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AN EXPLORATORY STUDY OF THE DETERMINANTS FOR A SUCCESSFUL IMPLEMENTATION OF OPEN INNOVATION IN LARGE MULTINATIONAL ENTERPRISES

MATURITY MODEL FOR ASYMMETRIC OI COLLABORATIONS WITH SMEs

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1. Abstract

Open Innovation collaborations with small companies carry several benefits for large companies looking to speed-up their innovation process and accelerates their market entry and therefore, remain competitive. However, continuous assessment of such collaboration is crucial for successful implementation. This research is based on the case study of a large company, whereas the aim is to measure their expertise in these specific collaborations through a maturity framework. The Asymmetric Open Innovation Collaborations Maturity Model is developed based on the existing Open Innovation Maturity Model but with the specific elements and capabilities required for the implementation of these collaborations in large enterprises. The elements are selected based on a secondary data collection. In addition, primary data is collected through the interviews conducted within our studied company. Furthermore, the interviews are complemented with the application of the adapted maturity framework. The results give an overview of the maturity status of the studied company as well as the current challenges and barriers to overcome in order to establish successful open innovation collaborations with small companies. At last, recommendations are given based on the most important areas and elements that represent the biggest challenges.

Keywords: Open Innovation, Asymmetric collaborations, Maturity Model

1.1 Key Findings

- The elements selected for the Asymmetric Open Innovation Collaboration Maturity Model (AOICMM) represent the diverse areas and capabilities to be assessed in these collaborations. It is integrated by 3 dimensions, where every dimension has elements and its metrics, starting with the conditions to foster these collaborations. It is followed by the capacities and instruments needed.
- The results of the application of the AOICMM in the different units within the studied company display a semi-mature level in average in these collaborations. However, every unit has a different focus, aims, and experiences in these collaborations. Therefore, the results do not indicate the general status of the entire company but give a good picture of their performance in these collaborations.

- The recommendations tackle the most prominent and common challenges faced by the diverse units which are related with the agility of the company, efficiency in the communication between the partners, the mindset of the employees in the large company and trust building among the partners.

2. Statutory declaration

"I hereby certify this thesis is my own work and contains no material that has been submitted previously, in whole or in part, in respect of any other academic award or any other degree. To the best of my knowledge all used sources, information and quotations are referenced as such."

3. Acknowledgements

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OI	Open Innovation
SME	Small and Medium Enterprise
AOICMM	Asymmetric Open Innovation Collaboration Maturity Model
SEI	Software Engineering Institute
OIMM	Open Innovation Maturity Model
ICMM	Innovation Capability Maturity Model
B2B	Business – to – Business
HQ	Headquarters
IP	Intellectual Property
KPI	Key Performance Indicator
NBD	New Business Development
R&D	Research and Development

4. Introduction

Increased competition and disruptive changes in the market have led companies to emphasize the importance of successful innovation management in order to stay ahead of competitors (Knoke, 2013). The relevance of innovation is also supported by advances in Information technologies (IT) that allow companies to access a vast, incredible amount of information at very low cost and therefore, use it for the creation of a competitive advantage (Pisano & Verganti, 2008). Thus, the development of innovation is becoming more complex since companies face difficulties in fostering innovative initiatives and to keep up the pace of the fast changes in the market just with internal capabilities and resources (Giannopoulou et al., 2010; Tobiassen & Pettersen, 2017). This has led to an increasing need of companies to rely more on different external knowledge acquisition through collaborations to improve their innovation processes and stay competitive (Spithoven, Vanhaverbeke, & Roijakkers, 2013).

The intensified use of different external sources of information is an indicator that companies are more certain of the benefits of engaging in Open innovation (OI) activities for better innovation outcomes (Katila & Ahuja, 2002; Lausser & Salter, 2006; Spithoven et al., 2013). In general, companies adopt OI activities to explore and detect the latest trends to follow (OECD, 2010) and it is through diverse open forms of collaborations with external partners that have proven to give effective results (Santoro, 2016; Ahn et al., 2016; Santoro, Vrontis, Thrassou, & Dezi, 2017). Thus, the adoption of collaborative OI practices (Theyel, 2013; Lamberti, Caputo, Michelino, & Cammarano, 2017) and the dynamics of this activity have been subject of extensive research where different analysis and metrics have emerged in order to assess its impact on innovation (Lamberti et al., 2017).

Nowadays, large enterprises are intensively engaging specifically in collaborations with Small Medium Enterprises (SMEs) despite its difference in size, skills, and interests (Lassen & Laugen, 2017). The unique combination of the entrepreneurial nature of a SME and the structure and resources of a large company represents an opportunity to build

faster and diverse approaches that aim at coping with changes in the market environment (Dogson, 2014; Brink, 2017). Such differences and the clear unbalance of the contributions in money, expertise, and interests in collaborations between both companies is known as an asymmetric collaboration (Connell, 2011). Asymmetric collaborations become even more difficult to achieve when it is for innovation purposes (Kirner & Som, 2016). However, it is fundamental that companies are aware of the advantages and disadvantages of engaging in asymmetric collaborations for innovation. On the one hand, companies are left behind if they are not willing to establish collaborations even if at first, they represent a challenge for the company. On the other hand, companies that aim at collaborating with asymmetric partners, face challenges due to the differences and the complexity that it carries. Nevertheless, to achieve successful collaborations between large multinational companies and SMEs for innovation, it requires the constant measurement of its performance to control and optimize the results (Chiesa et al., 2010, 1996; Kerssens-van Drongelen, 2001; Enkel, Bell, & Hogenkamp, 2011).

Continuous assessment of the performance of OI activities allows companies to recognize the status of an activity and therefore, plan and control for further improvements (Chenhall & Langfeld-Smith, 2007; Hauser, 1998; Enkel et al., 2011). One way to assess the status of an OI process is through the measurement of the maturity of the elements, such as the capabilities and tools that integrate it and that are necessary for its success. However, the measurement of the maturity of the elements that belong specifically to asymmetric collaborations between large multinational companies and SMEs has not been developed yet. Therefore, the aim of this research is to develop a maturity model that is applied to asymmetric OI collaborations (AOICMM) between large multinational companies and SMEs through the adjustment of the current Open Innovation Maturity model by Enkel, Bell, & Hogenkamp (2011), which is the model that is closer to the topic and therefore, represents a reference for the development of the AOICMM. This model aims to assess the maturity of the elements involved in OI collaborations between large enterprises and SMEs and thus, the successful implementation of such collaboration. The research is based on a main case study, where an analysis of the studied company (large enterprise) is done and its current maturity evaluation of the OI collaborations with SMEs. This will allow us to have a clear picture of the current status of their collaborations

specifically with small companies. The analysis of the studied company is complemented by the small companies' perspective, which corresponds to companies that have collaborated or currently collaborate with Beta company. At last, recommendations for further improvements will be given.

5. Research Aim

The research project's aim is to assess, using a main case study, the maturity of the collaborations with SMEs through an adaptation of the Open Innovation maturity model by Enkel, Bell, & Hogenkamp, 2011, under the concept of asymmetric OI collaborations. For confidential reasons, the company which the case study is based on, as well as the interviewees, are kept in confidentiality. The name "Beta" will be used when referring to the studied company (de Paulo, De Oliveira, & Porto, 2017)

This paper first examines the existing literature of Collaborations in Open Innovation, Asymmetric Open Innovation collaborations, the SMEs' perspective in collaboration with large companies and the OI maturity model to have consensus in the concepts. The first chapter is supported by an analysis of the current collaborations that Beta company has with SMEs and the dynamics of these collaborations. The purpose of this section is to complement the analysis with the theoretical background as a base for the formulation of the proposed maturity model for Asymmetric OI collaborations, to answer the first research question:

Research Question 1. What are the elements and metrics to determine the level of maturity of asymmetric collaborations between large enterprises and SMEs for open innovation?

The second part of the research is composed of the methodology chapter, where the development of the proposed model with elements and metrics is presented in detail. The explorative case study is based on the collection of qualitative data and enhanced by a set of interviews in different units within our studied company. Not only was the purpose to explore the dynamics in this type of collaborations but also to test the adjustment of the maturity model. In addition, this section is complemented with 3 interviews of small companies that have collaborated or currently collaborate with the studied company. The aim of this chapter is to answer our second research question:

Research Question 2. What is the current maturity level of the collaborations for open innovation between "Beta" company and SMEs?

At last, the research paper concludes with an analysis of the findings and its limitations. In addition, the recommendations will be added for further improvements with the intention to answer our third research question:

Research Question 3. How can the level of maturity be improved for successful OI collaborations between large enterprises ("Beta" company") and SMEs?

5. Literature review

5.1 Collaborations in Open Innovation

Open Innovation (OI) has gained momentum in recent years with extensive research from different perspectives, where diverse approaches and metrics have emerged, mainly in collaborations with external partners (Huizingh, 2001; Lamberti, Caputo, Michelino, & Cammarano, 2017). The concept of Open Innovation has recently been defined by West et al; (2014), as the "distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model" (Chesbrough & Borges, 2014). The definition highlights the relevance of the mechanisms used to reach the successful implementation of the OI strategies in the firm. At the same time, literature indicates that in order to develop a competitive advantage in today's market, it is crucial for companies to look beyond the boundaries of the firm when generating innovation, which should be fostered in an OI system in collaboration with diverse external partners that constitute the environment (Chesbrough, 2003; Lassen & Laugen, 2017). Therefore, collaborations are crucial for the implementation of OI within a company (Hiroyasu & Liu, 2015). This is supported by the increased importance that companies are placing in having access to external knowledge (Dingler & Enkel, 2016). The openness of a company in the interaction with external partners in the use of external information and ideas is crucial for creating new capabilities inside the company (Von Hippel, 1988; Chesbrough, 2003; Lassen & Laugen, 2017). Furthermore, most of the new innovation occurs when companies are willing to cross their own knowledge domains (Leonard-Barton, 1995; Carlile, 2004; Antikainen, Mäkipää, & Ahonen, 2010). One of the main reasons why companies establish collaborations with external partners is the role of speed and how can it allows companies to react faster to changes in the market (Lassen & Laugen, 2017). On the other hand, the focus on inbound Open Innovation, where collaboration takes part in, is due to the high interest in cost reduction (West, Salter, Vanhaverbeke, & Chesbrough, 2014).

As it has been mentioned before, innovative collaboration carries diverse benefits to companies that aim at remaining innovative and up to the market´s pace. This type of collaboration is defined as "the shared commitment of resources to the mutually agreed aims of a number of partners" (Dogson, 2014; Brink, 2017). It can be translated into a collaboration between external partners, supply chain or lead customers as the relevance of collaborations for innovation resides in the fact that this activity is based in complementarities (Brink, 2017). Therefore, one of the main factors to achieve a successful collaboration is the search of the synergies among the parties involved. On the other hand, Lazzarotti & Manzini (2009), compare the relation of the way companies collaborate with the degree of openness that they have. This means that the collaboration and its success are determined by the partner variety and/or the number of phases that the partners are involved in collaboration along the process of innovation.

The implementation of successful Open Innovation is arguably where diverse authors indicate different factors that are fundamental to achieve successful OI collaborations; however, studies also remark the importance of having the right conditions and measurements to reduce complexity and increase effectiveness and therefore, succeed in the collaboration (Lazzarotti & Manzini, 2009). Despite the different crucial factors that determine the right implementation of OI collaborations, reasons why companies are now more convinced of its implementation are diverse. The engagement in collaborative activities with external partners not only accelerates the process of innovation but also increases the share of knowledge by access to new markets and skills. This helps to compensate the lack of skills in-house and reducing risks by sharing parts (Kogut, 1989; Kleinknecht & Reijnen, 1992; Hagedoorn, 1993; Mowery & Teece, 2008; Eisenhardt & Schoonhoven, 1996; Lassen & Laugen, 2017). Contrary, it is also argued the fact that collaborations with external parties can cause the not-invented-here syndrome (Chesbrough & Crowther, 2006; Spithoven et al., 2013) and fear of the risk of spillovers. Nevertheless, despite the complexity of the collaborations with external partners for innovation purposes, there is no question of its fundamental role in companies whose aim to remain competitive in every time more disruptive markets.

As it has been discussed as one key element in OI collaborations, the diversity of collaboration partners that a company has, is being proved to have a positive impact with the success of the innovation output performance. Therefore, another factor used in literature for the indication of successful innovation collaborations refers to the range of different partners that a company establishes innovation collaborations with (Beck & Schenker - Wicki, 2012). This assumption is supported by the increased focus of companies to the creation of networks where companies that apparently have nothing to do with each other and have diverse sizes and interests collaborate to innovate (Lazzarotti & Manzini, 2009). This seems to create the conditions to foster innovation effectively since the differences can provide useful contributions that were not seen before by the companies collaborating. However, this is beneficial to a certain extent, since the prevailing complementation of the collaborating companies is still fundamental (Beck & Schenker - Wicki, 2012). This is sustained with the research done by Gillier, Kazakci, & Piat, (2012), where the relevance of having an "optimal" cognitive distance between collaborating partners is pointed out. The distance between partners should be enough to bring something original but not too distant that it does not allow them to understand each other.

The benefits obtained from a variety of partners for innovation collaborations have forced companies to look for this diversity through external partners such as suppliers, customer, research institutions and competitors (Figure 1). Collaboration activities with these types of external partners can represent new complementarities and approaches that were not possible to generate in-house (Becker & Dietz, 2004; Dachs, Ebersberger & Pyka, 2008; Beck & Schenker - Wicki, 2012). However, despite the benefits that can be obtained by engaging with partners along the horizontal and vertical integrations of a company, there are still barriers that demand organizations to implement mechanisms and conditions that can allow the effective development of such collaborations (Teece, 1992; Wallin & von Krogh, 2010; Beck & Schenker - Wicki, 2012). In addition, managers have started to put more attention to the managerial and organizational skills that are required for the achievement of successful collaboration for innovation among asymmetric partners (West et al., 2014).

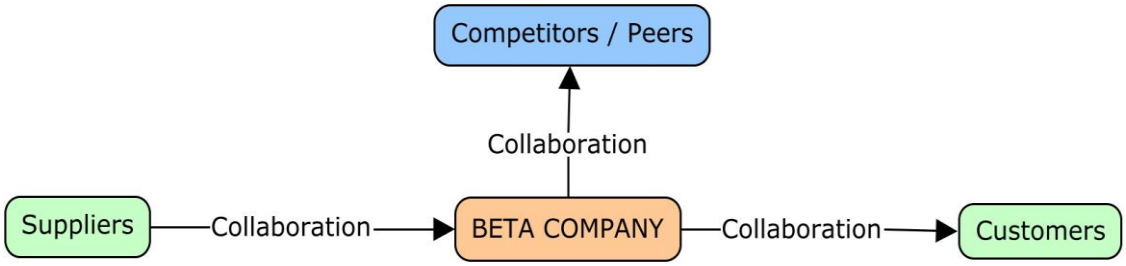


Figure 1. Dimensions of the diversity of collaborations for innovation

The different partners that a company engages with leads to different ways to collaborate and by hence, different approaches and strategies (Pisano & Verganti, 2008). According to Beck & Schenker - Wicki (2012), in collaborations, the relationships not necessarily mean the same size of companies but also it includes potential small companies. Therefore, the asymmetry in collaborations not only reside in the breath of external partners such as suppliers, customers, and competitors but also in the difference of the size of the firms collaborating. The size of a firm has an impact on the output of collaborations for innovation. Since the mid-1990s large multinational companies have started to establish collaborations with SMEs (Hagedoorn, Link & Vonartas, 2000; Rosenfeld, 1996; Beck & Schenker - Wicki, 2012) and this type of collaboration has increased in the last years due to the beneficial access that both companies can have and the complementarities found. However, the dynamics of this type of OI collaborations have not been extensively researched. Due to the relevance of collaboration for OI purposes and the existing gap in the literature, this research will be focusing on the measurement of the status of interactions in collaborations for innovation of Beta company with SMEs in the different roles that belong to breath of external partners mentioned.

5.2 Asymmetric OI collaborations between large enterprises and SMEs

The consequences of globalization have caused in the industry an increased competition among companies and more dynamic markets emerged in form of shorter product lifecycles. This requires companies, including large enterprises, to find new and more

diverse ways to be innovative through collaborations with asymmetric partners (Nijssen, Van Reekum & Hulshoff, 2011; Beck & Schenker - Wicki, 2012). Furthermore, diverse studies point out the crucial role of a large enterprise to emerge themselves into collaborations with partners that differ from them in order to increase the chances of success in novel innovations and keep the demanded market speed (Nieto & Santamaria, 2007; Beck & Schenker - Wicki, 2012).

When referring to asymmetric collaborations, we imply the imbalance exchange between companies or we can also state the lack of balance in the complementarities of the collaborating companies (Michalski, Montes, & Guevara Piedra, 2017). The concept of Asymmetric collaboration is also defined by Minshall, Mortara, Valli, & Probert (2010), *as those in which the partners differ significantly in size, resources or commercial experience.* Therefore, the focus of this research is placed on the asymmetries between large enterprises and small companies.

Collaborations between large enterprises and SMEs have gained relevance for innovation purposes. This type of collaboration is considered important for the survival of companies in demanding markets (Antikainen et al., 2010; Robinson & Stubberud, 2011; Teece, 2007; Tobiassen & Pettersen, 2017). The attractiveness of this type of collaborations is based on the combination of the technological expertise of the small company and the experience and market power that the large company has. This can result in better and faster innovation outcomes (BWA, 2016). At the same time, large companies face problems to understand how collaborations work with SMEs due to their differences (Hogenhuis, Van Den Hende, & Hultink, 2016). These hurdles appear when the partners are not so familiar with each other, which leads to increased complexity and thus, increased risk of failure. (Nooteboom et al., 2007; Wuyts et al., 2005; Gillier, Kazakci, & Piat, 2012).

While establishing collaborations with external partners for innovation, mostly during asymmetric collaborations, there are always mistakes done with the identification of the limitations of each company, the best structure for the collaboration and the goals to be

achieved (Pisano & Verganti, 2008). Furthermore, the identification of the right partner and the right structure to follow for OI collaborations is fundamental (Guner & Homburg, 2000; Vanter et al., 2014; Tobiassen & Pettersen, 2017). For the successful implementation of OI collaborations between large and small companies, it is necessary to establish the combination of diverse factors that are required to be taken into consideration by companies, in this case, large enterprises, that are willing to engage in this kind of collaboration. However, it is also crucial to be aware of the hurdles and barriers that hinder its right implementation.

According to work done by Lassen & Laugen (2017), companies that intend to innovate, tend to focus often on the internal functions of the company and less on the engagement with external partners. This exemplifies the complexity in establishing collaborations due to the behavior of companies towards this activity. Another crucial factor for the success of the collaboration and that represents a challenge for companies is the complementation of the parties involved. The complexity is even higher when the collaboration is between very different partners such as large companies and small companies. This in part due to the fact that when the two entities collaborate, the intensity and speed differ significantly (Parida et al., 2012; Tobiassen & Pettersen, 2017). In addition, there is also the involvement of the different conflicts of interests ((BWA), 2016). This is caused due to the different goals and interests of each of the collaborating companies. These differences are considered factors that lead collaborations to have low possibilities of success and to face barriers instead of generating profits from it, mostly when the differences are too large (Khanna et al., 1998; Ring et al., 2005; Kirner & Som, 2016). Nevertheless, Michalski et al., (2017) point out that despite strong asymmetries between partners, collaboration can be possible. SMEs are still an attractive partner for large companies in OI collaborations, since they are seen as an important source of innovation, mostly for large companies looking to improve their innovation capabilities (Chesbrough, 2006; Minshall et al., 2010) and become agiler to enter new markets (Marion & Friar, 2012; Hogenhuis et al., 2016). This is reached in part due to the flexibility and less bureaucracy allow SMEs to respond faster to the changes in the market (Berends et al., 2014; Lasagni, 2012; Nieto & Santamaria, 2010; Tobiassen & Pettersen, 2017), becoming a big advantage for larger companies when establishing collaborations with small companies.

Furthermore, small companies are good in solving problems faster than bigger companies, mainly in the earlier stages of innovation processes (Minshall et al., 2010), which represents a critical point for successful innovation outcomes in collaborations with large companies.

There is no doubt that the establishment of collaborations with SMEs represents advantages as well as diverse challenges for large companies when pursuing Open Innovation (Lasagni, 2012; Spithoven et al., 2013; Xiaobao et al., 2013; Tobiassen & Pettersen, 2017). However, one important element that it is not always considered for successful collaborations between large multinational companies and SMEs are high managerial and organizational capabilities from both companies with the aim to balance and harmonized the prevailing difference in size (Kirner & Som, 2016)

It is fundamental for large companies to begin to understand how collaborations with SMEs within Open Innovation can succeed despite the asymmetries already mentioned. This has become a major interest in diverse companies looking to improve their collaboration with smaller companies. To succeed in these collaborations, both parties have to be able to complement each other and benefit from it (Kirner & Som, 2016).

5.3 Start-up side/perspective in collaboration with Large enterprises

As it has been discussed previously in this paper, one of the biggest hurdles that large multinational companies face while collaborating with SMEs is the lack of understanding of the differences and of the perspective that the small company has (Hogenhuis et al., 2016). For this reason, despite the focus of the current research on the large multinational company perspective, it is necessary also to get an insight of how asymmetric OI collaborations are perceived by SMEs according to the existing literature. This will give us a broader overview of what the current position of SMEs towards such collaborations is. At the same time, this will allow our case study to advance by including this side of the collaboration and all barriers / challenges detected by SMEs for further recommendations.

SMEs face often hurdles to be considered as an option for innovation collaborations to large enterprises due to the lack of internal resources and experience in the market (Berend et al., 2014; Nieto & Santamaria, 2010; Tobiassen & Pettersen, 2017) The scarcity of resources preclude small companies to reach large-scale levels, often needed by large companies. Nevertheless, they count with far more benefits which overcome these hurdles and make them a promising external collaboration partner for large companies for innovation purposes.

The specific expertise that SMEs possess convert them into ideal partners for the first stages of the process of collaborations for innovation. Though, they often become suppliers when large companies see that they are just good at the initial part of innovation collaborations (Hogenhuis et al., 2016). This occurs when SMEs cannot contribute to the entire innovation process with large companies (Michalski et al., 2017). In worse cases, it leads to the acquisition of the small company not leaving space for further collaborations (BWA, 2016). One of the biggest assets that SMEs bring to the table while collaborating with Large companies is the pace of development and control over their collaborations. This is caused by less organizational barriers and the size of the company (Beck & Schenker - Wicki, 2012). This is also reflected in the flexibility and openness for exploration, which is ideal for large enterprises due to the expertise and specialization of the small company (Hogenhuis et al., 2016).

SMEs tend to look for collaborations with large enterprises due to their attractive power in the market and financial resources which is important for successful outcomes (Gruner & Hamburg, 2010; Tobiassen & Pettersen, 2017). Yet, one of the most persistent barriers detected by SMEs in collaborations with large enterprises is the difficulty of the initial contact. The concern is increased when they perceive that the large company gives no importance to the collaboration. Sometimes this can represent a life or death situation for small companies, when for large companies, it may be just one opportunity more, which may not affect them in case of failure (Minshall et al., 2010). However, it is fundamental that SMEs count with the networks and capabilities to be able to search and identify all

potential partners for OI collaborations (Lee et al., 2010; Vahter et al., 2014; Tobiassen & Pettersen, 2017). On the other hand, SMEs are aware that relying too heavily on larger companies may affect their internal development and lead to a strong dependency on external partners (Vanhaverbeke et al., 2002; Spithoven et al., 2013). This represents a critical point for SMEs when deciding to implement collaborations with larger companies. It is also crucial for them to know to which degree it is beneficial for the company to depend on such collaborations.

Another point that emerges in these type of collaborations is when any of the parties is not willing to reveal any kind of internal information. SMEs are proved to act protective of their know-how during the exploration phase when they fear not to be selected for the collaboration and important internal information is already revealed and could be used for the advantage of the large company (Lazzarotti & Manzini, 2009). As a consequence, SMEs tend to rely more on other organisms for OI collaborations such as research institutes and Universities due to the different interests and the type of risks involved (Lee et al., 2010; Tobiassen & Pettersen, 2017). Even though collaborations between asymmetric partners, as it is the case of SMEs and Large companies, carry diverse challenges and barriers from both perspectives, the benefits of establishing more OI collaborations between these two parties are clear. It requires high coordination and negotiations skills (Kirner & Som, 2016) as well as clear points and delegations along the process. Nevertheless, the continuous improvement of such dynamics is necessary. For this reason, a good measurement and control of the elements involved are fundamental for a successful implementation of Asymmetric OI collaborations.

