like all markets, only runs with the necessary intermediaries in place that make interactions and matching of partners possible. According to new institutional economics this is a way to minimize asymmetric information on the market (Spulber, 1999). It therefore does not surprise that scholarly discussion on the role and functions of intermediaries has intensified in various fields at the same time (Howells, 2006; Lopez & Vanhaverbeke, 2009; Roxas, Piroli, & Sorrentino, 2011; Zhao & Zheng, 2011). Innovation Intermediaries are no new phenomenon and there is a formidable variance of agents. Because innovation has for long been seen as a domain of market failure it is a public priority to support especially resource-limited SMEs through technology transfer offices, business incubators, or entrepreneurship centres. These have been strategically positioned close to universities and research centres, where the technology-based start-ups emerge. Others, such as science parks or development agencies have been positioned in often local or regional SME networks (Lee, Park, Yoon, & Park, 2010). Given their strong public funding, many have a legal and governmental non-profit structure. In contrast, younger innovation intermediaries such as the above mentioned examples of NineSigma or Innocentive have a commercial structure and operate on the basis of reward fees that they receive for exchange deals between knowledge and technology supplier and customers. Their success – and with no doubt current public budget austerity – provides theoretical and practical motivation to understand the changes in collaborative innovation processes and the “shift from being a mere facilitator of innovation to being also a source and/or carrier of innovation” (Klerkx & Leeuwis, 2009).

The aim of this paper is to explore collaborative innovation processes in open networks and especially the strategic implications for involved SMEs and intermediaries. The focus of this research is on the early stages of the innovation process in which technology based SMEs are particularly involved. The generally attributed advantage of SMEs in
this stage is their agility in the creation of innovation (Alvarez & Barney, 2001; Lawton Smith et al., 1991; Minshall et al., 2008), a reason for which we found large firms interested in cooperation with SMEs. But again the typical SME resource constraints were in place, for example when SMEs were not able to pay the fees for the innovation market portals. Due to the recent emergence of open innovation and the dearth in identified and described innovation cases in open innovation, we have undertaken an action research study. The research team has participated in open innovation processes to gain in-depth knowledge through direct experience in a total of seven cases in two settings: one setting in which large firms search for SMEs to cooperate with, and the other setting where start-up firms are promoted to find collaboration partners for growth.

We observed that those cases did progress well in which the intermediary could show to both collaboration partners tangible outcome with clear economic value, so that we refer to it as “deals”. And we found that those deals can be made in very early stages of the innovation process, for example in form of a price in an idea competition. More deals in later stages provide new valuations and progress measure. But unlike in pure online markets the intermediary got involved not only in brokering transactions but as well in the creation / production part of the innovation process. What looks at first sight similar to the public financed facilitation and SME support, emerged as a value creating service based on competences like matchmaking, innovation process management, and portfolio management on which intermediaries built a sustainable competitive position. From planning action interventions during the study we experienced that young start-up teams, existing SMEs and large firms alike prefer commercially viable innovation value chains that allow for the definition of viable strategic positions, including for intermediaries. We equally experienced that engineering and execution of such collaborative innovation processes is conceptually and practically underdeveloped.

The paper aims at contributing to academic understanding of the managerial issues in open innovation processes, starting with building processes from within open network to managing their execution. The
The paper aims at contributing to practice guidance in the definition of business strategies for innovation partners, especially intermediaries from a set of capabilities such as holding portfolios of innovation projects, matchmaking and innovation process/project management. The remainder of the paper is structured as follows. We set the scene with a review of literature on open innovation and in particular the role of intermediaries on one side and the management of innovation processes on the other side. We then introduce settings and method of the action research study and give a short narrative of the cases. The paper is completed with a discussion of observations from the study, conclusions and directions for future work.

