Master's thesis
R&D partnerships in SME's

Supervisor :
prof. dr. Bart LETEN

Hanne Daniels
Thesis presented in fulfillment of the requirements for the degree of Master of Management

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PREFACE

When thinking about a potential thesis topic, I primarily took inspiration from aspects of different classes I have enjoyed at UHasselt. My interest was first sparked last year when I took the Innovation and Value Chain Management-, Business Strategy- and International Marketing classes, where we discussed different entrepreneurial cases. My interest was triggered especially when it came to SMEs and how they look for inventive ways to stay innovative and differentiate themselves. Because of the inexistence of much prior literature on the topic, it was not the easiest topic as I learned, but one that I became truly interested in.

I am grateful to have had the support of a number of people who either lent an ear, a shoulder to lean on or provided guidance during the whole thesis process. First of all I would like to thank my promoter, Professor Bart Leten, for providing guidance, feedback and assistance – particularly in helping me find new perspectives that have not been linked to the theme before. I would also like to thank Piet Pauwels and Annelies Clijsters for their support and Guido Hermans for providing me contacts inside the Machiels Group.

I would like to express my appreciation to the participants of the case study research, namely Wouter Vanaken, Emiel Philipsen, Tom Claus, Erik Rogiers, Pascal Peeters, Pieter Van Moll, Freek Gielen, and Ann Dries. They gave me numerous new insights and knowledge regarding open innovation and the R&D partnership management process.

Last but not least, I would like to thank my family, friends, and particularly my boyfriend Tom, for their support and encouragement, pushing me towards my final goal.

MANAGERIAL SUMMARY

"Proper management, creation and maintenance of external partnerships are essential for an SME to succeed." (Lee, Park, Yoon and Park, 2010)

Because of the importance of management for the success of R&D partnerships and the limited attention the topic received in prior literature and studies, this master thesis aims to answer: "How do SMEs successfully manage their R&D partnerships?"

Inter-organizational R&D collaboration facilitates a synergistic blending of external and internal ideas into new products, processes and systems (Belderbos, Cassiman, Faems, Leten and Van Looy, 2014).

Innovation in SMEs is hampered by certain limitations such as: lack of financial resources, lack of specific knowledge, poor understanding of advanced technologies, etc. (Vanhaverbeke et al., 2012; Spitshoven et al., 2013). Therefore, smaller firms have to open up more than their larger counterparts to access external knowledge and technology for innovative purposes (Spitshoven et al., 2013). The application of open innovation is even more important for SMEs than for large companies.

The aim was to generate and gain new insights and ideas. The methodology was built based on the case study research method of Eisenhardt (1989) and Yin (2009). For this master's dissertation, six case studies were conducted with SMEs that operate in different industries. The data were collected through semi-structured in-depth interviews. Each case study was analyzed individually and afterwards a cross case analysis was made to see if there were any patterns, similarities or contradictions.

The key areas of importance that are highlighted by the cases are regarding: partner selection, process planning, evaluation, contracting and ownership arrangements, trust Vs. control, networking and partner types. Proper partnership management already begins from the start, accurate partner selection and screening based on specialised requirements is crucial. This process cannot go without up-front step-by-step planning, each process phase has to be planned and has to be followed up by the president of the consortium. Arrangements on ownership cannot be left out either, to avoid conflicts it is important to consider this from the beginning. Furthermore, evaluation is of great importance by making forecasts and predictions. Good personal relationships with partners can be an opportunity and advantage on the one hand, but also a weakness and risk on the other hand. It is important to find a good balance between control and trust, it is wise to trust in a critical way. Furthermore, it is important to keep control over the process and the possible challenges. Involving a mix of partners is a good idea to not become too dependent on one partner, this can be a combination of both market based and science based partners. Finally prior experience and a good professional network are essential as well.

LIST OF ABBREVIATIONS

Table of abbreviations	
Abbreviation	**Meaning**
B2B	Business to Business
B2C	Business to Consumer
CEO	Chief Executive Officer
CO2	Carbon Dioxide
ELFM	Enhanced Landfill Mining
IP	Intellectual Property
IPR	Intellectual Property Rights
IT	Information Technology
IV	Intravenous Catheter
KSF	Key Success Factors
NDA	Non-Disclosure Agreement
NIH	Not Invented Here
NPD	New Product Development
OI	Open Innovation
PVC	Polyvinyl Chloride
R&D	Research and Development
ROA	Return on Assets
ROI	Return on Investment
SMEs	Small- and Medium sized Enterprises
VS	Versus
WFGM-model	Want, Find, Get, Manage- model
ZOL	Ziekenhuis Oost-Limburg

TABLE OF CONTENTS

1   Introduction

R&D partnerships have become an increasingly common event and have triggered considerable attention in recent years (Van de Vrande, De Jong, Vanhaverbeke and De Rochemont, 2009; Du et al., 2014). Prior studies emphasized the need for inter-organizational R&D collaboration, which facilitates the synergistic blending of external and internal ideas into new products, processes and systems (Belderbos, Cassiman, Faems, Leten and Van Looy, 2014). Investing a huge amount in internal research and R&D is no longer applicable. Instead they are crossing company borders and try to create competitive advantage, by incorporating external ideas into their own internal innovation process, and allow other firms to use their ideas (Chesbrough, Vanhaverbeke, and West, 2006). R&D partnerships advocated to lead to a number of benefits such as better adaptation to the market needs, shared resources and risks among partners and better financial performance. By cooperation with external partners, the firms' performance and revenues will increase and their innovation processes will accelerate (Chesbrough, 2003).

Engaging in R&D partnerships not only triggers opportunities for value creation but also presents substantial challenges e.g. in seeking to appropriate this value. The challenges are depending on the partner type you are cooperating with, for example: there are less trust issues when working with science-based partners or inter-industry partners, they have different objectives and are not operating in the same market. Most challenges are linked to the management of the R&D partnership and the management of the IP, such as the ownership of the IP. The crucial role of project management has been recognised in a number of studies (e.g. Griffin, 1997; Chesbrough, 2003; Du, Leten and Vanhaverbeke, 2014). R&D projects have a high failure rate, to increase your chances and to perform better, proper monitoring processes with planning and regular reviews, are designated (Griffin, 1997). When partners are choosing for co-ownership, the paradox of openness plays, which means that creating innovations benefits from openness, while the commercialization requires appropriability. This phenomenon brings specific challenges along (Teng, 2007; Du et al., 2014). A good balance between trust Vs. control will be paramount.

Open innovation and managing R&D partnerships in SMEs is a relatively unexplored field, previous studies and research focused mainly on large companies while SMEs received in comparison little attention (Gassman et al., 2004; Chesbrough et al., 2006; Lee et al., 2010; Chesbrough 2014; Du et al., 2014). For large companies OI is a deliberate choice, for SMEs it is a way to overcome their limitations, it is not one on one comparable (Vanhaverbeke et al., 2012). The existing literature on large companies points out that open innovation positively influences the firm's performance (Gassman et al., 2010; Du et al., 2014) while scant literature on smaller companies suggest that it can be even more beneficial for SMEs (Van de Vrande et al., 2009; Vanhaverbeke et al., 2012; Spithoven et al., 2013). Small firms are by default more open than

large firms, in their search for new business opportunities because they do not have the necessary competencies and financial resources to develop these new practices internally. Innovation in SMEs is hampered by certain limitations such as: lack of financial resources, poor understanding of advanced technologies, etc. (Vanhaverbeke et al., 2012; Spitshoven et al., 2013). Therefore, smaller firms have to open up more than their larger counterparts to access external knowledge and technology for innovative purposes (Spitshoven et al., 2013). Lee et al. (2010) also argued that commercialization of the innovation in particular is more important for SMEs than for large enterprises.

SMEs are excluded from the mainstream discussion on R&D partnerships, although they are the backbone of the European economy, 99% of all firms and 60% of all output comes from SMEs, (EU Competitiveness Report, 2014). As is evidenced by previous literature, a major condition in this area can be summarised in the following statement:

"Proper management, creation and maintenance of external partnerships are essential for an SME to succeed." (Lee, Park, Yoon and Park, 2010)

Because proper management of the innovation partnerships is a critical condition for success, we will especially focus on how SMEs successfully manage their R&D partnerships, with special attention for their motives, challenges they are facing and ways to connect and select them.

This leads to the following research question, and sub-questions to be answered in this thesis:

How do SMEs successfully manage their R&D partnerships?

To answer this research question, sub-questions are formulated to support the central research question, namely:

1. What are the motives of SMEs to engage in R&D partnerships?
2. What were the challenges and problems during the collaboration process?
3. How do SMEs connect with external parties?
4. How do SMEs manage relationships?

This thesis will be structured in five chapters, in this introduction the topic was explained in a nutshell. Chapter 2 contains the literature review, which will provide insight of prior literature on the topic and related themes. After, the methodology and research approach will be discussed in chapter 3. Chapter 4, holds the analysis of the case study interviews and chapter 5 clusters the conclusions and answers the research questions.

2   Literature Review

2.1   R&D Partnerships

Lately we can detect a tendency towards a more open approach of R&D collaborating, these open innovation approaches are recognised and adopted across various industries. This has created new opportunities for diffusing knowledge and inventions by cross-pollination. People can now work together with different partners, use a diverse type of external sources, technologies and knowledge from different industries. Because of the clear fit of R&D partnerships within the wide concept of open innovation, it is important to understand: the meaning of open innovation (2.1.1), the differences to a more closed approach (2.1.2), the reasons for choosing such a collaboration approach (2.1.3), and with what type of partners you can collaborate (2.1.4)

2.1.1   <u>Open Innovation</u>

The original notion of open innovation comes from Henry Chesbrough (2003); he describes an open innovation model where companies rely on external sources and commercialize internal ideas by deploying outside routes to the market.

"Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation, respectively." (Chesbrough, 2003, p 63).

After taking a close look at the definition 2 key aspects can be distinguished:

1. On the one hand the "outside in" aspect of open innovation, where external ideas and technologies are brought inside the firm to be integrated in its own innovation process. And on the other hand the "inside out" aspect where unused and underutilized knowledge within the firm is brought outside the companies' boundaries to be externalized (Chesbrough, 2012).

2. The importance of the business model, if external ideas provide an optimal fit with the company's business model, than the idea can be internalized. While if there is no fit, it can be developed further outside the firm (Chesbrough, 2012).

Lately open innovation approaches are recognised and adopted across various industries. This has created new opportunities for diffusing knowledge and inventions. People can now work together with several different partners, use a diverse type of external sources, technologies and knowledge from different industries. OI structures participation, it taps into people's intrinsic motivation, distributes

accountability and empowers companies to access new ideas (Chesbrough et al., 2006). It helps sharing, teaching, and empowering employees. It is not because companies are opening up their doors that all tactics of closed innovation are discarded, innovation goals involve a complex mix of closed- and open innovation aspects, which are uniquely tailored to their own innovation objects (Chesbrough et al., 2006; Brunswicker and Vanhaverbeke, 2014).

2.1.2 <u>Moving from Closed to Open Innovation</u>

For most of the 20th century, most large industrial companies were successfully following a closed innovation strategy. Not only did they want to reduce the production costs by vertical integration, but they also wanted to develop new products that were suited for their large, specialized scale production (Chesbrough, 2003). That is why they invested a lot in R&D and hired capable R&D personnel, to develop inventions and new products that they protected with tight international property rights (IPRs). The large profit margins were reinvested in their internal R&D. This process went on and on, a virtuous circle of closed innovation, which resulted in many technological breakthroughs (Van de Vrande, De Jong, Vanhaverbeke and De Rochemont, 2009).

From the 1990s onward, this vertical integration strategy started to crumble. Companies started to question the principles of closed innovation, for numerous factors such as: technology development has become more complex, the supply of highly trained R&D employees had increased tremendously, the quality and accessibility of external expertise had picked up, etc. (Chesbrough et al, 2006). Companies could therefore not solely rely anymore on their own corporate R&D to come up with successful new products and services, they also had to look outside the firm's boundaries for interesting ideas and integrating these into the firm's knowledge base (Chesbrough, 2003). Due to these changes, inter-organisational relationships, networking, synergic relationships and ecosystems became more important (Lorenzoni et al., 1999; Van de Vrande et al., 2009; Watson, 2007).

To move from closed to open innovation companies should utilise both internal and external resources. Including all employees or departments in a brainstorming session could already be a step in opening up their doors to open communication and open innovation. Employees should be encouraged to share ideas and work together as a team through open and transparent networks. The use of online social collaboration tools can help with this. Furthermore, transparent communication, decentralized decision-making and collaborations across borders should be stimulated, and this needs to be integrated and translated in the firm's strategy (Barker and Duhaime, 1997).

Open innovation has generally speaking an internal and external component; it comprises both outside-in and inside-out movements of technologies and ideas, as Van de Vrande et al. (2009) referred to as technology acquisition and technology exploitation. Inside-out OI is about sharing your company's knowledge, ideas and resources with others that might need it; this can go from expertise, to unused technology that might be useful for other companies through licensing. Outside-in is about

external knowledge sourcing, your company is looking for expertise, resources or technology licensing opportunities (Chesbrough et al., 2006). The inside-out approach or technology exploitation, implies innovation activities to leverage existing technological capabilities outside the boundaries of the company, which can happen through: venturing i.e. the start-up of new organizations drawing on internal knowledge, finance, human capital, the out licensing of IP i.e. selling licenses to other organizations; and involvement of the non-R&D workers, for instance taking up useful suggestions or initiatives (Van de Vrande et al., 2009). The outside-in approach or technology exploration on the other hand, relates to innovation activities to capture benefits of external sources of knowledge, through: customer involvement which can be realised by market research; external networking which is about external network partners that support your innovation process by their knowledge or expertise; external participations by investing in companies to gain access to their knowledge; outsourcing R&D activities such as buying R&D services from universities, suppliers, research organisations etc. and acquiring of external IP is about benefiting by using other organisation's IP (Chesbrough et al., 2006; Van de Vrande et al., 2009; Lee et al., 2010). Through this openness towards other companies, universities, experts, customers, suppliers, etc. partnerships and networking and the management of these networks, deserves special attention (Watson, 2007).

2.1.3   <u>Motivations for Partnering Up</u>

R&D partnerships are becoming important in the current economical environment for numerous reasons. Following prior literature (e.g. Golightly, Ford, Sureka and Reid, 2012), we distinguish 5 different categories of motives for firms to be involved in R&D partnerships: financial reasons, innovative capacity, public relation, external forces and internal motivation and processes. The main goal is not always related to financial benefits, but this can be achieved indirectly through the other motivators.

Looking at the financial aspect, collaborations and partnerships can help companies to be more cost-efficient, by thinking outside the box, being flexible and to discover opportunities outside their corporate boundaries and networks. By looking outside your own company there are many ways to find ready-made solutions that can be useful or can lead to new ideas or technologies. The goal is to acquire new technologies and knowledge to shorten development times and to get products on the market faster which will give you a head start of competition (Golightly et al., 2012).

But financial benefits are certainly not the only reason to implement these open innovation strategies; the innovative capacity plays also a significant role. The access to new opportunities, networks and emerging markets are just as important. The ideas generated by tapping into the global community frequently present new opportunities for companies, and gets you to understand the customer better. In many cases, the ideas extend beyond for whom and why the original request was initially published which leads to new products or technologies that otherwise never were invented (Chesbrough et al., 2006).

The importance of knowledge base cannot be underestimated; knowledge can directly be used to support the company's needs and long-term innovation strategies. Building a strong knowledge base is important for companies that are interested in accelerating their open innovation efforts and developing new products and services for their customers (Chesbrough et al., 2006; Van de Vrande et al., 2009). The company can use the extended knowledge base later on in other (joint) projects and further (open) innovation efforts.

According to Van de Vrande et al. (2009) to create maximum value, it is important to both exploit internal knowledge and explore new knowledge from outside the company. In a fully open setting, firms combine both outflows and inflows of knowledge, they use external and internal ideas to discover and develop innovative opportunities (Van de Vrande et al., 2009).

Besides these reasons there are also other driving forces such as: good public relation by obtaining a prestigious reputation, external forces that practically force you to innovate such as: the changing world, disruptive technological business models (innovate or die), and the internal staff motivation: to keep people connected and interested, to challenge them, etc. (Chesbrough et al., 2006; Vanhaverbeke, W., Vermeersch, I., De Zutter, S. 2012).

2.1.4   **Partner Types**

Looking for knowledge elsewhere or external knowledge sourcing, as Brunswicker et al. (2014) calls it, through partnering, plays a crucial role in the R&D process of companies. This requires internal capabilities for managing these partnerships, in order to integrate inflows of knowledge with internal innovation activities, successfully apply knowledge from internal and external sources, and direct innovation actions (Brunswicker et al., 2014).

Du et al. (2014), proposed two categories of R&D partnerships: science-based (universities and knowledge institutions) and market-based partnerships (customers and suppliers). Prior studies have emphasized that both type of partnerships provide companies access to diverse types of knowledge and both types play crucial but different roles in R&D activities (Danneels, 2002; Faems D., Van Looy B., Debackere K., 2005; Du et al., 2014).

Market- based partnerships

Market-based partnerships have a close link to the market, such as partnerships with customers and suppliers (Danneels, 2002). First, looking along side the traditional value chain, via interactions with customers, might be a valuable approach if you are looking for first-hand information on customer needs, customer context and customer experience, customer preferences and requirements

(Brunswick et al., 2014; Du et al., 2014). It might also help you to establish a firm position in the marketplace by helping to eliminate product failures, which will give greater customer satisfaction (Harrison and Waluszewski, 2008; Gruner and Homburg, 2000; Du et al., 2014).