5.4 The Open Innovation Capability Maturity Model

Diverse studies in OI remark the importance of the control of improvements and the assessment of the performance of OI activities. The measurement of such improvements and performance can be done through the application of the OI maturity model. The OI maturity framework aims to be one mechanism for the measurement of the effectiveness of OI (Enkel et al., 2011). Furthermore, this model is the one that is closer to the topic of

Asymmetric OI collaborations since it takes into consideration the diverse elements that involve OI within a company. Therefore, this framework will be used as a reference for the measurement of the successful implementation of OI collaboration between large enterprises and SMEs.

The OI Maturity framework has its origins in *The Capability Maturity Model* or also named by (Alonso, Martínez de Soria, Orue-Echevarria, & Vergara, 2010), as the *"process improvement approach*." This model was developed in 1986 by the Software Engineering Institute (SEI) (Alonso et al., 2010) with the aim to manifest the status of the company in certain capabilities from a specific area as well as a support to establish the necessary steps for the improvement of those capabilities. It also reveals the barriers that hinder its success (Fraser, Farrukh & Gregory, 2003; Boughzala & De Vreede, 2012) and helps to establish a plan of action (Hain, 2010). Furthermore, maturity models allow companies to speed up their decision making, have a systemic transformation and be able to have an analysis of the successful implementation of collaborations (Metter & Roher, 2009; Hain, 2010).

In the OI maturity model, maturity is assumed to indicate the degree of performance of a capability. As it is mentioned by Enkel et al., (2011), *maturity is used as a measure of the effectiveness of processes.* Maturity is also defined by Paulk et al. (1993) *as the extent to which a process is explicitly defined, managed, measured and continuously improved* (Boughzala & De Vreede, 2012). This model is specifically based on the Innovation Capability Maturity Model (ICMM), which aims to assess the innovation capability of a company. However, the ICMM was used just as a reference since it is mainly focused on the internal innovation development of a company. The structure of both maturity models is integrated by 5 levels of maturity, in which, each one of them represents a level of the performance of certain capabilities. The five levels used in the ICMM developed by Essmann & Du Preez, (2010) and that was also used as a reference in the OI maturity model, are the following:

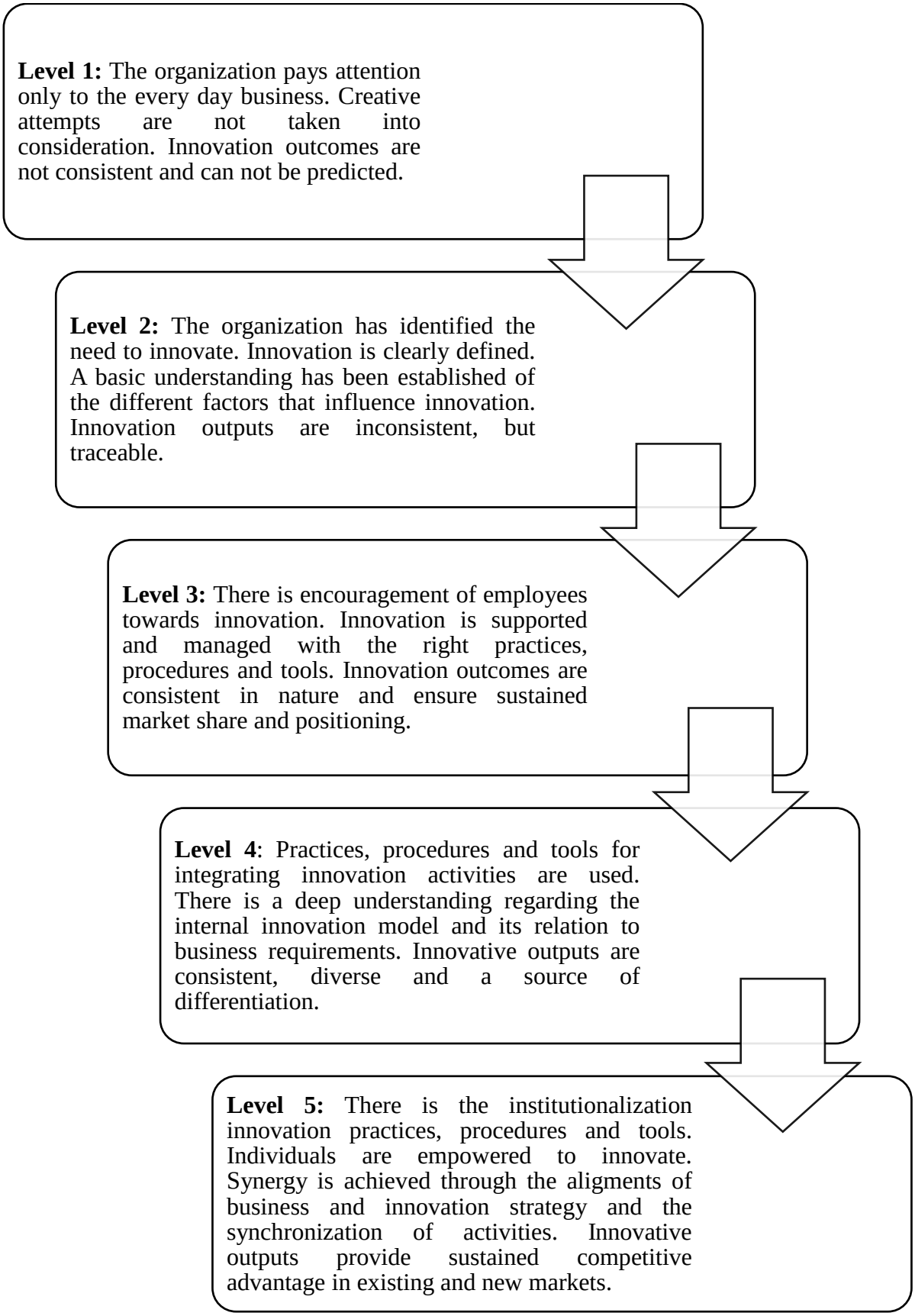


Figure 2: Maturity levels of the ICMM by Essmann & Du Preez, (2010)

Every level of maturity shows the state or performance of processes and capabilities in a specific area within a company at every level of maturity. (Hynds, et al., 2014). However, the elements that are part of the area of interest are necessary in order to be able to describe the different levels of maturity (Enkel, Bell, & Hogenkamp, 2011). In the OI maturity model, the multi-dimensional framework is integrated by 3 different areas or dimensions which characterizes the OI activities and are fundamental for the achievement of successful OI implementation in a company. Furthermore, the dimensions in the OI Maturity Model have a logical order starting with the sub-elements that should exist at first to foster OI within a company, which corresponds to the climate for innovation and the importance of leadership, among others, in the company. This dimension is followed by the second dimension which deals with all aspects related to the capacity of the company to foster partnerships. Finally, the last dimension is integrated by the elements that characterize the internal processes necessary to have in order to reach excellence in Open Innovation, where IP protection is included. (Enkel, Bell, & Hogenkamp, 2011).

The characterization of every level of maturity describes the different activities that a company is expected to perform at the different maturity levels. The expected behaviors also allow us to compare and have it clear the different improvements along the maturity levels until reaching the optimization of them (Paulk et al., 1993). In the OI Maturity model, a table that displays the expected behaviors at the diverse levels of maturity according to each element of the model was developed.

Maturity Level	***Expected behavior of all elements in OI***
Level 1: Initial	Employees take almost no initiative. The opportunities to innovate are found mostly by accident. Collaborations are done through emotional links. High IP protection. Outcomes are not identifiable. The commitment of the employees is based merely on friendships. No mechanisms for knowledge sharing.
Level 2: Repeatable	Initiatives are taken individually. Management limits its support to just verbal. Success events are just informally shared. Assessments are also done informally. Partnerships are just a few and repeated. Standardization is not formal. No clear direction of the company towards selection of partners and also development of skills. Knowledge is shared occasionally. Commitment is based on reputation. IP and legal conditions are strict.
Level 3: Defined	OI strategy is written. Success stories are shared. Assessment is party done based on OI. Success is acknowledgeable. Partnerships are more formal but still with low intensity. Standardization begins to be partial. The partners are more diverse. A network of partners is created and used. Training of employees is done empirically. Reporting is centralized. Knowledge is occasionally shared. Progress is monitored. IP is done more based on trust.
Level 4: Managed	Strategies are established and encouraged. The success events are shared and regulated. Goals are appropriately communicated. Successful employees promote the initiative taking. Partnerships are more focused, intense and last longer. All tools and resources are used for the success of partnerships. Partners are more diverse and the network is expanded. Employees are trained to succeed in partnerships. Communication is done via the intranet. Knowledge is share and facilitated. All progress and success are monitored. IP protection is applied more in the long term.
Level 5: Optimizing	Management level show by doing. All strategies that have been successful are shared and targets are adjusted continuously. The assessment is completely based on OI. Initiatives are taken by the whole organization. Focus is mostly on all external opportunities. Partnerships vary in intensity. Full standardization is reached. The satisfaction of the partners is taken into consideration and monitored. All information that comes from internal and external sources is gathered and used. OI activities are considered in the budget. All knowledge generated can be obtained through the database and also exploited. Monitoring of progress and success is optimal. All IP contracts satisfy both parties.

Table 1. Summary of expected behavior at the different maturity levels of the Open Innovation Maturity Framework (Enkel, Bell, & Hogenkamp, 2011)

6. Methodology

The relevance of the application of the maturity model is that it can be developed in diverse domains. However, the elements and expected behaviors in the OI Maturity model are very general and refer to OI as a whole and do not specifically address the elements and expected behaviors for collaborations with asymmetric partners. Even though some elements of the OIMM are present in the Asymmetric Open Innovation Collaboration Maturity Model (AOICMM), it does not reach yet the specificity of the elements found in asymmetric collaborations. Therefore, it is aimed to use the OI maturity model as a reference for the development of the AOICMM. This will be developed through the adjustment and redefinition of this model with elements that characterized and are fundamental for asymmetric OI collaborations between large companies and SMEs. The process of developments is based on the phases described by (de Bruin, Freeze, Kulkarni, & Rosemann, 2005), where it states the main phases to formulate a generic maturity model. The methodology for the development of the maturity model is used as the foundation for the adaptation to the specific topic of OI collaborations between big companies and small companies and also as an explanation of how the model is built. It is important to remark that as a result, this qualitative tool (Carroll & Helfert, 2015) will be used as an indicator of the maturity that our studied company has in its different units when referring to the dynamics of OI collaborations with small companies in order to reach its successful implementation (Martinez de Soria, et al., 2009).

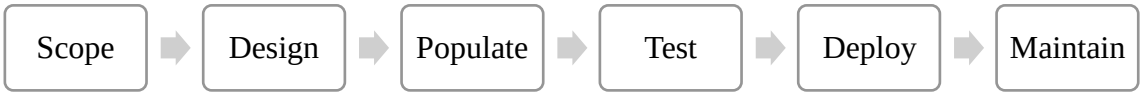


Figure 3: Model Development phases by de Bruin, Freeze, Kulkarni, & Rosemann, (2005)

The purpose of the Asymmetric OI Collaboration Maturity Model is not only the description of the current situation which corresponds to the dynamics of collaborations between our studied company and small companies, but also as a prescription, which places focus on the relation of certain capabilities with the business performance of the company. This allows us to point out the critical points that need to be improved and the first approach for such improvements. At last, the Maturity model can be used for

comparison purposes, where it is possible to do a benchmark among different units within the organization, companies or even industries (de Bruin, Freeze, Kulkarni, & Rosemann, 2005).

Both, the development of the model's adaptation and its assessment, are based on an exploratory study which is conducted based on the combination of secondary and primary data collection. Therefore, the extensive literature review aims to build the theoretical background for the development of the maturity model. It will be composed by scientific articles related to the topic of Asymmetric Open Innovation collaboration and the dynamics in the collaborations between large enterprises and small companies. The sources are mainly extracted from Academic Journals in EBSCO and Science Direct. Furthermore, the collection of primary data is critical for the assessment of the model and of the studied company, which will give us a clear picture of where it stands today in this type of collaborations and the elements to be improved.

6.1. Scope & Design of the AOICMM.

The definition of the scope of the model which corresponds to the specific Open Innovation collaborations between large enterprises and small companies is crucial for the successful adaptation of the Maturity model to Asymmetric OI collaborations. Even though in the research it is mentioned the scope of the type of collaborations to SMEs, it is only considered small companies below 250 employees. This is due to the fact that small companies and startups have a special way to work and also a particular mentality which leads us to find even more asymmetries while collaboration with large multinational companies. This is also supported by the fact that there is an increased interest in collaborations with disruptive, technological driven startups among diverse industries. Furthermore, the literature review has the purpose to set in context the research (Saunders, Lewis, & Thornhill, 2009) and find out the challenges and success factors that are present in this type of collaborations.

The relevance of this step lays in the ability to determine the dimensions and maturity levels, which should be presented in a clear structure without missing the complexity (de Bruin, Freeze, Kulkarni, & Rosemann, 2005) that these collaborations carry. Such determination represents a challenge due to the high importance that it has to cover all conditions, processes, instruments and capabilities belonging to our main focus (Martinez de Soria, et al., 2009).

6.2 Populate: The Open Innovation maturity model under asymmetric collaborations between large enterprises and small companies.

This section aims to answer the first research question which is *to identify the elements and metrics that are crucial for the successful implementation of asymmetric OI collaborations and that will be measured in the maturity model.* In order to have a clear understanding of the elements that are fundamental to the successful implementation of these collaborations, it was necessary to do an analysis of what literature indicates to be the most dominant factors affecting the development of such collaborations and therefore, preventing a company of succeeding in its implementation. Those elements distinguish the areas that are fundamental to obtain effective collaborations with small companies. Every element is described in the different maturity levels which refer to the degree of development reached until its mastery (Habicht, Möslein, & Reichwald, 2012). The benefit of developing a specific maturity model for this type of collaborations is that it allows companies to have a prioritization of actions (Alonso et al., 2010) to follow in the specific cases of OI collaborations with small companies. In addition, there is no research done in the development of a maturity model for specifically these collaborations.

Open Innovation collaborations between large companies and small companies represent one specific activity that is part of the entire range of activities within OI. Therefore, there are preconditions that are necessary to be reached by the company in order to foster successful OI collaborations with SMEs. The selected main dimensions that belong to this domain are presented in Figure 4

Proposed Asymmetric OI collaboration Maturity Model (AOICMM)

Based on the OI Maturity Model developed by Enkel, Bell & Hogenkamp (2011)

- **Dimensions of the AOICMM**

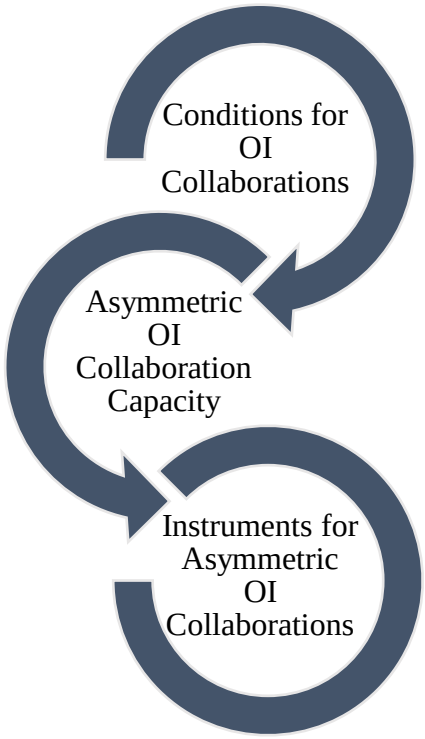


Figure 4: Overview of the 3 general elements considered in the proposed AOICMM

- **Elements and its metrics:**

Conditions OI Collaboration	*Leadership* - Clear Strategy - Awarenesss
	Incentives - Assessment
	Mindset - Initiative taking - Trust - Screening

Asymmetric OI Collaboration Capacity	*Partner Selection* - Network building - Selection Process - Mutual goals and expectations
	Collaboration Management - Knowledge Management - Standardized Process - Delegation of tasks
	Conflict Management - Partner Satisfaction - Time Management - Reputation
	Training - Learning mechanisms
Instruments for Asymmetric OI Collaboration	*Central Coordination* - Communication Dynamics - Communication of the available resources
	Resources - Point of contact - Mechanisms of control - Facilities for OI collaborations
	Legal Protection - IP Protection

Table 2: Metrics per element in the proposed AOICMM

6.2.1 Conditions for OI Collaborations

As mentioned before in this paper, there are studies suggesting the importance of having the right conditions and measurements to overcome obstacles and increase effectiveness in such collaborations (Lazzarotti & Manzini, 2009). This leads to the first dimension in the maturity model corresponding to the conditions that according to literature, allow the development of OI collaborations with SMEs. Such conditions belong to the degree of OI implementation in the company including the role of leadership to foster such collaborations within a company. Leadership is represented by the metrics corresponding to the degree of incorporation of such activities in the strategy of the company, where there is the recognition the need of having a clear orientation of the company towards OI collaborations including with SMEs through the diverse strategies of the company. The second metric that belongs to the element of Leadership is the awareness that the company should have over the benefits of engaging in these collaborations. This is followed by a second element that corresponds to the Incentives that encourage to foster this type of collaborations. Such incentives are measured by the existence and intensity of the assessment of employees based on the performance of such collaborations. Finally, the last element considered crucial for having the right conditions for the implementation of this activity is the mindset that is prevailed among employees within the company. This is measured by the maturity of the initiative taking that employees have in the engagement in OI collaborations, the trust that employees are willing to generate with potential partners and the intensity of screening of potential external partners besides the normal daily tasks.

6.2.2 Asymmetric OI Collaboration Capacity

The second dimension corresponds to the capacity of the company to foster the specific OI collaborations with small companies. This is through the crucial elements that according to literature, should be managed in order to overcome the most common asymmetries among these two entities. For this, the accurate management of the partner selection process that starts with the maturity of the network building is necessary. This is followed by the selection process of the right partner (specifically small companies).

The identification of the right partners based on its complementarities (Brink, 2017), defines the first steps into a successful implementation of the OI collaboration with small companies. Such complementation should be enough to have certain similarities but at the same time should have enough asymmetries that allow the development of something innovative (Gillier, Kazakci, & Piat, 2012). At last, due to the diverse hurdles that are present in such collaborations, the right management of it should also consider a clear agreement of the goals and expectations (Dingler & Enkel, 2016) prior the full engagement in the collaboration in order to avoid delays and disappointments occasioned due to misunderstandings.

The second element in this dimension refers to the collaboration management itself. This is represented by the maturity of the integration and absorption of the knowledge which was generated in the collaboration by the studied company. Then, the presence and maturity of a standardized process for the establishment of these specific collaborations. Another element is the dynamics in the delegation of responsibilities and tasks among partners at the beginning of the collaboration are taken into consideration. The third element emphasizes the accuracy of conflict management during the collaboration. Conflicts between these two entities emerge after the diverse challenges that prevail in these collaborations such as the problems of understanding each other due to its differences in speed and availability of resources (Hogenhuis, Van Den Hende & 2016). The metrics selected to evaluate the maturity of this element are the degree of partner satisfaction, the time management among the partners and the reputation of the big company to the small external companies. This latest metric corresponds to the large company perspective since the main focus of this research is the evaluation of our main case study, which is from the large enterprise side.

The last element in this dimension refers to the training of employees for the implementation of these collaborations. The literature points out the value of the training of employees to compensate and balance these asymmetric collaborations (Kirner & Som, 2016). Therefore, this element is measured by the maturity of learning mechanisms or training management for employees within the large company.

6.2.3 Instruments for Asymmetric OI Collaborations

The third dimension of the AOICMM is represented by the instruments that are necessary for the successful implementation of OI collaborations with small companies. This dimension is integrated at first, by the central coordination, which is measured by the communication dynamics among the partners. This refers to the degree of efficiency in the communication between the partners while collaborating. The second measure included in this element corresponds to the communication of existing resources within the company that facilitate the right implementation of collaborations and also allow its continued improvement (UnternehmerTUM GmbH; Wissensfabrik - Unternehmen für Deutschland e.V., 2014)

The second element refers to the relevant resources that allow collaborations with small companies to be more successful. The point of contact is considered as one important step for more and better collaborations. The lack of this first tangible point of contact for small companies when aiming to collaborate with large companies, is one of the most persistent barriers according to Minshall, et al; (2010). Therefore, its maturity represents a fundamental indicator for further improvements in this type of collaborations. The second measure considered is the mechanism of control implemented by the large company. This means specifically any evaluation system that allows the company to assess its collaborations. The last metric that is integrated into this element is the maturity of facilities shared during these collaborations, which is most frequently found in the form of co-locations.

At last, the element of legal protection indicates the relevance that IP has in collaborations, measuring its degree of maturity in the implementation during the collaboration. This element is considered crucial since one of the biggest fears and also one of the biggest barriers for small companies according to Lazzarotti & Manzini, (2009), is to reveal information without being selected before, due to the strict regulations within the large company and losing important know-how.

6.3 Test and application of the AOICMM

6.3.1. Data Collection

In order to be able to answer our second research question, *what is the current maturity level of the collaborations for open innovation between "Beta" company and SMEs?* it was necessary to apply the primary data collection through a combination of non-standardized and standardized semi-structured interviews. Beta company, which is the company where the adaptation of the maturity model is applied, is a multinational European company with more than 100,000 employees that provides technology, products and services to the B2B sector with a multidivisional structure. A total of main 19 interviews (including 3 pilot testing) were conducted within Beta Company in the different departments ranging from Operational Business Divisions to Research, New Business Development and Venture Capital, mostly at the HQ of the company. All the people interviewed currently manage or have managed collaborations with small companies for innovation purposes and occupy positions of Managers, head researchers or Scouters. The aim was to get in-depth of the current dynamics in this type of collaborations and to be able to test and apply the AOICMM. In addition, non-standardized semi-structured interviews were applied to three startups which have worked or are currently working with our studied Beta company. The information obtained helped to enrich the analysis of the current situation along with the information given by the employees within Beta company.

The classification of the interviews conducted within Beta company is listed below, where the differences from the type of division can be seen. The interviews conducted to the startups already collaborating with Beta company are listed as well with the nature of every company and also if the collaboration was successful or not.

6.3.2 Interviews (Units) within Beta company:

- Operational Business
- New Business Development and Venture Capital
- Procurement (Supply Enabler Innovation)
- Research Divisions
- Smart Innovation and technologies

6.3.3 External Startups:

Interviews conducted with external Startups already working or have worked with Beta company:

- License Partner: Collaboration in process
- Biotech company: Already working with Beta company for almost 4 years.
- Research startup: Collaboration failed.

The nature of the semi-structured interviews is to understand reality as perceived by experts in the field (Saunders, Lewis, & Thornhill, 2009). Therefore, the first part of the interview was integrated by open questions related to the previous experiences of the participants with collaborations with small companies. This part also helped to establish a case study perspective of the different units. The second part of the interview was integrated by a standardized semi-structured interview, which was interviewer-administered in the form of a questionnaire. The application of this second part of the interview had the aim of understanding the different opinions, attitudes, experiences (Saunders, Lewis, & Thornhill, 2009) and dynamics faced in such collaborations through the application of the AOICMM. The AOICMM also was applied with the intention to compare the results with the first part of the interview.

In order to test the Maturity model and also to verify the reliability and validity of the interview, three pilot tests were conducted with people of equal functions to the actual interviewees. Furthermore, the purpose of the test of the model was to validate that is was structured correctly, that it included all elements that represent our research topic and that it measured what it was intended to be measured (de Bruin, Freeze, Kulkarni, & Rosemann, 2005). After the implementation of the pilot testing, some questions were modified and some others added in order to make them clearer and therefore, reach the content validity. It is important to remark that most of the interviews were conducted face-to-face and just a few, which corresponded to the small companies and one within the employees in Beta company, were done by phone due to the location issues. In addition, some interviews were conducted with managers in subsidiaries abroad), a fact that is taken into consideration in the analysis of the results.