6.2.2 Open innovation and innovation process management

Open innovation thinking offers a framework in the tradition of Adam Smith (1776) in that increasing work specialization, here for innovation activities, is combined with improved market exchange mechanisms to strategically leverage the outcome of innovation efforts (Gassmann et al., 2010). A set of tools like technology trading, know-how, patent and licensing markets (Chesbrough, 2003) are proposed together with quite normative recommendations for change in organizational culture and corporate governance to make such open innovation successful. Market relationships are facilitated, for example, by recent online market places such as Innocentive or NineSigma that are reported to have received over 20,000 innovation proposals from all over the world and facilitated over 12 USD million in contract awards with mostly large firms like Kraft, Philips, or Unilever (Lopez-Vega & Vanhaverbeke, 2009). These platforms act as market brokers that match innovation problem owners as customers with solution providers as suppliers and get remunerated through transaction fees. Their source of competitive advantage is a monopolized portfolio of supply and demand from which deals can be generated. The examples suggest that market transactions are well suited to generate such deals, but matchmaking is only a part of the transaction cost in the innovation process. It does not surprise therefore that warnings are issued on other costs of coordination if the production or co-creation process of innovation is included in the analysis as a “conceptual frame for open in-
novation from the perspective of product/technology lifecycles and the different phases through which an innovation evolves from conceptualization to commercialization” (Dahlander & Gann, 2010).

In the words of A. Van de Ven innovation management is the “managing of new ideas into good currency” and fundamentally a problem of process understanding (Van de Ven, 1986). His study was focused on processes within organization. Innovation can be seen as a process similar to other business processes (Hammer & Champy, 1993) so that techniques of processes and quality management should be applicable. For example, innovation processes are enabled by promoters from all hierarchical levels (Fichter, 2009; Witte, 1973) who can be compared with supply chain managers and quality managers. Another central thought of quality management is statistical process control (Deming, 1986) that posits that process coordination is based on quantitative measures of outcome and intermediate progress. Fields like production or supply chain management, in which statistical process control has successfully been applied, map process steps along the value chain in great detail and establish quantitative measures for each of them. Such coordination does not necessarily be effected through supervision in organizational hierarchies. For innovation, process overview models exist for aspects such as technology brokering, competency rallying (Katzy & Crowston, 2008) and open innovation (Chesbrough, 2003) but the maturity of innovation process understanding that is sufficient for strategic business process reengineering still needs be developed.

Coordination of innovation processes is often provided in open networks or innovation systems on regional or national level (Edquist, 1997). Such systemic understanding of innovation stresses the interactions between firms and other stakeholders relevant to the social system. Like open innovation this is a view on inter-organizational innovation processes across the borders of single firms and into a broader, but coordinated network of stakeholders including governments, industry, and science/academia in “triple helix”-interrelationships (Leydesdorff & Fritsch, 2005) where knowledge, resources, and capabilities are exchanged.
In contrast to open innovation with its strategic view on firms that create superior economic rents from innovation, the outcome of innovation systems is often modelled as shared knowledge gain from a “non-linear learning process” (Asheim, 2004). This is especially interesting to young ventures and SMEs with limited resources for basic research, as they often have no own R&D department or the necessary financial background for it. Therefore partnerships with established companies or collaborating in SME networks is seen as a possibility to combine complementary resources and thus create higher – but shared – innovation performance (Edwards, Delbridge, & Munday, 2005; Rothaermel, 2001, 2002). Networks are a double edged knife because of the difficulty to attribute individual economic ownership that emerges from spill-over effects. As a substitution to the economic motivation, social production of knowledge is therefore seen as public responsibility and justification for public research funding. Still, it requires trust especially on the side of participating SMEs that benefits do outweigh cost in open innovation type collaborations.

SMEs especially fear losing technological competence as their sources of competitive advantage in collaboration with large firms. This is a reason that they rather pursue cooperation in the commercialization stage than in the creation phase (Lee et al., 2010). Lee et al. therefore suggest a network model with a trust building intermediary that facilitates the identification and matching of collaboration partners, the evaluation of collaboration projects and the development of an information database.