Second, suppliers can provide ideas for enhancing technological solutions or process innovations; they have knowledge on the latest technologies on the market (Brunswick et al., 2014; Van de Vrande et al., 2009). Through these partnerships it is possible to detect potential technical problems early in the process, and therefore improve the reliability and performance of the product (Kessler and Chakrabarti, 1996). Lastly, recent studies also proposed the benefit of partnerships with communities, such as communities of practice (Dahlander and Wallin, 2006; Du et al., 2014).

There is also some danger involved when it comes to market-based relationships. On the one hand a close partnership with customers may lead to rejection of new technologies that could become potential breakthroughs (Gassmann, Kausch and Enkel, 2010). And on the other hand, a tight relationship with your suppliers can reduce your objectivity in decision-making and may open the door to opportunistic supplier behaviour (Du et al., 2014).

This threat of opportunistic learning is not only present when a supplier is involved in the partnership, but also when competitors are involved. As was already mentioned, R&D partnerships provide great learning opportunities and access to scarce resources. However, when a competitor is part of the R&D alliance or network, the threat of opportunistic behavior can be present, which many firms attempt to manage by formalizing the partnership. Walter, Walter and Müller (2015) differentiate two forms of opportunistic behavior, strategic manipulation and knowledge appropriation. Prior research provided mixed findings suggesting that over-formalization might even promotes opportunism. In contrast, communication quality mitigates the effect on both strategic manipulation and knowledge appropriation. It is essential for managers to cultivate an atmosphere of open communication while they can still maintain some healthy distrust (Williamson, 1985; Wathne and Heide, 2000; Faems, Janssens, Madhok and Van Looy, 2008; Walter et al., 2015).

Science-based partnerships

Interactions with universities and research organizations can also be relevant for inventions and industrial innovation as it allows firms to experiment with new technologies and to refine existing technologies. Scientific knowledge functions as a map for applied research, by equipping R&D teams with a better understanding of the technological environment in which they search for solutions for the technical problems they are facing (Du et al, 2014). The relationships with such partners are usually long-term and aim to create joint value. They are building upon trust and mutual understanding. These relationships make it easier to identify, access, and absorb external ideas (Brunswick et al., 2014; Van de Vrande et al., 2009). They are seen as inexpensive and low risk source of specialist knowledge,

and are gaining popularity over time, which is partially stimulated by the government to promote public-private research partnerships (Du et al, 2014).

To benefit from science-based partnerships firms have to overcome a few barriers that relate to cultural differences, different interests and goals, e.g. firms wanting to protect the results and on the other hand universities wanting to publish them. When it comes to consulting experts in knowledge institutes, e.g. on intellectual property rights (IPR), to access technological knowledge, it might be difficult to get in touch with the right people, for example for SMEs, they may need to rely on intermediate service providers (Lee et al., 2010). Experts on IPR can provide crucial information services, which could help bridging the gap between technological opportunity and its successful commercialization, which is often a challenge especially for SMEs (Brunswick et al., 2014).

Implications for internal management

External knowledge sourcing or working with R&D partners has implications for the internal management team that goes beyond R&D. The management of the relationships will lay the foundations that enable a firm to benefit from their external sources of innovation. This implies both strategic as well as operational aspects (Brunswick et al., 2014; Van de Vrande et al., 2009). Brunswick et al. (2014) points out four internal components to take into account: the long-term innovation investments, the innovation strategy, innovation processes and project control.

A firm's spending on innovation gives a rough idea about its internal learning activities and desire to explore. If management focuses on investments in long-term innovation, this will shape the internal innovation activities as well. This is called "absorptive capacity" by Cohen and Levinthal (1989), the more a firm invests in R&D activities, the more it will be able to fully appreciate the value of new external information. This will enable firms to build sufficient internal knowledge and may motivate firms to open up to external sources of knowledge (Cohen and Levinthal, 1989; Brunswick et al., 2014). The development of an innovation strategy implies strategic processes and managerial action. Formal systems and procedures for NPD, such as stage-gate models, have become crucial in innovation management. Such systems help managers coordinate and integrate the development of innovations in a structured manner (Brunswick et al., 2014; Van de Vrande et al., 2009). To create value out of their innovations, firms need to measure and manage innovation projects and processes in an efficient, goal- oriented manner. Clearly defined measures and targets for timing, resources, and ensuring the quality of individual innovation projects are essential (Brunswick et al., 2014). It is of great importance to eliminate variations within the process and choose for a documented system with strict procedures and to standardize and generalize across various projects. Prior studies show that R&D projects with partnerships are associated with better financial performance, when they are managed in the most suitable way. Market-based partnerships, have higher financial performance when managed

in a formal way, while the other way around is true for science-partnerships; they are associated with higher revenues, when managed loosely (Du et al., 2014).

A formalised approach is characterised by strict-up-front planning and regular monitoring (Du et al., 2014). For example some companies might have a competitive relationship with a supplier, which causes confidentiality issues, that is why protection against unwanted knowledge spill-overs during an R&D partnership might be necessary. This can be tackled by the strict monitoring of the R&D directions that will be taken during the partnership (Du et al., 2014). When it comes to science-based partnerships (universities and experts), there is a less formal management approach required, too much formality might lead here to less room for autonomy and experimentation, which would result in less motivation for researchers. Universities and experts have their own objectives and goals, which might be completely different from the companies. Researchers are not directly competing with firms, that is why there is less concern for unwanted knowledge spill-overs. Scientists in academia freely pursue own research interests while companies direct scientists towards particular research activities (Aghion et al., 2008; Du et al., 2014).

The management aspect of open innovation and the creation and maintenance of external relationships is one of the most essential and difficult aspects of R&D relationships; it is a true pitfall for a lot of companies involving in R&D partnerships, especially when it comes to SMEs (Lee et al., 2010).

2.2   R&D Partnerships and SMEs

Small- and medium sized enterprises are organizations that are characterized by their "smallness", which is usually measured with an upper ceiling for number of full-time employees, yearly turnover, and/or annual balance sheet total (Chesbrough et al., 2014).

Company category	Staff headcount	Turnover (OR)[1]	Balance sheet total (OR)[2]
Medium-sized	< 250	≤ € 50 m	≤ € 43 m
Small	< 50	≤ € 10 m	≤ € 10 m
Micro	< 10	≤ € 2 m	≤ € 2 m

Table 2.1: Classification figures SMEs (EU recommendation 2003/361).[34]

[1] Turnover figures in million euros

[2] Balance sheet total number in million euros

[3] Definition small-and medium sized companies. *European Commission.* Retrieved from

http://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition/index_en.htm

SMEs are an important source of innovation. Not only high-tech or start-up SMEs but also established ones. They have the capacity for radical, new-to-the-world inventions, are fast decision makers and are quicker in reacting to changing market demands (Chesbrough et al. 2014). Although SMEs are more flexible, less formalized, and quicker to make decisions, their financial resources for internal R&D, material- and human resources, external knowledge, and ability to identify opportunities for out-licensing are more limited (Brunswicker et al., 2014; Chesbrough et al., 2014).

When open innovation in SMEs is embedded in and directly linked to strategy, it also directly links to the SMEs position in the value chain and its value creation relationships with partners (Chesbrough et al., 2014). Because of their smallness, SMEs cannot cover all R&D activities required to successfully realize an innovation or the commercialization of it their selves. Thus, innovation in SMEs regularly has an external and boundary-spanning component (Chesbrough et al., 2014). It is externally focussed by nature; they make most of the time use of inter-organisational relationships and partnerships, which is rooted in technology exploration (Van de Vrande et al.,2009).

2.2.1   Motives

Through the existing literature we can identify multiple motives for SMEs to work with R&D partners, the main reasons are market-related and knowledge creation (Chesbrough et al., 2014). Meeting customer demands, acquiring new knowledge, keeping up with market developments, reducing time-to-market, stimulating internal creativity, spreading of risks, enlarging social networks, and reducing costs, are the most important ones, which eventually should result in increased growth, better financial results, or increased market share (Van de Vrande et al., 2009). The advantage of partnering up can be taken into consideration, which can bring complementary assets and resources together to commercialize a new product or service, set industry standards, profit from infringements, and realize learning effects. Also ownership structure shapes the adoption of inbound open innovation, especially family-owned SMEs VS. Non-family-owned SMEs, and the level of education of the CEO and nature of the top management team can determine the openness to cooperation of an SME (Van de Vrande et al., 2009).

Alliances, networks and cooperation are critical drivers of innovation and help SMEs to access critical resources, extend their technological competencies, and build legitimacy and reputation. Cooperation with other organizations will increase the innovation performance, especially for SMEs (Pullen, Weerd-Nederhof, Groen, and Fisscher, 2012). Liabilities such as smallness, limited financial resources, complexity of products and development process (NPD) and manpower can be tackled in such a way.

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[4] These ceilings apply to the figures for individual firms only. A firm that is part of larger group may need to include staff headcount/turnover/balance sheet data from that group too.

Because of their limitations outside-in innovation is more popular with SMEs than inside-out innovation. Former studies demonstrate that when it comes to R&D exploration (outside-in) SMEs make more use of: customer involvement (97%)[5], external networking (94%) and outsourcing R&D (50%) (Van de Vrande et al., 2009). When it comes to the exploitation of R&D most SMEs make use of employee involvement (93%) (Van de Vrande et al., 2009). These prior studies linked the SMEs motives for practicing OI to the type of OI practice. When market research was used, the main reason was to keep up with the market demands and changes and increasing growth or market share. Knowledge gaining was the motive for involvement in external networks and outsourcing of the R&D process to external parties such as universities and experts, but also the market-related aspect is still important. When it came to employee involvement, motives were most of the time linked to the optimal use of knowledge, using initiatives of employees, keeping them motivated and their commitment (Van de Vrande et al., 2009).

Linking this back to the five motive categories of Golightly et al. (2012) (2.1.3 Motivations for Partnering Up), we see that the main reasons for SMEs to make use of R&D partnerships are mainly knowledge creation and market-related motives.

2.2.2 Challenges

Chesbrough and Crowther (2006) pointed out that SMEs are facing multiple challenges during their R&D partnerships. Not only a lack of financial resources; for instance why SMEs might lose opportunities to recruit specialized workers, but also their smallness, lack of specific knowledge are difficulties. The cooperation with other partners might be struggling as well, for example because of cognitive, organizational, cultural and institutional differences between the partners. Those problems can be related to corporate culture, free-riding behaviour, and problems with contracts, conflicting interests, too dense networks and structural holes, differences in timing of contributions, managerial complexity and cultural issues, the NIH syndrome (not invented here), the risk of losing R&D as a core competence, the loss of key technologies to third parties through leakages, communication issues, etc. (Chesbrough and Crowther, 2006; Van de Vrande et al., 2009; Pullen et al., 2012; Lee et al., 2010). The most of these problems are related to the management of the R&D partnerships and the management of IP, and the use of processes and tools, which will be further discussed more in depth.

The management of the R&D partnerships: R&D project management

The crucial role of project management has been recognised in a number of studies (Griffin and Page, 1996; Du et al., 2014; Chesbrough et al., 2014). Project management is the process that is followed by companies to plan, monitor and control the execution of R&D projects, via the adoption of

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[5] Percentages are based on a sample of 605 SMEs (Van de Vrande et al., 2009).

management tools and techniques (Pinto and Prescott, 1988; Du et al., 2014). SMEs hardly engage in formal R&D, so it is extremely important for them to manage their external relationships properly, this will lay the foundations that enable a firm to benefit from their external sources of innovation. However, SMEs regularly struggle with making purposively good use of their external relationships (Chesbrough et al., 2014). That is why also the management of partnerships is an important strategic dimension of openness in SMEs (Brunswicker et al., 2014; Pullen et al., 2012).

There are a lot of managerial challenges to take into account. It is important to understand the internal organizational practices, systems and routines for managing open innovation and related knowledge flows in SMEs. The transition to working with partners not only implies a change in strategy, a fit with the business model, but also an organizational change. The absorptive capacity plays a significant role, companies require the ability to absorb external knowledge in order to benefit from it. Absorptive capacity is a condition for inbound open innovation and is built through formal R&D, which implies a major challenge for SMEs. SMEs require special capabilities for managing these network relationships. One of the risks of working with partners and networks is becoming too dependent upon their relationships; this needs to be monitored in the management team of the SME (Pullen et al., 2012; Chesbrough et al., 2014).

Managing IP in partnerships

Choosing a trustworthy partner, exposing the right amount of IP, avoiding opportunistic learning, maintaining control, and constructing agreements that effectively allocate IP rights, are only a few challenges a company can face when dealing with IP. "Managing IP is an extremely complicated matter" is a truism (Teng B.S., 2007). As was already mentioned, alliances and R&D partnerships have a very high failure rate, due to difficulties such as shared control and inter-partner competition. But when it really becomes tricky, is when the contracting between companies is incomplete, the ownership of the IP can sometimes be blurred in the process and this can cause problems (Park and Russo, 1996; Chi and Roehl, 1997; Teng B.S., 2007).

Firms can opt for different types of IP protection, including trademarks, copyrights, patents and trade secrets. The two last ones will be focussed on because they are most commonly used. The main difference lays in the legal protection, patents are exclusive, others cannot use the technology contained in the patent before the expiration date. Trade secrets on the other hand, may be independently developed and then used by others. While patents offer better protection, there is a lot of relevant information that has to be disclosed during the patent process. Lately the use of trade secrets is more and more upcoming (Teng, 2007). When it comes to the IP of R&D partnerships, it is equally as important to protect the existing IP as to leverage it. Teng (2007) proposed a three-step IP management process: IP contribution (determining factors such as inter-partner trust and IPR

regimes), IP control (such as agreements and R&D set up) and IP governance (IP classification and ownership options).

It already starts from the beginning, good partner selection is critical. One of the first and most important decisions is deciding who to work with and what to share with them. The goal is to develop a good understanding of both partners' IP profiles before forming a partnership. These first steps are valuable since a company may lose IP through opportunistic learning or unauthorised knowledge leaking, some companies might have a hidden agenda (Larsson et al., 1998; Teng, 2007). Inter-firm learning is one of the key objectives of R&D partnerships, on the one hand they learn from the collaboration and on the other hand they learn how to collaborate. Learning offers a convenient and effective way to obtain valuable knowledge otherwise difficult to develop in-house (Teng, 2007). But learning can be a double-edged sword because it can both improve and undermine the competitiveness of the companies.

Good monitoring and auditing of the IP is another possible pitfall, for instance the appointment of an IP coordinator within the partnership is always a good idea, just as periodic IP reviews within the firm and meetings between the partners (Teng, 2007). This asks for special appointed people, for whom most SMEs do not have the budget nor the people. SMEs often neglect it owing to compliancy, they step back and let their partners take charge of the IP auditing. This lack of due diligence often leads to IP damages (Kaltenheuser, 1999).

The choice for a patent or trade secrets can be influenced by: the external environment (the protection regimes), the nature of the innovation itself and the organisation. Not all innovations are patentable, it is important to be able to determine the potential value of the innovation, to decide if the patent application will be worthwhile. Because of the technicality of the matter, it is best for an SME to make use of specialised experts on IP (IP lawyers, IP consulting, etc.) (Teng, 2007).

Partners also have to agree on the question who will be owner of the IP. Literature proposes four ownership options, depending on the firm's core competencies and on the risk of patent interference: individual ownership, public ownership, third-party ownership and joint ownership such as a co-patent. A co-patent is a patent owned by two or more parties, both parties have the right to exploit the invention on their own behalf (Teng 2007; Belderbos et al., 2014). For a certain type of partnerships (e.g. small partnerships or informal ones) it might be very difficult to divide the intellectual property, in these circumstances co-patenting is their second best option (Hagedoorn, 2003).

Co-patenting is the joint ownership of the collaborative outcomes of the R&D partnership. Co-ownership of IP restricts the firms' ability to fully appropriate the market potential of knowledge derived from the collaboration. The challenging paradox of openness plays here a significant role: creating innovations benefits from openness while commercializing innovations requires appropriability. The commercialization of an R&D project is often a challenge for SMEs, experts on IPR can provide crucial

information services, which could help bridging this gap between technological opportunity and its successful commercialization (Brunswick et al., 2014).

The difficulties and challenges of co-patenting depend on the type of partner the company is involved with intra-industry, inter-industry or university partners. Belderbos et al. (2014) demonstrated that co-patents with intra-industry partners have a negative impact on market value, because they are having a lot of overlapping exploitation domains, this is not the case when it comes to inter-industry partners because the exploitation domains like to differ. When it comes to universities, these partnerships are having a positive impact on the market value as well, because they are not active in competing commercialization domains. We can conclude that co-patents with intra-industry partners, companies that are active in the same industry, where there is a risk of overlapping domains, will create more challenges in appropriating value than co-patents with inter-industry partners and universities.

2.2.3   Processes and Tools

In comparison to small companies, large companies use a more structured process approach when it comes to their R&D partnerships, although this approach can also be useful for SMEs.

Some companies tend to develop their own suites of metrics, to evaluate for instance the return on investment (ROI)[6] from their R&D projects. Other important parameters can be customer feedback on innovative offerings or the new time to market (Golightly et al., 2012).

Appropriate tools and processes may be useful to support the R&D project process. A few companies are using the want, find, get, manage (WFGM) model as a tool to do so, based on the WFGM model by Slowinski (2004) (Martinez, 2013; Slowinski, 2004). SMEs tend to have the image that processes and metrics are not their strong suit, there might still be some room for improvement. There is no specific literature available on this, but it will be investigated as well during the interviews.