The test of the model was represented by a questionnaire that included all the elements and metrics proposed in the AOICMM, where the answers were represented by the five different maturity levels present in every element (See the questionnaire format in the Annex 12.1). It was divided according to the dimensions selected, each one with its corresponding elements. Every metric represented a question, which resulted in a total of 22 questions. The formulation of the questionnaire was based on the OIMM questionnaire developed by (Enkel, Bell, & Hogenkamp, 2011). The questionnaire was not applied in the interviews with the small companies since the aim was not to assess their maturity level but to complete the analysis of the current situation (See format of the interview in the annex #). Furthermore, the interviews were conducted without problems since it was preferably for the managers to answer to the second part of the interview, the application of the model, in the form of an interview rather than completing the questionnaire by themselves. This might occur due to the complexity of the questions and the fact that interviewees find it faster and easier to give explanatory answers face-to-face. Another assumption refers that this method is preferred when it is relevant for their current tasks in the company (North et al., 1983; cited in Healey, 1991; Saunders, Lewis, & Thornhill, 2009). For validity issues, the questions were clarified and discussed every time that it was needed, using diverse perspectives to get the most accurate answers.

The information generated during the interview was audio-recorded and transcribed into a protocol that was created with the aim to categorize the information obtained in the first part of the interview and present it as a case study. The protocol varied between the interviews within Beta company and the interviews with the small companies (See both formats in Annex 12.3 and 12.4). The information classified in the protocol was used as a support for the evaluation of the test, which was applied in the second part of the interview. However, it was found that one of the interviews conducted within Beta company did not fulfill the information needed for the protocol and for the test of the Maturity model, therefore, for this reason, the interview was not used for analysis in this research.

The results are shown in the form of a case study along with the evaluation of the application of the AOICMM, which are presented in the next chapter. The evaluation of each unit can be compared with the expected behaviors according to each maturity level in the three dimensions selected (See Table 3). The evaluation of maturity model in every interview is presented in the Annex #.

6.4 Maintain

To maintain the continuing development of the AOICMM, it is necessary that the understanding of the dynamics of this type of collaborations broadens and deepens. Such an evolution can be specified in a particular industry or area of interest (de Bruin, Freeze, Kulkarni, & Rosemann, 2005)

Expected behaviors in the AOICMM

Maturity Levels	Elements		
	Conditions for OI collaborations	Asymmetric OI collaboration capacity	Instruments for Asymmetric OI Collaboration
1. Initial	OI collaborations with SMEs are not integrated into the strategy of the unit. Success stories are not communicated. Lack of initiative from the employees towards this type of collaborations. Lack of trust between partners. Clear power dominance of the big company. Collaborations with small companies are spotted accidentally. The network of small companies consists of one-off contacts. Selection of the small partner is made based solely on experience. The big company takes most of the power. Inconsistent process in the management of conflicts. The length of the collaboration with a small company is not relevant. The communication between the partners is inefficient and agreements are made with difficulty. Employees ignore the availability of resources for OI collaborations with small companies. Collaboration partners are contacted informally through no specific mean of communication. IP protection is too strict, keeping everything to themselves.		
2. Repeatable	OI collaborations with small companies are verbally supported by the management. Employees share their experiences in collaborations with small companies by word of mouth. OI collaborations with small companies are supported informally when they are proven necessary. Individual initiatives in looking to establish OI collaborations with small companies. Information exchange is slow and with low intensity due to the lack of trust in the small company. The screening of potential small companies´ partners is focused on the own advantage of the big company. The network of small companies is based on repeated contacts with several departments. Identification and selections of SMEs for collaborations are based on affection and previous experiences. The need for mutual goals and expectations between the partners is identified as important but not crucial in collaborations with small companies. The accuracy of the incorporated knowledge is low and not used for improvements. Collaborations with small companies are performed informally. Partners assume responsibilities in an opportunistic way. Conflicts between partners are solved by experience. There is the intention of having mutual timeframe between the big company and the small company. The big company only relies on the predeterminate image that it has in collaborations with small companies. Employees learn to deal with the		

	differences between partners based on their own previous experiences. The efficiency of the communication between partners is based on the degree of affection. Employees are aware of the available resources for better collaborations with small companies through other employees. The point of approach of small companies to the big company is done informally through website information. Informal and individual evaluations are sporadically done. Some partners are able to share their facilities. IP is given under strict conditions and it is minimum.
3. Defined	Collaborations with small companies are integrated into the strategy in order to become agiler. Success stories are shared by the management. Employees are assessed and/ or reward based on the performance of these collaborations. Initiative to demonstrate the establishment of these collaborations by selected employees. Information between partners is revealed with more intensity but it is still a slow process since it is done according to the information revealed by the small company. Screening of potential small companies as partners is done by selected employees. The network of potential small companies is limited just to established small partners. The selection and identification of the right partner are done based solely on the existing information available from the small company. The establishment of mutual goals and expectations between the small company and the big company is done just in a few cases. There are efforts from the big company in the right integration and use of all knowledge generated in collaboration with a small company. There are standardized tools for collaborations in general with clear ownership. In some collaborations with small companies there are prior defined tasks designated between the two partners. Increased priority in the management of conflicts with small companies but still managed partially with established methods and tools. The establishment of a timeframe in collaboration with small companies is advised. Identification of the need to take an image as crucial for improving the trust of SMEs. Employees develop capabilities needed for collaborations with small companies from other employees by word of mouth. There is the identification of the need for a more efficient communication in collaborations with small companies. Available resources for collaborations with small companies are exclusive within departments or units. The point of approach of small companies is more formal through established channels and departments. There is an informal evaluation system created from previous experiences. Limited sharing of adequate facilities to the small company. The IP protection is more open and less bureaucratic. It is more based on the trust in the small company.

4. Managed	OI collaborations with small companies are explained and stimulated by the management. There are seminar and workshops in the company that promotes the benefits and examples of OI. Managers reward employees based on the performance in collaborations with small companies. With the establishment of OI collaborations through scouting activities, specifically for small companies, employees are stimulating this type of collaborations. The exchange of information with the small companies is more intense almost causing no delays in the process of the collaboration. The information is revealed with the aim of reaching the objectives proposed. There is a team composed of scouts and leaders who coordinate the screening of potential collaborations with small companies. There are diverse lists of networks of all potential or already established small companies. The identification and selection of the right partnership with a small company are based on the vision and strategy of the company. Most of the collaborations with small companies have a clear agreement on goals and expectations between the partners. There is a standard guideline in how to implement OI collaborations in general. The delegation of tasks and responsibilities between the partners is standardized. Conflict management with smaller companies is a topic in workshops of OI collaborations. A mutual timeframe is required for OI collaborations with SMEs. Trustworthy image of the big company is considered important for the benefit of the collaboration with a small company and actions are taken. Employees are specifically trained in the development of skills needed for collaborations with small companies. Employees focus on the improvement of the efficiency of the communication among partners. Diverse channels such as seminars communicate the available resources in the company that can be used for better OI collaborations in general. There is a specific and integrated point of approach for small companies. There is an evaluation system for OI collaborations in general. Adequate facilities are shared for more intense and longer collaborations. IP and legal consider long-term perspectives.
5. Optimized	The benefits that OI collaborations with small companies carry the innovation processes are intensively demonstrated by the management. The success stories are continuously shared throughout diverse channels and use for strategic purposes. Management makes continuous evaluations and/or rewards to employees based on the improvements and outcomes from these collaborations. All employees are constantly looking to take the initiative in the establishment of OI collaborations with small companies. Information exchange is adjusted to the pace and strategy of the collaboration with the small company. All employees are continuously looking for opportunities of OI collaborations with small companies. There is a constantly updated network with all potential

	companies and strategically expanded. The identification and selection of the right SME are based on a proactive strategy. All OI collaborations with small companies are based on a prior agreement of mutual goals and expectations. Improvements and new innovations are integrated into a central system for further use and it is constantly updated. For the implementation of these collaborations, there is a continuous improved process with a focus on SMEs ranging from the prior stages to the establishment of the collaborations and it is adaptable to the different objectives. The delegation of responsibilities is performed naturally in all OI collaborations with small companies according to the strategy, timeframe and objectives set. There is a constant update to employees in how to manage and prioritize the conflicts generated between these partners. There is a default establishment of a timeframe in these collaborations, which is constantly monitored. Previous and present efforts and success factors are constantly revealed to the external SMEs to remain as an attractive partner. There is the continuously sharing of new skills and knowledge by employees in specifically challenging OI collaborations such as with small companies. Employees foster communication that is adequate, efficient and satisfactory with small companies. Employees are updated with the available resources in the company that can improve the challenges that emerge in these collaborations. There is a collaborations platform with defined contact persons and areas according to the interest of the SME or vice versa. There is an established system for the evaluation of all OI collaborations including with small companies. This system is constantly updated and shared in the company. Facilities for collaborations (co-locations) are owned by the network of partners for OI collaborations. Adequate and flexible IP protection, win-win contracts.

Table 3. Summary of expected behavior at the different maturity levels of the AOICMM, based on the OIMM (Enkel, Bell, & Hogenkamp, 2011).

7. Findings

7.1 Current dynamics of Beta with collaborations with SMEs.

The results from the interviews conducted within our main case, Beta company, are presented in Table 4. The results of these interviews are structured in diverse clusters, which represent the nature of each division and the role within the company. Each cluster has the diverse interviews done. Each interview represents a different unit. The aim of this structure was to analyze the diverse dynamics of this kind of collaborations can be within the same division including challenges and success factors. This approach was taken in order to highlight the way these collaborations are performed according to every type of position and also for the comparison of the results of the Maturity model test. Furthermore, an analysis of each cluster is presented where the results are discussed more in detail.

Cluster	Department	Prevailed role of SMEs in Collab.	Challenges	Success factors	Average maturity score
Operational units	Global Business Development	Customers, Technology suppliers	Difference in speed, difficulty in sharing information, IP, difference in expectations and ambitions, technology delivery	Mutual understanding, having the right people, depth evaluation of the business case and market assumptions, fair negotiations, market facing capabilities, technical capabilities	**4**
	New Business development & Innovation Management	Developing partners, license strategy technology, process development partners	Different speed in decision taking, internal bureaucracy, non-invented-here syndrome, lack of awareness by higher management, lack of trust in the partner, asymmetric information sharing	Communication efficiency, openness towards new forms of collaborations; for example: co-location	**3.8**
	Scouting & Innovation Management	Manufacturing partner; looking for funds	Lack of representativeness of the department in the whole unit, different speed (timeframes), difference expectations and conflicts of interest, inflexibility of the big company, lack of corporate strategy and vision towards these collaborations, lack of communication efficiency among partners, conservative mindset, lack of time due to daily tasks, fear of change and high competition	Management support, personal engagement, persistence, short wins,	**2.6**
	Startup LLIN	Production	Lack of mutual timelines, speed, attitude: arrogance; cultural barriers: language; mutual understanding	Trust among partners, time spent with the partner, clear agreements	**3.1**
NBD & Venture Capital	Business Build up	Complementary small companies	Fear of potential competition, lack of agreements for IP, poor integration of soft elements within the company, speed & cost performance	Openness, clear agreements in expectations, resources and key deliveries; a process with constant feedback; learnings from feedback loops, encouragement of management, common basis in communication with the small company	**3.9**
	Venture Capital	Value chain	Lack of time of the employees in the business units, lack of understanding of the partner, attitude of arrogance of employees in Beta company, business units do not use this support, partnering with the wrong people	Excitement among employees; bringing the right people together to collaborate; encouragement of the different business units through support and resources in the form of new business and new market development teams; flexibility; clear agreements	
	Venture Capital / New Business America	Customers; technology partners; suppliers	Overworked legal department delay drafting of documents; slow decision taking; difference in timelines with the small company; different expectations within Beta company; partnering with the wrong people; technical immaturity in the small company; difference in culture; non-invented-here syndrome	Interface for collaborations with small companies; right setting of collaboration process; understanding of the partners; two-sided agreements; less restrictions of operation to the small company at the beginning; right incentives; more screen line processes to have faster and easier collaborations	**3.4**
	New Business: Scouting & Innovation	Diversified: suppliers; looking for funds	Lack of maturity of the technology offered by the startup; No support from management towards disruptive technologies; No good communication among partners; different timelines with the small companies; difference in speed; high amounts of money asked up-front by the small companies	Openness and honesty in the collaboration; build of trust; attractiveness of the company; finding common basis with the partner; interesting in solving conflicts of asymmetry; finding of balance between optimism and fear in new technologies; combined benefits from both partners	**3.5**
	Technology License	License partner	Difference in speed between the license partner and this unit; internal strict processes in Beta; slow decision taking; skeptical view towards sharing information with the partner; fear of potential competition; belief that all is possible to do in-house	Build trust; openness of the company; right selection of the partner; chemistry between the partners; understanding of both companies; establishment of clear roles and responsibilities	**2.9**

Cluster	Department	Prevailed role of SMEs in Collab.	Challenges	Success factors	Average maturity score
Procurement	Supply Enabler Innovation	Suppliers	Lack of trust, asymmetric information sharing, non-invented-here syndrome, fear of potential competition, fear of change	Willingness to overcome challenges, capabilities of the partners, inclusion of the small company in the roadmap design, clear & transparent delegation of tasks and responsibilities	**3**
Research Divisions	Research in a new technology	Diversified	Technical hurdles; Approval of disruptive ideas and technologies; no clear agreements in money and timeframes	Right people and business culture; uniqueness of the technology; clear commitment of both sides; support of potential customers for general approval; effective timeframe and impact; right conditions	**3.5**
	Research subsidiary abroad	Customer; support	No support of Beta company to new technologies; short term perspective in new technologies; fear to share information with small companies; fast-paced markets; complicated internal processes; difficulties with spatial distance between partners; arrogant attitude in Beta company	Clear intentions between the partners; Risk taking with small companies; regular team meetings (face-to-face); trust (win-win situation); open and fair discussions in the collaboration; understanding of the innovation culture of the other company; consideration of the small company as the same value; flexibility in research planning	**3.1**
	Research: Technology & Incubation	Technology providers	Lack of time of the employees within the unit; misuse of the power (Beta company); difficulty to find a stop criteria; cost of the technology; wrong assumptions made by the small company; balance between optimism and fear in new technologies; no clear understanding among the partners, specially money; Not fast and easy process to take decisions	Right incentives for the startup; freedom to operate for the small company; clear stop criteria; need of soft skills; building personal network; strong entrepreneurial power within the company	**3**
	Research: Technology Incubator in subsidiary abroad	License partner; looking for investment	Not enough people interacting with the small company; difficult to get internal alignment; internal high competition among employees; lack of tools for more flexible and rapid processes for collaborations; tools for long-term projects (too slow)	Cultural openness to small companies; understanding how to work with small companies; clear communication between partners (sensitiveness)	**3**
Smart Innovation & technologies	Smart Innovation and Technologies	Innovation vendors	Lack of easiness of internal processes (For example: up-front payments); different speed; mindset of just collaborations with big companies; very high expectations within the company	Clear establishment of problems within the company; willingness to work on solutions and its implementation; having the right people, resources and money	**3.3**

Table 4. Summary of the results obtained from the interviews and the application of the AOICMM in each unit.

7.1.1 Cluster 1: Operational units

The units interviewed corresponding to operational business are focused mainly on either product development, scouting of new ideas for innovation and/or innovation management for a specific operational division. One of the units has the particularity of developing new business in the form of internal startups within Beta company. This is implemented when an idea or technology is not possible to be integrated into the core fields of the company.

The interaction with small companies for collaborations represent an important part of their daily business, mostly for complementary purposes. However, this type of collaborations does not represent the most important activity within the unit, even though, its importance is reported to be continuously increasing. Nevertheless, these units consider themselves as one small part of an operational unit, therefore, their activities and its impact do not represent a unit as a whole.

The role of operational units in collaborations with small companies is to be the interface for these collaborations and also to facilitate the market facing in the marketing collaborations. Notwithstanding, there is certain reliance on Venture Capital as support for the initial assessment of the company and their technology. In one of the units, this reliance is stronger since they can only approach these small companies through venture capital.

One of the biggest challenges that these units commonly face is the difference in speed among the partners. The fast pace of the small companies is considered as a strength for one of the units, which recognizes the importance of making the effort to adapt to this pace, mainly in the phase of early testing of prototypes in the market. However, it is also identified by this unit, the degree until this can be useful, which correspond to the first phases of development in a collaboration in order to reach the optimum process and cost

position. Another unit has mentioned the importance of speed in deciding, since long processes for decision taking within Beta company do create a hurdle in the collaboration.

The lack of understanding among the partners is the second most common hurdle that these units face during their collaborations with small companies. This is experienced when each partner has different ambitions and expectations for the collaboration. One of the units mentioned the importance of making efforts to find the alignment between the partners, which is taken as crucial for the selection process of the partner. This is achieved either by constantly reminding why they act in a certain way or why they are slow, but at the same time trying to speed up the internal processes. Nevertheless, even within the same cluster, such challenges and the dynamics during the collaborations present a broad range of difference between them. Such is the case of another unit which demands the adaptation of the small company to their processes and speed due to the high internal inflexibility and conservative thinking. If this is not achieved, the collaboration might break up. In addition, it is perceived that there is no failure culture within Beta company mostly because of high internal competition and fear of change among the employees.

Further challenges directly related to the elements evaluated in the AOICMM are discussed in the next chapter.

7.1.2 Analysis of the Maturity of the Operational Units

The 4 operational units interviewed have obtained in the application of the AOICMM an average of 3.4, which indicates a slight over medium maturity level in the implementation of collaborations with small companies. However, within the units it has been identified a broad range of difference in their maturity whose scores vary from a 2,6 to a 4. Such differences are visible in Figure 5. The diagram indicates the red line the highest scores in every element of the maturity model. The blue line indicates the lowest scores reported by this unit in the different elements. At last, the green line shows the average score in every element by the different units conforming this cluster.

The establishment of mutual goals and expectations is the element which is average obtained the highest maturity within this cluster. This element is related to the common posture of these units which was expressed in the interviews where this step is considered crucial for sustaining better collaborations with small companies. In some cases, the achievement of the common goals and aims is considered as a success in the collaboration. Furthermore, the importance of establishing small victories was also remarked in the interviews. However, as it has been mentioned before, there are great differences in the maturity of these units. This is reflected at first in the element corresponding to the assessment of employees based on the performance of these collaborations. Moreover, the screening of any external opportunity for collaboration with small companies shows a great difference. This is due to the argument given by a unit which indicated that employees are busy enough with the daily tasks and do not have the time to look for these opportunities. Particularly, the selection process also displays this variation even though, in the interviews the right selection process was indicated as one of the success factors for successful collaborations. This included the importance of finding the right people and the careful assessment of the assumption given by the small company. The same occurs with the element referred to the sharing of facilities for these collaborations, where one unit indicated the successful implementation of co-location. This specific activity was used as a way to explain the different dynamics found in Beta company compared with the small company, such as the high internal rotation of employees and slow processes. The lowest element in average corresponds to the learning mechanisms, where most of the units recognized not having any kind of training for their employees for specifically dealing with this type of collaborations.

The efficiency in the communication among the partners was mentioned in the interviews as one element considered fundamental, however, this still represents a challenge for most of these units. Some of the causes given were the lack of tools for increasing this efficiency, the attitude of arrogance that some employees have within Beta company and cultural barriers such as language. Nevertheless, this element has in average a 3, which is not as low as it was expected. Furthermore, it was also mentioned by one unit the lack of corporate strategy and vision for reaching better collaborations with small companies. However, this statement was contradicted by another unit which pointed out the visible

change of management towards these collaborations where there are more attention and support. As a consequence, this creates a positive influence among employees. The variation of experiences in this element is reflected in the result of a clear strategy in the diagram. At last, the same large variation is presented in the element of IP protection due to the fact that some units reported not having any issue with it and others have experienced a high inflexibility where the aim is to own it completely in ever collaboration.

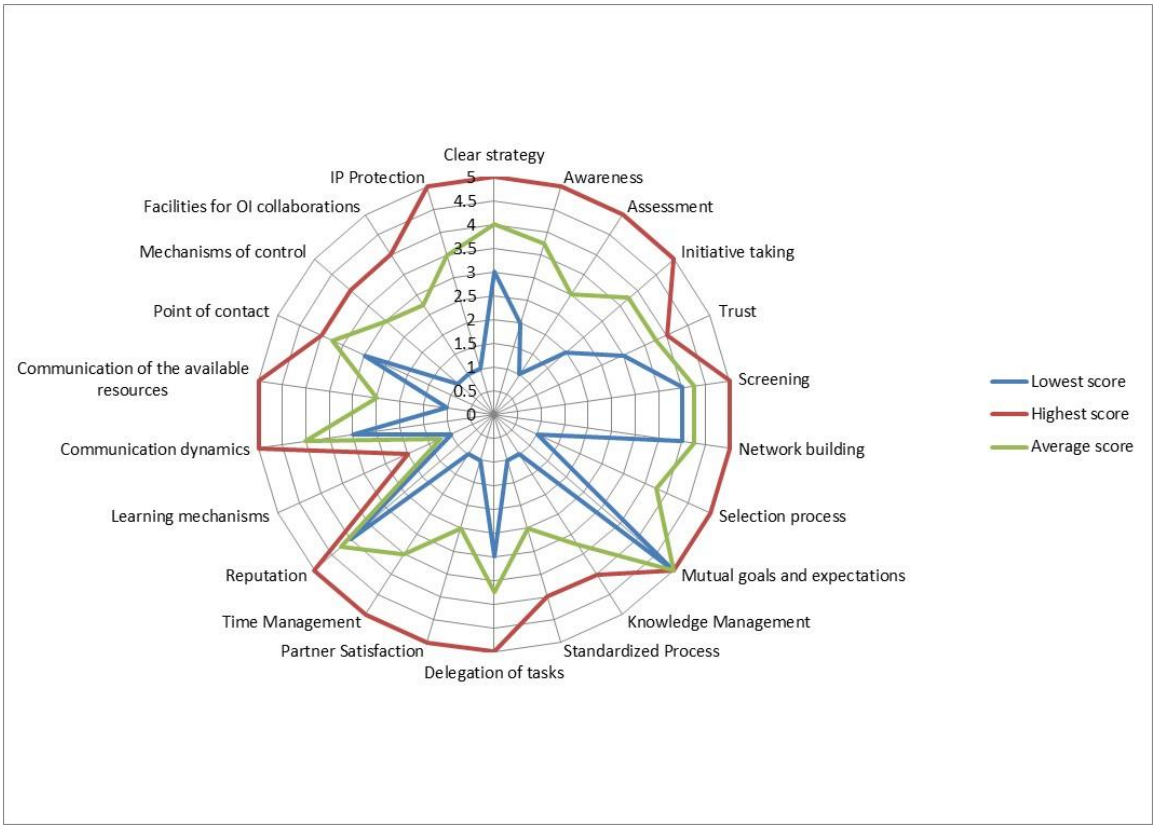


Figure 5: Results of the AOICMM test in the operational cluster within Beta company

7.1.3 Cluster 2: New Business & Venture Capital

The nature of this cluster differs significantly from the activities and focus that operational and research divisions have specifically in collaborations with small companies. Nevertheless, the way this cluster works and the roles that they take in collaborations, help to understand the structure of Beta company. This is a support for further analysis of how the different units and divisions within Beta company work and perform in collaborations with small companies.

There were five interviews performed within this cluster, where every unit was different from each other. However, these units have commonly the aim to build new businesses outside the core activities of Beta company with the exception of one of the units which act as a license partner for a specific technology. This unit has the purpose to look for license partners, preferably startups. The establishment of a license collaboration with a startup in the same region is ongoing. The role of this unit is to do all the research of the technology sold in order to assure its continuous improvement. Nevertheless, the license partner is focused on the transformation of the technology and its commercialization. The need for a license partner emerged from the realization that it is not possible to do all in-house. They identified the best option to work with startups in order to become mast movers in the market.

The rest of the units within this cluster also act as a support of the different units within Beta Company by enabling Open Innovation to them. This is done through making interesting startups and deals available for them. In addition, they help the diverse business units to understand what can be done in collaboration with a small company, the way to structure the process and achieve a win-win situation. In fact, one of their KPIs is to enable a certain amount of either marketing, licensing or joint development collaborations. Furthermore, they look that the identified startups might be potential end customers.

The high importance placed on these collaborations is perceived as furtherly increasing. One of the main reasons is to speed up in order to keep the pace of different markets and find capabilities that are not found in-house. However, it is fundamental for them to think out of the box in order to look for suitable solutions and business models for markets in need. At the same time, they are in charge of the assessment of the value proposition of the small company at the entry point.

An increase in the intercultural interactions in the collaborations is characteristic of this cluster as it is seen in one of the units which is located and focused on a specific market abroad, where they perform these collaborations without requiring the endorsement of the business units. Consequently, there are able to move faster than other venture capital corporates. On the other hand, another unit indicated that most of its collaborations are performed with startups from this region. since they have experienced a more open and easier culture of startups with excellent structures. The nature and impact of this specific element in their interactions with startups are further discussed in this research paper.