From the review so far, coordinating the interrelationship of creation and commercialization of innovation emerges as the central concern of innovation in open networks. Another root motivation of open innovation is the lack of user orientation (Von Hippel, 2005). While this rather is an effect of general lack of commercial orientation of R&D departments internal to large firms (Chesbrough, 2003), it is for SMEs again a consequence of resource constraints that are limiting marketing and commercialization possibilities. In the European public framework program for innovation FP 7, the search for alternative combinations of the creation phase and the commercialization phase of the innova-
tion process is subsumed under the term Living Lab to which over 200 regions refer as “... environments for innovation and development where users are exposed to new ICT solutions in (semi-) realistic contexts, as part of medium- or long-term studies targeting evaluation of new ICT solutions and discovery of innovation opportunities.” (Følstad, 2008). With reference to the triple helix model the involvement of users in such co-creation process is called “quadruple helix (public, private, government, and end user)” (Galbraith & McAdam, 2011). The Living Lab is presented as a process coordinating innovation intermediary for “(1) closing the pre-commercial gap by manifesting initial demand for products and services, as well as (2) orchestrating the actions of disparate actors in order to gain critical mass for the creation of a product or service“(Almirall & Wareham, 2011, p. 100).

There is broad agreement in literature that innovation processes in open networks are coordinated through a visible hand, often referred to as innovation intermediary. Fichter introduced “networks of promoters in communities” and argues that structured processes in innovation systems do not emerge by themselves or the invisible hand of markets, but have to be designed and managed (Fichter, 2009). The intermediary is as well described as broker and communicating entity between stakeholders of an innovation system, which typically have problems in finding the right innovation collaboration partner (Hargadon & Sutton, 1997; Howells, 2006; Lopez & Vanhaverbeke, 2009; Shvaiko et al., 2010). Howells (2006) identifies further roles of “intermediaries” as to “perform a variety of tasks within the innovation process”. Bessant and Rush (Bessant & Rush, 1995, p. 101) add consultancy services as main function of intermediaries “which help to bridge the gap between technological opportunity and (often poorly articulated) user needs. And Klerkx and Leeuwis point to the role of intermediaries to overcome various gaps among innovation system stakeholders that can lead to innovation system failures and reduced performance. They call for “systemic intermediaries who connect the different components of international, national, sectoral and/or regional innovation systems” (Klerkx & Leeuwis, 2009, p. 850).
Innovation intermediaries are described to provide a set of operative activities that link them to the network innovation processes, but literature provides only fragmented insight about the intermediary-process relationship. In contrast to supply chains, where seamless integration of partners into inter-organizational processes has been found equally important as process integration inside the firm (Chen & Paulraj, 2004) there is little report of how innovation intermediaries act as process managers or coordinators. The role as system level agent (Howells, 2006) with an information and communication role has been studied, but it remains open, whether an innovation intermediary remains passive with regard to concrete processes, or actively engages as promoter or process manager. Do they only transfer knowledge and technology from one party to the other or do they also offer individual services to the stakeholders? A frequent conclusion is that the impact of intermediaries on the innovation process remains under-researched (Batterink et al., 2010; Pittaway et al., 2004).

This is equally true concerning the question how intermediaries contribute to the creation of innovation processes. This is in contrast to supply chain management literature which provides various supplier selection models (Luo et al., 2009; Wu, 2009). Fichter describes that promotors contribute to their generation through micro political action (Fichter, 2009), but there are doubts on how the intermediary should get involved with individual partners in concrete processes. Lopez and Vanhaverbeke (2009, p. 30) formulate the open research question “How do companies identify, select and interact with innovation intermediaries?” Especially the pre-collaboration phase with the search for and matching of potential partners is little researched for innovation partnerships.

6.2.3 Research approach and case data

Our study follows an action research design (Susman & Evered, 1978) to study the management of innovation processes in networks where the researchers are embedded in real projects and interact in real-life settings to help solving problems and learn from this experience (Ottosson, 2003). This is a suitable approach for the given research
question as it helps developing a holistic understanding of the identified problem (Coughlan & Coghlan, 2002). The rigorous structure of action cycles with the four steps of problem analysis, action planning, action intervention, and reflection helps organizing research at the interface with practice and to separate scientific learning from practical problem solving. In a first, more explorative action cycle we developed the pre-understanding for gaining insights to specific problems or situations (Gummesson & Van Maanen, 2000). Our second action learning cycle is driven by deliberate planning of theoretically motivated interactions. Action reflection cycles were established in form of regular meetings by the research team, the authors. In total we have engaged in seven cases which can be grouped in two settings, one in which SMEs cooperate with large firms, and the other where start-up ventures are supported in entrepreneurship networks. In the second cycle deliberate and explicit planning was enforced by project plans that were requested by European and national funding bodies.