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[6] ROI measures the amount of return on an investment relative to the investment's cost. To calculate ROI, the benefit (or return) of an investment is divided by the cost of the investment, and the result is expressed as a percentage or a ratio. Formula: $ROI = \frac{(Gain\ from\ investment - Cost\ of\ investment)}{Cost\ of\ investment}$ (Silber, Wellesley, Watkins, Leigh, Moseley, and Dessinger, 2010).

Figure 2.1: Want, Find, Get, Manage (WFGM) model (Martinez, 2013; Slowinski, 2004; Golightly et al., 2012).

The WFGM model splits the R&D collaboration process into four phases, this is only one possible option, other tools such as IT tools, collaboration platforms, innovation portals etc., can be implemented to support the innovation process. These enable the placement of challenges, the collation of responses, the improvement of internal staff engagement, and collaboration across internal business unit or regional boundaries (Martinez, 2013; Slowinski, 2004; Golightly et al., 2012).

Understanding the motives, needs and incentives to have an open view towards R&D relationships is important to maximize the effectiveness of these processes (Sieg, Wallin, and Von Krogh, 2010). Process creation is not SMEs strong suit; one of their characteristics is that they learn from experience rather than following any particular model or methodology (Golightly et al., 2012). There is no particular literature on the processes SMEs follow during the management of their R&D partnerships. How SMEs do so will be investigated through interviews.

2.2.4 <u>How to overcome these challenges?: KSF for managing R&D partnerships</u>

SMEs can benefit in different ways from open innovation. Managing the relationships between the R&D partners and organizing the entire network, is a necessary condition for success.

When it comes to the management of the partnerships, there are certain aspects to take into account such as: partner selection, planning, dividing of the tasks, evaluation, problem solving, etc. The right partner selection is a first condition for success. It is important for partners that they are willing to

share knowledge, information and risks. The attitude towards commitment has to be the same among partners, they all have to share the same vision. Good partnerships are build on trust and strong personal relationships (Vanhaverbeke et al., 2012). Trust can be seen as the belief that one party will not intentionally take advantage of the other party (Barney and Hansen, 1994). Partner firms with a high level of trust are able to proceed faster, commit more and collaborate better (Teng, 2007). This trust is on the one hand a key success factor but on the other hand a weakness as well, because when this partner leaves, the project comes to an end or you have to look for a new one. That is why careful partner screening is so important (Vanhaverbeke et al., 2012).

Open innovation is a multi-disciplinary approach that requires a variety of skills and knowledge to make it work; it is unlikely for one person to possess all of the required expertise. That is one of the reasons people work in R&D teams. So one of the primary skills, as mentioned before, is knowing where to source the required knowledge and competencies, both internally and externally to the organization (Von Hippel, 1988; Golightly et al., 2012; Lee et al., 2010). This is a big challenge for SMEs, that is why it might be useful to work with an intermediary, such as Ninesigma[7] or Innocentive[8]. Those are two examples of intermediary companies or matchmakers that coach companies in their innovation-, R&D process, from strategy implementation to acquiring new technologies. They enabled companies to leverage their partner networks of expert knowledge to solve immediate challenges. They integrate new knowledge and capabilities into the companies, help them to implement a new open culture, put up new processes and connect firms with experts to help them solve their problems.

Several organization and management activities will be necessary to maintain relationships. It is crucial to care for each other, share problems, support each other and look jointly for solutions. It is the central SME that has to take this responsibility. This management process has to be activated continuously, by planning meetings and deadlines and follow them through. Every innovation project has to be carefully documented and registered; knowing which partner is good at what and dividing the tasks as such. These planning responsibilities are the responsibility for the central firm in a partnership. The process also entails disciplining and evaluating partners that are not behaving according to the rules and values of the network. Also openness in communication and reporting is an essential aspect, which encourages a trusting relation among partners (Vanhaverbeke et al., 2012). Financially it is essential to keep the costs of the project under control, again the central firm is responsible for this aspect. Every partner is occupied with their part in the relationship, but the central firm has to keep the full picture in mind. This management process also requires that partners manage the balance between the internal management of the company and external management of the R&D network. Collaborative innovation is the easiest with partners of similar size. SMEs are in general not eager to work with large firms because they fear that they might steal their technology, their decision

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[7] Company Ninesigma. Retrieved from http://www.ninesigma.com/ninesigma-europe/our-commitment-to-oi

[8] Company Innocentive. Retrieved from https://www.innocentive.com

making process is also completely different which can cause problems. Large companies can also be reluctant to spend their valuable time on SMEs and start-ups, which means that they will have to proof that they are worth the invested time (Vanhaverbeke et al., 2012; Usman and Vanhaverbeke, 2016). Some SMEs (especially start-ups) might consider partnering with a large firm because of their wide web of resources and experience in various development process stages and commercialisation of certain ideas or technologies. However to be successful they have to understand each other's perspectives and align their goals and values, but also the network strategy has an important role. To keep control it is important for the smaller companies to give each partner a specific task within their field of specialization, to not become too dependent and not give them too much power (Usman et al., 2016). The management of the network again takes a central place in an OI environment and is essential for this success as well. But when it comes to collaborating with a large firm, the experience of the owner or manager with large firms is of importance (Vanhaverbeke et al., 2012; Usman et al., 2016).

In certain cases where IP might be applicable, IP control mechanisms such as contractual measures, e.g. non-disclosure agreements, might be used to control the IP outflow and minimize opportunistic learning and other IP misappropriations.

3 Research Methodology

3.1 Research Approach

There are several approaches possible to qualitative research according to Yin (1994), which include surveys, experiments, archival analysis, history and case studies, with each having their own relevance in particular situations (Yin, 1989; Yin, 1994). The case study method has been chosen for this thesis topic, because of the relatively little research that has been done in the area. This will enable a more in-depth and exploratory look at exactly how SMEs successfully can manage R&D partnerships.

Case studies have been described by Yin as: "a method that investigates a contemporary phenomenon within its real life context, especially when the boundaries between phenomenon and context are not clearly evident." (Yin, 1989; Yin, 1994). According to Eisenhardt (1989), It can be used to accomplish multiple objectives such as: providing descriptions, testing theories and/or to generating theories. Furthermore, when using a case study method, evidence is typically collected from a variety of sources in order to get the best in-depth analysis. These sources can include but are not limited to documents, interviews, observation and artifacts (Rowley, 2002). For this research we have chosen to explore the topic through depth interviews, for each case study there is one semi-structured interview completed.

Collected data can be categorized as either primary or secondary data, which refers to the method used to collect it. Primary data is new and collected using techniques such as observation and interviews. Secondary data is information already collected and made available through methods such as journal articles, newspapers, company blogs or previous interviews etc. (Arbnor and Bjerke, 2009).

Both primary- and secondary data will be included in this thesis. The cases will rely on interviews, with SMEs that are involved in R&D partnerships, and on secondary data, such as: company website information, company reports, as well as published journal articles and scientific research articles.

3.2 Company Selection

The SMEs are selected based on conversations with employees of Corda Campus and entrepreneurs that are members of Voka. The selection is varied and diversified, the companies are active in different industries and start-ups as well as established and experienced SMEs are integrated. The companies are selected based on diversification of industries so that multiple industries are included in the case selection, both low- and high tech industries and based on level of experience. Hereby it is possible to look for patterns, similarities or differences between industries or level of experience. The

selected companies are active in: healthcare, construction, telecom, truck and trailer business, retail and tourism.

Spronken Orthopedie

Spronken is a distributor and manufacturer of medical equipment. The family company is already 36 years active in the healthcare sector.

Machiels Group

The family company started 70 years ago as a construction firm, nowadays they are active in multiple sectors such as real estate, building solutions based on CO_2, producer of renewal energy etc. They are a true pioneer when it comes to renewable energy and sustainable entrepreneurship.

Mobile Vikings

Mobile Vikings, nowadays part of Medialaan, is a telecom provider that also offers their customers, which they call their Viking Community, free mobile data. They have a top-notch software platform that allows them to offer additional services to the Vikings. Their key to success is their vision, unique business model, and innovative ecosystem, in which they integrate with partners.

Versus-Omega

Vs Omega celebrated recently their fifteenth anniversary. They are a manufacturer of sliding – and lifting roofs for truck trailers.

Bambooti

Bambooti is a young start-up company, located at the Corda Campus. They create products such as Iphone cases and Macbook skins, from renewable resources. They value sustainable entrepreneurship in their manufacturing and processes.

Best-Local is a start-up company, also located at the Corda Campus. They created an online tourism platform.

More facts and figures about the selected companies are summarized in the table on the following page[9].

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[9] All figures were consulted from the website of the NBB: https://www.nbb.be/nl/balanscentrale/jaarrekeningen-raadplegen

Overview of the company selection

	Spronken	Machiels	Mobile Vikings	VS-Omega	Dynatex	Bambooti	Best-Local
Industry	Healthcare Industry	Building & construction Industry	Tele-communication Industry	Truck Industry	Truck Industry	Retail	Tourism
Existence (years)	36	70	7	15	13	Start-up	Start-up
Employees	112	35	57	18	2	2	2
Revenues (in euros) (2015)	11.188.945	4.857.815	7.106.581	3.060.182	3.386.613	/	/
Balance sheet total (in euros) (2015)	6.618.542	16.323.855	11.209.264	7.202.338	1.596.153	/	/
Profit (in euros) (2015)	972.615	-3.825.507	-3.781.515	712.787	-34.991	/	/
Size	Medium-sized	Medium-sized	Medium-sized	Small	Small	Micro	Micro
Type of commerce transaction	B2C/B2B	B2B	B2C	B2B	B2B	B2C	B2B
Interviewee(s)	Wouter Vanaken (Product Manager)	Emiel Philipsen (CEO)	Tom Claus (Marketing & Business Development)	Erik Rogiers (Owner, General Manager & Sales) Pascal Peeters (head R&D)	Christophe Callens (General Manager)	Pieter Van Moll (Owner) Freek Gielen (Owner)	Ann Dries (Owner)
Ownership	Family company	Family company			Family company		

Table 3.1 : Case study company overview

3.3 Interview Structure

The six interviews are structured in four parts: introductory questions, questions about the current partnership strategy, future orientated questions and closing questions. First we talked about the role of the interviewee in the company and their vision on partnerships. Second we focused on the R&D partnership strategy, this part is structured based on the sub-research questions and the processing of the data: motives, challenges, connecting with different partner types and the management. After we discussed the future of the company, if there were new product developments or investments planned, etc. Finally there was still room for additional information and advice for other SMEs involved in R&D partnerships. The complete structure of the interview questions can be found in appendix A and the transcriptions in appendix B.

4   Case Studies

This chapter describes the findings resulting from the case study research.

The cross case analysis shows information on: the motives for SMEs to involve in R&D partnerships, challenges and problems they might face, how they connect with these partners, and how these partnerships are managed, during the six in-depth interviews. All SMEs have their own R&D department besides the start-ups and they are all involved in different types of partnerships.

This cross case analysis will show any patterns, similarities or contrasts in the data, allowing the central research question to be answered. One semi-structured interview was completed for each case study. Each case study report is analyzed separately, however the findings are structured by theme. Each theme will be important to answer the research questions later on in chapter 5. The table in appendix D demonstrates a summary of the most important findings. Interesting additional background information on the SMEs, can be found in the case fiches in appendix C.

4.1   Motives

SMEs are more limited in their resources, knowledge and budgets compared to big companies. As Vanaken stated, "the advice of our partners is indispensible". Faster process and faster time to market is also a popular motive, as he demonstrated with an example: "In the beginning we tried to do an aspect of the process ourselves, it took us nine months and still wasn't working out properly and when we gave it out it was finished in eight weeks". The financial motive was also clearly present in every case, as Philipsen stated: "The failure rate of R&D projects is very high. Multinationals such as Jansen Farmaceutica, have another budget, they made calculations of this. But SMEs have to be much more selective on budget, this all comes down to budgets and cost-efficiency".

The market needs and –changes drove Spronken, Mobile Viking and Versus-Omega to an R&D partnership. Because of a change in the market, due to the new legislation, Versus-Omega was forced to take action, as Rogiers mentioned: "Because of the many horrible accidents involving trailers who lose their loading on the roadway, a new regulation was created to specify the strength of the trailers' superstructure, the EN 12642XL regulation. This rule has forced every trailer builder and parts manufacturer to develop new and better solutions to create an even stronger and safer trailer". Mobile Vikings on the other hand wanted to keep their promise to their customers as Claus explained: "We promised our Vikings free mobile Internet and we want to stick to our promise and keep making this possible. Over the years we worked hard to keep our prices low, and lower them when needed, but after a while you're done with competing on prices. We were running out of resources and we reached our maximum". For the two start-ups it was a necessity to survive, without their mentors and experts, they would not be able to make it.

Furthermore most of the SMEs are collaborating with a mix of partner types, both science based and market based partners. As Vanaken mentioned: "The university UHasselt and hospital ZOL helped us to work out the concept of the Smart IV. They did research on feasibility, if it would be possible to realise within the budget and if it would create added value to the market. After this pre-phase, we thought about what was needed to make this product market ready, and about what we were able to do ourselves or source out. The production and development was so complicated and expensive, especially in Europe. So partners with specialised knowledge we didn't had ourselves were necessary. We looked for small niche partners in South-East Asia, we found 4 companies that were going to be responsible for the further design and development of the product."

For Machiels the partner type choice is depending on the type of project. For the Betacel project they collaborate with different universities and specialised labs, for the ELMP their consortium is based on: scientists, academics and companies, such as KU Leuven, UHasselt and VITO, and for the MAC^2 project they work together with Van Gansewinkel.

Versus-Omega selects their partners on a product basis, depending on the type of product and what specifications are needed; they choose the right partner for the job. As Rogiers explained: "We work with our partners on a product basis, it depends on the product if we use partners, and we are obtaining an outside-in approach. Most of our products were developed by our own experienced R&D department, such as our sliding roofs (folding plates), Penta Slider etc. We are able to test a lot of those developments in-house, in our lab but when we don't have the knowledge on something specific, we consult the synthetic materials lab of the UHasselt or organisations such as TUFF or Decra. For instance they tested our folding plates on strengthness and durability, by exercising pulling tests in extreme circumstances. Step by step we tested our product in each phase, which made it possible for us to make improvements and after the final tests we received a certificate. Based on legitimate tests within these specialised organisations you can proof to the market that your product is solid and has superior quality. Carapax, a PVC roof curtain with an aramid reinforcement construction welded against it, is developed together with Dynatex. Dynatex is a curtain producer; it's the company of Christophe Callens a friend of mine. When we have questions on ownership we contact Bart Lieben (an IP lawyer) at Gevers or an expert of Arnold & Siedsma (patent and trademark agencies), they do research on our patents and follow them up." It is clear that when it comes to less experienced SMEs such as Best-Local and Bambooti, that they lean on the partner suggestions of their mentors and advisors of Corda Campus.

The SMEs made their partner choice based on product- or project type and on the presence of specialized knowledge and expertise. When it comes to market based partners: Spronken, Machiels and Mobile Vikings only collaborate with inter-industry partners, Versus-Omega, Bambooti and Best-Local collaborated with intra-industry partners as well. The SMEs active in an ecosystem such as

Mobile Vikings, Bambooti and Best-Local are active and open for both outside-in and inside-out orientated partnerships, the other SMEs are only active in outside-in partnerships.

4.2 Challenges and Learnings

All of the SMEs use a mix of partners, as was mentioned before, to not become too dependent on one partner, they use multiple partners and a combination of both market based and science based partners. Besides that they only transfer a particular activity of the entire development process, as Vanaken explains: "We do this by using multiple niche partners, and give them all a little section of the product to deal with. And we only transfer activities related to the development of production and production itself, quality control, business process such as marketing etc. and sales we keep internally."

Some SMEs had to cut lose some partners for multiple reasons: some partners tend to have too little resources; this was the case for a partner of Spronken. Or there was no fit between the partners, such as with Mobile Vikings and Booking.com, as Claus mentioned: "A lot of the challenges we faced came down to service. Mobile Viking stands for good service and our Vikings expect this from us. So when we were working with partners who didn't value service as much, problems were unavoidable. For instance for booking.com service wasn't a priority, and this caused problems. Our Vikings had to wait a long time before receiving the points, and there were a lot of complaints about that transfer. Our Viking Community expects of our partners the same level of service as Mobile Vikings is offering." Mobile Vikings saw this as learning, and adapted their requirement list for external partners. This demonstrates again that the fit between partner companies is so important.

Mind-set differences between scientists and managers, can lead to relational issues. As Philipsen demonstrated: "Scientists don't think about relevance or ROA, which is the most important part otherwise it's useless. This interesting symbiosis is fascinating but extremely difficult. Who is able to succeed in this challenge, will reach the optimal collaboration." He also talked about the scepticism universities can have toward SMEs, as he stated: "It's the easiest to work with equal partners: small and small, large and large. For an SME to work with a big university isn't evident. Universities are more suspicious and careful when it comes to SMEs, they'll have to proof themselves and their validity first before being accepted. This is a different story when Janssen Farmaceutica or Umicore are knocking on the door."

But not only cooperating with a university can be challenging for SMEs also working with a large company changes the rules as it was the case for Versus-Omega after Dynatex became part of Sioen. Versus-Omega could use the ownership of the name as leverage to let Dynatex only sell in combination with a VS roof, because if Dynatex was not allowed to use the name, they had to do the marketing all over again. As Rogiers stated: "If they drop us, we'll drop them. This situation was

working out well because we were both on the same page, he realized that he needed us and visa versa, but this changed when Dynatex became part of a bigger company Sioen." All of a sudden Dynatex was operating in a larger market and had access to more resources, which changed the situation completely.