Among the diverse hurdles that these units face is the fear of competition that some employees have within Beta company. However, most of them are open and willing to engage in this type of collaborations. Furthermore, some units have abandoned their respective new business development teams due to the lack of time that the employees have for engaging in projects outside their daily tasks. Thus, it is recognized by these units the need to create more interfaces for these collaborations through teams dealing specifically with these collaborations. In addition, the spatial distance between the partners is sometimes one important barrier usually when there is not a good relationship among the people involved in the collaboration. This might affect the communication between them, therefore, they can struggle with the understanding of each other. It was also mentioned the impact that the attitude of arrogance found in some employees within Beta company is not positive, mostly when they expect things to work out perfectly in the first trial. This hurdle is directly linked with the not-invented-here syndrome also identified for some of these units.

Speed is also mentioned among the biggest challenges that these units encounter while engaging in these collaborations. This is mainly due to the slow process of decision making in Beta company, which makes it difficult to find common timetables, even with the license partners.

7.1.4 Analysis of the Maturity of the New Business & Venture Capital units

The average score obtained by this cluster, (3,4) indicates its semi-maturity. However, there is still certain variation in the maturity of the different units that are part of this cluster. The element with the highest maturity on average refers to the communication dynamics between the partners. This is caused due to the high importance that the units place on the development of clear agreements, expectations, resources, key deliveries and so on. This is followed by constant feedback loops. In addition, there is interest to test the assumptions given at the beginning of the collaboration where there is still high uncertainty. The second highest maturity on average refers to the establishment of mutual goals and expectations, as it has been mentioned previously.

In the selection process, the broad variation among these units is clear even though, this step was mentioned as one of the most crucial for engaging in successful collaborations with small companies. Moreover, IP protection was mentioned to be sometimes a challenge, however, as it is visible in the average score, it causes no big trouble as it was experienced in the case in which a collaboration worked successfully without any contractual basis for 10 years. This element is supported by the high score obtained in the element referring to trust among the partners.

There is the awareness of the need for more streamlined processes in order to have faster and easier collaborations. This is reflected in the low score achieved in the element of standardized processes. Among the elements with the lowest maturity is the one referring to learnings mechanisms, where there is no specific training for employees mentioned in these specific collaborations. At last, mechanisms of control display a low maturity level,

even though, in the interviews it was recognized by one of the units the implementation of feedback loops for further improvement.

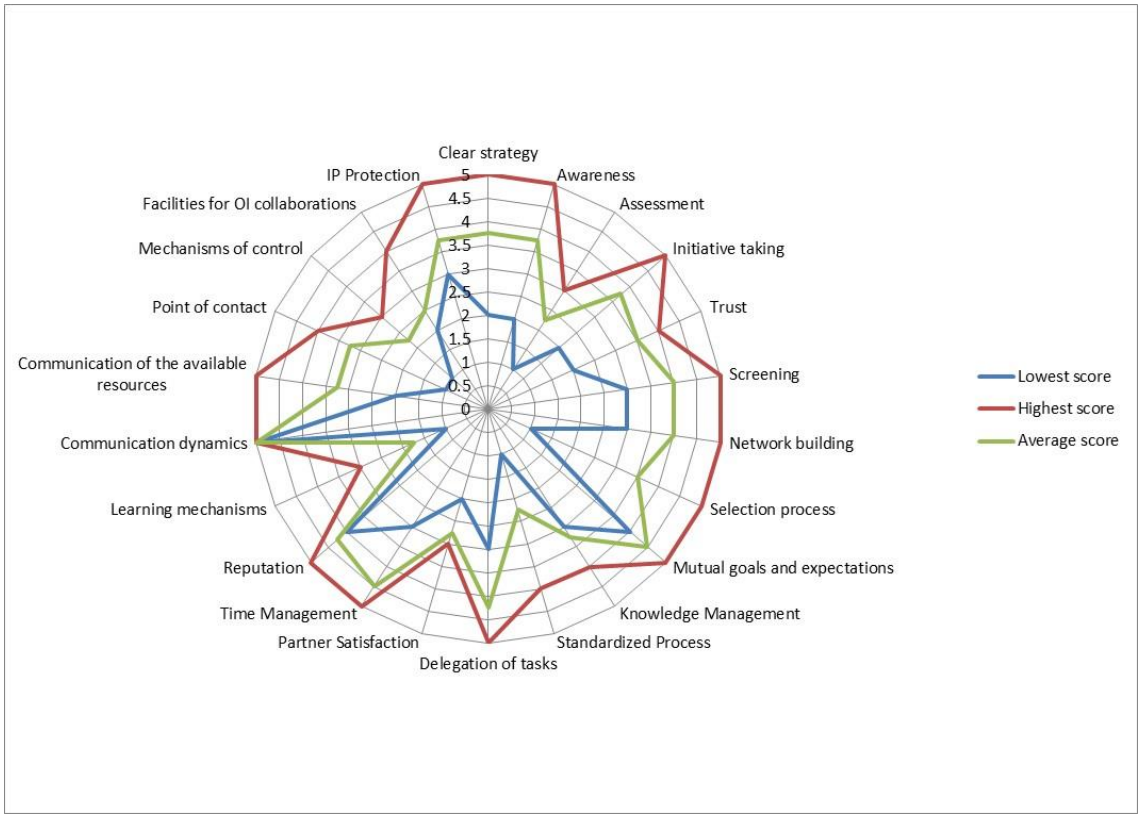


Figure 6: Results of the AOICMM test in the NBD & Venture capital cluster within Beta company

7.1.5. Cluster 3: Procurement

This unit is focused on the identification of the supplier and category manager in order to guide this person through the process of managing a collaboration. The person interviewed has been in charge of this unit for one year. Therefore, it was reported that there are not many collaborations done with small companies so far. Nevertheless, such collaborations have been gaining importance within the unit. The aim of such collaborations is not for a specific development or saving cost, but rather to create an inspiring case that can be used for internal marketing or change management within Beta company.

One of the biggest hurdles that this unit detected for establishing collaborations with small companies successfully is the lack of trust of the employees to the partner. As a consequence, there is little readiness to share information leading to an imbalance in the information revealed. Furthermore, there is a constant fear among the employees of potential competition along with the not-invented-here syndrome.

Another big barrier for this unit is the lack of willingness of the problem owners to implement the solutions found after a whole process or collaboration was put in place. This not only represents a waste of time or money, but the decline of the good reputation of Beta company. Notwithstanding, there is an increased effort to find solutions and overcome such challenges. Therefore, they make efforts to integrate the small company in the roadmap design of the collaboration with the clear establishment of responsibilities on each side.

7.1.6. Analysis of the Maturity of the unit: Procurement

The score obtained by this unit, 3, represents a medium level of maturity in the elements established in the model for collaborations with small companies. There are elements such as the assessment of employees on the performance on these collaborations, the screening of external opportunities, network building, selection process, mechanisms of control and facilities for OI collaborations which report the lowest maturity level. On the

other hand, elements such as IP protection and awareness are categorized as the highest level of maturity. The delegation of tasks and the establishment of mutual goals and expectations also obtained the highest level of maturity. This is supported by the inclusion of the small companies in the process design of the collaboration as it was mentioned in the interview. At last, contradictory with was mentioned in the interview where there is lack of trust perceived among the partners in these specific collaborations, trust also achieved the highest level of maturity.

Figure 7: Results of the AOICMM test in Procurement within Beta company

7.1.7. Cluster 4: R&D Divisions

The research divisions within Beta company are mainly focused on the technical side in the collaborations at the HQ of Beta company and also in one of the global subsidiary located in another country. At the same time, they look for the alignment with the business side of the company for innovation projects. They work on disruptive technologies, which are heavily supported by the management. This represents pressure and motivation for the people involved in such projects. The importance of these units for the company resides in their role as a link between the business units and a potential market. One of the units interviewed acts as a technology scout, looking for new technologies for the company. Its role also requires looking for innovative new business models in the non-core fields of the company. Furthermore, their support is extended until certain degree after the business units take over the project. However, some business units are reported to not give the importance to the role of research and their projects (including collaborations with small companies) that research proposes, since they are currently busy with the daily tasks.

In order to consider a collaboration successfully, most of these units consider the transfer of the technology into a business unit or a market as one of the key criteria. They are in fact measured by this transfer rate, whether it is achieved through collaboration or in-house. However, some of the reasons that they have for engaging in collaborations with small companies are the flexibility and speed that these companies bring to the innovation process. Nevertheless, to collaborate with small companies in an early technology does not mean for these units that afterwards, it will turn out an immediate financial success. This sometimes becomes a challenge for the initial support of an idea or of this type of collaborations. In addition, the high internal competition for career development and recognition within Beta company does not allow employees to rely on collaboration where the success is not immediate.

During collaborations with small companies, the research units interviewed reported to deal diverse challenges related to a complex internal alignment which leads to problems

with speed difference among the partners. In addition, there is a prevailed fear of the employees to share valuable information, mostly because they represent the technical side in the innovation collaborations. Furthermore, the evaluation of the different potential technologies offered by small companies become complex when there are no clear criteria for the selection of such technologies. It is difficult for them to find the balance between over-optimism about a project and fear to collaborate for disruptive technologies. At last, it was reported the need for better tools to be used in collaborations in order to overcome the challenges related to speed, communication and internal alignments.

Among the key success factors needed to better collaborations between these units and small companies, it was repeatedly mentioned the importance of openness of the employees within Beta company to engage in these collaborations and assume the risk that collaborating with small companies have. The relevance of trust and common understanding in the collaboration is high for these units in order to engage in more successful collaborations with small companies. Furthermore, clear stop criteria are fundamental in the development of new technologies, but at the same time, flexibility is needed since it is difficult to plan the entire development process. In addition, clear and efficient communication among partners is highly important for better collaborations. At last, two of the units interviewed are integrated by people of a previous company which was acquired by Beta company. These units still work with the old company´s model, which includes the consideration of the small company as a partner with the same value during collaborations.

7.1.8 Analysis of the Maturity of the Research Units

The Maturity test (Figure 8) applied for this specific cluster is composed by 4 interviews of the different units within the Research division. The average score obtained by this unit in the test is 3,1 which locates this cluster as a semi-mature one. Expected behaviors related to this score are presented in Table 3. The results obtained from the application of the AOICMM indicate the different elements which present the lowest and also the highest maturity degree and the range of difference in maturity among the units in this same cluster. One of the lowest scores in maturity was obtained in the element of partner satisfaction, which refers to the degree in which the units are willing to solve the conflicts

of asymmetry. This is directly related to the strict internal processes of Beta and the lack of understanding among the partners. Furthermore, the assessment of employees shows a low level of maturity, indicating the lack of any type of assessment or reward based on the performance of these collaborations. Time management is also one of the lowest scores in the average of this cluster. This is reported to occur since in the development of disruptive technologies, the planning is only possible to a certain degree. Learning mechanisms, along with evaluations of the collaborations are on average immature in this cluster. Facilities for these collaborations present a low maturity level due to the existing barrier to share information in Beta company. On the other hand, efficiency in communication, delegations of tasks, reputation, mutual goals and expectations, network building, clear strategy and awareness present high peaks in the level of maturity of some units. Nevertheless, it is detected a great difference among the units in maturity in the elements corresponding to network building, the establishment of mutual goals and expectations, communication of available resources and having a point of contact for small companies willing to collaborate with this cluster.

Figure 8: Results of the AOICMM test in the research cluster within Beta company.

7.1.9 Cluster 5: Smart Innovation and Technologies

The last cluster corresponds to the unit dedicated to smart Innovation and technologies. This unit has the particularity to be a senior project which directly reports to the board in Beta company. All projects involved in this unit take a lot of attention, thus, represents pressure and responsibility for the different teams. This unit is divided into different topics or areas of innovation, which makes them unique in the structure of Beta company. The collaborations with startups have the aim of benefiting from their ready-to-use product in order to become better in different areas which do not correspond to the core-fields of the company. At the same time, the interaction with startups helps to find complementary technologies. There is no interest in acquiring the small companies or integrated them into the company. Therefore, they have the role of implementing the scouting process and representation of the Beta company in terms of digitalization. Furthermore, part of their job is to define the process that is used to deal with these small companies according to their requirements. This process for dealing with small companies is part of an ongoing project in this unit.

One of the biggest challenges faced by this unit while engaging in collaborations with startups is the low flexibility to work caused by the standard processes already established within Beta company. Such processes are not made for collaborations with small companies. As a consequence, it is difficult for them to keep up with the speed of the small companies. In addition, there is the prevailed mindset of preferred collaborations with established large companies since the expectation is always towards big solutions.

Among the key elements needed for better collaborations is the openness to talk about problems and the willingness to solve it from the big company side. In addition, it is crucial to bring together the right people, resources and money to increase the chances of success.

7.1.10 Analysis of the Maturity of the unit: Smart Innovation & Technologies

The results from the AOICMM test in this cluster are presented in Figure 9. The maturity score obtained was 3,3, which indicates a medium level of maturity in collaborations with small companies. One of the elements which present a high level of maturity is the clear strategy that this unit has towards OI collaborations. This is supported by the element of standardized processes which aim to deal with collaborations with small companies. Nevertheless, the awareness of good practices for better collaborations with small companies is not well known. Furthermore, the elements of conflict management and point of contact are the ones with the lowest maturity in the unit. As it was mentioned in the interview analysis, trust building among the partners represent still a challenge which is reflected in the score obtained.

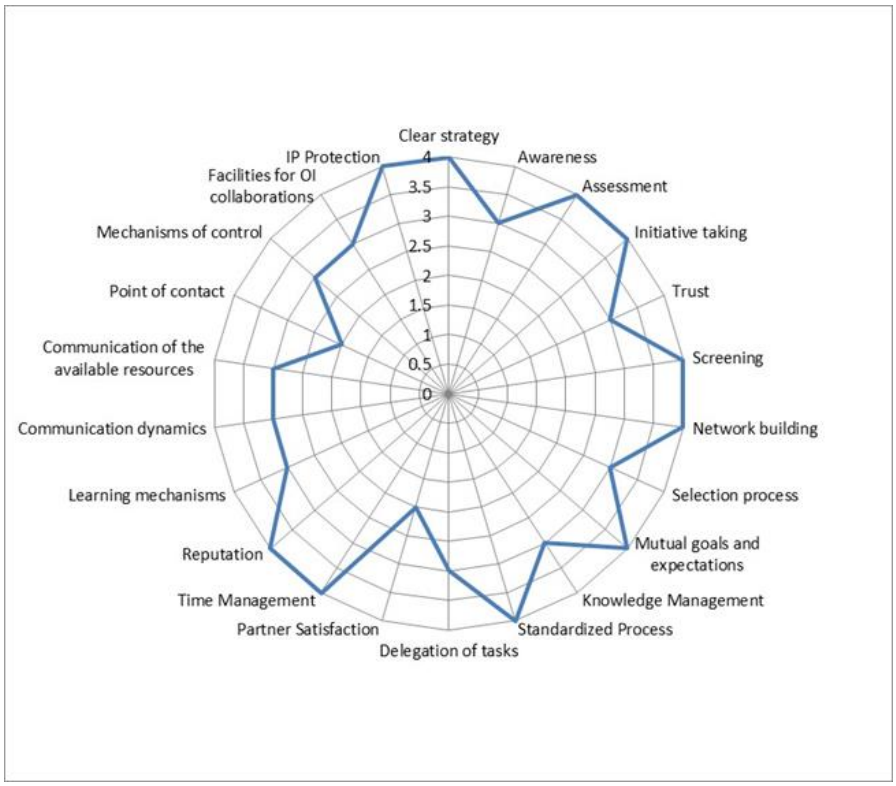


Figure 9: Results of the AOICMM test in the smart innovation and technologies unit within Beta company.

7.2 Analysis of the Small companies' experiences

The startups that were interviewed are either in current collaborations with Beta company, act as an already license partner or their collaboration with Beta failed. The interviews revealed that their dynamics and experiences varied among each other. However, there are factors which are experienced in common by these companies either with Beta company or with other large corporations. Therefore, the aim of this section is to complement the findings within Beta company by adding the experiences of these small companies which have worked or currently work with Beta, which put them on the other side of the collaboration.

The first company is a startup with 4 people which is currently working with Beta company as a license partner. The collaboration with Beta started after the owner of the small company approached the person in charge of the technology within the big company. Even though, the startup considers the collaboration successful, it has not been to the degree which was expected.

The second small company is a Biotech company which has been working in collaboration with Beta company for already 3-4 years. As technology providers, they identified that everyone in general likes them as a company and the role that they have, but the translation of this into a joined business or into the large company is very difficult. Nevertheless, they consider the collaborations with a large company as very important since it is a big help to have a strong partner who represents the technology. The aim of their collaborations is mostly for commercialization purposes. They consider their experience with Beta company so far as average since it has had some positive aspects but also some challenges, which are discussed later in this section.

The third and last company interviewed is a very small company specialized in R&D. Their aim is to look for collaborations in order to have the opportunity to work with a large corporation such as Beta company. However, the collaboration they had with Beta was not successful due to diverse hurdles that were not possible to overcome.

Furthermore, no goals and expectations were established prior to the collaboration. Lastly, the failed collaboration and the experience with Beta company left a negative reputation of the company in this small company.

7.2.1. Challenges & perceived needs

Even though, two of these companies currently are in collaborations with Beta company, they have faced challenges in common not only with Beta company but also with other large corporations. One of the most common challenges faced by these companies is the difficulty in establishing the collaboration in the first place. There is the impression that the employees within Beta company are too busy to take other projects more than the daily tasks. In addition, it is also perceived the constant competition that they have with the internal R&D, which is directly linked with the not-invented-here syndrome. Two of the 3 companies interviewed have experienced an attitude of arrogance from the employees within Beta company, which has made the communication difficult and not felt at the same level of value for both companies.

There is an increased need to have clearer agreements and delegations of tasks since it was not defined prior to any of these collaborations. Furthermore, it was experienced by the companies a lack of understanding between the two partners, mainly in how the decision-making process is done within Beta company. This has been difficult to understand for these companies since there is a high rotation of personnel within Beta, which makes the decision process slow, besides a lack of clear strategy and specific processes for this type of collaborations. The amount of information shared during these collaborations has been crucial for the small companies. In some cases, it has been experienced that the information is unilaterally shared, where the only concern of Beta is the patent. This represented a break-up factor for the collaboration of one of these companies. Therefore, transparency in the communication between the partners is considered as a key element for the establishment of successful collaborations between these two parties.

Lastly, in any of the collaborations of these companies with Beta company a timeline has not been established. This is not perceived as a downside in the cases where there is the introduction of an innovative technology. Nevertheless, all the companies interviewed account the need of speed for the big company side. Quick reactions are crucial for the survival of the small companies.

8. Limitations

Although, this research provides a first good impression in the maturity of the performance on open innovation collaborations with small companies in Beta company, it presents several limitations. The results must be interpreted taking into consideration the following restraints:

- At first, the elements that integrate the AOICMM were selected based on an extensive literature review, however, some elements might have been not considered. In addition, the design of the model was made for this specific case study, therefore, its replicability should consider the adjustment of it according to the aim of its use.

- Second, the selection of the respondents was set by a member of Beta company. Furthermore, diverse units were appointed with the aim to cover as much as possible. Notwithstanding, this does not represent a general impression of the entire company, but of the specific units which were interviewed and assessed.

- The results obtained in the interviews are based on individual input and the own experiences of the participants. Some of the participants have had more collaborations with academia and big companies. Thus, the interpretations of each experience might be biased be the other type of collaborations done, including the experiences in their previous positions within the company or in some cases, in another company.

- The role of the interviewees and the impact of each person represent a small portion of the whole unit. Therefore, the characteristics presented by every person does not portray the behavior of all employees within the same unit. However, the broad range of units and people interviewed reflect a good impression of how Beta company works.

- The results portray the interactions with companies from different parts of the world in the collaborations sustained by the interviewees within Beta company. However, there are universally assumable similarities in small companies around the world

which might result in common asymmetries while collaborating with large corporations. Thus, it is not possible to state whether the success or failure of such collaborations is due to the universally assumable asymmetries between these two companies or due to cultural aspects.

- The transcription of the interviews was done through the application of a protocol which aimed to shorten the time of this and summarize the most important aspects. Therefore, the elements extracted from the interviews were done through a subjective selection, which might be biased by the researcher.

- For the interpretation of the results within Beta company, it should be considered the special constellation that the unit of New Business Development & Venture Capital represents. The role of this unit is very specific and focusses on looking for the establishment of these collaborations, which differs from the rest of the units.

- Results cannot be taken as absolute, since it is not necessary to obtain the highest score in every element of the AOICMM. In addition, for more accurate results, it is necessary to include the benchmark with companies with the same size and/or same industry (Enkel, Bell, & Hogenkamp, 2011).

- At last, the elements and results might be understood different according to the experience of the person and role in the company (Enkel, Bell, & Hogenkamp, 2011).

9. Recommendations

The aim of this research was not only to determine the elements to be included in the AOICMM and the current and diverse dynamics of the company "Beta" in collaborations with small companies, but also to point out future directions for improvement in order to reach the successful implementation of these collaborations. The determination of the most relevant areas to improve was based on the information obtained in the interviews and the results of the AOICMM application in Beta company. Such areas or elements represent the most prevailed barriers or challenges which were mentioned by many of the interviewees in Beta company and also by the small companies. Furthermore, in the interviews performed, diverse suggestions for improvement were obtained. These recommendations were given by the different units, which aim to overcome the most prominent challenges faced. However, it is not possible to set them as the only solutions to be implemented since such critical points do not represent the status of the company as a whole but in the specific areas. Furthermore, in every unit and according to the aim, there might be specific areas to be focused on and solutions for improvement. The following suggestions are summarized and presented according to the area o element to be improved:

- In terms of improving the efficiency in communication among the partners during the collaborations, it was suggested the need of new communication tools that allow partners to submit new innovations easier and at the same time, be able to have access to people involved and documents exchanged. The information flow can be done through data and communications rooms and even, there could be the inclusion of some gamification as a component of this tool as it is found in the app Foursquare (Batch component of people). This suggestion was perceived as one important step which can distinguish Beta company in their collaborations with small companies. The tool could even be part of a platform where also problems in the collaborations are shared or the challenges that the unit faces. Nevertheless, these communication tools should be designed to be suitable for fast collaborations with small external partners.

- One of the most commented hurdles was the lack of right communication of success/failure stories and/or best practices for improving these collaborations. It was mentioned the idea of exchanging success stories through inspirational speakers which share the different options and ways to collaborate with small companies. This can also be done through the assignment of a team to create a case that has resources, time, support and constant feedback from top management in order to market it internally. In addition, from diverse collaborations, a seminar with the most important things to consider while engaging with small companies can be created and also with the most common pitfalls. These suggestions could be added to any communication tool or distributed through any channel inside the company. It was also advised an intelligence system that can be accessed to obtain any relevant information, which can be good practices or processes or recommendations. These can be shared by the initiative of employees.

- The difficulty of internal processes in Beta was constantly stated in the interviews. Therefore, among the recommendations given by the interviewees was the establishment of a process that helps employees to know how to start, how to develop and what not to forget during a collaboration. This can also be performed through a stage-gate process specifically designed for the interactions with small companies, taking in consideration the important hurdles faced. The aim of this is to make the internal processes easier and faster when collaborating with fast-paced small companies.

- In order to tackle the problems related to employees not having more time for implemented this type of collaborations, the constant encouragement of employees to engage in these collaborations was advised. This can be done through the support and resources given in the form of more teams in New Business and New Market Development. Furthermore, management support and/or sponsors is considered as a complement for the reinforcement of the implementation of these collaborations among employees.

- One important hurdle detected in the analysis of the results and also mentioned by the small companies was the difficulty of the first approach of the small company to the different units within Beta company. The establishment of a specific point of contact for the diverse units was reviewed as useful in order to overcome this issue, mostly due to the varied understanding in the units of through which mean small companies should be approached and vice versa. The point of contact can be done through any landing page, platform, tool or department in Beta company or even externally. However, it would be helpful that units in Beta are aware of which options they have available and how the different approaches can be done.

The recommendations can be added to or used as support for the ongoing process which is being developed within Beta company by the unit of *Smart Innovation and Technologies* to work better with small companies.

The directions for improvement of the collaborations with small companies stated in this section have the purpose of overcoming the most shared challenges found in the results obtained within Beta company. However, the recommendations only indicate future improvement opportunities and do not state the solution for the improvement of these collaborations in all cases or units within the company. Therefore, the recommendations must be adjusted to every unit, aim and focus. In addition, it is important that the suggestions are adapted to the culture of the company, which is diverse and very different among the units themselves.