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<th>Setting</th>
<th>SME – network</th>
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<td>Sample</td>
<td>Five collaborations between SME and Living Lab</td>
<td>Two open innovation collaborations between large enterprises and start-ups (start-ups selected among 205 candidates)</td>
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<td>Data collection</td>
<td>Two semi-structured interviews with CEOs and project managers</td>
<td>Two semi-structured interviews (1 CEO, 3 innovation manager)</td>
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<td>One mid-term report</td>
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<td>&gt; 50 email correspondence</td>
<td></td>
</tr>
<tr>
<td>Data analysis</td>
<td>Document analysis</td>
<td>Document analysis</td>
</tr>
<tr>
<td></td>
<td>Cross-case analysis</td>
<td>Web content analysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cross-case analysis</td>
</tr>
</tbody>
</table>

**Table 11: Research design.**

As typical with action research, data collection in the study is accomplished in a number of complementary ways. Structured and semi-
structured interviews were regularly undertaken to understand the network situation. From participating in projects, minutes of meetings, field notes from attended meetings and bilateral interactions as well as document analysis of email conversations, project plans, and similar documents were collected. Data were subsequently coded and processed from which research relevant issues emerged, which gave rise to additional literature research. Through this the study is designed so that the research scope enhances by iterative learning cycles over time (Kock et al., 1997).

The study setting in European Regions of Knowledge

The study takes place in Europe, where innovation networks are an explicit element of innovation policy. In 1999 Europe has released the Lisbon agenda as its explicit innovation policy and again confirmed it in 2009. One of the pillars of this policy is the strengthening of regional innovation systems, networks, clusters or regions of knowledge (Röttmer, 2011) because a majority of European innovations has been found to emerge from geographical areas with a high density of large and small firms, universities, and research centres. Policy implementation is undertaken through a set of grant programs from different European Commission Direction General (DG), which are the European-level analogy to state ministries. For example, DG Research has created the regions of knowledge program, the aim of which is to strengthen innovation in regional networks. DG Information Society has created an action line Living Labs in its ICT grant program and so forth. National government programs increasingly align their policy objectives with the European level and create own programs such as the German FHprofUnt-program, which aims at strengthening the position of universities of applied sciences in collaborative innovation networks especially with SMEs. All this reaches industry and universities in form of public grant projects.

Most innovation networks are designed with an industry or technology focus. In our study, the automotive industry with its tiered supplier structure provided the setting for the SME – large firm cooperation, with an OEM and a tier-1 supplier participating as large firms. The
start-up network setting has a technology focus on applications for Europe’s satellite navigation system GALILEO / EGNOS, the equivalent to the American GPS system. When operational in 2013 it is supposed to create over 100,000 jobs of which over 90% will be in application products and services provided by SMEs. DG Industry in the European Commission therefore stimulates start-up ventures and SMEs from the broadest possible range of application domains but from a limited, steadily increasing number of regions, to adopt satellite navigation technology in their product and service range.

First action cycle exploration of start-ups collaboration in Living Labs

The first two cases of this study were generated in reply to a business idea competition called Galileo Masters, which is organized since 2006 in about 20 European regions in order to stimulate adoption of satellite navigation technology. Each region selects a winner and runner-up, from which a European winner is chosen. The price is a package including a cash price, European media coverage, free incubation services in one of the regions, and potentially matching for venture funding. Both cases were regional winner teams and their projects, one in the location based service industry with a mobile phone application that allows finding restaurants, public transport and other points of interest in vicinity. The other case is in the agriculture industry with an application that allows farmers to automatically generate the legally required reporting on pesticide application to fields from combining position and applied amounts already on the tractor.