Looking for the right partner takes a lot of time and it is seen as difficult to come in contact with the right person within the partner company, as Claus stated: "The most difficult part is to come in contact with the right person within the partner company that has the same vision".

Cultural differences, were for Best-Local a true challenge. As Driesen mentioned: "Asians are less open and need a different approach then I was used to. I learned to adapt to this by working with a Chinese intern." Also working with a translator can cause problems, as Driesen stated: "The negotiations with a translator in between have been challenging as well. It's difficult to make clear arrangements and to express exactly what you mean, because a translator will always give another twist to it, not on purpose but it's always different then hearing it from someone directly." That's why she decided to focus especially on Singapore and Hong Kong, in that case the language barrier is no issue, because they speak English.

The advice to make contractual arrangements with partners from the start came back every time, even when working with family and friends, as was the case for Versus-Omega. According to Rogiers: "This is a case where we lost control, for all our other products or product improvements: for our slidingroof folding plates, the Trike Rollers, Penta Slider, lifting system, etc. we have patents. Besides this exception we only work together with partners if we have the ownership of the product, based on formal contractual agreements."

Challenges SMEs can run into are so divers, they depend on: partner type, the type of industry and the level of experience an SME has.

4.3   Connection and Selection

Most of the SMEs connect with their partners and select them based on their network, that they have build themselves over the years or they know through networking organisations such as for e.g. Voka, and based on experience. As Philipsen stated: "The selection happens most of the time based on contacts out of the network of the CEO or other managers, these can be direct contacts or indirect via Voka or other organisations."

After an internal brainstorm session or based on a market research, the SMEs set up a list of requirements they or the market feels their partner should posses. Such as it was the case for Mobile Vikings, as Claus mentioned: "We started in April 2016, first with a brainstorm within our team and

after we did a survey in our community. Out of these results we set up a long list, we narrowed it down to a short list based on requirements we set up, based on 'Viking DNA'. We were asking ourselves the question: do these partners have the same values, do we share the same vision? The feeling has to be right, there has to be a clear fit between the two companies."

Some SMEs also stated the importance of fit between the companies, partners have to share the same values and vision. This is how Bambooti and Mobile Vikings selected their partners. For instance Mobile Vikings selected Coolblue based on the fact that they also value good service. Or as Van Moll explained they see it as a very intuitive process: "We don't have a selection procedure, we just work with the two of us and decide together on the spot based on the feeling we have of something, if we share the same values and have the same thoughts about something."

Reputation is often a reason to choose for a certain partner, as Vanaken stated: "The medical industry is a big industry but small world, everyone knows the important players where you have to knock on the door. Even the big guys such as: Braun, Philips, Toshiba, etc. are working with these partners. They have a good, solid reputation and proven themselves over the years." Spronken was able to build sustainable relationships with these strong niche partners.

The presence of specific knowledge and resources (machines etc.) plays an important role as well in the selection of R&D partners. SMEs select a partner based on a special type of knowledge the partner has and the SMEs need in their R&D process, such as Rogiers mentioned: "The EN 12642XL regulation has forced every trailer builder and parts manufacturer to develop new and better solutions to create an even stronger and safer trailer. Because of my personal relationship with Christophe and his knowledge on the curtain technology, I thought of him as a partner."

None of the SMEs have a written down selection procedure, which Philipsen sees as a characteristic of SMEs, only Mobile Vikings and Best-Local are working on it, but they both see it as a challenge because partner selection has been done so far in an informal and flexible way, and this is hard to structure and standardize because each situation is different.

4.4 Management of the Partnerships

Control and trust are two important concepts when it comes to managing R&D partnerships. Especially the balance between these two is essential. Spronken and Machiels talked about a critical trust between them and their partners, trust is only a small part of the equation. The relationships are formal and everything is strictly contracted no matter what type of partner was involved. As Philipsen stated: "We work with our partners based on a critical trust. Of course trust is necessary, but it only represents a small part of the puzzle, objectivity and hard figures represents the largest part. Contracts are already drawn from the beginning, right after the selection of the partners." The other

SMEs worked on an informal basis with their partners, without IP arrangements, but in some cases contracts and NDAs were drawn up. Mobile Vikings has contractual arrangements with their partners and NDAs when it comes to sharing customer information, they are looking for the right balance between control and trust. Bambooti works based on mutual trust, without any contracts. And Best-Local draws contracts with their partners, and is still looking for a way to protect the concept itself. Driesen also values a good balance between trust and control.

Furthermore, most of the SMEs pointed out the importance of strict up-front planning, in certain cases every step of the process is fixed in a contract such as it was the case for: Spronken, Machiels and Mobile Vikings. According to Vanaken: "Every little detail is clearly stated in the contract: which company does what, the whole production process, the packaging, shipment, testing, etc. and they can't deviate from it without explicit permission from us. In this way they can't make changes that will for instance lower the quality so that they will financially enrich themselves more. They also may not develop software further on their own without consulting us first, to avoid discussion and unnecessary work." Also at Machiels this is the way of operating, as Philipsen mentioned: "For instance our ELMP consortium is build up in 4 phases: a scientific consortium, which is about the development, who has the knowledge and knowhow to do the research on this. In phase 2, the industrial consortium, we'll discuss who it will execute, in phase 3 there's a financial consortium, this is how it will be financed and phase 4 is the actual execution in practice. These are the 4 steps that have to be planned and discussed from the beginning. All of this has to be followed up by the president of the consortium, he is responsible."

The SMEs for whom ownership can be subject of discussion, implement this in their contracting, such is the case for Spronken and Machiels. Vanaken mentioned: "From the first meeting we made it to all of our partners crystal clear that the product and everything related was going to be property of Spronken. The Smart IV is patented since half a year and Spronken is only patent holder." For Bambooti and Mobile Vikings IP is not an issue, Bambooti's product is not patentable and also for Mobile Vikings is it inapplicable, and even when someone would try to copy their value proposition and approaches, Mobile Vikings sees it as an opportunity. As Claus explained: "We never fear imitation, when it comes to the Belgian Telco industry, we don't see anyone copying us. And globally seen we already have been copied. Gifgaf in England has copied us and in Belgium a bank has. Hellobank did, they copied our complete strategy from the full online aspect till service, community, everything, they just applied it to the bank sector. We don't mind, we actually like if other companies are copying us, as long if it's in another industry or sector. If there's then a collaboration possibility with these companies, there's an instant fit and match, which makes it easier to work together."

Versus-Omega would normally fit into the category of Spronken and Machiels, in normal circumstances they always draw up contracts from the start and make ownership arrangements. For one of their product developments, Carapax, they worked together with a company of a friend, Dynatex. Because of their informal and personal relationship, their normal critical trust changed into a

blind trust. As Rogiers explained: "Through this whole process we never made arrangements on ownership, and that's where it went wrong. Dynatex patented the product of Carapax behind our back. In this case, when it came down to this product, I made the critical mistake to trust too much on our personal relationship. In other projects, we already make contractual arrangements from the start, but because of the trust aspect I thought we could settle this afterwards. But Christophe got to it first and patented the product, right after I heard this we immediately patented the name Carapax." This created a strange situation: Versus-Omega is owner of the name. Everyone in the industry thinks that the product is theirs, and Dynatex is owner of the product itself. There isn't a lot they can do with just the name without the product, but they used this as leverage to force Dynatex not sell to their competition and only sell in combination with a VS roof. The level of formality can depend on the partner type, if they are part of your personal network, family or friends, which can cause control loss.

Finally, when it comes to evaluating the partnerships, the SMEs do not have a written down procedure. Although some SMEs such as Spronken, Machiels, Mobile Vikings and Best-Local have certain procedures. Spronken works based on forecasts to evaluate their partners. They set up short- and long term targets that their partners should reach. Machiels is working based on permanent evaluation as Philipsen explained: "The partnerships are evaluated permanently; this is the responsibility of the president that has been appointed. This is going on till the president decides the solution or outcome is valid. He also has to watch over the practicality of the project and the attainability, otherwise all of the efforts were useless." Mobile Vikings is using a 3-6-9 approach, with trial periods and also a two-times-a-week evaluation of their partners. As Claus stated: "The contracts with our partners are drawn based on a 3-6-9 principle and this is how we evaluate as well. We have a try out of 3 months, that's the first evaluation moment where we will investigate if everything is going smooth and well, if our Vikings (customers) are satisfied, if there aren't too many problems or difficulties, etc. The follow-up itself happens everyday; I'm following up from very nearby. 2-weekly we evaluate the whole cooperation process with our partners, all the facts and figures: the numbers, if the partners are happy, which type of product we have to promote more, and adapt where necessary." If the Viking customers are not satisfied of the services of the partners of Mobile Vikings, such as it was the case for Booking.com, the partnership ends immediately.

5   Discussion, Conclusions and Limitations

5.1   Discussion of the Research Questions

Now the results of the cases as well as the information sourced in the literature review will be discussed in context with the original research questions.

What are the motives of SMEs to engage in open innovation?

Through the existing literature we could already identify multiple motives for SMEs to work with R&D partners, the main reasons are overcoming their limitations (resources, knowledge and budgets), market-related (changes in the market, market demand and legislation) and knowledge creation (Van de Vrande et al., 2009; Chesbrough et al., 2014). These motives are confirmed in the case study interviews, although the case study companies also pointed out the importance of cost-efficiency.

Because of their limitations outside-in innovation is more popular with SMEs than inside-out innovation (Van de Vrande et al., 2009), as was also demonstrated by the cases. All the SMEs were involved in outside-in R&D partnerships, only Mobile Vikings was involved in inside-out R&D partnerships as well and Bambooti and Best-Local were open for the idea. SMEs located at an ecosystem, share mutual values and have different opinions about sharing ideas and knowledge. They have less fear for unwanted knowledge spill-overs, have more trustworthy relationships with their partners and have an open mind when it comes to inside-out knowledge sharing. Former studies demonstrated that when it comes to R&D exploration (outside-in) SMEs make more use of: customer involvement (97%)[10], external networking (94%) and outsourcing R&D (50%) (Van de Vrande et al., 2009), as was evidenced by the cases, external networking, outsourcing of the R&D process and customer involvement (market research) were most frequently used.

What were the challenges and problems during the collaboration process?

Cooperating with partners might be struggling for SMEs, because of all sorts of reasons such as: cognitive, organizational, cultural and institutional differences between the partners. Those problems can be related to corporate culture, free-riding behaviour, and problems with contracts, conflicting interests, differences in timing of contributions, managerial complexity and cultural issues, knowledge spill-overs, communication issues, etc. (Chesbrough and Crowther, 2006; Van de Vrande et al., 2009; Pullen et al., 2012; Lee et al., 2010). Most of the problems SMEs are facing are related to the

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[10] Percentages are based on a sample of 605 SMEs (Van de Vrande et al., 2009).

management of the R&D partnerships and the management of IP, and result from the inexistence of procedures and planning. Challenges SMEs can run into are so divers, they are depending on all sorts of aspects: the level of experience an SME has, the type of industry or the partner type, for instance the difference in mind-set between SMEs where there is no fit, or the differences between a scientist and a manager, but also differences between small and large companies can be part of the issue. Universities and other large organizations can be sceptical toward SMEs, small companies and start-ups have to proof their selves more towards them. This is also a challenge mentioned in the case studies of Vanhaverbeke et al. (2012) and Usman et al. (2016).

As was mentioned in prior literature: incomplete contracting between partners and IP ownership can sometimes be blurred in the process and this can cause problems (Park and Russo, 1996; Chi and Roehl, 1997; Teng B.S., 2007). SMEs often step back and let their partners take charge of the IP. This lack of due diligence often leads to IP damages (Kaltenheuser, 1999). Versus-Omega was so focussed on the testing phase and was not looking forward to the commercialization phase, which is often a challenge for SMEs (Brunswick et al., 2014). Also the partner type had to do with this failure, Dynatex is intra-industry partners, this causes according to Hagedoorn (2003): a risk of overlapping domains, which will create more challenges in appropriating value. This could have been tackled by the strict monitoring of the R&D directions during the whole partnership (Du et al., 2014). As was mentioned before a strong personal relationship can be an advantage but it can also be a weakness (Usman et al., 2016), it is important to remain at all times a critical trust towards partners, even when it comes to family and friends. Because Versus-Omega was involved in an R&D partnership with a personal friend, they lost control because of too much trust.

All of the SMEs use a mix of partners, to not become too dependent on one partner, so they use multiple partners and a combination of both market based and science based partners. Besides that they only transfer a particular activity of the process based on the speciality of the partner.

High tech SMEs (Spronken, Machiels and Mobile Vikings) are more strictly planned, critical trusting, more controlling and formally managed than low tech SMEs (Bambooti, Versus-Omega and Best-Local). But this depends on the framework the SME is operating in as well, when an SME is part of an ecosystem (Mobile Vikings, Bambooti, Best-Local), trust and openness becomes more crucial. These SMEs also value the creation of a procedure but for other reasons, not because of the controlling aspect but because of the management efficiency. Ecosystem SMEs are also more open to the selection of partners based on market research, so they involve the customer and they value the importance of a value fit with their partners. These SMEs have another mind-set and are more open towards not only outside-in knowledge sharing but also inside-out, which is different for the other SMEs, they are only willing to be involved in outside-in partnerships.

How do SMEs connect with external parties?

There is no prior literature on how SMEs specifically select or connect with their R&D partners, it is only demonstrated to some extend in the case study research of Vanhaverbeke et al. (2012) and Usman et al. (2016). Other literature only states the importance of good partner selection and the fact that it can be challenging for SMEs (Larsson et al., 1998; Teng, 2007; Chesbrough et al., 2014). The importance of a good personal and professional network and experience was also mentioned in the work by Vanhaverbeke et al. (2012).

The cases demonstrated that SMEs are learning from experience, which was also mentioned by Golightly (2012), Vanhaverbeke et al. (2012) and Usman et al. (2016). In the beginning Bambooti ordered without screening suppliers first, and Best-Local wanted to get started with a product without market-fit. If we compare this to the processes of the more experienced SMEs, we can distinguish a clear difference. More experienced SMEs build up more financial resources, and are able to hire experts. They have proven themselves through the years, and due to this they can lean on universities and their own professional network. Start-ups or less experienced SMEs don't have these advantages, but when they are part of an ecosystem, they can make use of the contacts of their mentors and partners of the ecosystem.

Certain SMEs involved brainstorming and market research, to set up a list of requirements they or the market feels their partner should posses. This approach was also used by the Isobionics case of Usman et al. (2016). Besides the right requirements, some SMEs also stated the importance of fit between the companies, partners have to share the same values and vision (Vanhaverbeke et al., 2012).

Reputation and the presence of specific knowledge and resources (machines etc.) play an important role as well in the selection of R&D partners. SMEs select a partner based on a special type of knowledge the partner has and the SMEs need in their R&D process.

Most SMEs connect with their partners and select them based on their personal network, not based on a formal written down procedure. A network they build themselves over the years based on experience or they know through networking organisation. We can state that experienced companies make more use of their network they build. They know their way around the industry and know on which door to knock. Start-ups and less experienced companies make use of the networks of their mentors and supervisors, initiatives such as entrepreneurship competitions, advisory tools for startups and tech business communities, and ecosystems such as Corda Campus can help them in this development process. There is a big difference in mindset between companies located at an ecosystem, such as Corda Campus, where it is all about networking, sharing information, creating synergies and where companies are using internal and external knowledge to develop their products

and processes. These companies, especially Mobile Vikings and Best-Local, are more open for the idea of creating procedures and involving market research in their partner selection process.

How do SMEs manage these relationships?

External knowledge sourcing or working with R&D partners has implications for management as well, that goes beyond R&D. The management of these relationships will be critical for a firm to benefit from their external sources of innovation (Brunswick et al., 2014; Van de Vrande et al., 2009; Vanhaverbeke et al, 2012; Usman et al., 2016). The importance of good management was also pointed out by the interviewed SMEs. When it comes to SMEs, the importance of partnership management is acknowledged and seen as a challenge but there is only limited information on how to deal with it and how the management is structured (Griffin and Page, 1996; Vanhaverbeke et al., 2012; Du J. et al., 2014; Chesbrough et al., 2014).

R&D projects have a high failure rate, which is also confirmed by the case study companies, to increase your chances and to perform better, an appropriate project management approach is essential (Griffin, 1997). Prior literature already appointed that for large companies, this appropriate approach depends on the type of partnership, if it is a market-based partnership or a science-based one (Du et al., 2014). A market-based partnership (suppliers and customers) benefits most of a formalised approach, which is characterised by strict-up-front planning and regular monitoring (Du et al., 2014). When it comes to science-based partnerships (universities and experts), there is a less formal management approach required, too much formality might lead here to less room for autonomy and experimentation, which could result in less motivation for researchers (Aghion et al., 2008; Du et al., 2014). Spronken and Machiels chose a more formal management approach with strict up-front step-by-step planning, each process phase was planned and contracted, for e.g. which company does what, the development phase, the production process, the financial aspect, and the commercialisation. All these steps were planned and discussed from the beginning and were followed up by the president of the consortium, which is according to Vanhaverbeke et al. (2012) a condition for a successful partnership. Both SMEs were looking for the right balance between control and trust, and were maintaining a critical trust towards their partners. This critical trust was also part of the case studies of Vanhaverbeke et al. (2012) and Usman et al. (2016). As Vanhaverbeke et al. (2012) stated a good personal relationship can be an opportunity and an advantage but it can also be a weakness, which was demonstrated by the Versus-Omega case. The level of formality can depend on the partner type. When partners turn to be part of the entrepreneur's personal network, they tend to manage this relationship more informal then they normally would have, this can create challenging situations. They lost control because of too much trust in a partner whom was also a personal friend.