10. Conclusion

This research pointed out the relevance of the implementation of open innovation collaborations with small companies for large enterprises looking to improve and speed-up their innovation processes and thus, be able to enter markets faster. Special emphasis was placed on the measurement of this specific activity in order to reach its successful implementation. Therefore, the tool Open Innovation Maturity Model (OIMM) was used as a reference for the adaptation and development of the Asymmetric Open Innovation Collaboration Maturity Model (AOICMM). The AOICMM had the aim to measure the degree of performance in this specific type of collaborations and therefore, be used for further improvements. The extensive literature review revealed the dimensions and elements which are critical for successful collaborations with small companies for innovation purposes. The AOICMM is integrated by 3 dimensions, where each one has diverse elements and metrics. The first dimension corresponds to the conditions needed by a company in order to foster this type of collaborations. This dimension includes the importance of leadership, incentives and the right mindset to allow at first OI collaborations within the company. The second dimension refers to the capacity of the company to engage in collaborations with specifically small companies like partner selection, collaboration management, conflict management and training of the employees. At last, the third dimension contains the instruments for these specific collaborations such as central coordination, resources and legal protection.

The interviews performed and the application of the model within the studied company, Beta company, demonstrated the complexity that these collaborations take in large corporations. Additionally, it helped us to find out the barriers and key factors to succeed in its implementation. The results revealed a semi-mature company in the performance of open innovation collaborations with small companies. The different scores achieved in the different units which were assessed range from 2,9 to 4, where most of them are situated in the range of 3. Nevertheless, it is not possible to generalize the score as a representation of the entire company since the units constitute just a portion of the company and their focus and roles are different from each other. However, there are challenges faced by most of the units, which correspond to the difference in speed due to strict internal processes, lack of trust of the employees within the large corporation since

there is a difficulty in the sharing of information. The attitude of arrogance and lack of time of the employees to engage in these collaborations are also commonly faced. At last, the efficiency in communication represents a prevailed barrier due to the challenges related to mindset and lack of trust. The barriers mentioned by the units within Beta company are supported by the information obtained in the interviews with the small companies. These small companies are either currently collaborating with the studied company or have collaborated. Both aspects, success and failure, were taken into consideration. This information was a support to the first analysis done.

Furthermore, there is an increased need of diverse factors which were commonly mentioned within Beta company and by the startups which had or have collaborated with the company in order to improve the performance of Beta company in collaborations with small companies. Communication efficiency was among the most common key factors that should be improved. The diverse elements that could help to achieve this are better communication channels or tools, more openness of the company by also bringing the right people in place and a better understanding of the partners. At last, more flexibility in the internal processes of Beta company is recommended in order to help to keep up with the fast pace that small companies demand.

11. References

(BWA), B. für W. und A. e. V. (2016). Innovation – Werttreiber der Wirtschaft, *49*(0), 0–48.

Alonso, J., Martínez de Soria, I., Orue-Echevarria, L., & Vergara, M. (2010). Enterprise Collaboration Maturity Model (ECMM): Preliminary Definition and Future Challenges. *Enterprise Interoperability IV*, 429–438. https://doi.org/10.1007/978-1-84996-257-5_40

Antikainen, M., Mäkipää, M., & Ahonen, M. (2010). Motivating and supporting collaboration in open innovation. *European Journal of Innovation Management*, *13*(1), 100–119. https://doi.org/10.1108/14601061011013258

Beck, M., & Schenker - Wicki, A. (2012). Cooperating with external partners: The importance of diversity for innovation performance. *UZH Business Working Paper Series*, (331), 1–33.

Boughzala, I., & De Vreede, G. J. (2012). A Collaboration Maturity Model: Development and exploratory application. *Proceedings of the Annual Hawaii International Conference on System Sciences*, (January), 306–315. https://doi.org/10.1109/HICSS.2012.47

Brink, T. (2017). SME routes for innovation collaboration with larger enterprises. *Industrial Marketing Managemen*, *64*, 122–134.

Carroll, N., & Helfert, M. (2015). Service capabilities within open innovation Revisiting the applicability of capability maturity models. *Journal of Enterprise Information Management*, *28*(2), 275–303. https://doi.org/http://dx.doi.org/10.1108/JEIM-10-2013-0078

Connell, D. O. (2011). *Harvesting External Innovation: managing external relationships and intellectual property*.

de Bruin, T., Freeze, R., Kulkarni, U., & Rosemann, M. (2005). *Understanding the Main Phases of Developing a.* ACIS 2005.

de Paulo, A. F., De Oliveira, S. V. W. B., & Porto, G. S. (2017). Mapping impacts of open innovation practices in a firm competitiveness. *Journal of Technology*

Management and Innovation, *12*(3), 108–117.

Dingler, A., & Enkel, E. (2016). Socialization and innovation: Insights from collaboration across industry boundaries (Aspects of socialization and innovation). *Technological Forecasting & Social Change*. Retrieved from http://dx.doi.org/10.1016/j.techfore.2016.05.017

Enkel, E., Bell, J., & Hogenkamp, H. (2011). Open Innovation Maturity Framework. *International Journal of Innovation Management*, *15*(6), 1161–1189. https://doi.org/10.1142/S1363919611003696

Essmann, H., & Du Preez, N. (2010). PRACTICAL CASES OF ASSESSING INNOVATION CAPABILITY WITH A THEORETICAL MODEL: THE PROCESS AND FINDINGS. Retrieved from http://www.indutech.co.za/attachments/186_Essmann%20-%20Practical%20cases%20of%20assessing%20innovation%20capability%20with%20a%20theoretical%20model%20-%20The%20process%20and%20findings.pdf

Gillier, T., Kazakci, A., & Piat, G. (2012). The generation of common purpose in innovation partnerships: A design perspective. *European Journal of Innovation Management, 15*(3), 372-392.

Habicht, H., Möslein, K. M., & Reichwald, R. (2012). Open Innovation Maturity. *International Journal of knowledge-based Organization, 2*(1), 92-111.

Hain, S. (2010). Developing a Situational Maturity Model for Collaboration (SiMMCo) – Measuring Organizational Readiness. *5th International Conference on Design Science Research in Information Systems and Technology (DESRIST)*, (July), 1–6. Retrieved from http://desrist2010.iwi.unisg.ch/fileadmin/desrist/downloads/DC_Papers/DESRIST2010DC-Hain.pdf

Hiroyasu, I., & Liu, Y.-Y. (2015). Revealing the Intricate Effect of Collaboration on Innovation. *PLoS ONE, 10*(3). doi: https://doi.org/10.1371/journal.pone.0121973

Hogenhuis, B. N., Van Den Hende, E. A., & Hultink, E. J. (2016). When should large

firms collaborate with young ventures? *Research Technology Management*, *59*(1), 39–47. https://doi.org/10.1080/08956308.2016.1117329

Hynds, E. J., Brandt, V., Burek, S., Jager, W., Knox, P., Parker, J. P., . . . Zietlow, M. (2014). A Maturity Model for Sustainability in New Product Development . *Research - Technology Management* . doi:10.5437/08956308X5701143

Kirner, E., & Som, O. (2016). David against Goliath ? Collaborative innovation in R & D partnerships of low- tech and high-tech firms . Empirical evidence from German industry, (July), 1–11.

Knoke, B. (2013). A short paper on Innovation Capability Maturity Model within Collaborations. In C. W. Proceedings (Ed.), *The 25th International Conference on Advanced Information Systems Engineering , 1006.* Valencia.

Lamberti, E., Caputo, M., Michelino, F., & Cammarano, A. (2017). How to measure collaboration in an open innovation context. *International Journal of Business Innovation and Research*, *14*(3). https://doi.org/10.1504/IJBIR.2017.087090

Lassen, A. H., & Laugen, B. T. (2017). Open innovation: on the influence of internal and external collaboration on degree of newness. *Business Process Management Journal*, *23*(6), 1129–1143. https://doi.org/10.1108/BPMJ-10-2016-0212

Lazzarotti, V., & Manzini, R. (2009). Different Modes of Open Innovation: a Theoretical Framework and an Empirical Study. *International Journal of Innovation Management*, *13*(4), 615–636. https://doi.org/10.1142/S1363919609002443

Michalski, M., Montes, J. L., & Guevara Piedra, W. (2017). Can asymmetry impact performance, collaboration and integration? an empirical study. *The International Journal of Logistics Management*, 00–00. https://doi.org/10.1108/IJLM-03-2016-0084

Minshall, T., Mortara, L., Valli, R., & Probert, D. (2010). Making "Asymmetric" partnerships work. *Research Technology Management*.

OECD. (2010). *SMEs, Entrepreneurship and Innovation*. https://doi.org/10.1787/9789264080355-en

Pisano, G. P., & Verganti, R. (2008). Which Kind of Collaboration Is Right for You ? by Gary P . Pisano and Roberto Verganti. *Harvard Business Review*, (December), 78–86. https://doi.org/Article

Santoro, G., Vrontis, D., Thrassou, A., & Dezi, L. (2017). The Internet of Things: Building a knowledge management system for open innovation and knowledge management capacity. *Technological Forecasting and Social Change*. https://doi.org/10.1016/j.techfore.2017.02.034

Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research Methods for business students.* Pearson Education Limited .

Spithoven, A., Vanhaverbeke, W., & Roijakkers, N. (2013). Open innovation practices in SMEs and large enterprises. *Small Business Economics*, *41*(3), 537–562. https://doi.org/10.1007/s11187-012-9453-9

Tobiassen, A. E., & Pettersen, I. B. (2017). Exploring open innovation collaboration between SMEs and larger customers. *Baltic Journal of Management*, BJM-01-2017-0018. https://doi.org/10.1108/BJM-01-2017-0018

UnternehmerTUM GmbH; Wissensfabrik - Unternehmen für Deutschland e.V. (2014). *Collaborate to Innovate.* Garching : UnternehmerTUM.

West, J., Salter, A., Vanhaverbeke, W., & Chesbrough, H. (2014). Open innovation: The next decade. *Research Policy*, *43*(5), 805–811. https://doi.org/10.1016/j.respol.2014.03.001

12. Annex

12.1 Interview structure within Beta company

Introduction

- Introduction of the research project and its objectives
- Purpose of the interview: Questionnaire with the aim to have an overview of the current interactions and collaborations of the department with SMEs for innovation and to test the maturity model that was adjusted for Asymmetric Open Innovation Collaborations

FIRST PART:

The first part of the Interview aims to have a general overview of the most recent collaborations with SMEs for innovation purposes in the last 3 years.

General Information:

- ❖ Brief explanation of your background and your main tasks
- ❖ What is your role or position when collaborating with SMEs for innovation purposes?

Experience with Collaborations with SMEs for Innovation

- Normally, Which role do small companies have when collaborating Beta Company? (Supplier, competition or customer)?
- Beyond these options, what other kind of roles small companies have that have you experienced?
- What is the general attitude of your team (Unit) towards collaborations with small companies?
- How important are these collaborations considered for the success of the goals you set in the unit?
- Think about collaborations with small companies that were considered successful.
- What was the aim of the collaboration? The content? The result?
- What were the success factors? Why it was considered successful?
- Now, think about the collaborations with small companies that were considered failures,
- What was the aim of the collaboration? The content? The result?
  What were the failures factors?
- What challenges do you considered more common in these collaborations?
- How do you normally overcome them?

AOIMM TEST: Specific OI collaborations with SMEs

1. Conditions for OI Collaborations

1.1 Leadership

Clear Strategy

- Are OI collaborations with small companies promoted in the current corporate strategy of the company?

  - It does not form part of the corporate strategy
  - They are verbally supported by the management
  - These collaborations are integrated in the strategy to become more agile
  - They are explained and stimulated by the management
  - They are demonstrated by the management due to the benefits that they carry to the innovation processes

Awareness

- Are advantages and examples of collaborating with external partners, specifically with small companies, communicated throughout the company?

  - Advantages and examples are not communicated at all
  - Employees share their experiences with small companies by word to mouth
  - Advantages and examples are shared by the management
  - There are seminars and workshops that promote the benefits and examples of OI collaboration but not exclusively with small companies in a regulated way
  - The examples and benefits are continuously shared throughout diverse channels and used for strategic proposes

- **Would you consider it enough? If not, in your opinion, how can it be improved?**

1.2 Incentives

Assessment

- Are employees assessed and awarded based on OI collaborations with small companies?

  - No assessments are made to employees based on the engagement in this type of collaborations
  - They are supported informally when they are proven "necessary"
  - Employees are assessed and rewarded partly based on them
  - Managers award employees based on the performance in these collaborations
  - Management make continuous evaluations and rewards to employees based on the improvements and outcomes from these collaborations

1.3 Mindset

Initiative taking

- Are employees willing to establish OI collaborations with small companies to remain innovative?

  - Little initiative taking by employees due to the challenges that are seen at first sight.
  - Individual initiatives in looking to establish OI collaborations with small companies
  - Champions are appointed to demonstrate the establishment of these collaborations after detecting the potential benefits of them.
  - With the establishment of OI collaborations through scouting activities specifically for small companies, employees are stimulating this type of collaborations
  - All your employees are constantly looking to take initiative

- Are there some reservations of some kind by employees? If yes, which kind? How do they manifest them?

Trust

- How much information are you able to share with your external partner (Small company /start up) for the benefit of the collaboration?

  - Almost no information is shared even when a NDA is signed and in place. Clear power dominance from the big company
  - Information exchange is slow and with low intensity due to the lack of trust in the small company
  - Information is revealed with more intensity but still a slow process since it is just done according to the information revealed from the other party
  - The exchange of information is more intense causing almost no delays in the process. Information is revealed with the aim to reach the objectives proposed
  - Information exchange is adjusted to the pace and strategy arranged in the collaboration with the small company

Screening

- Are your employees screening the external environment for new possibilities of collaborations for OI with small companies?

  - Collaboration with small companies are done by accident spotting
  - The screening is focused on the own advantage
  - Employees considered champions do the screening
  - There is a team composed by scouters and leader who coordinate the screening
  - All employees are continuously looking for opportunities of OI collaborations with small companies

Is there anything else related to this topic that you consider important to mention?

2. Asymmetric OI Collaboration Capacity

2.1 Partner Selection

Network building

- Is there a network of potential small companies or start-ups available to all employees?

  - One-off contacts
  - Repeated contacts with several departments
  - The network is limited to just established small partners
  - There are diverse lists of networks of all potential or already established small companies
  - There is a constantly updated network with all potential small companies and strategically expanded

Selection Process

- Do you have specific criteria for the identification and selection of the potential SMEs as a partner?

  - There is no criteria or specific process established. It is made by own experience
  - Identification and selection are based on affection and previous collaborations
  - The right partner is identified and selected based existing information of the partner
  - The identification and selection of the right partner based on the vision and strategy
  - Criteria is based on Proactive strategy

How does the identification and selection of the small company work in OI collaborations?

Mutual goals and expectations

- Is setting mutual goals and having clear expectations for both partners, part of the process of engaging in collaboration with a small company?

  - There is no consideration of mutual goals and clear expectations
  - Identification of the need as important but not crucial in collaborations with small companies
  - It is done just in a few cases
  - Most of the collaborations with small companies have a clear agreement in goals and expectations
  - All OI collaborations with small companies are based on a prior agreement of mutual goals and expectations

2.2 Collaboration Management

Knowledge Management

- Is the knowledge generated in OI collaborations with SMEs systematically incorporated and used in the company for further improvements?

  - There is no defined incorporation of the knowledge generated (individual attempts)
  - The accuracy of the incorporated knowledge is low and result in no improvements
  - There are efforts done in the right integration and used of all knowledge generated
  - All valuable knowledge generated is incorporated and used systematically in the company
  - All improvements and new innovations are integrated in a central system for further used and it is constantly updated

Standardized process

- Is there a standardized process for the implementation of successful collaborations with SMEs?

  - There is no standardized process to implement asymmetric partnerships
  - Employees implement collaborations with SMEs in an informal way
  - There are standardized tools for collaborations in general with a clear ownership
  - There is a standard guideline in how to implement OI collaborations in general
  - Continuous improved process with a focus on SMEs ranging from the prior stages to the establishment of the collaboration and adaptable to the different objectives

Delegation of tasks

- Are responsibilities within the team and the partner efficiently delegated in the process of the collaboration?

  - No clear delegation of responsibilities. The big company take most of the power.
  - Partners assume responsibilities in an opportunistic way
  - In some collaborations there are prior defined tasks designated between the partners
  - There is a standardized guideline in the delegation of responsibilities
  - The delegation of responsibilities is performed naturally in all OI collaborations with SMEs according to the strategy, timeframe and objectives between the 2 partners

2.3 Conflict Management

Partner Satisfaction

- How are conflicts (speed, interest, style of work) in collaborations with small companies managed? (Focus on the 3 most recent collaborations with SMEs)

- No priority in managing conflicts of asymmetry (inconsistent process)
- Conflicts are solved by experience. Informal and opportunistic.
- Increased priority. Conflicts are managed partially with establish methods and tools
- Conflict management with smaller companies is a topic in workshops of OI
- There is a constant update of how to manage and prioritize the conflicts generated between small companies and large companies

Time Management

- Do collaborations with small companies work under a mutual established timeframe?

  - The length of a collaboration is not relevant
  - Some intentions of having a mutual timeframe are done
  - The establishment of a timeframe in a collaboration with SMEs is advised
  - A mutual timeframe is required for OI collaborations with SMEs
  - All OI collaborations with SMEs have a prior established timeframe and it is constantly monitored

Reputation

- Does the company implement strategies that aim to manifest an attractive image as a partner for external small innovative companies?

  - The image of the company is not considered at all for a OI collaboration with SMEs
  - The company only relies in the predeterminate image that has so far
  - Identification of the need to take image as crucial for improving the trust of SMEs
  - Trustworthy image is considered important and actions are taken
  - Previous and present efforts and success factors are constantly revealed to external SMEs to remain as an attractive partner

2.4 Training

Learning mechanisms

- Do employees have a specific training of how to collaborate with asymmetric partners (small companies)? (To specifically overcome with the differences between companies such as internal processes, culture, behavior, regulations, etc.)

  - Employees have no training to develop these specific capabilities
  - Employees learn to deal with these differences based on own previous experiences
  - The lessons are learned from other employees by word to mouth
  - Employees are consciously trained in the skills needed for these collaborations
  - There is the continuous sharing of new skills and knowledge by employees in specifically challenging OI collaborations such as with SMEs

Is there anything else related to this topic that you consider important to mention?

3. Instruments for Asymmetric OI Collaborations

3.1 Central coordination

Communication dynamics

- How efficient is the communication among partners? (SMEs)

  - Communication is inefficient and agreements are made with difficulty
  - The efficiency of the communication is based on the degree of affection among the partners
  - There is the identification of the need of a more efficient communication
  - Employees focus on the improvement of the efficiency of the communication among partners
  - Employees foster a communication that is adequate, efficient and satisfactory with small companies

Communication of the available resources

- Are the employees aware of the available resources (networks, portals, strategies, guidelines, etc.) in the company for OI collaborations with SMEs?

  - Employees ignore the availability of resources for OI collaborations for SMEs
  - Employees are aware of those resources through other employees
  - The available resources are exclusive within the departments
  - Diverse channels such as seminars communicate the resources that can be used in benefit of OI collaborations in general
  - Employees are constantly updated with the available resources that can improve the challenges that emerge in OI collaborations with SMEs

3.2 Asymmetric OI Collaborations Resources

Point of contact

- How defined is the point of approach for SMEs that aim to collaborate with the company (internet portal or collaboration platform)?

  - Collaborations partners are contacted informally through no specific mean of communication
  - Contact is done informally through information found in the website
  - The point of approach is more formal through established channels and departments
  - There is a specific and integrated point of approach for small companies
  - There is a collaboration platform with defined contact persons and areas according to the interest of the SMEs or vice versa

Mechanisms of control

- Is there is any evaluation system for the outcomes of OI collaborations with SMEs?

  - There is no evaluation of the collaborations in OI with SMEs
  - Informal e individual evaluations are done sporadically
  - Informal evaluation system created from previous experiences
  - There is an evaluation system for collaborations in general
  - There is an established system for the evaluation of all OI collaborations including with SMEs that is constantly updated and shared

Facilities for OI collaborations

- Are you able to facilitate collaborations with small companies in shared facilities (to overcome lack of resources of the other party)?

  - There are not supportive facilities in place
  - Some partners are able to share their facilities
  - Limited sharing of adequate facilities for shorter collaborations
  - Adequate facilities are shared for more intense and longer collaborations
  - Facilities owned and built by the network of partners for OI collaborations

3.3 Legal protection

IP protection

- Does the company have mechanisms for the effective protection of IP specifically for cases like collaborations with SMEs?

  - IP protection is too strict keeping everything to themselves
  - IP is given under strict conditions and its minimum
  - The protection of IP is more open and less bureaucratic. It is more based on trust
  - IP and legal consider long-term perspectives
  - Adequate flexible IP protection, win – win contracts

- **What do you think your unit is mostly lacking to engage in more successful collaborations? In what element do you consider you are successful?**

In your opinion, as a unit where are we located in the implementation of these type of collaborations?

Initial 1 3 5 Optimized

12.2 Interview format for SMEs

Purpose of the interview: Questionnaire with the aim to have an overview of the current interactions and collaborations of the department with SMEs for innovation and to test the maturity model that was adjusted for Asymmetric Open Innovation Collaborations.

Time Frame of the last 3 years

The interview will be compound of open questions that aim to have an overview of the experience you have had from that side of the cooperation and also a discussion of the challenges and benefits of engaging in this type of collaborations.

General Information:

- Brief explanation of your background and your main tasks
- What is your role or position when collaborating with SMEs for innovation purposes?

Experience in collaborations with large enterprises for Innovation

1. Normally, Which role do you have when collaborating large companies? (Supplier, competition or customer)?
2. Beyond these options, what other kind of roles have you experienced?
3. What is the general attitude of your team (Unit) towards collaborations with large companies like Beta Company?
4. How important are these collaborations considered for the success of the goals you set in the company?
5. Think about collaborations with large companies that were considered successful.
6. What was the aim of the collaboration? The content? The result?
7. What were the success factors? Why it was considered successful?
8. Now, think about the collaborations that were considered failures,
9. What was the aim of the collaboration? The content? The result?
10. What were the failure factors?
11. What challenges do you considered more common in these collaborations?
12. How do you normally overcome them?

Specific elements that are part of these collaborations.

1. Mindset: Are your employees willing to establish OI collaborations with large companies to remain innovative?
2. Trust: What has been your experience in the amount of knowledge exchange and degree of trust during collaborations with Beta Company?
3. How do you identify and select the potential big company partner?
4. In the collaborations with Beta Company, did you establish clear mutual goals and expectation?
5. How did you manage the conflicts of speed, interest, style of work during these collaborations?
6. Did you establish a timeframe?
7. Did you delegate responsibilities and tasks with the partner during the collaboration?
8. How did you approach Beta Company at first? (Point of contact)
9. In your experience with Beta Company, do you think there are shared spaces for the successful collaboration?
10. What about the IP protection, do you think it was effective?
11. How efficient did you consider the communication between the two partners?
12. Reputation: Would you consider Beta Company as a trustworthy partner for OI collaborations in your company?
13. Do you think Beta Company make efforts to transmit a good image as a partner to external companies?

12.3 **Protocol.** Classification of recorded interviews within the company

Name of the interviewed:

Unit represented:

Aim: Where does the unit stand in terms of collaborations with SMEs (small companies and startups)?

Points to cover (Obtained through open questions and extra comments):

- Weight or importance of these collaborations for the unit?
- Role of the unit or person interviewed in OI collaborations with SMEs
- Criteria to consider a collaboration with a SMEs successful:
- Biggest Challenges found in OI collaborations with SMEs (including experienced failure factors):
- Success factors and strengths considered by the unit or person in charge:
- Attitude (mindset) towards these collaborations:
- Extra comments (Elements / factors or experiences not considered in the model):

12.4 Protocol for Interviews with SMEs

- Type of collaboration:

Experience in Collaborations with Large enterprises for Innovation

- Relevance of the collaboration
- Role of the SMEs in the collaboration
- Biggest Challenges found in these collaborations
- Success factors and strengths in collaborations with small companies:
- Attitude (mindset) towards these collaborations:

Dynamics of the collaboration:

- Trust experience:
- Identification of the potential partner and point of approach to big companies
- Mutual goals and expectations:
- Timeframes:
- Delegation of tasks.
- Reputation to the external partners:

12.5 Transcription of interviews and spiderweb diagram per Unit[1]

Cluster 1: Operational Divisions

Global Business Development within an operational division:

Focus: This specific department is in charge of taking care of product development, global product development and sustainability topics for a specific operational division. The orientation is basically market facing with the manufacturing and marketing new products. The collaboration with startups and small companies in just one part of the typical operations. They are not considered professional in how they deal with small companies; however, they consider themselves capable of performing a decent work in such collaborations.