The first case emerged from a business planning lecture at university, while the second was generated by an existing SME. Both got in contact with one of the authors and were initially supported in their application process towards the Galileo Master competition. After their success they asked for further support with the next step in the innovation process, the development of the product based on their idea. We supported them in joining the regional Living Lab for this step. In both cases the same Living Lab got involved. The specific composition of technology institutions and universities did fit the location based ser-
vice team so that they used the living lab throughout the product development and testing phase. The agriculture team did initial prototyping and user testing in the living lab for about one year and moved on for hardware development of the tractor onboard unit with selected global suppliers. Both teams emphasized the importance of appropriate and extensive testing to the success of their innovation. The location-based team continues to use the “real-life” environment of the Living Lab for software and concept testing. Priority for the agriculture team switched to hardware testing for which the team was referred to the European Space Agency which provides the necessary facilities. Both ventures have achieved the market introduction milestone.

Action learning results from the first cycle is on the one hand, that action intervention namely occurred for overcoming gaps in the innovation process and that organizing seamless processes in open network benefited the SMEs most. On the other hand, the known issue of orienting innovation projects to user demand early proved highly relevant.

Second Action Cycle of Innovation Collaboration in Networks

The second action cycle started in 2009 with action planning in form of designing projects in reply to new calls for proposals from the public innovation programs. The satellite navigation competition had successfully mobilized numerous innovative product and service ideas for some of which product development in living labs would provide valuable support. Therefore the intermediary organizing the satellite navigation competition and the network of Living Labs agreed to team up as two stages of the innovation process that they call “innovation highway” (Katzy & Turgut, 2010). Institutionalizing regular cooperation across Europe required considerable detail in process planning. For example, a special Living Lab prize was created and awarded three first prizes to start-up teams, which became cases of this study. One case is a location-based eHealth application, the second is an application to help car drivers reduce CO2 emission, and the third is a city tourism application. Upon the selection of the idea winners all European Living Labs were invited to submit their application for hosting field trial and prototyping. From all submissions, one Living Lab is
selected as partner for each start-up team and awarded a grant to partially cover the cost of executing the next stage. Expectation is that in the selected Living Lab the promising idea will achieve the milestone of prototype development and validation through its user community. Action intervention in this phase was for example during a first introductory get-together of interested Living Labs with the prize winning start-ups, contribution to process development and the development of selection criteria for business ideas and Living Labs, contribution to the agreement between start-ups and Living Labs, and eventually coaching of the collaboration process.

At the same time, interest in understanding and developing collaborative innovation processes with SMEs was voiced in the automotive industry. Car manufacturers and their first tier suppliers typically assume the coordination role for large supplier networks and constantly search for new SMEs to join. Problem analysis showed that the large firms face challenges in establishing the innovation network for several reasons, for example because finding the right SME is difficult and costly especially when they come from remote industries. As well, reluctance of SMEs to engage with the much larger enterprises posed an obstacle. The focus of action planning, which again was documented in a project plan, therefore was on designing innovation processes that are facilitated by neutral intermediaries, which in the overall structure is not much different from the satellite navigation competition where as well large firms do offer their resources to find and invite start-ups and SMEs for collaboration. The two concrete cases of our study are first an exploratory study where the marketing department of the established company is searching for new services and technologies for future positioning of their products in new market niches with new business models. The other project is from a manufacturing department that is in search of unconventional solutions for a defined technological problem in the production process. In both cases, action intervention entailed innovation process engineering, support in the definition of objectives, search of suitable SMEs, and establishment of the collaborative relationship.
6.2.4 Findings and discussion

From our action involvement three research issues emerged: (1) the role of the involved innovation intermediaries shifted away from neutral facilitation towards engaged innovation process management, which raises questions on the nature of open innovation processes. (2) matching complementary resources of network partners and integrating them into a coordinated innovation process is an important capability; and (3) valuation of innovation projects at all stages and management of the project portfolio, which could provide a solution candidate for the “funding paradox” (Klerkx & Leeuwis, 2009) for intermediaries in that it provides financial measure of performance from which revenue models can be derived.

Innovation process management capability

The original plans to establish collaboration between the satellite navigation competition participants and the living labs had foreseen support to demonstrate the process in a first round after which the cooperation projects were expected to be self-coordinating. But, experience showed quickly that collaboration partners had an essential demand for continuous collaboration support and process management so that new plans have been drafted to incorporate their requests for future years. The large firms in the automotive industry voiced similar expectations:

“… I expect you to have a portfolio of start-ups and a structured process (...) like the professional agencies which already offer similar services ...”
[meeting/field note].