Some partner types ask for a different approach than others. From the Versus-Omega case we learned that intra-industry partners ask for formal contracts and strict management, as was confirmed

by the literature (Du J. et al., 2014). Also when these partners are part of your personal network, contracts have to be drawn up, and these partners can preferably be managed in the same way as you would manage other partners. Negative events, such as being stabbed in the back by a partner, can cause a protectionist reaction, as also happened in this case. For instance, SMEs aren't willing to work with other partners anymore without having the full control, and losing their trust.

SMEs for whom ownership can be subject of discussion, is it important to make these patent- and ownership arrangements right from the start, to avoid conflicts, as Spronken and Machiels did right away. When a product or process isn't patentable, the level trust is becoming more important and the relationships become more informal, as was evidenced by the cases of Mobile Vikings, Bambooti and Best-Local.

Furthermore, it is important to evaluate the cooperation process. None of the SMEs had written down procedures, although some of them made use of certain procedures such as Spronken, Machiels, Mobile Vikings and Best-Local. They agreed with Vanhaverbeke et al. (2012) that an evaluation process was a necessity for success. Forecasts have to be made on a short-term and long-term basis and there has to be room for permanent evaluation of the partners. Everyone has to follow-up the made arrangements, if not there have to be consequences.

Generally there are differences detected between high tech (Spronken, Machiels and Mobile Vikings) and low tech SMEs (Bambooti, Versus-Omega and Best-Local). We can conclude that high tech SMEs, plan their management process more formally and step by step, make contractual arrangements from the start on every aspect of the process and ownership, and evaluate their partners periodically. Low tech SMEs, operate more in a flexible and informal way, and they not always draw contracts. When a product or process isn't patentable, the level of trust is becoming more important and the relationships become more informal. SMEs that are part of an ecosystem clearly have a different mindset when it comes to openness and trust. Mobile Vikings, Bambooti and Best-Local, operate more based on trust than the other SMEs. Mobile Viking even sees it as an opportunity if they are being copied, under the condition that it is an inter-industry partner. Also when it comes to start-ups the level of trust becomes more important because they do not always have the resources for protection mechanisms.

How do SMEs successfully manage their R&D partnerships?

Appropriate R&D partnership management is a condition for success. This already begins from the start, accurate partner selection and screening based on specialised requirements is crucial. This process cannot go without up-front step-by-step planning, each process phase has to be planned, for e.g. which company does what, the development phase, the production process, the financial aspect, and the commercialisation. All these steps have to be planned and discussed from the beginning and

have to be followed up by the president of the consortium. It is wise to divide the entire process in tasks and delegate them based on specialisation of the partners. Further down the line, evaluation is of great importance, by making forecasts and predictions. All the made arrangements have to be followed-up and evaluated by the person in charge, which is most of the times the central company. It is extremely important to leave nothing un-discussed or open for interpretation. SMEs for whom ownership can be subject of discussion, have to make patent and ownership arrangement right from the start, to avoid conflicts. Good personal relationships with partners can be an opportunity and advantage on the one hand, but also a weakness and risk on the other hand (Vanhaverbeke et al., 2012). It is important to keep a critical trust between partners; trust is only one part of the equation. It is also important to keep control over the process and the possible challenges. Network creation and involving a mix of partners is a good idea to not become too dependent on one partner, this can be a combination of both market based and science based partners, also throwing experience in the equation is essential, this can be on the side of the central company or one of the partners.

5.2 Managerial Recommendations, Limitations and Future Research

This master thesis includes several practical implications for the managers including the role they can play in organizing and managing R&D partnerships. Suggestions on how SMEs can orchestrate R&D partnerships and ecosystems are being made. These aspects are explained by answering the research questions in section 5.1.

This research contributes to a critical but yet underexplored topic, the management of R&D partnerships in SMEs. The research is based on exploratory case studies so the conclusions drawn from these six cases may be hard to generalize, although the wide coverage of technology field and different types of SMEs involved. The findings could be used for further development of the theoretical framework.

Future research, including quantitative studies, will be helpful in examining the conclusions and providing more in-depth understanding of R&D partnerships in SMEs and start-ups. They might zoom-in in which type of management approach is appropriate for which partner type. Or link the management aspect of R&D partnerships to performance. There definitely is room for extensive research on the management of IP and how SMEs are dealing with those challenges; this is still an untouched research area.

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APPENDIX

Appendix A: INTERVIEW STRUCTURE

Introduction

- Introduction
- Explain purpose of the thesis and in clear understandable words the concept of open innovation and R&D partnerships
- Ask permission to record the conversation
- Is it possible to give a short introduction of the company, who you are and your role in the company? (Industry, employees, profit, year founded, ownership structure, education of CEO, turnover)
- How would you describe your characteristics (ex. Willingness to learn, involvement,…) and the characteristics of the organization (ex. Age, size,…)?
- Can you describe the environment where the company is active in? (turbulent, market characteristics, government control…)
- What is your vision on OI?
- Is your firm involved in R&D partnerships?

The current partnership strategy

Introduction

- When did you introduce R&D partnerships within the firm? How was it initially implemented into the company?

Motives

- Why did you introduce this approach? (Motives/drivers for doing so)
- What are the benefits of working together with other organizations?

Challenges and dealing with them

- What were the challenges and problems during the collaborations (ex. IP challenges, communication,…)? What are the challenges on managing inside-out? What are the challenges on managing outside-in?
- And how did you overcome them?

- How do you make sure not to become too dependent on your relationships/partnerships/networks...?
- How do you handle the risk of imitation?

Connecting with partners, different partner types and management of the partnership

- Can you explain the cooperation strategy? What is it about? Who is it with (type of partners)? Within external knowledge sourcing do you make use of customers, suppliers, universities/research organizations, experts on IP or network partners? How does this work exactly?

    o Based on what do you select you partner(s)? (Complementarity, mind-set, values,…) How does this process work? (Formation of the network)
    o Who is responsible for this process? Who manages it? And how is it managed?
    o Is there a procedure for the maintaining of the external relationships?
    o Trust Vs. Control
    o Formality Vs. Informality
    o Information sharing
    o Communication process
- If the collaboration was successful, does it stop there or do you go further?
- Were the collaborations on project basis or product basis?
- Would you say that the relationships are sustainable?
- Do you use always the same partners or are also looking for new ones?
- How do you evaluate a partnership?
- How is the organization of the collaboration process structured? (Centralized or not)
- Is there a certain procedure to follow? By who and how is this procedure managed? Which skills are important to manage this?

The future

- What is your long-term view for the company? Do partnerships have a place in that? (Are there long term innovation investments planned?)
    o How do you see the future for partnerships within the company?
    o Plans of changing the approach? Doing things differently?

Closing

- Do you have advice for partners of a network/relationship? Or for SMEs wanting or planning to involve R&D partners?
- Are there any topics that we did not touch upon but you expected me to talk about?

- Do you have further questions or comments to make?
- Thank you for your participation

Appendix B: TRANSCRIPTED INTERVIEWS

Interview Case Study 1: SPRONKEN	
Data	15/07/16
Organisation	Spronken Orthopaedics & Medical
Interviewer	Hanne Daniels
Interviewee	Wouter Vanaken
Location	Personal interview at Spronken in Genk

Is it possible to give a short introduction of who you are and your role in the company?

I am product manager, responsible for the R&D- and production follow-up of the Smart IV.

When did you introduce OI within the firm? How was it initially implemented into the company? Is your firm involved in partnerships?

Since the kick-off of the Smart IV in November 2012, OI was introduced for the first time and we started working with R&D partners from then on. Our CEO, Leon Spronken, was in an annual meeting at the hospital of Genk (ZOL), with doctors and nursing staff, the nursing staff was continuously called away to go and check patients IV's. This is how he came up with the idea, that there must be something on the market that is able to monitor this automatically. First the idea was internally discussed and with hospital staff to check if there was a need for it, after we started looking for partners. OI is used in a project-based way, it depends on the projects and we only apply it out-side in. There has been demand for inside-out OI projects, but we don't want to pursue that at the moment.

Can you explain the cooperation strategy? With what type of partners are you collaborating?

The university UHasselt and hospital ZOL helped us to work out the concept of the Smart IV. They did research on feasibility, if it would be possible to realise within the budget and if it would create added value to the market. After this pre-phase, we thought about what was needed to make this product market ready, and about what we were able to do ourselves or source out. The production and development was so complicated and expensive, especially in Europe. So partners with specialised knowledge we didn't had ourselves were necessary. We looked for small niche partners in South-East Asia, we found 4 companies that we going to be responsible for the further design and development of the product.

Based on what do you select your partner(s)? (Complementarity, mind-set, values,…) How does this process work? (Formation of the network)

We found our partners through relationships I build when I was working in the USA, also in the medical sector. The medical industry is a big industry but small world, everyone knows the important players where you have to knock on the door. Even the big guys such as: Braun, Philips, Toshiba, etc. are working with these partners. They have a good, solid reputation and proven themselves over the years. We determined some requirements when we started to look for partners, and the four companies we're working with meet our requirements. Such as the ISO 13485 is an important standard in our industry. All our partners have the accreditation and are meeting the quality standards, this is especially important when it comes to the partners that are responsible for the critical hardware. The selection process went apace for us; it was not hard to select our partners and to contact them.

Who is responsible for this process? Who manages it? And how is it managed?
- o **Trust Vs. Control**
- o **Formality Vs. Informality**
- o **Information sharing**
- o **Communication process**

I (Product Manager) am responsible for the management of the partners and for the further follow-up of the R&D process. From the first meeting we made it to all of our partners crystal clear that the product and everything related was going to be property of Spronken. The Smart IV is patented since half a year and Spronken is only patent holder. There were contracts drawn up with all partners, they can't give licenses to other companies of competitors of Spronken, but on the other hand we will be richly compensated, they had to sign an NDA. Through the whole collaboration we aim a win-win scenario for both our partners and Spronken. We have access to knowledge we don't have and ownership and they will be financially well compensated and link their name to another successful new innovative product. Every little detail is clearly stated in the contract: which company does what, the whole production process, the packaging, shipment, testing, etc. and they can't deviate from it without explicit permission from us. In this way they can't make changes that will for instance lower the quality so that they will financially enrich themselves more. They also may not develop software further on their own without consulting us first, to avoid discussion and unnecessary work.

We always draw up 2 types of contracts: a financial contract and a technical-quality contract. A Technical-quality contract is important because, if a partner firm is being audited, and there is a huge quality problem found in their production, you'll be put on notice and then you can do something about, then you have to stop the production immediately. So you can state that we value control, we think that good rules make good friends. In this way the boundaries are clear and everyone knows his job, if not it goes wrong.

We have good relationships with our partners, but they are business partners so these relationships are formal and professional, we intend a right balance between trust and control. We share as much information as is needed. We only share that type of information that our partners need to do their job, for example: they only had a drawing of the Smart IV and some requirements from us but there were a lot of special techniques and algorithms they didn't knew about, because it was simply not needed for their part in the process.

We meet our partners at annual medical fairs, we share our contacts with them and visa versa, and advice them to other companies, in that way they'll know that we're thinking about them and we're happy with the cooperation and grant them their success.

If the collaboration was successful, does it stop there or do you go further?

No we obtain sustainable partnerships if a partnership goes well, we will pursue with it. For our type of product it would also be to difficult to change all the time and because of the limited niche players on the market it's simply impossible. That is also why it is important to treat those partners well and negotiate fair contracts.

How do you evaluate a partnership?

We continuously evaluate our partnerships, we prepare together with them a year plan and long-term plan, targets they have to reach, a forecast of all the costs and with all numbers, such as predications of price fluctuations of steel etc. I have contact with our partners on a weekly basis and I am continuously following up the collaboration.

Why did you introduce this approach? (Motives/drivers for doing so) What are the benefits of working together with other organizations?

We don't have all the resources and knowledge in house for such a project as the Smart IV, that's why we needed partners to develop this in the first place. Their advice is indispensible. But we always ask them to put it in numbers, so that we can decide if it's beneficial for the quality. The time to market is another important driver, people that are doing this for years will do it much faster. For e.g. in the beginning we tried to do an aspect of the process ourselves, it took us nine months and still wasn't working out properly and when we gave it out it was finished in eight weeks. That's how big of a difference it can be. And the aspect of cost-efficiency can't be underestimated. You never did this before so, you don't know what it will cost or the risks. We have partners that were willing to do the failures and test-phase for free.

What were the challenges and problems during the collaborations (ex. IP challenges, communication,…)? And how did you overcome them?

We had to let a partner go, because he appeared to have to limited resources. They couldn't guarantee us continuity; so we had to cut him lose. They accepted too many clients and weren't able to come through. This was something we couldn't foresee, but because of the clear contracts we drawn up from the start it wasn't a problem.

We didn't had to deal with IP challenges, because we made our expectations clear from the beginning and we made arrangements from the start about property and all other aspects of the collaboration. This is an advice I would give to other SMEs that are involving in partnerships.

How do you make sure not to become too dependent on your relationships/partnerships/networks...?

We do this by using multiple niche partners, and give them all a little section of the product to deal with. And we only transfer activities related to the development of production and production itself, quality control, business process such as marketing etc. and sales we keep internally.

What is your long-term view for the company? Does OI have a place in that? (Are there long term innovation investments planned?)

Yes it certainly has a place; we already planned an FTO search for a new project: a technique that measures the fluid balance, how much a patient is drinking a day. It already exists but isn't complete yet. At the moment everyone measures input but no one measure output yet. We are looking for a technique that measure input and output, the balance and during what timeframe. This is an important step in heart failure- and kidney failure research. But before starting on it we first want to do research on how to patent it.

Do you have advice for partners of a network/relationship? Or for SMEs wanting or planning to involve R&D partners?

Yes, as I already mentioned make your expectations clear to your partners from the beginning and make clear arrangements from the start about property and all other aspects of the collaboration. Dare to cross country borders; culture or distance doesn't have to be a problem. If it is the right and best partner for the job, it's worth it.

Interview Case Study 2: MACHIELS	
Data	27/07/16
Organisation	Machiels group
Interviewer	Hanne Daniels
Interviewee	Emiel Philipsen
Location	Personal interview at the headquarters of Machiels in Hasselt

Is it possible to give a short introduction of who you are and your role in the company?

I am CEO of the Machiels Group for 9 years, before that I was the director international business for 10 years. Before my career at Machiels, I was financial director at Randstad and Centerparcs.

When did you introduce OI within the firm? How was it initially implemented into the company? Is the firm involved in partnerships?

Since 2012 we're active in all sorts of innovative R&D projects such as the Enhanced Landfill Mining Projects, Mac2 project, closing the circle philosophy, etc. For all of these R&D projects we work together with different partners.

Can you explain the cooperation strategy? With what type of partners are you collaborating?

We collaborate with both universities and experts, who help us develop innovative technologies, and on the other hand with companies, who have specialised knowledge and resources we don't have. For instance we needed specific knowledge on hydrogen, and we contacted one of the top companies involved in this matter, a company such as Linde.

For our Betacel project, where we're looking for a solution to cure diabetic type II, we outsourced the R&D to specialised labs and universities.

Enhanced Landfill Mining Project (ELMP) is a consortium, where we work together with: scientists, academics and companies, such as KU Leuven, UHasselt and VITO, where we aim to convert old landfills into sustainable energy on the one hand, and reusable raw materials on the other hand. This project fits right in with our Closing the Circle principle. We want to work together with our partners and the rest of the world on a better world for future generations. We want to make contributions for global solutions to close the circle and to reduce our ecological footprint. We're not only doing this on a site in Belgium but are also active in Chili.

The MAC^2 project is about collecting liquid maritime- and industrial waste flows for research. We also clean ship's holds and supply vessels with oils, fuel, steam and process water. For this project we collaborate together with Van Gansewinkel.

These are the most important R&D projects we're involved in, but we're also active in solar energy projects, wind power energy products, etc. They're all related to sustainability.

But we always work from one direction and that's outside-in orientated.

Based on what do you select your partner(s)? (Complementarity, mind-set, values,…) How does this process work? (Formation of the network)

There is no down written procedure for this selection; this is also a characteristic of SMEs. The selection happens most of the time based on contacts out of the network of the CEO or other managers, these can be direct contacts or indirect via Voka or other organisations.

When it comes to partnering with a university we can rely on the reputation we build up through the years, this makes it easier for us to directly reach the right people.

Who is responsible for this process? Who manages it? And how is it managed?
  - ○ **Trust Vs. Control**
  - ○ **Formality Vs. Informality**
  - ○ **Information sharing**
  - ○ **Communication process**

For instance a consortium such as ELMP is build up in 4 phases: a scientific consortium, which is about the development, who has the knowledge and knowhow to do the research on this. In phase 2, the industrial consortium, we'll discuss who it will execute, in phase 3 there's a financial consortium, this is how it will be financed and phase 4 is the actual execution in practice. These are the 4 steps that have to be planned and discussed from the beginning. All of this has to be followed up by the president of the consortium, he is responsible.