Roles in the collaboration: The role of the small companies in these collaborations is diversified, however, typically it would be their customers or also technology providers. In some areas specifically, there is a high interaction with startups for collaboration. Nevertheless, the collaborations with such companies are just considered as a complement to their already developed technologies. When it is referred to the role of this department in collaboration with small companies, it is implied that they are in the lead of negotiating any kind of agreement with the customer.

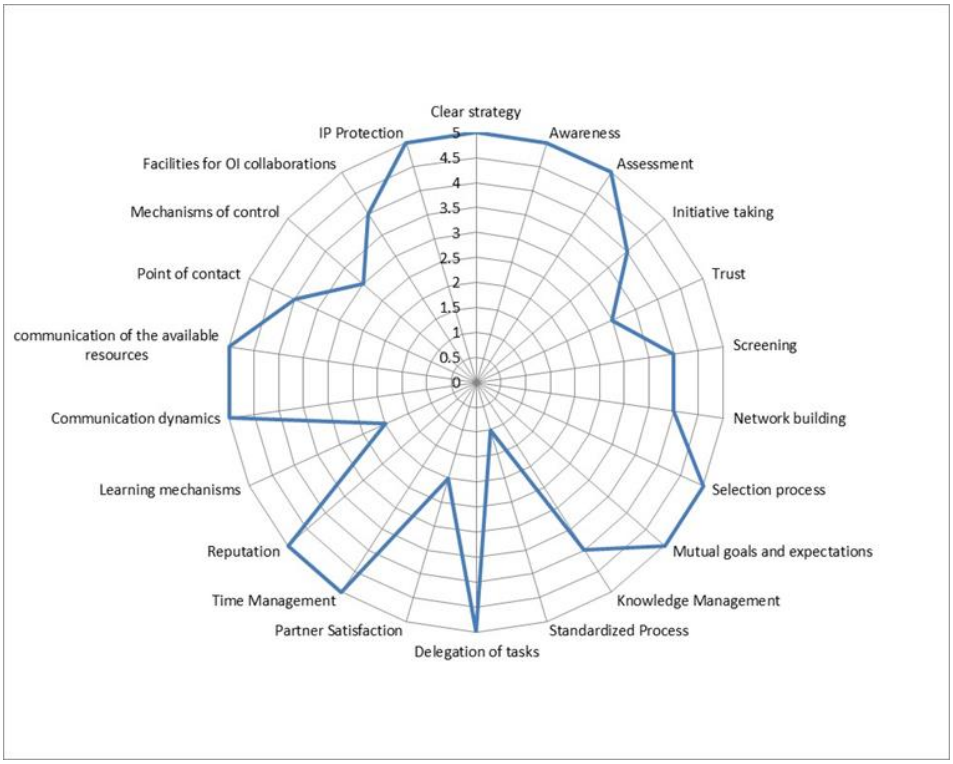
Challenges: One of the biggest challenges while engaging in a collaboration with a small company is the alignment of speed between both companies. The small company, typically a startup, has a different kind of speed which makes them capable to be faster to deliver a product in the market or even just for a test in the market, which differs from the big company. However, such speed is considered as a strength of the small companies. They consider that they should try to adapt more to this pace, mostly in the testing of prototypes which can be tested earlier in the market. On the other hand, in some stages it is necessary for this department to cover the time needed to come with an optimum result and also to reach operational excellence with an optimum process and optimum cost position. This is not considered by the startup. Therefore, the startup is considered ideal for the first stages of a collaboration, however, in the stages when it is necessary to have a solid result with a planning for the next 10, 20, 30 years, another perspective comes in

[1] All original protocols are available at request

place. The alignment of this understanding is fundamental to overcome this challenge. Another important hurdle is the step of the sharing of information where it normally tends to delay the collaboration. However, this step is considered necessary in order to speed it up after the agreement is settled. In cases when the different ambitions and expectations cannot be aligned, or the technology does not deliver what it was expected, then, this represents a break-up point for this department. IP issues are always among the discussions; however, this is performed in balance and adequate for both parties.

Success factors: One of the factors that should be taken into consideration by this department in order to foster successful collaborations with small companies begins with the selection process, which is considered critical, since it does not only rely on the assets offered by the small company but the relevance of mutual understanding between both parties. In the end, it is a business people in which having the right people is highly important and sometimes even crucial for the development of collaboration. In addition, the understanding of the background and perspective in depth of the small company is important. Sometimes, startups tend to be very optimistic despite the culture, which forces them to look more into the business case and market assumptions before any decision is taken. Afterwards, the agreement of joint targets and joint set of deliveries takes place, where there is a clear understanding of the tasks performed by each party. There are also cultural differences when there are collaborations with companies from other countries, however this step is well performed so far.

In addition, one of the most important assets that this department brings to the table in collaborations with startups are fairness and common sense in the moment of negotiating with them. This is complemented with technical capabilities and market facing capabilities, which add value to the collaboration. Nevertheless, whenever a collaboration is established, the criteria to consider it successful depends on the target set. In some cases, it could be that the target was the development of certain technology, so, when it is thought that the technology delivers what was expected, then, it is considered successful. In other cases, the respecting phase gate criteria is followed, where every step is marked with certain objectives.



Spiderweb Diagram Global Business Development within an operational division

New Business Development & Innovation Management within an operational division:

Focus: The focus of this department is divided into two functions. One refers to the innovation management, which it is more as innovation controlling, where they look at budgets, the continuous improvement of project portfolios and even radical projects. This part is more focus on the processes than on products. The second focus of this department is the development of new business, internal startups, that are very transformative for any application and that are normally not developed within a business unit since they are too complex, or they need a different structure.

Roles in the collaboration: The collaborations with external startups in this department are not so many as they were experienced in the previous role of the person in charge of this department. However, in both cases, the small companies took roles of developer partners, which is basically providing the know-how fur a further scale-up. This type of partners is normal and quite usual for this area. Nevertheless, there were some atypical roles taken by the small companies, which included a small company doing the license

strategy technology, which was quite unusual, since they were taking the lead. Another atypical partnership was one when a startup provided a process of how to produce a certain product. This required a very close collaboration. On the other hand of the collaboration, the role of this department was mainly as project manager, integration manager or in some cases M&A person. In the cases where it was the project management lead, the main function was the provision of money where there was also a mix of different central units working for the same project.

Whenever a startup represented an important asset for the success of the project, this department specifically invested in them, where they normally buy around 20% shares that are enough to have control over the collaboration and any possible break up. There is no interest in owning the company but this step is in order to avoid that they are bought by another competitor.

Challenges: One of the most prevailed hurdles for this department during a collaboration with a small company is the difference in speed. Mostly, the speed in deciding things during the collaboration. Therefore, this department has to remind to the small company why they are slower constantly, but on the other hand, they consider important to speed up their internal processes and that's the reason why they have the new business development functions. They remark their efforts to have less bureaucracy in order to overcome this challenge. For this, they simply decide more and have fewer committees. Another typical stigma that has emerged quite often among the employees in the sense that the small company is not doing quite well their job. This is mainly due to the fact that their work with high risk and this department consider it intolerable. Nevertheless, this is overcome by placing the scope that will be using regarding risk and minimum requirements. In cases when there are employees not baring or overcoming this hurdle, they are replaced, which is only possible to do in big companies.

Still, there are still key factors that should be developed such as the awareness of higher management regarding the needs that startups have in these collaborations. When there is not an understanding of this and the normal issues or challenges occur, it becomes very difficult to convince them (higher management) that it is normal. Another important issue that it is considered lacking in this unit is the overcome of not-invented-here syndrome where the employees take long to understand the need to explore and develop certain

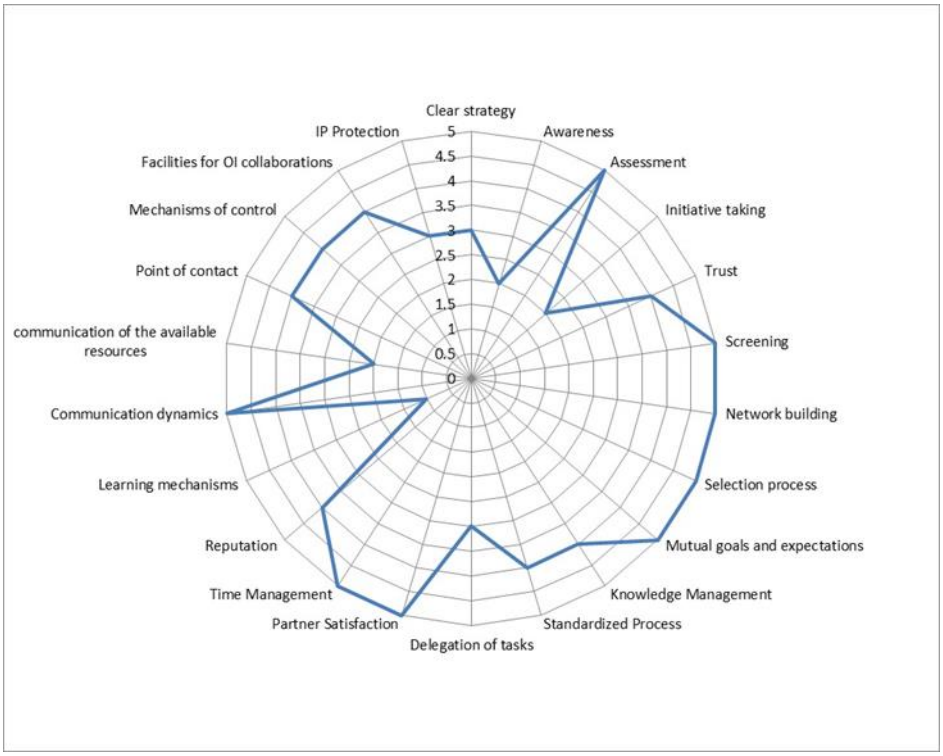
technology or product with external complement and not entirely in-house. For this, it is necessary to put pressure on people. Still, what it has been experienced to be a point where the collaboration cannot be continued is when it does not simply match technically.

Regarding the trust among the partners, it has been experienced that the smaller companies tend to be stricter in sharing information. The key solution to this situation is the build of trust between the two partners. For this, this department usually shared a bit more in order to gain trust. It is understood that collaborations with small companies require more efforts and resources than with other big companies.

Success factors: The relevance that the communication efficiency among the partners for this department is high. Therefore, they establish frequent meetings in order to overcome the differences if these two worlds, big companies and small companies. They have made big efforts of exchanging during the collaborations implemented with small companies.

In one specific case, there was the opportunity to execute a co-location during the collaboration with the small company, where people from the small company were working in this department and vice versa, the employees from this department were working at the small company. The employees installed in the small company had the function of translators for any asymmetry that emerged between them. This case worked out well, however, it was very important to have well defined all aspects regarding IP and ownership since it can be confused very easily.

The increased openness of this department towards new forms of collaboration is discussed and perceived as something that has been gaining relevance in the last 5 years. The reason is simply because many of the solutions which are offered by them in the market are every time more complex. Therefore, they need to fill specific know-how gaps and collaborations with these specialized small companies are a big tool for this.



Spiderweb Diagram New Business Development & Innovation Management within an operational division

Scouting & Innovation Management within an operational division:

Focus: The role of the person in charge of this department is to look for new things and acquiring new ideas for innovation in a specific operational unit. The importance of the collaborations with small companies has been increasing since it is becoming one of their main activities. However, the functions developed within this department are perceived as 1% of the whole unit. This leads to the result that independent of how active or radical this department might be, it does not necessarily mean the representation of the unit as a whole.

Roles in the collaboration: The roles taken by small companies have been as a product developer and also as a manufacturing partner. In other cases, startups look mostly for funds, where they look for the money and it matches with the interest in the technology they offer by this department. Regarding the role of this department in this type of collaborations, they are mainly the interface to the company by initiating the collaboration. They also rely on diverse functional colleagues who act as support. Moreover, there is a rule which indicates that startups must only be approached by

Venture Capital. This must be the first contact which helps them to assess the valuation of the business model of the small company and if the technology is feasible.

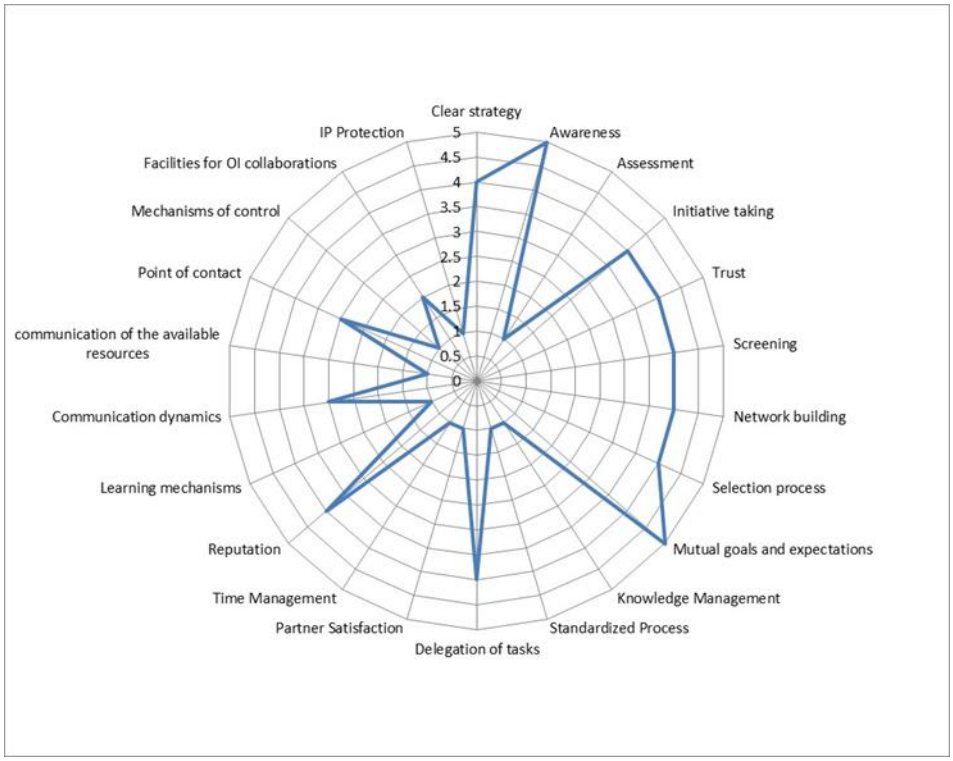
Challenges: Speed has been detected as one of the most prevailed challenges due to the different timeframe that each company has for developing phases. This does not always fit together and does not allow them to establish timeframes among the partners. However, the people in charge of this department have indicated that they are still learning to deal with this hurdle. Another challenge that is faced quite often, is the difference in the expectations and conflicts of interest. Nevertheless, this issue is perceived as impossible to overcome unless the small company adapts to Beta company. This is in part due to the high inflexibility of the unit in working with startups, since it is considered that the company (Beta company) does not allow the unit to move faster. As a consequence, the collaboration is preconditioned to fulfill this requirement first, otherwise, the collaboration breaks apart. In fact, there is a lack of corporate strategy and lack of vision that indicates these specific people what needs to be achieved, where they should be in the next years specifically for disruptive innovations since the classical business does not give room for such development within the company. In addition, the unit is seen as quite conservative, where people tend to be very critical when engaging in collaborations with small companies. Lack of time due to daily tasks, fear of change and high competition among the employees seem to be the main drivers for this behavior. Another indicator can be the fact that there is not a failure culture among the employees. This leads to the difficulty of bringing something new into the company. However, the small part of this unit, which is the new market development considers themselves as quite collaborative as also quite conscious of the current issues.

At last, the communication between this department and the collaborative partner is considered very important. Notwithstanding, in reality, this communication is not well aligned due to lack of communication tools that allow them to increase the efficiency and not only rely on old and conservative tools.

Success factors: Even though, there is a clear struggle perceived by this department with the organizational set up for engaging in better collaborations, there is also the impression that management is changing and putting more attention to these specific collaborations and to the benefits that it brings. This is considered fundamental, since it brings a positive

influence among employees and encourages them to overcome certain challenges that represent a hurdle for these collaborations. In addition, management support is a complement for personal engagement. Also considered very important for the development of better collaborations. At last, persistence is another factor which is believed to be a strength in this department. It is needed when there is a high percentage of projects which might go wrong, usual in disruptive innovations.

In order to call a collaboration successful, it will always depend on the expectation generated before with the small company. Sometimes, it is considered successful when common goals, common aims and common understanding are found among the partners. When two companies from completely different backgrounds or industries come together to work, is also considered as a success. At last, when in the course of development of a product, when it reaches the expectancies and it starts to be commercialized is also a success. It is crucial for this department that while working with a startup, there is the set of diverse steps and small successes in order to reach an overall success.



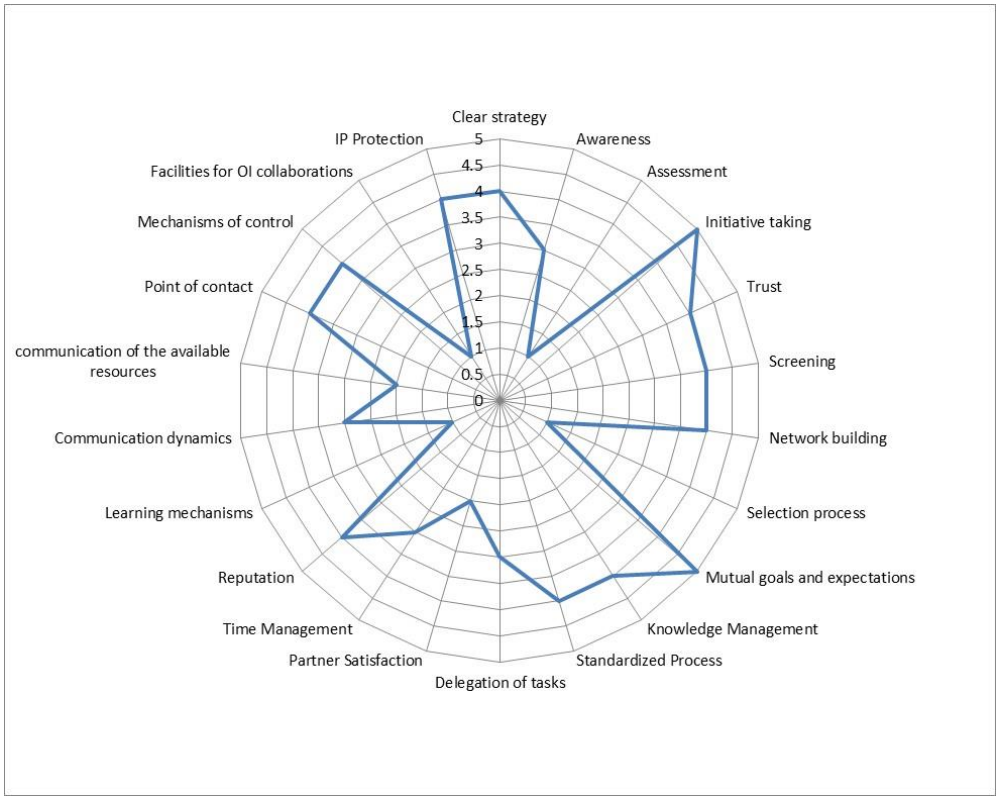
Spiderweb Diagram Scouting & Innovation Management within an operational division

Startup LLIN within an operational division:

Focus & roles in the collaboration: The focus of this specific department is placed on partnerships with startups, where the role of the small companies is in the production. On the other hand, the role of the person in charge of this department is to head the group on marketing cooperation with technical people or marketing people. There is a certain reliance in Venture Capital when collaborating with small companies since VC might be able to give a background of the company and might also be interested in acquiring the company. However, this is not always the case.

Challenges: The development of mutual timelines represent a common challenge for this department or in some occasions, even a failure factor. The complexity is higher with the fact that small companies face problems to maintain a product development for a long-time period. Furthermore, the attitude of the people working in Beta company is also considered as a barrier for this type of collaborations. There is a persistent high arrogance from the Beta company which makes communication between the partners complicated. In addition, there are also cultural problems faced by partners located abroad such as the fact that they only have 1 person in 3 production facilities that speak English. As a consequence, this department makes an effort to understand how these partner work and what they need. On the other hand, they consider crucial that small companies also understand how this big company works, for example, the high rotation of its employees.

Success factors: Special focus is placed on the development of trust between both partners. That is the case that there are 2 existing collaborations with small companies where there is no contract signed for 10 years. Therefore, people in this department are conscious that there is the need to spend more time with the small companies, in order to understand them better, their background and their motivation. This is not possible to know unless there is physical time spent together. Moreover, there is the issue regarding financial benefits, where there is always the question of how to share the cost and responsibility and at the same time, how the profit will be shared. Nevertheless, a collaboration is not considered successful unless there is something sold for joint benefit.



Spiderweb Diagram Startup LLIN within an operational division

Cluster 2: New Business & Venture Capital

The nature of this cluster differs significantly from the activities and focus that operational and research divisions have specifically in collaborations with small companies. Nevertheless, the dynamics that this division has and the roles that they take in collaborations, help to understand the structure of Beta company. This is a support for further analysis of how the different units and divisions within Beta company work and perform in collaborations with small companies.

BNB Business Build Up

Focus: The focus of this specific division differs from the rest of the divisions. New Business has a special purpose. They are building new businesses outside of the core activities of Beta company, addressing significant needs of the society of any kind. The managing director of New Business is responsible for two specific areas within this unit. One is the development of the new businesses and the second is the buildup of a specific

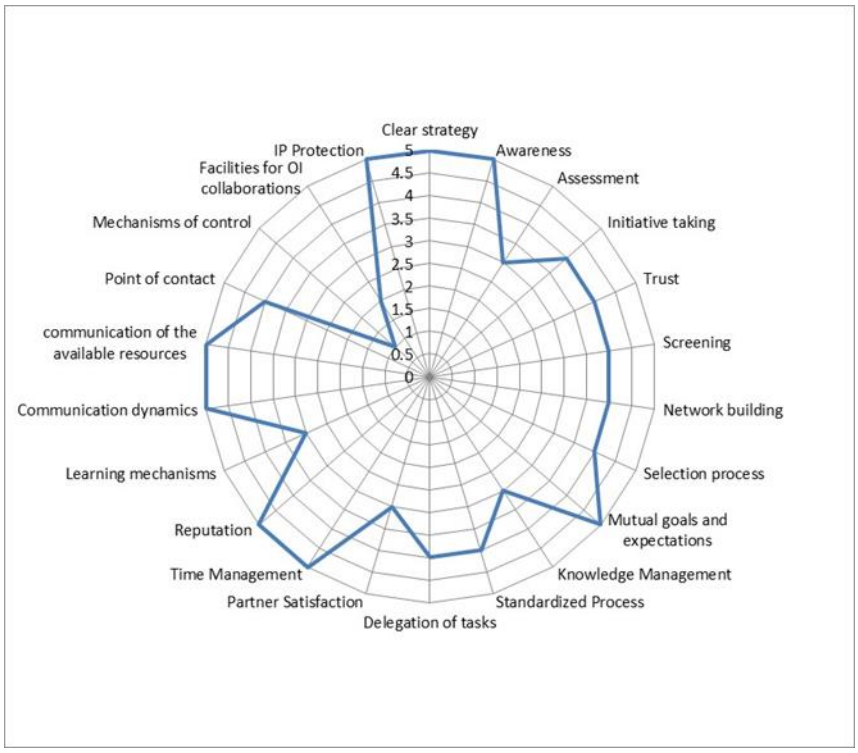
technology. Initially, there is the identification of the opportunities in the industry, followed by a proof of concept successfully scouted and incubated. These collaborations are mostly done with small companies that might be potential end customers. The importance of these collaborations for this area in high and furtherly increasing. This is due to the identification of the need of capabilities not found in-house and also the need of speed up to keep up with the pace of the different markets. For this, collaborations with small companies or startups are considered very efficient. Furthermore, this unit has been establishing most of its collaborations with startups in the US than in other countries. The reason is just that it has been perceived the culture of startups in the US are more open and easier with excellent structures.

Roles in the collaboration: The roles of the small companies in collaborations with this unit are diverse. The main interest of this unit is to find in the partner all complementary capabilities and also, further connections into technology clusters. Therefore, their role of the person in charge of this special area is to make strategic decisions whether the project takes place or not, corresponding to prioritization and selection of needs and partners. This also includes decisions in investment in the company.