In fact, all industrial partners did call for an “intermediary” not different from how they are described in innovation management literature (Batterink et al., 2010; Howells, 2006). Namely the expectation was to integrate various functions along the innovation value chain (Hansen & Birkinshaw, 2007; Roper, Du, & Love, 2008) toward concrete outcomes. In contrast to literature, which mostly assumes that innovation
processes are internal to one organization, open innovation processes are in inter-organizational network environment, which however did not moderate expectation on coordination efficiency. Table 12 summarizes what expectations firms openly addressed towards the intermediary. In none of the projects such role for the intermediary had been pre-assigned during action planning. Only during action reflection it emerged that such coordination function in the innovation value chain is only addressed implicitly, if at all.

<table>
<thead>
<tr>
<th>Service</th>
<th>Start-up</th>
<th>SME</th>
<th>Big firm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial broker service</td>
<td>limited attractive for partner finding, due to limited financial resources</td>
<td>Moderate attractive for solution finding, within limits of financial resources</td>
<td>Very attractive for solution finding and full service provider</td>
</tr>
<tr>
<td>Network facilitation services</td>
<td>Very attractive especially in form of publicly financed coaching services</td>
<td>Attractive especially as consulting services, but sometimes limited by financial resources</td>
<td>Very attractive as full service provision of external idea sources</td>
</tr>
<tr>
<td>Broker services</td>
<td>Very attractive for further value creation, due to the fact, that early stage innovation is valued</td>
<td>Very Attractive for running the innovation process more efficient through network access</td>
<td>Very attractive for running the innovation process more efficient and fast partner finding</td>
</tr>
<tr>
<td>Collaboration Services</td>
<td>Promoting contacts with decision makers in large firms or network</td>
<td>Promoting access to collaborative network facilities, innovation partners &amp; complementary resources</td>
<td>Efficient identification of innovations and qualification for cooperation of partner &amp; solution</td>
</tr>
</tbody>
</table>

Table 12: Innovation process coordination perception by case managers.

“…I need more transparency for a better understanding (…) how you systematize the profiling of our requirements and the search for new ventures. …”

[personal interaction/field note]

In a series of action-intervention meetings firms stressed the importance of explicit explanation of the innovation activities from which
the process description in the upper part of Figure 15 emerged as blueprint for running projects. In other words, partners in the innovation process approached innovation intermediaries as service suppliers and requested certainty on approaches, quantified prospects of results, as well as business references. In the course of the study, we observed that intermediaries listed in the lower part of figure 15 describe projects, like the seven cases in which we participated, as their reference portfolio.

A priority in the discussions was the structuring of the innovation process to generate marketable intermediate results. The involved intermediaries did have a history in providing support and facilitation, for example as university incubator offering a wide range of start-up consultancy services, but those activities are not prepared to demonstrate results with realized value, making it impossible for firms to quantify economic value of collaboration with the incubator’s portfolio. This changed with providing a first economic value to business ideas in form of the cash prize, of project investment plans for the living lab trials, and later valuations in financing rounds with investors. It became the role of the intermediary to demonstrate outcomes of stages of the innovation process and steer to have them validated by closing “deals” between supplier and customers. The process manager in this way is a deal-flow manager visualizing the value for all involved stakeholder to make deals happen. Identifying the right partners for such deals proved a highly debated issue in this context.
**Matchmaking capability**

Collaboration between participants of the business idea competition and Living Labs led to different outcomes for both teams: while it resulted in efficient prototype development in both cases, the European Space Agency and international hardware providers proved to be the right partners for the agriculture team’s next development phase. The location-based team continued cooperation with the living lab. Based on this experience the process was organized more precisely in the second action research cycle: detailed criteria were established and the process was supported by the experts from the intermediary. The more successfully the intermediary organizations matched the collaboration partners the more visible the efficiency of those intermediaries; or, as one manager put it:

> “*Our problem is not to find sufficient innovation partners; we need to understand how to find the right one, because searching for suitable partners interferes with the actual innovation!*”
>  
> [meeting minutes]

Matchmaking is more than searching the right partner and a subsequent market transaction. The cooperation decision is a complex group decision-making process, in that managers are aware that the cooperation decision is path establishing (Sydow, Schreyögg, & Koch, 2009) in that it is often bundled with decisions about technology or business model alternative that determine the future innovation direction. More research is needed to understand not only the strategic implications of this decision but as well its group dynamics. A frequent request was to support the dynamics through social media and to allow for higher dynamics of the process.