When it comes down to the R&D part, we first start with asking important questions, internally and we consult specialists. After this phase we start selecting partners and forming a team. We are the leader in this process; we always deliver the president of the team. After the formation, we start having subject-based discussions, brainstorm about various topics and make arrangements regarding tasks, what's being investigated where, content, but also financial arrangements are being made. Teams meet each other on fixed dates and sub-groups are being made. All these processes are informally structured as a pyramid, and are ran as a real organisation or company.

We work with our partners based on a critical trust. Of course trust is necessary, but it only represents a small part of the puzzle, objectivity and hard figures represents the largest part. Contracts are already drawn from the beginning, right after the selection of the partners.

If the collaboration was successful, does it stop there or do you go further?

We always work based on sustainable relationships, we're always thinking long-term.

How do you evaluate a partnership?

The partnerships are evaluated permanently; this is the responsibility of the president that has been appointed. This is going on till the president decides the solution or outcome is valid. He also has to watch over the practicality of the project and the attainability, otherwise all of the efforts were useless.

Why did you introduce this approach? (Motives/drivers for doing so) What are the benefits of working together with other organizations?

To do all these R&D projects on our own would be too expensive and too complex. The failure rate of R&D projects is very high. Multinationals such as Jansen Pharmaceutics, have another budget, they made calculations of this. But SMEs have to be much more selective on budget, this all comes down to budgets and cost-efficiency.

What were the challenges and problems during the collaborations (ex. IP challenges, communication,…)? And how did you overcome them?

Relational issues such as, the interests gab between scientist and manager, can be a true challenge. Scientists don't think about relevance or ROA, which is the most important part otherwise it's useless. This interesting symbiosis is fascinating but extremely difficult. Who is able to succeed in this challenge, will reach the optimal collaboration.

It's always important to ask "What is it the market wants?", "Is there a need for new technology on this or that?". Always link back to the market and the relevance of an idea.

It's the easiest to work with equal partners: small and small, large and large. For an SME to work with a big university isn't evident. Universities are more suspicious and careful when it comes to SMEs; they'll have to proof themselves and their validity first before being accepted. This is a different story when Janssen Pharmaceutics or Umicore are knocking on the door.

How do you make sure not to become too dependent on your relationships/partnerships/networks...?

We always make sure we work with a combination of partners: always and experts/universities on the one hand and a niche company on the other hand, such an approach lowers the risk of becoming too dependent.

What is your long-term view for the company? Does OI have a place in that? (Are there long term innovation investments planned?)

Look with an open vision at the world, making contributions to global and to further reduce our ecological footprint. Working with R&D partners is a necessity, so it will always be present.

Do you have advice for partners of a network/relationship? Or for SMEs wanting or planning to involve R&D partners?

Having an open-mind and being flexible are two necessary conditions to succeed in a partnership, and making clear arrangements from the beginning.

I see an important role for the government, when it comes to guide SMEs to the right partners, creating platforms, changing the mind-set through education. If you compare our innovation climate to that of California (Silicon Valley), we still have a long way to go. Everyone from entrepreneur to hairdresser or pub owner is thinking in an innovative way and is capable of communicating and pitching their ideas. LRM at the Corda Campus has picked up the idea from Silicon Valley, but there's still a lot to do, there is more need of projects and platforms such as this.

Interview Case Study 3: MOBILE VIKINGS	
Data	28/07/16
Organisation	Mobile Vikings (VikingCo)
Interviewer	Hanne Daniels
Interviewee	Tom Claus
Location	Personal interview at Corda Campus in Kiewit

Is it possible to give a short introduction of who you are and your role in the company?

I am Tom Claus and am partnership manager at Mobile Vikings. I am looking all the time for new partners and am responsible for the maintenance of the partners, the contracts, evaluation, follow-up, etc. the full package when it comes to partners. I

How was OI initially implemented into the company? Is the firm involved in partnerships?

Mobile Vikings stands for 'Community' – 'Service' – 'Product Innovation'. We promised our Vikings free mobile Internet and we want to stick to our promise and keep making this possible. Over the years we worked hard to keep our prices low, and lower them when needed, but after a while you're done with competing on prices. We were running out of resources and we reached our maximum. To live up to our promise we involved external partners since April 2016. We thought about how external partners could make it possible for us to offer free data.

On the other hand we also have our own innovation department (Viking Lab) that is looking all the time for new innovative ideas. But it's also spread over the whole company, everyone has 5 innovation days/ year. You can use those days to brainstorm and work on ideas, outside the box of your daily routine. If you're idea is useful and after it has been released you get back your 5 days to work on other projects. For example: for the Vikingdeals, someone had an idea upon showing a notification when there's a Vikingdeal on products of Coolblue, through a chromepluggin. This idea is been put into practice and this person got back his days, to use for the creation of other ideas. We encourage out of the box thinking through our whole company. We organise also Hackathons, which is a 24 hour learning marathon, where everyone works together and tries to learn from each other, for e.g. trying for once each others jobs.

Can you explain the cooperation strategy? With what type of partners are you collaborating?

We have a strong Viking community (18-35 year) of which 98% are holder of a smartphone. Which type of partners could be interested in our community?

We came out by a number of retailers, web shops, travel agencies, etc. such as: Coolblue, Zalando, Uber, NMBS, bol.com, AS Adventure, Zeb, Travelbird, Kinepolis, lensonline, etc. Take for instance Coolblue, we recommend certain products of Coolblue or Coolblue itself to our community, if one of our Vikings buys something of Coolblue we get a commission of Coolblue and our Viking gets Viking points to reload a certain amount for free. We're always looking for new Viking deals and new partners to work with.

But we also operate inside-out, we're involved in start it @ KBC, Iminds, the Corda Campus and we created Viking Lab, where we support and coach start-ups. For example: we gave tips and tricks to Bambooti on how to build out their social media campaign. Start-ups can use our community as well for feedback on their ideas and products but some of those products and knowhow can also be beneficial for us, because everything is changing so fast through this we stay up-to-date and so we know what's living in start-ups.

We believe in the principle of knowledge sharing and this in 2 ways.

We don't work with research departments of universities, we reach this latest knowledge more through working with start-ups from the Incubator and a lot of them are fresh graduates.

Based on what do you select your partner(s)? (Complementarity, mind-set, values,…) How does this process work? (Formation of the network)

We started in April 2016, first with a brainstorm within our team and after we did a survey in our community. Out of these results we set up a long list, we narrowed it down to a short list based on requirements we set up, based on 'Viking DNA'. We were asking ourselves the question: do these partners have the same values, do we share the same vision? The feeling has to be right, there has to be a clear fit between the two companies. For e.g. we selected Coolblue based on the market research (1), and because they value service, just as we do (2). There was an immediate fit, and this is also what makes the collaboration easier afterwards.

Who is responsible for this process? Who manages it? And how is it managed?
- o **Trust Vs. Control**
- o **Formality Vs. Informality**
- o **Information sharing**
- o **Communication process**

I am responsible for the partnerships together with another colleague. We're fulltime looking for new partners and my job is also to maintain these partnerships, set up contracts, solve problems, etc. everything related to the management of these relationships. We are currently working on making

procedures out of this process but we already found out that this is extremely difficult and will take a while.

IP never is in the picture, when partners start talking on this matter it's a done deal for us. Of course there are certain contracts necessary and NDAs when it's about sharing customer information. We're trying to find a good balance between trust and control, but when we don't trust a partner it wouldn't be a partner. All our contacts are informal, quiet lose and friendly.

We never fear imitation, when it comes to the Belgian Telco industry, we don't see anyone copying us. And globally seen we already have been copied. Gifgaf in England has copied us and in Belgium a bank has. Hellobank did, they copied our complete strategy from the full online aspect till service, community, everything, they just applied it to the bank sector. We don't mind, we actually like if other companies are copying us, as long it's in another industry or sector. If there's then a collaboration possibility with these companies, there's an instant fit and match, which makes it easier to work together.

If the collaboration was successful, does it stop there or do you go further?

Yes, if the collaboration is successful we extend the contracts and go on. We always obtain sustainable relationships, but on the other hand we keep looking for more and new partners.

How do you evaluate a partnership?

Our contracts are drawn based on a 3-6-9 principle and this is how we evaluate as well. We have a try out of 3 months, that's the first evaluation moment where we will investigate if everything is going smooth and well, if our Vikings are satisfied, if there aren't too many problems or difficulties, etc. The follow-up itself happens everyday; I'm following up from very nearby. 2-weekly we evaluate the whole cooperation process with our partners, all the facts and figures: the numbers, if the partners are happy, which type of product we have to promote more, and adapt where necessary.

Why did you introduce this approach? (Motives/drivers for doing so) What are the benefits of working together with other organizations?

It was a necessary condition to grow for us, and our resources were worn out. If we wanted to stick to our promise we needed partners. In the relationship with our partners we always try to make both our products stronger, and this happens through the sharing of resources and knowledge.

What were the challenges and problems during the collaborations (ex. IP challenges, communication,…)? And how did you overcome them?

The most difficult part is to come in contact with the right person within the partner company that has the same vision.

A lot of the challenges we faced came down to service. Mobile Viking stands for good service and our Vikings expect this from us. So when were working with partners who didn't value service as much, problems were unavoidable. For instance for booking.com service wasn't a priority, and this caused problems. Our Vikings had to wait a long time before receiving the points, and there were a lot of complaints about that transfer. Our Viking Community expects of our partners the same level of service as Mobile Vikings is offering. We saw this as an important learning, and put service first on our requirement list. This demonstrates again that the fit between partner companies is so important.

From out of our community there was also a big demand for supermarkets, where they could gain points but it has to be possible to set up such a system and when it comes to supermarkets it's not that easy. Were still doing research on the possibilities in involving supermarkets.

How do you make sure not to become too dependent on your relationships/partnerships/networks...?

We never promise exclusivity to partners, otherwise we're stuck when a collaboration doesn't go as we expect. We're also involving as many partners as we can; we're looking always for new partners, so when we lose one the others can cover this.

What is your long-term view for the company? Does OI have a place in that? (Are there long term innovation investments planned?)

I think the future will be mobile only, we want to offer a full package: phone, television, radio, etc. Now there is Stevie, which makes it possible to watch television online. Maybe we can offer in-house 4G some day, and this can make us a global player. Partnership wise, we would like to collaborate with a bank. For each euro our Vikings spend they should be rewarded with points, that's our dream and long-term goal. We want to offer our Community a wide and large range of partners, from retailers, start-ups, banks, etc.

Do you have advice for other SMEs wanting or planning to involve R&D partners?

Dare to work with partners and share your ideas, because this will make your idea more scalable and you'll access to more knowledge and other, maybe bigger, networks.

Interview Case Study 4: VERSUS-OMEGA	
Data	25/08/16
Organisation	Versus-omega
Interviewer	Hanne Daniels
Interviewees	Erik Rogiers
	Pascal Peeters
Location	Personal interview at Versus-Omega in Opglabbeek

Interview Case Study 4: DYNATEX	
Data	25/08/16
Organisation	Dynatex
Interviewer	Hanne Daniels
Interviewee	Christophe Callens

Is it possible to give a short introduction of who you are and your role in the company?

I am the owner of Versus Omega, we are a manufacturer of sliding- and lifting roofs for trailers. Versus manufactures two different types of sliding roofs: curtainsider roofs and full cover roofs. Each roof is equipped with the patented Omega folding plate. I'm managing the day-to-day business, active in international sales and I'm trying to sit together with our internal R&D department once a week. I am active in the truck industry since the beginning of my career and had other companies before such as Focus and Etes (Sesam), where we were also active in the trailer sliding roof industry.

When did you introduce OI within the firm? How was it initially implemented into the company? Is your firm involved in partnerships?

Most of our products are developed by our own R&D department, with the help of external technical experts when extra information is needed. For the development of the Trike Rollers, 7 years ago, I founded with another partner a new company to have more control over the co-ownership and afterwards I bought him out, he resigned all the rights to the product. And to develop Carapax, 9 years ago, we collaborated with Dynatex, a manufacturer of multi-axial PVC coated reinforcements for trailer curtains.

Can you explain the cooperation strategy? With what type of partners are you collaborating?

We work with our partners on a product basis, it depends on the product if we use partners, and we are obtaining an outside-in approach. Most of our products were developed by our own experienced R&D department, such as our sliding roofs (folding plates), Penta Slider etc. We are able to test a lot of those developments in-house, in our lab but when we don't have the knowledge on something

specific, we consult the synthetic materials lab of the UHasselt or organisatios such as TUFF or Decra. For instance they tested our folding plates on strengthness and durability, by exercising pulling tests in extreme circumstances. Step by step we tested our product in each phase, which made it possible for us to make improvements and after the final tests we received a certificate. Based on legitimate tests within these specialised organisations you can proof to the market that your product is solid and has superior quality.

Carapax, a PVC roof curtain with an aramid reinforcement construction welded against it, is developed together with Dynatex. Dynatex is a curtain producer; it's the company of Christophe Callens a friend of mine.

When we have questions on ownership we contact Bart Lieben (an IP lawyer) at Gevers or an expert of Arnold & Siedsma (patent and trademark agencies), they do research on our patents and follow them up.

Based on what do you select your partner(s)? (Complementarity, mind-set, values,…) How does this process work? (Formation of the network)

Because of the many horrible accidents involving trailers who lose their loading on the roadway, a new regulation was created to specify the strength of the trailers' superstructure, the EN 12642XL regulation. This rule has forced every trailer builder and parts manufacturer to develop new and better solutions to create an even stronger and safer trailer. An English client of us, Stronghold, picked our brain on anit-theft curtains, which reinforce the curtains diagonally with steel inside. We started brainstorming on this existing product and had the idea to use these curtains also on our roofs. Because of my personal relationship with Christophe and his knowledge on the curtain technology, I thought of him as a partner. He thought it was a good idea, and was willing to cooperate. This is how the selection went, we don't have written down procedures. I work a lot from my network I buildup through the years in the industry and through contacts via organizations such as Voka. And out of that network pool of people and companies, we select based on reputation, knowledge and resources.

Who is responsible for the collaboration process? Who manages it? And how is it managed?
- **Trust Vs. Control**
- **Formality Vs. Informality**
- **Information sharing**
- **Communication process**

I am responsible for this process, I make the decisions and the process is followed up by me and head of R&D Pascal. All of the testing for Carapax was happening over at VS, because we have the knowledge, infrastructure and installations to do so. We started testing, and the initial curtain Christophe was selling was too stiff, the roof didn't opened quick enough and the steel cabling inside

could rust. So we came up with the idea to change the steel for aramid filaments, which are stronger than steal and don't rust. This turned to be a much better product and we started testing again to use it as a roof, the tests turned out great, so the product was market-ready. Because Dynatex is a curtain producer they have a lot of knowledge on the production process and making this machine wise happening.

Dynatex is selling their curtains to truck curtain manufacturers, which aren't interested in this curtain because they don't know what to do with it, how it is used etc. Dynatex doesn't has relationships with truck manufacturers, we on the other hand do have these relationships, because we are selling to them, those are our customers such as Kögel, Schwarzmuller, Van Hool, etc. So we came to an agreement, we we're going to do the marketing and promotion for Carapax, making sure that truck manufacturers would advise their curtain manufacturers to buy Carapax curtains at Dynatex.

Through this whole process we never made arrangements on ownership, and that's where it went wrong. Dynatex patented the product of Carapax behind our back. In this case, when it came down to this product, I made the critical mistake to trust too much on our personal relationship. In other projects, we already make contractual arrangements from the start, but because of the trust aspects I thought we could settle this afterwards. But Christophe got to it first and patented the product; right after I heard this we immediately patented the name Carapax. This created a strange situation: we are owner of the name, everyone in the industry also thinks it is ours, and Dynatex is owner of the product itself. There isn't a lot we can do with just the name without the product, but we could use this as leverage to not sell to our competition and only sell in combination with a VS roof. Because if we wouldn't allow him to use the name, he would have to do the marketing all over again. The contacts within this partnership were more informal and build on trust, but this depends on the type of partner we're working with.

This is a case where we lost control, for all our other products or product improvements: for our slidingroof folding plates, the Trike Rollers, Penta Slider, lifting system, etc. we have patents. Besides this exception we only work together with partners if we have the ownership of the product, based on formal contractual agreements.

We're having also NDAs with the aluminum companies that we work with. Our big customers are able to buy directly from the aluminum factory, but we receive a commission for this, this is all drawn up in a contract, they can't go behind our back.

If the collaboration was successful, does it stop there or do you go further?

Yes, if the collaboration was successful, we would consider working again on another product, because we're using these partnerships only on a product basis. But only under the condition that

there are clear arrangements from the start and we have sole ownership, or under the construction of creating another company together.

How do you evaluate a partnership?

We don't have a strict procedure for this, we only work with company partners that we know for a long time, that have the knowledge and resources. We follow-up on a weekly basis, a member of our R&D team is always working on this, but this really depends on the product/project.

Why did you introduce this approach? (Motives/drivers for doing so) What are the benefits of working together with other organizations?

Because of a change in the market, due to the new legislation, we started brainstorming on a solution. If you do something completely on your own it takes much more time, it's also impossible to have all the knowledge and resources (machines) in-house. For instance with Carapax, we had the idea to use it for roofs, we have a lot knowledge on roofs and in-house roof testing, but we're no curtain manufacturer. That's why we contacted Dynatex, because they are specialized in that matter.

But also when product testing becomes too complex to do it in-house we use University or specialized organization labs to do so. For our IP purposes we use IP experts.

What were the challenges and problems during the collaborations (ex. IP challenges, communication,…)? And how did you overcome them?