Challenges: It has been identified that on occasions there is a prevailed fear among the employees within this unit that the small companies might be competitors. Nevertheless, most of the employees in the same unit are open and enjoy working in this type of collaborations. Another challenge that this unit has faced during these collaborations is the fight for IP, which is the most common break up points in collaborations with startups. This is normally overcome by leaving it in the hands of the lawyers before it becomes an outstanding situation. However, this issue has been more predominant for this unit in collaborations with bigger companies than with small companies. At last, when results are visible in collaborations with small companies, this unit considers the integration of the technology into the company as a result of a collaboration with a small company better than the integration of soft factors and exchange of information by the people involved in such collaborations.

Success factors: Speed and cost performance are considered as very important factors for this area in collaboration with small companies. These are taken as important indicators for the selection of the partner or even the project. Once the collaboration is

established, it is given high importance to the development of clear agreements in expectations, resources, key deliveries and so on. This is achieved by a spent effort in defining what it is aimed at their collaborations followed by a constant feedback process among the partners. Such continuous evaluations allow them to test the assumptions established at the beginning of the collaboration process where there is still a lot of uncertainty. Furthermore, they intend to take the learnings immediately from those feedbacks loops in order to improve and adapt their way forward. In addition, the lessons learned from all kind of collaborations are constantly shared inside the unit even if the collaborations failed. These practices are supported by an increased encouragement from management to engage in more collaborations with small companies. Moreover, they have experienced that while collaborating with small companies, it is crucial to communicate at the same level without applying too much power. As a result, this has paid back in many ways such an increased trust in the collaborations. At last, to consider a collaboration successful is particularly different seen by this manager director. Even if the outcome has been negative but everything possible to make it happen was done, it is also considered as a good result since it brings also learning to this unit.



Spiderweb Diagram BNB Business Build Up

Venture Capital

Focus: The nature of Venture capital is different from other divisions. Their focus is placed on the support of different business units or divisions within Beta company. They are in charge of enabling open innovation for the units by making interesting startups and interesting deals available for them. Their job requires thinking a bit out of the box. It is established in their target agreements and part of their KPIs to enable a certain amount of collaboration either marketing, licensing or joint development collaborations. Nevertheless, they not only show the business units what they are looking for but what they are not aware of yet and they should look for. The radar function that they have is reflected in their role as mentors or coaches for the units. They try to make them understand what could be done in certain collaboration, how to structure the process of such collaboration, ow how to achieve a win-win situation with the partner. The performance on collaborations with startups is also part of their job.

The interaction that this team has with the different units within the company is done through the different innovation scouting teams that all research platforms have. At first, interesting ideas are presented to the business units for further opportunities in business collaborations. In addition, a couple of times a year, there is the discussion with the people corresponding to the business units regarding topics that might be worth considering.

Roles in the collaboration: The most common role that the small companies take in the collaborations managed by the venture capital team is down the value chain. On the other hand, the role that venture capital has is as a connector or matchmaker. It is crucial for them to understand what are the fields corresponding to the person in charge of the business unit and what their customers expect. In some occasions, they support negotiations contracts. Furthermore, if at some point, if the investment is done by venture capital, this is also taken as support to achieve the targets in a certain way.

Challenges: Once the match has been done and the collaboration is taken over by the business units, it is often perceived that the process is stopped due to lack of time of people. This might happen because they already have a certain project and cannot take another one. Furthermore, the spatial distance between the partners takes an important role in the performance of these collaborations, however, this is perceived as a barrier when the people who interact and the chemistry among the partners affect the

communication, which leads to a lack of understanding between the partners. Moreover, collaborations with small companies are also affected by the attitude of arrogance that is sometimes present within beta company. This hurdle is usually present at the beginning of the collaboration process.

The function of venture capital is appreciated in some units where there is a regular exchange of information. However, there are some units where the function of new business developments has been abandoned, which makes the possibilities of collaborations more difficult to implement.

Success factors: The key factor for Venture Capital to succeed in the implementation of more collaborations within the business units is to create excitement among the colleagues in the company in order to listen and consider certain ideas. Secondly, bringing the right people together in a collaboration is crucial for the achievement of goals in a collaboration. Therefore, this is also considered as a key element in collaborations with small companies. Furthermore, encouragement to the different business units and divisions to engage in more collaborations with small companies is done through support and resources in the form of the New Business or New Market development teams. At last, they consider important in the early stages to be more flexible and make it clear the diverse agreements in order to make the collaboration easier.

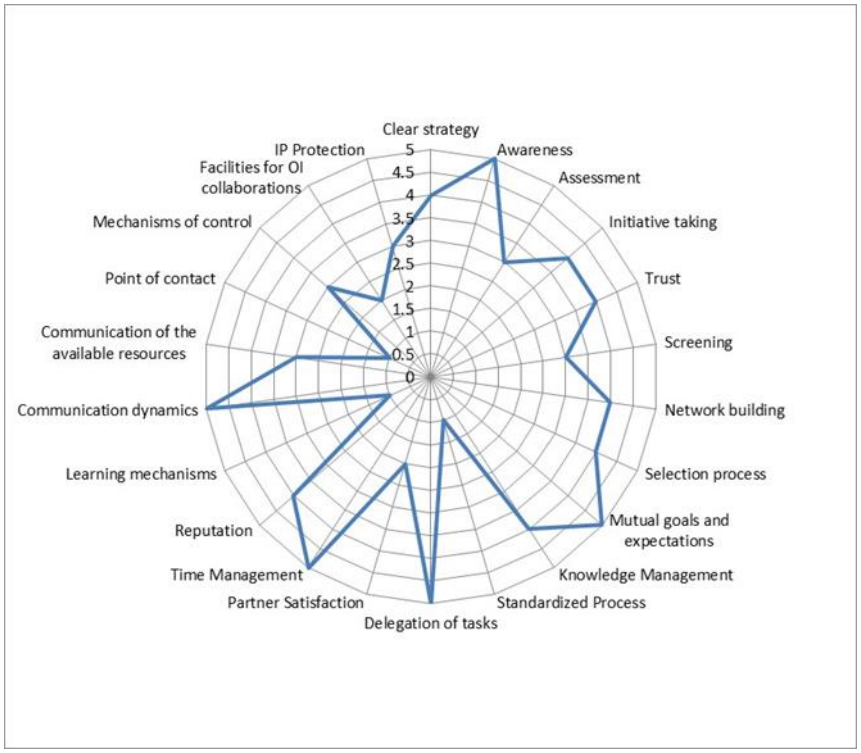
Venture Capital and New Business Abroad

Focus: This department is specifically located and focused on another region. Compared to other Venture capital corporates, they have processes that allow them to move quicker than most since they do not require approval or endorsements from the business units within Beta company. When they compare collaborations with startups and collaborations with academia, the first ones are considered easier to be worked on. In addition, it is faster to move to commercialization than with universities. Therefore, these collaborations are taken with some importance within this unit.

Roles in the collaboration: In the two collaborations managed by the person in charge of this unit, the small companies have taken roles as a customer and as a technology partner. In other cases, they were suppliers to Beta company. On the other hand, the person in charge of the Venture capital team in this region acts as investment manager.

Challenges: Overworked lawyers delay the draft of documents. Decisions take longer and in general the large corporation moves slowly. This is what this unit faced, which make it really difficult to find the same timescales with small companies for collaborations. The speed that each company has, differ. As a consequence, startup partners get frustrated and the collaboration suffer difficulties. In addition, it is perceived that employees in the large company consider themselves as very important and expect that everything works out in the first trial. This increased the complexity of the collaboration and might even break it. Whatsoever, the biggest challenge faced by this unit refers to the starting point of a collaboration, where 90% of those challenges are present at the very up-front of the collaboration process. It could be that they partner with the wrong people or in other cases, from the small company side, they face technical problems that might not have been prioritized. Some challenges might be related to changes in the priorities in the business or in the strategy itself. Furthermore, differences in expectations and even the culture result in challenges for this units while collaborating. At last, there is the particularly reaction from the research team involved in the collaboration which is known as the not-invented-here syndrome.

Success factors: One important factor mentioned by the person in charge of this unit is the increased need to have an interface while collaborating with small companies. This means to have a team dealing specifically with the partner since the employees dealing with the daily tasks are normally very busy to take this role. After the collaboration is established, the right set of the process to follow and the understanding of the role of each partner is fundamental for this unit. It should be clear that the agreement is both-sided and not one-sided. The best collaborations have been when there are not many restrictions at the beginning to the startup. In addition, it is necessary for them that both companies have the right incentives to move forward in the collaboration. At last, what is necessary to have to achieve the factors previously mentioned is more screen line processes that allow them to make their interactions with the small companies faster and easier and therefore, successful. Nevertheless, they consider such collaborations as a success when after the investment, a specific value is added to the company and also there is a return in their investments.



Spiderweb Diagram Venture Capital and New Business Abroad

New Business: Scouting and Incubation

Focus: The focus of this specific area is related to the identification of areas and different markets which might be under internal or external stress and cannot be sustainable in the future. Therefore, their task is to look for solutions and suitable business model for these markets. This is done through the identification of opportunities outside Beta company. For this, collaborations with startups are always use as counterpart which are constantly monitored, even if they are not attractive at first. In addition, this specific group do not cooperate with the business units within Beta company, but they look for external opportunities that might not be too far from these business units. This gives them the possibility to be taken by them in the future.

Roles in the collaboration: The role of the small companies in collaborations coached by this division is diversified. Nevertheless, it should be complementary. In some other cases, it is clear their role as suppliers or even just looking for money. The latest is common when they get in contact with the group of Venture Capital.

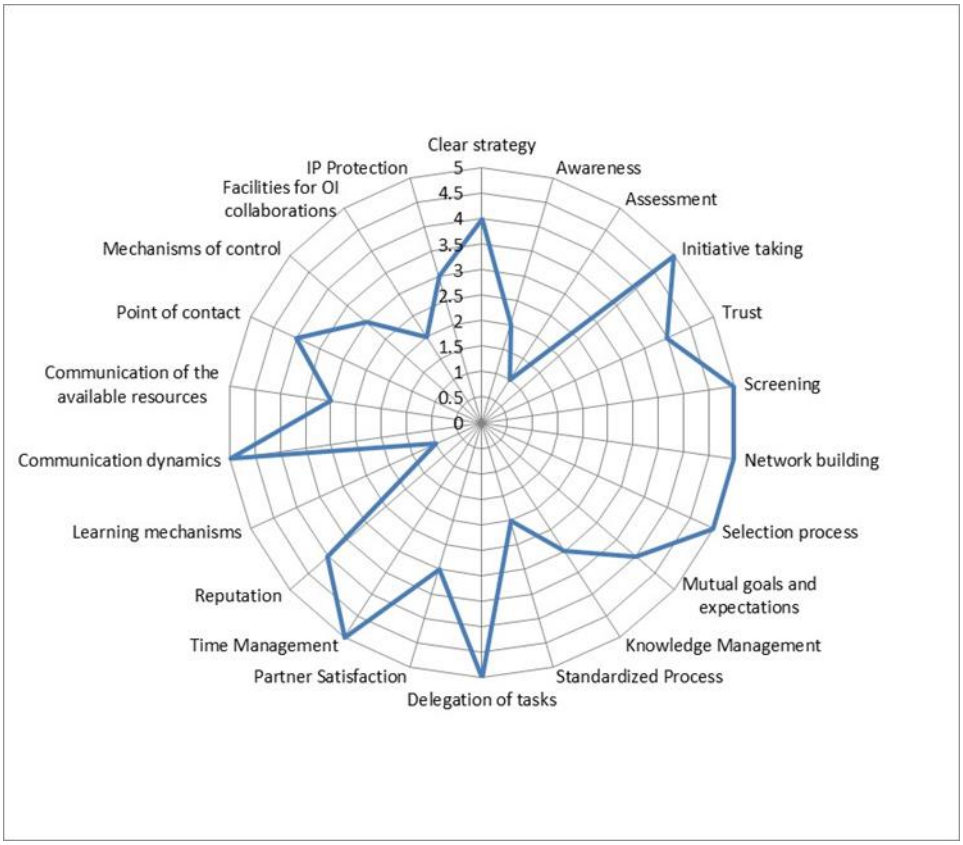
In the case of the role of Beta company, this specific group has the role to establish the technical discussions and the assessment of the value proposition of the small company at the entry point. When the companies fit to specific projects within the group, they adopt the role of project leaders in the collaboration. Notwithstanding, they recognize the benefits that they bring in the collaboration with small companies such as the financing money, market richness and the good reputation of the big company.

Challenges: The special nature of this group attract sometimes small companies with technologies or people that might not be mature enough or worth cooperating. However, in these cases, there is a further monitoring of the company with the intention to see whether there is any progress and might get close to what is needed in the moment. In other cases, the person coordinating see a big potential in a small company, but it might be too outside the core of the business and therefore, it is not supported by the managers.

The communication among the partners can sometimes be difficult due to the different timelines and terms for targets. The small companies normally had short terms while this group must take ideas and developments worth for the next 20 years, which makes decision making slow and careful. At last, some small companies require high amounts of money up-front in the collaboration and this is one of the challenges that this group faces since it is difficult for them to give that much money at the beginning. Therefore, they engage in negotiations to find the best starting point.

Success factors: Openness and honesty have been key factors for this group in order to build trust at the beginning of the collaboration process with small companies. This is considered as the biggest basis for successful collaborations as it has been experienced in one collaboration where the information was shared under non-contractual basis. Delicate information that might be used for a patent was not shared. Nevertheless, the build of trust is also part of the goal of this group, which is to become attractive for the small company. In addition, they have identified the need to downplay themselves to find common basis with the small partner. This is demonstrated by learning how to approach and solve conflicts of asymmetry with the small companies. However, on the one hand, they must be open and willing to make use of their network in order to get informed about the market and where new technologies and startups might be found. On the other hand, it is crucial to be able to find the right balance between ideas that can be over optimistic

and missed by fear or change. The best collaborations experienced so far by this unit have been where they have combined benefits from both companies. Notwithstanding, they are considered successful when there is the development of a technology which might create new products or when products are created and sold.



Spiderweb Diagram New Business: Scouting and Incubation

Technology License

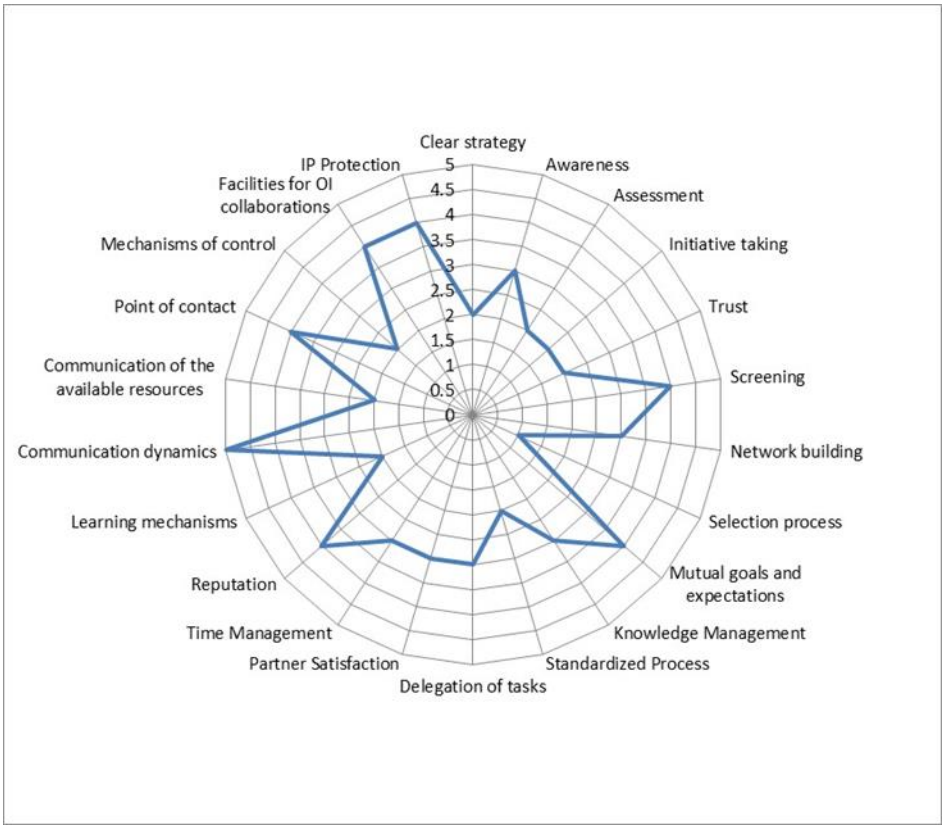
Focus: This specific unit has its focus on the selling of a technology´s license. They have already found a license partner in the same region, which is a startup. This unit is also in charge to do research for the startup and bring this information to them. However, the startup is by itself. At the same time, this unit within Beta company, see that such collaborations with small companies has been gaining more interest within the company. It has come to realization to many that it is not possible for them to do everything and therefore, there is the need to find technologies in order to be fast movers in the market.

Roles in the collaboration: The small company has bought the license and oversees the use of the technology to produce and sell the product. Even though, they have the support for research of the technology and its continuous improvement from this unit in Beta company, they are dealing with the business by themselves. Besides the role with this license partner, this unit has the role of leading and guiding the business of this technology in order to find more license partners. Therefore, the person in charge of this unit is the first contact for the license partner, for cases of pricing or even how to help the company.

Challenges: One of the biggest hurdles faced by this unit is the difference in speed between the license partner and the group. On the one hand, this unit has strict processes which sometimes makes it difficult to meet the demands of improvements in the technology or even just for making decisions there is a process to follow. On the other hand, the small company needs to be more agile in order to survive in the market. However, they have the right to act by themselves and produce and sell to whoever they need without needing permissions of the big company.

Even though, there is a good relationship between this unit and the startup during the license collaboration, there is still some challenges that the unit faces with the internal mindset. It is often questioned the need of establishing collaborations with small companies. Many people still see the downside of working with partners due to information sharing and potential competition. In addition, there is the belief of being capable to do all in-house due to their size and number of experts. However, for the person in charge of this unit, it is considered crucial to overcome this hurdle since benefits that the small company brings in this type of collaborations are the complement for the success of certain projects.

Success factors: One important key element for this unit is the openness to share the most in order to build trust and have higher chances of success. Although, the right selection of the partner and the chemistry among the people is also crucial for such development. This is followed by the understanding of how both companies work and need and also by the establishment of clear roles and responsibilities. Yet, when the partnership is successful or there is the development of a potential good project, this unit does not consider the collaboration successful until you introduce a technology or product into the market and success in the market.



Spiderweb Diagram Technology License

Cluster 3: Procurement

Supply Enabler Innovation:

Focus: The person in charge of this area is responsible for identifying the supplier and the category manager, guide him or coach him through the process to manage a collaboration, including small companies. In the record that this area has in collaboration, there are not many which correspond to small companies since this person was assigned to this position one year ago. Nonetheless, collaborations small companies are taken as quite important. The target for this department is not driven by values or by saving certain amount of money but rather by creating an inspiring case that can be used for internal marketing significance and change management.

Roles in the collaboration: Even though, there are not many collaborations registered with small companies so far, the few cases correspond to small companies that acted as suppliers.

Challenges: One of the most prominent challenges detected in this case is related to the lack of trust of the employees. This is reflected in the little readiness of the business to share information with the other party. There is a detected imbalance in the kind of information is revealed. As a consequence, people want to know as much as possible from the small company but they do not really trust them. This is believed to be also related to the not-invented-here syndrome. Another prominent fear among the employees of Beta company is the potential competition that might exist or could be created on the other side of the collaboration.

Moreover, it has been experienced by the person in charge of this area that after guiding the whole process where the need was already identified, the right solution was found along with the right supplier, the problem owner is not willing to do the effort to implement the solution when it requires changes. This is felt as frustrating by the people guiding this collaboration since it does not only represent a waste of time and money, but a loss in the reputation of the company since the collaboration must be ended because of the lack of willingness of certain employees. As a consequence, a prolific reason for a call off of the projects is that the importance of the need or solution is either not clear or low.

Success factors: Despite the challenges that this area in Beta company faces, there is the increased effort to overcome such problems and find solutions. This is supported by the acknowledge of the amount and range of capabilities that Beta company has. This also represents a big opportunity for small companies to go beyond the collaboration by establishing another one within the same company. This area also looks for the inclusion of the small companies in the designing of the roadmap and the establishment of clear and transparent delegation of activities.

Spiderweb Diagram Supply Enabler Innovation

Cluster 4: Research Divisions

Research in a new technology

Focus: This specific unit is focus on a new technology which is a highly complex subject. The people working for this unit are only working in this technology field and are separated from the other units within Beta company. Furthermore, they have special opportunities and a different level of flexibility while working. Collaborations with small companies are part of their focus since they help them to increase the momentum and reduce the time in the market which is crucial for new technologies. Generally, this unit is the technical supported, however, they must find the right alignment with the business side. One of the reasons why they establish collaborations with small companies are the flexibility of working with these companies.

Roles in the collaboration: The role of the small companies in collaborations with this unit can be everything. This is due to the fact that they are working in a new technology field. Therefore, they must create segments and diverse activities. On the side of the

collaboration, this unit is focused on the technical side. They develop a deep understanding of technical needs and what requirements exist and try to solve all these questions.

Challenges: When collaborations involve new technologies, it is a challenge to validate the idea in the first place. Sometimes, the expectations are too high and also there is time pressure. This can be turned into something positive. Other type of barriers is faced in the technical development. The collaboration can even break if there is not a clear agreement of the timeline or money involved.

Success factors: Uniqueness of the technology is one of the most important factors for this unit in collaboration with small companies. In addition, there should be a clear commitment on both sides of the collaboration in order to foster better collaborations. This is part of the business culture, which should not be underestimated, which is not mentioned but this reflects the commitment of the people. In addition, it is crucial to find the right partner. This is reflected in having the right conditions, the right people. The chemistry between the people is highly relevant which should be taken as an element with great impact in how the collaboration is developed.

Spiderweb Diagram Research in a new technology

Research subsidiary abroad

Focus: This unit is specifically focused on the research unit located in one of the subsidiaries abroad. This person interviewed is in charge of the process of incubation, where it is even encouraged to do something with startups. This might be different to how operational units work.

Roles in the collaboration: The role that SMEs have taken in collaborations with this unit was more as customers. These companies have asked for support to this unit. This approach is taken with the aim to transform them into future customers and to open up the market to new technologies. During the collaborations done, completely novel approaches were developed. The role of this unit during this type of collaborations is to coordinate the service given to the small company. This comes as a response to the intentions of some small companies to get the interest of such a big company like Beta.

Challenges: Among the diverse challenges that this unit faces, there is the constant fear of the small companies to share information. At the same time, both parties should be aware that novel technologies or innovation do not bring an immediate business after their development. Some hurdles are created internally because the unit or the employees become complicated. The attitude of the employees in Beta is considered to be sometimes arrogant but could be improved since it causes often some hurdles. However, one of the biggest challenges appear when the physical distant between the partners is too large, which makes the matching of agendas more complicated and the communication suffers.

Success factors: A collaborations is considered successful when the technology developed fits and works as it was planned. Some contracts demand a technical success and if it is the case, the commercial success which is often done by the unit. It is important that they are aware of the risk that working with small companies carries. Sometimes, the collaborations failed because the technical target was not achieved or because the market moved too fast and the technologies was already out of it. One key success factor considered by this unit is the trust building between the partners, reflected in a win-win situation. Even if the technical part was not achieved, it can lead to learnings without destroying the trust built. Furthermore, the constant contact with the small companies through meeting is very important for this unit. In these meetings, both parties should be open and willing to expose the current problems and possible solutions. In addition, it is

fundamental that the people involved in the collaboration understand the innovation culture of the other company because sometimes there are completely different. This helps to find better compromises without changing each other.

Currently this unit is working with key technologies capabilities. This is a new approach for the supporting processes in the company. There are twenty-one platforms doing that and in each platform, they have different kind of projects supporting the platform. This unit tries to follow up these projects from the beginning to track the whole development and use or support when necessary.