**Valuation and portfolio management capability**

Besides the individual projects, it was the critical mass of concurrent projects on which the innovation networks of the study did thrive. And it was the capability of the intermediary to translation the combined
value of a portfolio of individual deals into individual benefits of the stakeholder in several ways.

The likelihood of finding matching partners for the initiation of a new innovation collaboration project increases with the number of available partners in the network. All intermediaries in the study therefore engaged in building critical mass portfolios. In this way the satellite navigation competition did invest in establishing a network of experts capable of assessing business ideas, just as the living lab network invests in laboratory infrastructure and user communities with different interests and qualification.

Portfolios of active and past deals as symbolized by the circles in the centre of Figure 16 were equally carefully composed as above mentioned portfolios of the sources from which deals can be matched. Portfolios of more than one hundred business ideas in the business idea competition or prototype developments in Living Labs each year allow analysis on technical and business trends. Knowing about similar projects prevents repeating experiences or double work and provides insight in achieved technical capabilities and unsolved issue and challenges. The deal flow, the number of successfully completed matching projects, at the same time proved a strong competence signal on the side of the intermediary. It can be used to evaluate the performance of intermediaries and can be measured by the size or value of the deal portfolios or the number of realized deals.

**Figure 16:** Deal flow portfolios for intermediaries.
Deal flow portfolios establish financial valuations and therewith open ways for intermediaries to participate in the value created. In the course of the project two of the intermediaries entered into formal share participation of undertaken projects. It is too early to judge on the practical impact of such mechanism, but it introduces the concept of building a position for intermediaries in the innovation value chain based on a share of the value created. Future research will need to address the question of how to establish those portfolios – in particular for not-(yet)-commercialized intermediaries.

6.2.5 Conclusions and future research

This paper explores open innovation processes through the depth of getting involved in seven cases of an action research study. All cases have in common that innovation intermediaries contributed to the establishment of the collaboration and the management of its operations. In some cases online innovation market places were used for selected stages but obviously explicit coordination was needed to integrate the innovation process. This coordination was provided to the studied networks by intermediaries that offer a wide range of known consulting and facilitation services (Howells, 2006). Such facilitation is often provided through public funded agencies with no commercial intent. In the here described cases, however, intermediaries increasingly developed strategies to build viable positions in the innovation value chain. In this respect the study addresses a research gap on coordination in open innovation (Dahlander & Gann, 2010).

In conclusion we saw that the prevailing facilitating rationale for intermediaries is replaced by a value creation rationale in the innovation value chain. In concrete, intermediaries developed capabilities of identifying collaboration partners, matchmaking, innovation process management, and making innovation valuations visible in deals between innovation suppliers and customers. Investment in capability building was accompanied with a shift of revenue models from public funded facilitation to collecting transaction fees and taking co-ownership of
innovations in the early phase, from which we hypothesize the existence of a strategic position of open innovation coordinator.

This study shares the limitations of naturalistic inquiries which provide deep insight in a small number of cases. Even more so, the study explores cases of recent changes of strategic behaviour of intermediaries that are motivated by practical need and the publications on the concept of open innovation. More research will be needed not only to generalize the findings through quantitative studies. As well more qualitative studies are needed to chart the evolution of the phenomena. But even if the phenomena shall prove transient, it contributes an opportunity for theorizing on the coordination of innovation processes. In this line there are more opportunities to research into open innovation processes and the strategic capabilities of partners in the value chain.

The paper makes a practical contribution to corporate innovation managers in defining their cooperation with partners in innovation networks. Notably it makes a contribution to research policy makers and decision makers, who search for alternatives in funding schemes, and strategic decision makers who search for sustainable business models for innovation intermediaries where public funding alone is no longer a reliable revenue source. The advice from this paper is to develop complementary market-based revenue streams from holding a portfolio of innovation projects.