We had some challenges concerning IP when it comes to Carapax as I mentioned before. Christophe patented the product first, but we are patent holder of the name Carapax. Because of this move we can use the name as leverage to not sell to our competition and only sell in combination with a VS roof. If they drop us, we'll drop them. This situation was working out well because we were both on the same page, he realized that he needed us and visa versa, but this changed when Dynatex became part of a bigger company Sioen. Sioen doesn't care about this arrangement and has a bigger market as Dynatex had, so they supply also other trailer roof manufacturers. It's easier to work with a smaller company with a big one or when a small company becomes part of a big one.

How do you make sure not to become too dependent on your relationships/partnerships/networks...?

We always try to have the upper hand in a collaboration, keep the most important aspects in-house and be the sole owner.

What is your long-term view for the company? Does OI have a place in that? (Are there long term innovation investments planned?)

Penta Slider is a product we've been working on for years, and the market is getting more ready for it, it's gaining popularity. We'll be developing this further and make improvements. Penta Slider has the potential to become as big as the sliding roof system.

Do you have advice for partners of a network/relationship? Or for SMEs wanting or planning to involve R&D partners?

Make contractual arrangements right from the start, even when you're working with friends or family. There have been more requests to develop products together but I'm not agreeing if there aren't contracts or arrangements on ownership, I always obtain to be sole owner or have the majority.

Interview Case Study 5: BAMBOOTI	
Data	18/07/16
Organisation	Bambooti
Interviewer	Hanne Daniels
Interviewees	Pieter Van Moll
	Freek Gielen
Location	Personal interview at Corda Campus Incubator in Kiewit

Is it possible to give a short introduction of who you are and your role in the company?

We are Pieter and Freek and started our company Bambooti one year ago. We create lifestyle products from natural resources such as: wooden sunglasses, Iphone cases of stone, bamboo macbook skins. All our products are personalize-able. We started out via Kickstarter a crowed funding webpage, and competitions such as Start it @ KBC and 1828, where we won €50 000. Freek takes on the design part, everything related to the website and other online aspects. And I (Pieter) deal with shipping arrangements and issues, pricing, looking for partners and looking for new ideas.

When did you introduce OI within the firm? How was it initially implemented into the company? Is your firm involved in partnerships?

We started using external partners straight from the beginning. We started our company right after we graduated, so we didn't have any experience or money. Through Kickstarter and 1828 we earned our first money to set off, and start it @ KBC helped us by coaching and mentoring us in being an entrepreneur and our mentors gave us valuable feedback concerning law issues, financial aspects, etc. We don't have knowledge on how to produce these products of natural and durable materials, how to treat the material that it stays clean or on laser techniques to personalise our products.

Can you explain the cooperation strategy? With what type of partners are you collaborating?

Because we don't have the right product knowledge. We used a sourcing agency to select abroad companies for us, that could produce for us. We decided to do this after some failed attempts to make our own selection online, the quality was each time very poor and this cost us a lot of money. This is how we found a company from Wales, that was doing the same thing their selves in Wales, and they had all the machines and techniques to do so. We made an appointment and went there to discuss what they could do for us. They are now doing the production for us in Wales and functions as supplier. For our stone cases we're still looking for someone who can do the production for us because this is totally new, and needs special cutting laser technique.

We are located at the Corda Campus Incubator, with other start-ups and companies nearby, we frequently brainstorm with other entrepreneurs and share ideas, and because we're located there we can enjoy extra help tools. Also our mentors from Start it @ KBC help us out with good advice and La Bottega is next to our own web shop, our unique selling point. We don't work with universities or schools, because that's not really applicable to our product.

We are working on a customer feedback system, to get direct feedback from or customer on who they are, what they want, etc. We need the help of our customer because the products we're offering are fashion products and this changes quickly, so it's important for us to detect the new market demands asap.

Everything related to our website and software for the upcoming app, we're doing ourselves, with the help of digital assistance and help apps. We try to fix things first ourselves.

Based on what do you select your partner(s)? (Complementarity, mind-set, values,…) How does this process work? (Formation of the network)

We don't have a selection procedure, we just work with the two of us and decide together on the spot based on the feeling we have of someone, if we share the same values and have the same thoughts about something.

Who is responsible for this process? Who manages it? And how is it managed?
- o **Trust Vs. Control**
- o **Formality Vs. Informality**
- o **Information sharing**
- o **Communication process**

We both are, we're doing everything together but I (Pieter) am a little more active in this field. We don't have a procedure or process, we work based on mutual trust, common sense, and the feeling and vibes we get from people. All our contacts are informal, we are very open and put everything out. It's important to talk about your new ideas, to put it out there, this will raise opinions and you'll get feedback and that's the only way the idea we'll get better. Our product is not patentable, we picked it up from other countries, and because it wasn't on the Belgian market yet. We're not afraid someone might copy us, by that time we already made something else out of natural/durable materials. Our relationships are amicable, we don't put a lot of effort into the management of them, we make arrangements and they know what we want. We don't have contracts with anyone yet. We thought about it, but then it didn't went through.

If the collaboration was successful, does it stop there or do you go further?

No, when everything goes well we go further, otherwise we have to go and look for a new one and that costs a lot of money and time.

How do you evaluate a partnership?

Again we don't have procedures for anything; we handle problems when they come up. Such as for instance, they were once using glue of less quality, this resulted in customer complains. We arranged that our producer was redoing it for free. After a while he changed to another glue. Everything is open for discussion; it's a company we have good arrangements with.

Why did you introduce this approach? (Motives/drivers for doing so) What are the benefits of working together with other organizations?

It's much faster and cheaper, if we had to do all of it ourselves it wouldn't be possible, because we simply don't have the resources for it. We don't have to invest the time to learn it, we just outsource is.

What were the challenges and problems during the collaborations (ex. IP challenges, communication,…)? And how did you overcome them?

We are extremely dependent on our partners: on our partner in Wales and on our partners at the Corda Campus for advice. CC partners aren't a problem because the mentors are volunteers; they deliver inside-out knowledge because they want to keep abreast. If our partner production partner in Wales would leave us that would be a disaster, but we have a lot of trust in him and we share the same vision with him, he started just like us years ago and would never do that.

How do you make sure not to become too dependent on your relationships/partnerships/networks...?

We realise that we are extremely dependent but we'll try to build this gradually off through the years, and things we can do ourselves such as marketing, IT, etc. we will do ourselves.

What is your long-term view for the company? Does OI have a place in that? (Are there long term innovation investments planned?)

We don't make long-term plans, because the market we operate in changes all the time, we adapt ourselves all the time and make adjustments when necessary.

Do you have advice for partners of a network/relationship? Or for SMEs wanting or planning to involve R&D partners?

Talk about ideas and share knowledge that's the only way to go forward and to learn and stay innovative. Don't be afraid of sharing ideas, only so the idea will develop and grow.

Interview Case Study 6: BEST-LOCAL	
Data	18/07/16
Organisation	Best-Local
Interviewer	Hanne Daniels
Interviewee	Ann Dries
Location	Personal interview at Corda Campus Incubator in Kiewit

Is it possible to give a short introduction of who you are and your role in the company?

I started my company Best-Local 1,5 year ago, then we launched a first attempted of the tourism platform.

When did you introduce OI within the firm? How was it initially implemented into the company? Is your firm involved in partnerships?

There were a lot of problem during the begin stage, there was no response to my initial idea. I worked as a guide for many years, and have a lot of experience in the industry and I felt the need for change. My first idea was to make a platform, where tourists could contact local guides to do something together which they are passionate about such as making pasta in Genk. But there wasn't a law to pay these guides legally, the industry isn't well regulated yet. Because I was facing all these problems I was in need for mentoring and knowledge on all entrepreneurship aspects. This is how a lot of partners came in the picture. I had the idea but I was in need of specialised people that have the knowledge to make it happen.

Can you explain the cooperation strategy? With what type of partners are you collaborating?

Because of Start it @ KBC I have a large pool of experts to talk to. But I have a lot of other mentors such as: within Iminds and Corda Campus, LSU (Limburg Start-Ups), Koen Desmet from Mobile Vikings who is my financial expert, IP expert Jos Swinnen (Agentschap Ondernemen), etc. I am good at networking and in 1,5 year I was able to build a network around me of people who give me advice, feedback and I learn a lot from them.

Because of the failure of my initial idea, my mentors advised me to start over again, and do tests in the market, and try to answer the question: WHO is my customer? And start from there on again. I followed the advice and did a lot of market research. The results let me to the Asian market, and a B2B approach, Asian people love full packages all-inclusive when they travel. Through the contacts of Iminds I came in contact with the Asian Market, they introduced me to the university of Singapore. I did another survey this time in Singapore and China specifically. That's how I started working on a B2B proposal. I realised that I needed someone who speaks Chinese; LSU got me a Chinese intern.

Belgian tour operators will be making proposals to me and I'll offer them to my Chinese tour operator contacts, through them I'll reach the Chines market. At the moment we're doing some more market research, via videos to find out in what type of Belgian activities and -attractions Asian people are interested in.

Based on what do you select your partner(s)? (Complementarity, mind-set, values,…) How does this process work? (Formation of the network)

This all happened via Start it @ KBC and the Corda Campus synergies, the people I got know through networking etc. They brought me in contact with my mentors, Chinese intern and IT'ers. I don't have a strict process for this, it just happened on a logical basis. I followed the LEAN Start-Up process of Steve Blank, just like Mobile Vikings did. This is all about reducing the time to market and looking for a good market fit. You have to code your ideas, make them measurable, and learn from the data of your investigation. I have two mentors who were thought by Steve Blank himself, who introduced this approach to me and are advising me on it.

Because of my lack of experience on entrepreneurship, my mentors shaped me till the entrepreneur I am today. I learned from all of them, and took a piece from each specialist and made my own approach.

Who is responsible for this process? Who manages it? And how is it managed?
- **Trust Vs. Control**
- **Formality Vs. Informality**
- **Information sharing**
- **Communication process**

I am responsible, because I am a start-up and for now working on my own.
When I started off, I was extremely afraid; I let everyone sign NDAs, even specialist I was consulting. Now I feel stupid about it, because it was just the initial idea back then, far from done; it still needed a lot of development. To protect my idea itself, I hired a digital safe at the Agency of Entrepreneurship, in that way you can proof since when you have the idea. Because of the Corda Campus mentality, I learned being more open to others about my ideas. I thought that you can only make them better by getting feedback, sharing information and learning from each other. It's all about the execution of the idea and how you develop it. But when I'll enter the Asian market, protection will be needed. I am looking into that with one of my mentors. Also when I'll be sharing my Chinese database information, I'll have people sign a confidentiality agreement. On the one hand you can't work without mutual trust, but when contracts are needed, they will be definitely drawn up. We're looking for ways to protect the concept itself. I am using TeamLeader, a project management tool, where I make my reports in. My purpose is to create a procedure out of this, how I contact my Chinese contacts, step 1-2-3-4- etc. I want to create a structure, to make the cooperation more fluent.

If the collaboration was successful, does it stop there or do you go further?

If the partnerships are successful they will be maintained, I'm looking for sustainable relationships. Because it takes a lot of time to find the right partners and build a good relationship them, it would be too time consuming to change all the time. Also when you're used to work with someone, this happens more easily and smoothly.

How do you evaluate a partnership?

I'm making reports on collaborations, and meeting with Asian operators. First I set up small projects, as a test to see how they are to work with. Via TeamLeader I'm working on setting up an evaluation procedure as well.

Why did you introduce this approach? (Motives/drivers for doing so) What are the benefits of working together with other organizations?

If I didn't used partners to advice me, I would have invested all of my money already and started with the platform for the initial idea. It would have been a total failure because there wasn't enough market demand and it wasn't realisable because of legal issues. And without Chinese partners it would be impossible to reach the Chinese customer. I need the knowledge and resources of my partners to make it.

What were the challenges and problems during the collaborations (ex. IP challenges, communication,…)? And how did you overcome them?

There have been some issues regarding cultural differences. Asians are less open and need a different approach then I was used to. I learned to adapt to this by working with a Chinese intern.

The negotiations with a translator in between have been challenging as well. It's difficult to make clear arrangements and to express exactly what you mean, because a translator will always give another twist to it, not on purpose but it's always different then hearing it from someone directly. That's why I'm going to focus especially on Singapore and Hong Kong, there they speak fluent English and after the Chinese market, I'm planning to scale up to Europe and the rest of the world.

Building your service in such a way that there is a market-fit, and adjust it to the exact needs of your customer.

And finally the protection of my concept, we're still looking for a good protection strategy.

How do you make sure not to become too dependent on your relationships/partnerships/networks...?

I am looking for as many partners as possible, to divide 'the risk' of losing one.

What is your long-term view for the company? Does OI have a place in that? (Are there long term innovation investments planned?)

Yes because it is build on relationships, with partners that have knowledge that I don't have (specialists on finance, law, IP, etc.) and partners that have resources that I don't have (the Asian operators, that have their foot in the Asian market).

I'm even planning to look into options to work with Booking.com, Air B&B, cities, and community of Flanders etc.
For the platform we're planning now to start with a wix account as a test, then use freelance IT'ers to develop it more and then I'll look for an IT co-founder. Because IT is such a big part of my service, I need someone full-time for that.

Do you have advice for SMEs?

I would advise start-ups to thoroughly test the market before starting off; a product-market fit is essential, stay in the test phase until you found that fit. It's like building a house, when the funding is bad, the house will collapse.

Surround yourself with good specialists; it's impossible to know everything in every department.

Appendix C: CASE FICHES

COMPANY 1: SPRONKEN

Spronken is a distributor and manufacturer of medical equipment such as bandages, orthoses, prosthetics etc. The family company is already 36 years active in the healthcare sector. They value quality and are constantly looking for product improvements and for new innovative solutions. In their medical department they are developing innovative products for the low-care health industry. This asks for extensive research with the assistance of academic support and their external partners. Improving medical service at the bedside of the patient is one of the most important goals in the healthcare industry today. The healthcare staff is spending a lot of time on monitoring patients and taking care of IV refills. Besides that medication administration errors cause a multitude of deaths each year, which can be prevented by utilizing monitoring- and verification systems.

The Smart-IV is an innovative patented product development of Spronken, it is a wireless monitoring solution, which enables remote monitoring and drug verification of traditional gravity infusion therapy. Nurses scan certain barcodes: their badge, the patients' bracelet, the hitch of the IV and the IV bag itself. The smart system links all the data together; all the information is tracked by computers. It is now possible to see when an IV is empty, who changed it, when it will be empty again etc. The patients can be individually monitored and this categorised per hospital department. The system can easily be rolled out in hospitals utilizing the existing Wi-Fi infrastructure. This system gains time for hospital staff and reduces the risk of administrative errors. Spronken developed the Smart-IV together with multiple R&D partners such as: Cegaka which handled the IT aspects, ZOL hospital of Genk, UHasselt and multiple specialized East-Asian contractor companies, but Spronken is sole owner. After a pilot project at the hospital of Genk (ZOL), they are working on the commercialization[11].
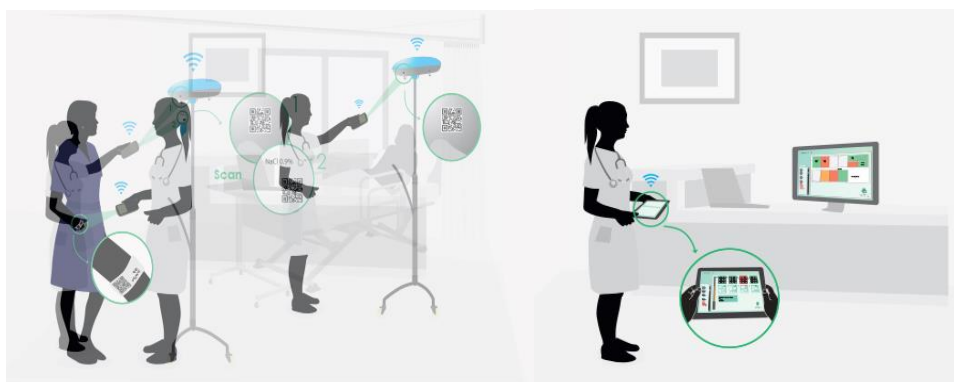

Figure A: Demonstration of the Smart-IV

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[11] Retrieved from http://www.spronken-medical.com

COMPANY 2: MACHIELS

The family company started 70 years ago as a construction firm, nowadays they are active in multiple sectors such as real estate, building solutions based on CO2, producer of renewal energy etc. They are a true pioneer when it comes to renewable energy and sustainable entrepreneurship. Their plant is located on a carbon-neutral industrial site, which produces its own electricity using solar energy and wind power. Machiels Building Solutions looks beyond the limitations of its own projects, they are involved in all sorts of environmental development and society projects.