Spiderweb Diagram Research subsidiary abroad

Research: Technology & Incubation

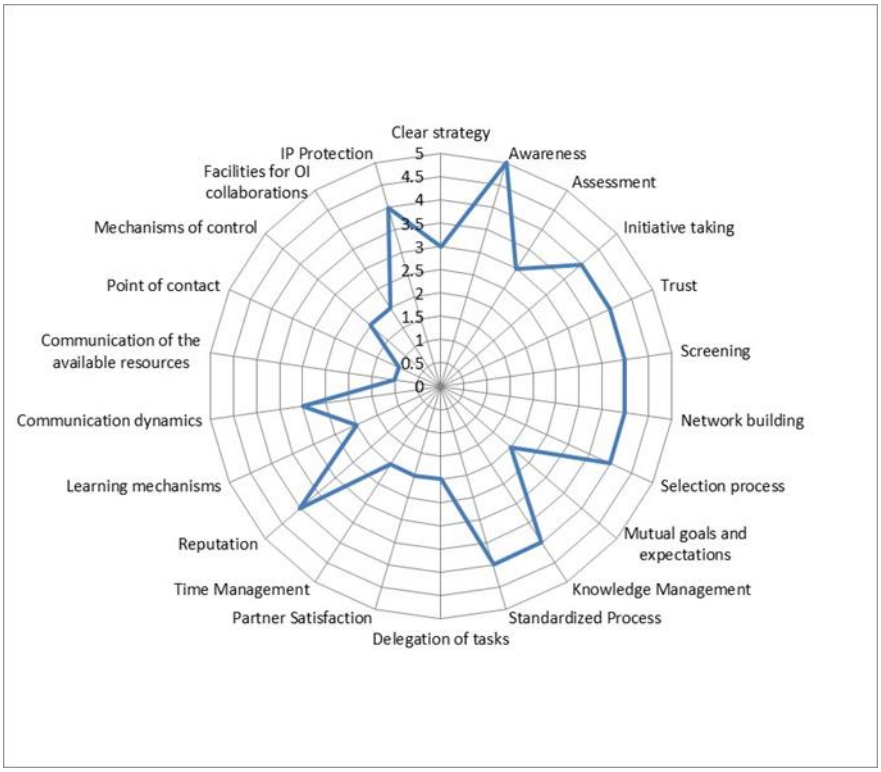
Focus:

Roles in the collaboration: The role of small companies in the collaborations sustained by this unit is of technology providers. In the case of the person interviewed in this unit, the role is to use the technology developed and integrated into the company. This requires understanding the technology offered by the partners and to identify where this

technology could fir in Beta company. They also act as the link between the potential market and a business unit. When the incubation is far enough, this unit steps out. However, the support for a certain period of time remains. A collaboration is considered successful when a technology is transferred to a business unit. Nevertheless, success can be seen differently, which can also be seen as the amount of financial benefit that the technology brings to the company.

Challenges: Very often Beta miss uses its power because sometimes, they prefer the small company to follow their rules. What this unit does about it is to set a scenario where the small company gets an income or a beneficial situation. For example, this can be done through the payment for the initial testing. Furthermore, the units sometimes do not have the time to deal with any potential market of the future since they are occupied with the daily tasks. Collaborations might fail when the solution was too expensive for the market or because our side was not prepared to buffer it. Sometimes, there are wrong assumptions and people are very enthusiastic about a specific technology. However, the most critical part is to find the balance between the two extremes.

Success factors: the freedom to operate, mostly in the incubation phase of technologies coming from startups is very important. However, it is very difficult to decide when to stop, therefore, clear stop criteria is crucial. On the other hand, there should be a balance to also fight for the technology. People network is also considered as a key element for successful collaborations with small companies. There is the need of a strong entrepreneurial power in the company which is not often found in big companies like Beta. This is one of the reasons why disruptive innovation are not as obvious as they should be in organizations like Beta.



Spiderweb Diagram Research: Technology & Incubation

Research: Technology Incubator Subsidiary abroad

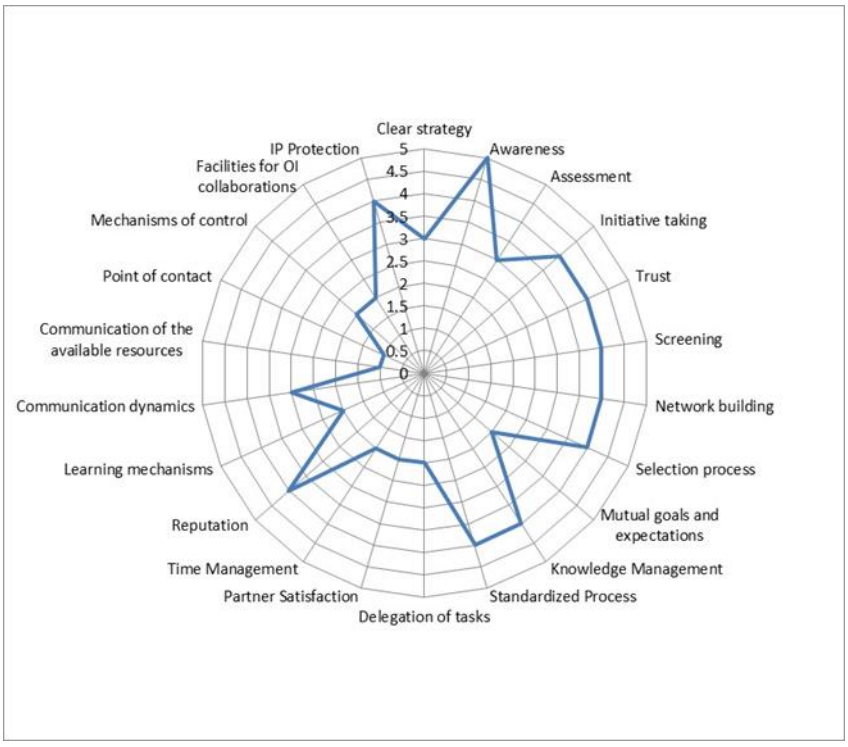
Focus: The aim of this unit is to look for new technologies for Beta company. This also includes new business models. They specifically focus on non-core fields of the company. The filter to select small companies is often through the business models and exit strategies.

Roles in the collaboration: Sometimes, the role of the small companies can be licensing when they are technology driven. Some other companies are just looking for investment. It really depends of the company and the business model. The role of this unit, specifically of the person interviewed is as a project manager of the technology, the legal part indirectly with the support of the legal colleagues. The focus is on the early stage of scouting which is managing the steps in terms of development, targets and so on.

Challenges: One big hurdle in the company is that they have very few people interacting with small companies. The second biggest challenge faced by this unit is the internal alignment. This is difficult to achieve. In part, this has to do with the culture in the company to reach a certain level in the individual career and personal benefit. This

increases the complexity when an idea has to be approved. They just need one person against to know that the project will face many difficulties. Furthermore, it is detected by this unit the lack of tools for better communication between the partners. Normally, when a collaboration fails is in the expectations of Beta company. Most of the colleagues have the same expectations with small companies than with large companies. They do not know how the small companies work.

Success factors: One important factor missing in the company according to this unit is the cultural openness to small companies and to understand the need to find a compromise while collaborating with them. The communication is highly relevant to succeed in these collaborations. It has to be clear and with sensitiveness towards the small company.



Spiderweb Diagram Research: Technology Incubator Subsidiary abroad

Cluster 5: Smart Innovation & Technology

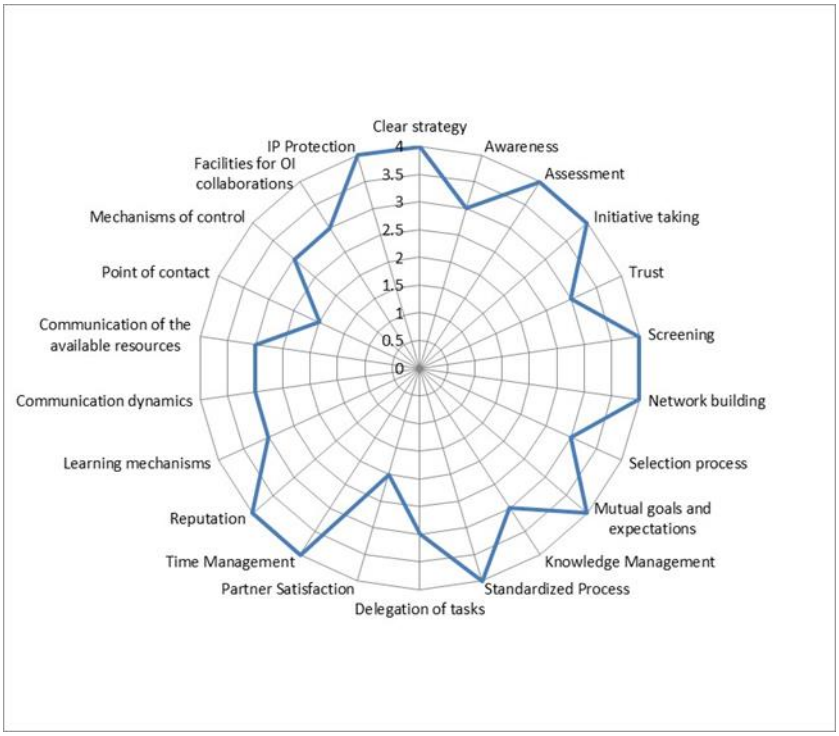
Smart Innovation & Technology

Focus: This unit represents a senior project, which is directly reporting to the Board of Beta company. This unit in particular gets a lot of attention but also pressure and responsibility. This unit is divided in different clusters which are translated into topics. The person interviewed is in charge of heading the scouting process in the topic of smart innovation and technologies. The purpose of this topic is to look into different areas of innovation. This unit considers the scalability of a project as fundamental when they look for startups.

Roles in the collaboration: The most prominent role that the startup takes when collaborating with this unit is the one of innovation vendor. This unit aim to benefit from the ready to use product of the small companies. They want to use the innovation to become better in diverse areas within Beta. They do not do any co-development. There is no interest in acquiring them or integrating them into the company. This goes as long as the startup is not part of the core competencies of the company. The task of the person interviewed is to go to the market and find the startups that have the technology that can bring Beta company to the next level. The role of the interviewee is on the one hand as responsible of the scouting process which means to look for startups. On the other hand, to represent Beta company in terms of digitalization to the outside world.

Challenges: The consider that Beta company is not ready to deal with small companies as vendors or customer. This is because Beta has its own standard processes and these are meant for collaborations with other large companies. This is also reflected in the payment terms of 60 days which kill the startup at the end. One of the most dominant challenges is the speed in the company, mostly when the small company requires fast answers from the large company. Furthermore, the easiness of the internal processes of Beta is also a challenge. There are a lot of requirements needed for small companies in order to collaborate with Beta. This issue is also related with the mindset of the people. Some employees rely heavily on the already established big collaborations. Nevertheless, this is improving. The reason why some collaborations fail is due to high expectation management.

Success factors: It is crucial to find the startup with the solution that the person or unit needs to solve their problems. At the same time, they have to be willing to implement the solution. There is a perceived cultural change towards working with startups in the unit. It is believed that there is a big rethinking process going on, in which more entities or units are doing a great job.



Spiderweb Diagram Smart Innovation & Technology

12.6 Protocol for Interviews with SMEs

Biotech company (Direct citation)

Working together with the Betha company for already 3.5 – 4 years.

Relevance of the collaboration

Reason to engage in these collaborations: the sexiness of covering the entire value chain in different industries and different applications, it is of course, very difficult to execute by a small company and on the other hand, we are very much technology driven, it is also

not the sexiest part of making money. That's why collaborations with larger companies make sense.

Importance of these collaborations for the small company: for us, it is very important but you cannot generalize but for us it is very important because there is the issue of complicated value chain and to have a very strong partner there, that's of big help. At the end, which of course plays in, we prefer to also have these big companies to later buys us because we have invested in the company and we have to sell it sooner or later.

Role of the SMEs in the collaboration

Most of the time, we are the technology providers. How we also see ourselves is as technology experts.

Biggest Challenges found in these collaborations

- Trade-off with daily business is always a challenge

Perceived importance that large companies put in these collaborations: Most of them are doing a bad job in terms of evaluation. On the other hand, if you come with a new technology, everyone likes it, but the big issue is that they have their daily business going on and there is always a competition between the daily business and new stuff coming in. Then, you come with something new and everyone loves it but they don't have time to check it.

Number two is that sometimes we are in competition with their R&D, like they are super proud in developing new stuff but when external companies come, they are not that happy because it is not developed in-house. That's of course, from our stand point it is quite unfair, because very often from the startup perspective because you have a better product or technology, because of political reasons or because the R&D is upset and so on.

- Decision making processes are difficult to understand

- Entry points into corporates are mostly inexistent or not well defined

From the small company perspective, it is very difficult to have a good first touch point towards the large corporations. Of course, there is the corporate VC fund, there might be

a new business department and so on, but very often, with the large companies you approach them and nobody knows actually, who could be responsible and nobody knows per definition to have an overview of the product. The most important thing is to have a good touch point for small companies which can then, let you start the whole process.

Break up points:

- Pace, when they are too slow. We are moving in a very high frequency because we have to move very quick.
- Not clear strategy in Open Innovation. At the end, everyone likes it but they don't have a structured process on how to continue, that might be another reason for that.
- Budget. If there is not budget for doing new stuff, of course, that's an issue as well.

Success factors and strengths:

- Speed. How quickly they react. Very often the smaller they are, the quicker they are.
- Transparency. That it is transparent how they work
- Willingness to pay large amounts as early as possible because that counts for us.

❖ **Attitude (mindset) towards these collaborations:**

In general, when you are an innovation and technology provider, per definition everyone loves you, everyone likes what you do. That's for a small company something that should be fantastic, you can be proud of but it is then, very difficult to translate that aspect into a business or into a larger collaboration.

In my opinion, one of the most important advices for large companies is that you have to establish some kind of channel where you communicate problems that you have. People in large corporations are very proud and of course, communicating problems is something that they are happy about because officially there might be any problems.

Dynamics of the collaboration:

Trust experience: very high trust, it is always based on the people. We were very lucky. It is trust in both sides because from our side as the technology provider and from the side of the big company with being open and not reluctant in saying secrets.

Identification and selection of potential partners: each startup company has little resources. In general partnering is very important. Partnering is mostly done with large companies for the commercialization when they have the same clients or the technology that we can supplement.

Mutual goals and expectations: to be honest no, that's also something is very difficult. Rule number one is to see is there is any strategic link between the companies. People are not really aware of the goal (current collaboration with Beta company) because we haven't even put it in the contract. The most important thing for us is the pay. If you come with clear goals, most of the time, the process will be efficient, so it will be quicker. I know also, that it is difficult to come with deadlines, the probability that they will be taken serious is quite low.

Timeframes: time is mainly managed by the large corporations, very randomly by the small corporations

Delegation of tasks. It is done as it goes and even with the current collaboration, in the decision-making process, nobody knows how it is on Beta company, because there are so many people involved. Sometimes startups are like kids or even teenagers and you have to take them by the hand through the processes, because they can be silly.

Efficiency of communication with Beta company: that's a very good and important aspect. That means that relatively high response rate.

Benchmark of the collaboration with Beta so far: 3

Recommendations from the SME´s side:

If you have a clear and defined path for every technology company that approaches Beta company, and it is always the same way, both parties can exit everywhere during the process, at least to give orientation to small companies. That doesn't mean to standardized stuff. That would be at least I know if I approach a company this and this

will be the steps and those will be the goals, that would give me more confidence and would probably increase the motivation on getting from one step to the other.

I can only image it if you are a large corporation and as I said, the resources of the small company are quite small, I would always give away my product for free because usually, most of the time it cannot be afforded and throw it into the whole university innovation ecosystem and see what happens with them.

Communication dynamics: it would be cool to have just one tool where one new innovation project comes in and that contains all profiles from people being involved, that contains all documents that have been exchanged. That includes chat communications, not that many emails back and forward, that would be a quite cool thing if I open some kind of data room and communication room for a new target. That could be something that could make Beta company to distinguish itself. You make a platform out of it, where you share your problems or the challenges that you have because that's where open innovation leads to open collaborations. You could even make fun out of it and put a gamification component on top of it. But that comes again that you have your clear defined process. (Batch component in people as it is done in 4square).

Shared facilities: we are little in resources and that means for production facilities, it is not pickleable for each and every project, to use them, although they might have 100% occupancy, that's something very valuable.

IP protection: it comes again to trust. I think it is very dangerous for large corporations if you generate bad chapters in this regard. If you do a very detail diligence in a company, you don't invest and then, later on use only the information. That could have a bad impact in the reputation of the company. That's one aspect and the other aspect is that's the job of the small companies, you got to make sure that the contracts are fair and you cover your interests.

Advice for corporates

- Give away for free whatever you have (ala Google)
- Allocate 5% of your R&D budget on external innovation
- Implement a lean start-up aka. failure culture

- Increase efficiency and power of tech scouts within corporation
- Ensure support through top management
- Provide an easy entry point + overview of your corporation
- Set up a clear strategy on (external) innovation
- Use corporate VC as communication platform to start-up scene
- Communicate your problems, try open innovation platforms

Advice for start-ups

- What do I bring to the table? (be bold)
- What's the relevance for them? (strategic fit considerations)
- Precise project management
- Clear proof of technology
- Clear compensation strategy
- Find your promoter within the corporate
- Consider approaching not only the Goliaths
- Understand your industry and the big changes / trends
- Try a market pull approach by tackling the client's client
- Know what it means to get a supplier to large companies

License partner. The small company bought the license. (4 people in total in the company)

Role of the SMEs in the collaboration

Personally, I was in charge of the market launch because the technology was close to be in the market and I think this was a mistake because it was not. if you start a collaboration like that, you should have the team involved since the early beginning even the technical side and also the marketing side. For me, the mistake was to start with only technical people and then get somebody in the mass to have a market view and then two worlds coming together. If you start something like that from the early beginning, it is much better.

Biggest Challenges found in these collaborations

What we need is technical support and financial support. This would give a good feedback to Beta company.

They always change the rider of the horse. The leader of the startup in the big company. Everybody has a different perspective, which is fine, because it is as well, person related.

How the challenges overcome: You need a high level of self-motivation. On the other side, you need positive aspects. You need little successes to keep the motivation high.

Here, there are strict processes that the startup has to follow. I think it is good to stablish processes in a certain way, but you need certain flexibility depending on what you have. Not every product or technology would fit into that frame. We do not have a process like that (the startup), but we have internal processes as well. You need to have certain rules, otherwise, everybody would do what he/she would like to do. For startups and for new innovative products, you need a certain flexibility.

IP protection was not a problem because it was already part of the contract. It was integrated in the contract because it is a technology that is licensed.

Overcoming challenges in the communication dynamics: Clear defined processes would help and a better understanding from the early beginning to make everything clear. You need the partners on the same level. I think everything is easier when you have the feeling you are on the same level. You need to bring it on the same language code.

Success factors and strengths:

For me, the most important thing is to have the right people in the right places.

Is the current collaboration considered successful? We have been successful, a little bit but not as we needed to be.

Attitude (mindset) towards these collaborations:

Arrogant. Very simple, easy. Because they thought we come like God and they have to run after the technology (Beta perspective). I think we have to separate having a product only and the technology. The technology is much more and big companies should not underestimate when small companies have certain technology knowledge. They (entrepreneurs) start from the early beginning with their own hands and they know what they do. Beta company sometimes is coming as the big company name and they have great products and it's a good company but for me it was a top down, we are here and the customer is far below. They think everything has to go as they would like to have it. I think sometimes, they do not really understand what we are doing because they have never done it by themselves.

Employees are willing to establish collaborations with big companies. Even, when someone give feedback (good), they are proud, completely different behavior than big companies.

They are proud to work with Beta company as a big company. When they have a problem, they say if they can ask Beta company because they might know it. So, there is a high respect level to the knowledge of Beta company.

Dynamics of the collaboration:

Trust experience: difficult question and difficult answer. I would wish as a partner, when you have a partnership, trust is the most important word. You must rely on your partner and the partner has to rely on you. This is always related to people itself and this makes things difficult, because everybody has a different behavior

Identification and selection of potential partners: we start with a market cluster. We do have a specific way how we go forward. We have to make sure that we can have the quick wins so we can get certain load of the plant itself and then, you also have the long time running projects.

Mutual goals and expectations: Yes, we have. Even the project that we have now with Beta company has its goals through the whole Phase gate process and even the customers get certain perspective because we need to reach these goals in a certain timeframe and we have to give feedback why we are not in the position we needed to be because we have to pay a high license fee. If we don't get the money, if Beta company

is not earning the money, then, they have to report that the business is not there. The reality is different because we haven't reached the goals. Timeframe was not established. It was as quick as possible.

Point of approach: in this case, it was the startup who approached Beta company, it was easy to get to the person in charge of the technology. The technology was already well known in the market.

Delegation of the tasks. There was not delegation of the tasks.

Benchmark of the collaboration with Beta so far:

Recommendations from the SME´s side:

My recommendation would be that they should come and work for 4 weeks to see what they all have to do.

If I have a good product or a good technology, if I decide if I give it outside, I already take the partner from the early beginning and I do not have something finished and try to sell it. Or they do it as an independent company, they have the money.

Reputation: I think Beta company can do more. I think the potential is not really used and this could help even smaller companies to go into collaborations to make them successful as well. To help our customers to be more successful.

Importance of communication for the external partners that are not even in known industries.

Collaboration that failed

Relevance of the collaboration

We are a very small company specialized in R&D, therefore, production or distribution are not our focus. For this part, we are looking for collaborations, actually we are collaborating with big companies, so, I think it is very important to have the opportunity to work with other big companies such as Beta company.

Role of the SMEs in the collaboration

Since we are a company focusing on R&D, we are working with different kind of companies (supplier, customer and cooperation partners)

Biggest Challenges found in these collaborations

- Trust (Key point).
- Unilateral Information sharing
- Not invented here
- "Asking the turkeys for Christmas

Challenges faced specifically with Beta company: The collaboration was not successful. The big challenges were the unilateral information sharing, because all the time many things were asked, we had to send many documents and there were very few answers send to our side. If we had questions or asked for market data or other stuff, they didn't answer or it was very little information. At the moment or right now, I think they haven't answered to our questions. They weren't able to send any data, but I think it is maybe better to have said that they do not know. That was one of the break up point. Another point was the non-invented here syndrome. The first contact was inspiring. But when we then talked to the people in the department, they commented that it was not very new and they could do it on their own. There was like a break between these two departments. In our case, the only thing that seemed to be interesting was the patent. There was no more communication about the direction of the collaboration. There are other things belonging to a collaboration than a patent. There was no discussion on how to collaborate in the production, for example, or in the formulation or in the possibilities of distribution or anything more than patents.

IP Protection. Too strict that it blocks the collaboration.

Conflict management: for us, time is money. It is very important to have a clear timeframe

Success factors and strengths:

- Short communication, talk to the right person who is in charge to make decisions

- Confidential agreement
- Agreement (who is in charge, who is the owner, what if the project fails,
- Openness, no tricks
- Company should be open for innovation, not only the marketing department but also the employees (lose jobs/ competition)
- Employees must be aware of the coming big challenges// problem: big fear to cut their own jobs??

Attitude (mindset) towards these collaborations:

- Small company are mostly very specialized in for example R&D, other areas like production or distribution are parts to be some kind of outsourced, big companies sometimes are working with different methods/materials for a long time, experienced in this field so there could be a great overlap
- Collaboration in using devices, lab space,
- Distribution
- Cooperation in the development of products or technologies
- Overcome barriers to market entry
- "Nobody will be fired for buying IBM!"
- Early customer testing

When we started thinking in such collaboration, there were people who were with some kind of fear, because they already had contact with such big companies and they said that they only want your idea, to be careful with that and everything you are telling them, they will use it for their own purpose. This was kind of critical. Fear is the most prevailed factor.

With us, they (Beta company) had a special way to talk to us like they are that big and we are very small.

Dynamics of the collaboration:

Trust experience: Trust is one of the most important points of the collaboration because you can have many confidential agreements but in the end, confidential things are discussed and confidential things are shared. We are willing to share as much as it is

needed. I think one part is the sharing the information, because without that, it is very hard in an open way.

Identification of the potential partner and point of approach to big companies

- Different events specialized in “your field”
- Depends on what kind of collaboration
- Early stage come back with further data new people in the job inside the company next meeting

Mutual goals and expectations: in the special collaboration with Beta company, there were not goals nor something written down. But I think it is one of the most important points to make clear what is the role of every partner and who is charge of which part.

Timeframes: (it is done within the company)

Delegation of tasks. (it is done within the company)

Reputation to the external partners:

- From our own experience Beta company has got a negative reputation
- No Collaboration-Spirit
- Only question patent
- So “they” got all information they needed, there was no communication about further possibilities, further products, other ways of cooperation,

Other SMEs describes Beta company as:

- very arrogant way to talk to start ups
- discredit
- “they” only want your idea/patent