Through Remo, their competence centre, they handle their environmental policy from the biggest high-performance site for industrial waste storage in Belgium.   The project is the final piece in the waste products policy of the Flemish government. Stored waste is converted into energy production and material recycling. All their projects take part in their Closing the Circle philosophy. The storage of waste products with the aim of reusing them fits entirely in the cradle-to-cradle idea. Everything is reduced to its origins so that a new production circle starts using previously used basic materials and electricity is generated from landfill gas. The released heat is used to heat the company premises and installations. Remo wants to valorise historic landfills, by using the best available techniques; a lot of this waste can be recycled. Waste products that cannot be recycled will generate green energy for 200 000 households. This entire process is the basis of Group Machiels' Closing the Circle project and will generate hundreds of jobs.
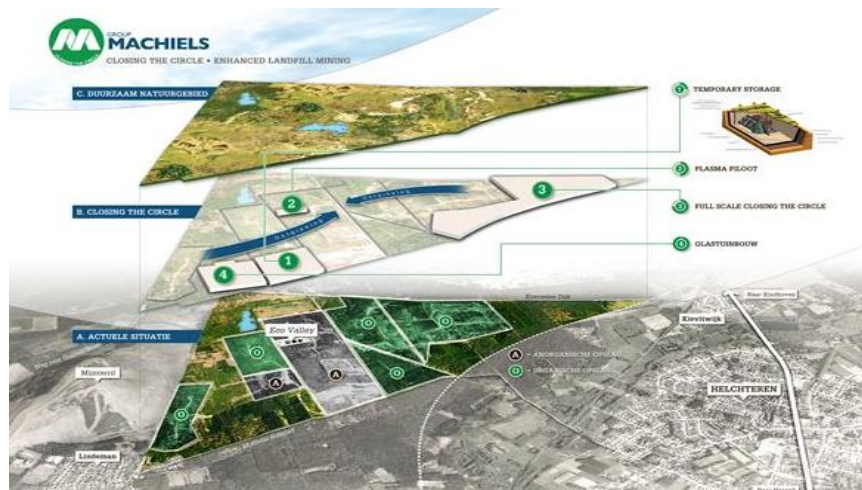

Figure B1: Closing the circle

The Enhanced Landfill Mining project fits in this bigger picture of closing the circle as well; it is a consortium of scientists, academics and companies who aim to convert old landfills into sustainable energy on the one hand, and reusable raw materials on the other hand (Figure B2).   One of the first specific ELFM projects is the valorisation of the Remo landfill site of Machiels in Houthalen-Helchteren. Because of its size and significance, this is the spearhead project of Group Machiels' Closing the Circle idea. The Remo site contains more than 15 million tonnes of waste. It has been

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estimated that about 45% of the waste could be recycled to materials. The remaining waste has a high enough caloric value for use in high-efficient energy generation after pre-treatment. The Closing the Circle project will take about 20 years and involves an investment of more than 230 million euro. Through the collaboration with the strategic research partners in the ELFM consortium (KU Leuven, VITO and UHasselt), Closing the Circle allows Flanders to grow into a Competence Centre for Enhanced Landfill Mining and Enhanced Waste Management, as well as offer worldwide valorisation opportunities. This collaboration comprises technological innovation complemented by new business models and new regulations[12].
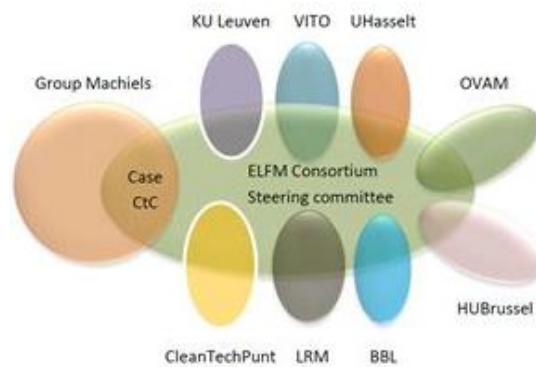

Figure B2: ELFM Consortium

Under the name of MAC[2], Group Machiels and Van Gansewinkel Belgium collect liquid maritime waste and industrial waste flows for treatment. They also clean ship's holds and supply vessels with oil, fuel, steam and process water. MAC[2] collects the oil from the collected waste flows and turns it into high-quality fuel to ensure maximum reuse. The polluted water goes to a water treatment plant for physiochemical and biological cleaning. All vessels need to meet Marpol laws to combat the pollution of the maritime environment. MAC[2] helps them to meet these high demands[13].

Beta-Cell project is doing research on ß-cells to transplant into diabetic patients. These cells are producing insulin. These ß-cells come from foetal pig placentas. Machiels is partnering with the International Diabetic Research Centre and the VUB for this research project. This is still in the test phase on mice. The results are promising, the cells were growing and producing insulin. After a study on apes, there will be some tests on diabetics as well[14].

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[12] Retrieved from http://www.machiels.com

[13] Retrieved from http://www.machiels.com

[14] Retrieved from http://www.machiels.com

COMPANY 3: MOBILE VIKINGS

Mobile Vikings, nowadays part of Medialaan, have their headquarters at the Corda Campus the innovative heart of Limburg. They are a telecom provider that also offers their customers, which they call their Viking Community, free mobile data. Beginning 2008 they started teasing the online community, by means of invite codes to get a SIM card. Later on, end of 2008 they launched Mobile Vikings, the first Belgian operator with a fair use policy of mobile data. At the end of 2009 they started of the member-gets-member system, every Viking who convinces a friend to become a Viking receives a free top-up. Mid 2010 they already had 50.000 Vikings and towards the end of 2013 their community consisted of 200.000 Vikings. Today there are around 250.000 Vikings in the Mobile Vikings Community.

They have a top-notch software platform that allows them to offer additional services to the Vikings. Their key to success is their vision, unique business model, and innovative ecosystem, in which they integrate with partners. Mobile Viking believes that by cooperating internally and externally, they stand stronger and embody the 1+1=3 principle, while creating added value with and for others. They share knowledge, empower others and grow together.

Mobile Vikings stands for 'Community' – 'Service' – 'Product Innovation'. They promised their Vikings free mobile Internet and wanted to stick to that promise and keep making this possible. Since April 2016 they involved external partners to live up to this promise. Coolblue, Zalando, Uber, NMBS, bol.com, AS Adventure, Zeb, Travelbird, Kinepolis, lensonline, etc. are a number of their partners for which they recommend products to their Vikings. If the Vikings buy something of a partner, Mobile Vikings get a commission and the Viking gets Viking points to reload a certain amount for free. But they are also active in two-way knowledge sharing, by also operating inside-out. Mobile Vikings is involved in start it @ KBC, Iminds, the Corda Campus and they created Viking Lab, where they support and coach start-ups[15].

Figure C1: Envisioning Viking Deals process

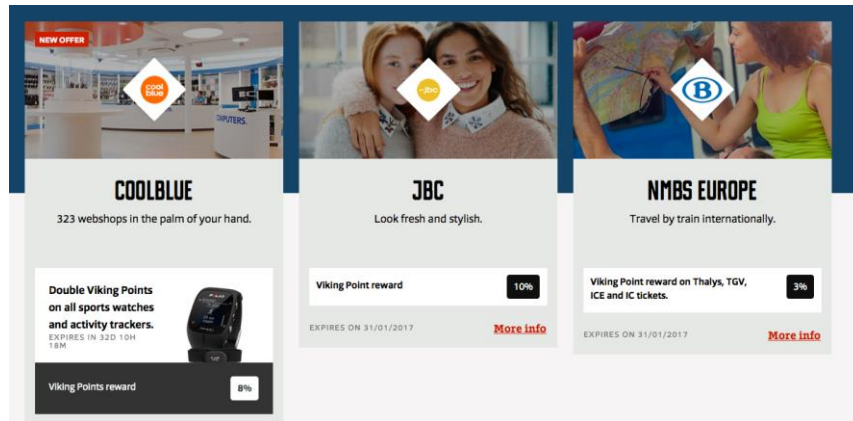[15] Retrieved from https://vikingco.com/nl/about/

Figure C2: Example of Viking Deal

COMPANY 4: VERSUS-OMEGA

Versus-Omega is a manufacturer of sliding – and lifting roofs for trailers of trucks. The company exists for 15 years and is headquartered in Belgium (Opglabbeek), but the Versus roofs are distributed all over the world: from Germany to Sweden, from Egypt to Mexico. They also have a few Belgian clients such as for instance Van Hool or Essers but their main focus is on export. They have won over the years a number of times entrepreneurial export prices. The owner and CEO, Erik Rogiers is active in the truck industry since the beginning of his career and had other companies before such as Focus and Etes (Sesam).

Versus manufactures two different types of sliding roofs: curtainsider roofs and full cover roofs. Each roof is equipped with the patented Omega folding plate (Figure D1), which curve automatically upward while opening the roof. Most of their products, such as: the folding plates, the Penta slider and lifting system, are developed by the internal R&D department with the help of external technical experts when extra information is needed. The Penta slider is an extremely easy and quick system to open curtainsiders. As the curtainsider has rollers both at the top and the bottom side, it easily folds up in one swoop. The Penta Slider systems combine all the possible curtainsider and sliding roof systems in one concept. VS also developed Axces roof lifting systems (Figure D4). They allow that the roof can be easily lifted up to 450mm which makes loading or unloading from the side a lot easier.

But for certain products VS collaborated with external partners, such as it was the case for the TRIKE curtain rollers and the reinforced Carapax roof (Figure D3). The patented TRIKE curtain rollers make the opening of the side curtains extremely easy and quick, as demonstrated in Figure D2. The thoughtful design makes sure the curtains will never block. For the development of the TRIKE Rollers, they founded Claro, another company together with a partner to co-develop this product.

To stand the XL tests due to new legislation, a sliding roof needs to be reinforced. By means of the patented Carapax roof this is very easy without having disturbing cables hanging around in the loading

space when opening the roof. To develop Carapax, VS collaborated with Dynatex, a manufacturer of multi-axial PVC coated reinforcements for trailer curtains[16].
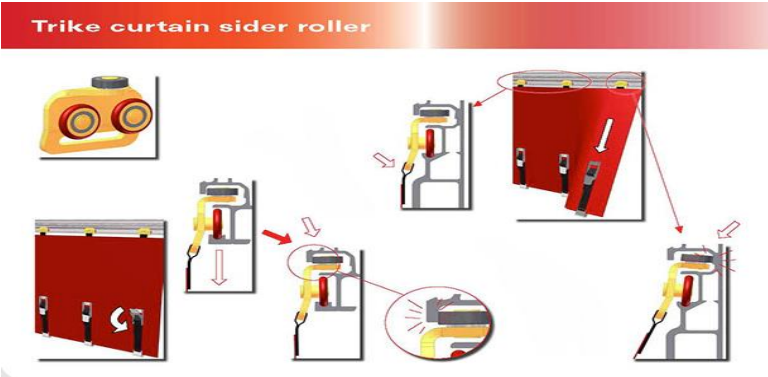

Figure D1: Folding plates

Figure D2: Demonstration of Trike rollers

Figure D3: Carapax roof

Figure D4: Axces lifting system

[16] Retrieved from http://www.versus-omega.com

COMPANY 5: BAMBOOTI

Bambooti is a young start-up company, located at the Incubator of the Corda Campus. They create products such as Iphone cases and Macbook skins, from renewable resources. They value sustainable entrepreneurship in their manufacturing and other processes. They are striving towards building a brand that is committed to promoting a healthier relationship between humankind and nature by developing high-grade products from natural renewable resources. Their goal is for the Bambooti products to make a difference by inspiring us to live in a more authentic and sustainable way. The problem of poor vision is an important issue that affects our global community that is why they are helping Eyes For the World to provide self-adjustable glasses through distribution programmes in the developing world[17].

They started out via Kickstarter a crowed funding webpage, and competitions such as Start it @ KBC and 1828, where they won risk capital. Pieter and Freek started using external partners straight from the beginning. They get a lot of expertise from their mentors from Start it @ KBC and from the Corda Campus. La Bottega is next to their web shop, their unique selling point. In their marketing strategy, they use a lot of social media to reach their customer (Figure E1 and E2).

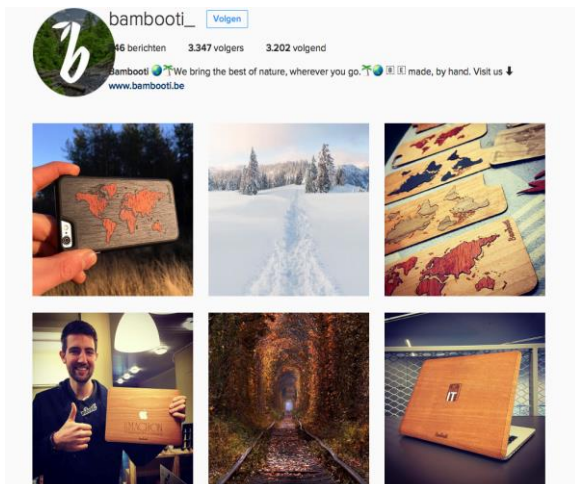"Bring the best of nature, wherever you go!"

Bambooti

Figure E1: Iphone covers and Mac book skins

Figure E2: Social media management

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[17] Retrieved from https://www.bambooti.be

COMPANY 6: BEST LOCAL

Best-Local is a start-up company, located at the Incubator of the Corda Campus. They created an online tourism platform, serving as a bridge between Asia and Europe to connect people, businesses and networks to create win-win experiences. Ann Dries is the founder and CEO, she has a lot of experience in tourism, for many years she was active as a guide. Ann is responsible for the networking and tourism aspects. She is working with multiple partners, as demonstrated in Figure F, such as: Pasar, Iminds, StudentStartUp (PXL), Corda Campus, Differenthotels.com, city of Hasselt, Innovation centre Limburg, Start it @ KBC. And she can count on the support of: Liu Xiaowei (Asian Market expert), Koen Desmedt (Financial expert), Simon Matalucci (Marketing support) and Luk Balcer (Art Director)[18].

Figure F: Best Local Network

[18] Retrieved from http://www.bestlocal.be

Appendix D: SUMMARY CASE STUDY

	Spronken	Machiels	Mobile Vikings	VS (& Dynatex)	Bambooti	Best-Local
Product type	Smart IV (2012)	Multiple innovation projects -> 'Closing The Circle' (2012) ELMP MAC2 BETACEL etc.	Viking Deals (2016)	Trike Rollers (2009) Carapax (2007)	Lifestyle products of natural resources (2015)	Tourism platform (2015)

Partner type	Science based (UHasselt)	Science based (KUL, UHasselt, VITO)	Start it @ KBC, Corda Campus (inside-out)	Science based (UHasselt labs, quality testing, TUFF, Decra) IP experts	Start it @ KBC, Corda Campus, experts	Start it @ KBC, Corda Campus, LSU, Iminds, experts
	Market based (inter-industry; ZOL & Asian niche SMEs)	Market based (inter-industry: specialised companies)	Market based (inter-industry: retails etc.)	Market based (intra-industry: Dynatex)	Market based (intra-industry: company Wales + inter-industry) + Customer feedback	Market based (intra-industry: Chinese and Belgian traveling agencies)
Orientation	Outside-in	Outside-in	Outside-in & inside-out	Outside-in	Outside-in (but open for inside-out)	Outside-in (but open for inside-out)
Motive(s)	Need i/t market Cost-efficiency Knowledge & Resources Faster time-to-market	Risk spreading of the failure rate Cost-efficiency Budget	Resources, bottom price was reached Free Mobile Internet (demand/promise) Growth	Changes i/t market New legislation Time-to-market Knowledge & Resources	Time-to-market Cheaper Knowledge & Resources	Time-to-market Reducing failure risk Knowledge & Resources

Selection	Network	Network	Market research	Personal network	No selection procedure	Market research Asian market
	Requirements	Requirements	Requirements	Experience	Intuition	Expert network
	Reputation	Reputation	Viking DNA (Value Proposition fit)	Network organisations (Voka)	Fit in values and vision	Experience
	(No written down procedure)	(No written down procedure)	(Procedure in progress)	Reputation/knowledge/ resources		
				(No written down procedure)		

Management of the procedure/ Structure/ Evaluation	Ownership arrangements & contracts from the start	Ownership arrangements & contracts from the start (4-phase planning)	2 people fulltime looking for new partners + maintenance	No strict procedure or planning	No process or procedure	LEAN start-up process
	Individual ownership	Individual ownership	3-6-9 evaluation principle (trial periods) + 2x/week	Vs -> testing & marketing D -> production (planned)	Mutual trust	Team Leader: making reports, to create later on a procedure
	Every step of the process is stated i/t contract	Strict step-by-step planning		No arrangements from the start		Step-by-step plan discussed with mentors
	Strict short-term and long-term planning, forecasts	Permanent evolution by president consortium		Weekly basis, based on results of tests		
Formal / Informal	Formal	Formal	Informal	Informal	Informal	Informal

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Control Vs Trust						
	Patent, contracts (financial and technical)	Patents, contracts, critical trust	No IP Contracts + NDAs on customer info Balance trust - control	Carapax: Trust (friends) Patent on name Other products: Patents NDAs Contracts	Mutual trust Not patentable No contracts	Mutual trust Looking into protection (experts) Contracts Balance trust-control

Challenges & Learnings					
Level of resources partners	Scientist >< Manager Relational issues, other goals	Imitation = collaboration opportunity -> instant fit	Arrangements from the start (also with friends and family)	Looking for partners takes a lot of time	Product-market fit
Contracts from the start	→ Relevance for the market (ROA)	Diff. to contact right person in the partner company	Balance control-trust	Screening agencies for companies abroad	Legislation
Arrange every step of the process from the start	Proof validity to universities (diff. small Vs big)	If there is no fit in the company values and value proposition impossible	Big Vs. Small firm	Talk about ideas, feedback	No fear to share ideas
Mix of diff. partner types	Work with combination of partners	Never give exclusivity	Keep most important aspects in-house	Only give out production, rest ourselves	Cultural differences
Transferring only production activities	Clear arrangements from the start	Many different partners			Multiple partners
	Government	Make idea scalable			

Future R&D investments					
Yes	Yes	Yes	Yes	No	Yes

Auteursrechtelijke overeenkomst

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R&D partnerships in SME's

Richting: **Master of Management-International Marketing Strategy**
Jaar: **2017**

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Voor akkoord,

Daniels, Hanne

Datum: **12/01/2017**