

# A comparative study of innovation-related knowledge acquisition strategies by boundary spanners in small and medium-sized companies within the DACH region

A Master's Thesis submitted for the degree of  
“Master of Business Administration”

supervised by  
Assoz. Prof. Dr. Peter Keinz

Dipl.-Ing. Stefan Niedermair, BSc

00403011

## Affidavit

I, **DIPL.-ING. STEFAN NIEDERMAIR, BSC**, hereby declare

1. that I am the sole author of the present Master's Thesis, "A COMPARATIVE STUDY OF INNOVATION-RELATED KNOWLEDGE ACQUISITION STRATEGIES BY BOUNDARY SPANNERS IN SMALL AND MEDIUM-SIZED COMPANIES WITHIN THE DACH REGION", 135 pages, bound, and that I have not used any source or tool other than those referenced or any other illicit aid or tool, and
2. that I have not prior to this date submitted the topic of this Master's Thesis or parts of it in any form for assessment as an examination paper, either in Austria or abroad.

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## Abstract

Small and medium-sized enterprises are the base of many economies. In order to innovate, research has found that these companies rely heavily on knowledge exchange with entities outside the company boundaries. These exchanges are enabled and orchestrated by individuals inside the company known as boundary spanners. This study aims to get a better understanding of how these individuals fulfill this role and what flows of information they make available to the company.

Semi-structured interviews were conducted with seven experts from different SMEs in the DACH region. The interviews were analyzed using a 5-step framework developed to visualize the flow of different external streams of information through the company's boundary to internal channels of dissemination. These flow graphs then offered the basis for the investigation into the knowledge sourcing strategies pursued by the companies.

The analysis shows that boundary spanning individuals enable almost all knowledge inflows in the observed companies, and many require direct personal interaction. The actual sourcing strategies they employ are, however, dependent on the individual circumstances and needs of each company as well as the industry in which they fall. These strategies can range from extensive general searches to highly focused ones. The study also shows that the use of new technologies by boundary spanners is only meaningful under particular conditions, where the information needed is available on the internet. Companies that need access to more sensitive information depend on the direct exchange with a boundary spanner. A further finding is that the boundary spanners' ability to provide meaningful knowledge to a company does not only depend on his skills and personality traits, but also the means available for internal knowledge dissemination.

This study concludes that boundary spanning is a key enabler for innovation in SMEs, which cannot be adequately replaced by technology or other mechanisms. The ability to build up meaningful relationships and the creativity needed to make connections between a piece of information and the business context are crucial abilities of boundary spanners in this context.

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## List of abbreviations

SME(s)	Small and Medium-sized Enterprise(s) <sup>1</sup>
R&D	Research & Development
IoT	Internet of Things
IP	Intellectual Property

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<sup>1</sup> As defined here: [https://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition\\_en](https://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition_en)

# 1. Introduction

The world, as we know it today, is faster paced and more connected than ever. It seems more than reasonable to describe the business environment and the world in general as VUCA (volatile, uncertain, complex and ambiguous), particularly in light of the COVID-19 pandemic, ongoing climate change and increasing global frictions (Bennett, 2020; Warrell, 2020). This is a time where companies of all sizes need to be able to innovate in order to adapt and leverage opportunities in this fast-changing environment.

In Austria, 99,6% of all companies are Small and Medium-Sized Enterprises (SMEs)<sup>2</sup>. They employ approximately 2/3 of the total workforce and generate over 60% of all revenues (BMDW, 2020). For SMEs, innovation is a blessing and a curse at the same time. On the one hand, these companies are said to be much faster to react to a changing environment than large enterprises. On the other hand, they often lack the financial and personal resources to do so. This opens the question: How do SMEs stay innovative?

The answer to this question is often through cooperation and collaboration (Vanhaverbeke, 2011). The term nowadays, typically associated with this behavior, is open innovation. In open innovation, flows of knowledge through the company's boundaries are used to fuel its innovation performance (Chesbrough and Bogers, 2014). They could happen with different external entities, including other companies, private people, or research facilities. These flows, however, do not happen by itself but need to be diligently initiated and orchestrated. A particular kind of employee within a company flourishes at such tasks and is referred to as boundary spanner.

Boundary spanners are individuals who actively engage in exchanges, build up connections, and gather information outside the company. This concept is not new. However, in recent years new technologies, such as online social networks or video chats, were developed and found widespread adaption. These developments should make it much easier to find and interact with individuals and organizations around the world and facilitate boundary spanning activities, which in turn should improve the grounds for open innovation.

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<sup>2</sup> The prevailing definition of Small and Medium Sized Enterprises (SMEs) in Europe is given by the European commission as companies that (1) have a staff headcount smaller than 250 people and (2) either turnover of no more than €50 m or a balance sheet total of no more than €43 m (European Commission, NaN).

Studies on open innovation in SMEs have highlighted certain preferred sourcing strategies. They have shown the benefits of some of these strategies on innovation performance (Brunswick and Vanhaverbeke, 2014), while others have demonstrated how a whole SME ecosystem of collaborators can depend on the actions and coordination of one central boundary spanner (Vanhaverbeke, 2011). Studies on boundary spanning have been extensive and analyzed the characteristics of such individuals (Tushman and Scanlan, 1981b) and their influence on the innovation process (Hsu, Wang and Tzeng, 2007).

There is, however, a lack of understanding of how boundary spanners actually manage the flows of knowledge across company boundaries in the context of open innovation in SMEs.

### 1.1. Objectives and course of investigation

Within this context, the objective of this thesis is to investigate the concept of boundary spanning in SMEs, in light of the external connections established through open innovation and the broad availability of technologies supporting boundary spanning. By looking at the knowledge acquisition strategies of companies through the eyes of boundary spanners, this study aims to get a better understanding of how these individuals actually fulfill this role and what flows of information they make available to the company. In doing so, this study aims to investigate the following question:

#### **How do SMEs use boundary spanning to improve their access to external sources of innovation?**

The thesis looks at three distinct aspects of the boundary spanning process using the following guiding questions.

1) Which external sources of innovation are used by SMEs?

The first aspect **explores the spectrum of external sources** that are used by SMEs compared to typical external sources of innovation considered within the open innovation literature.

2) How are these sources accessed?

Which channels are used to access them? What role does the boundary spanning individual play in this process, and which competencies and abilities do they need? What role does technology play in this exchange?



This line of investigation will give a clearer picture of **the external aspects of the boundary spanning role** today.

### 3) How are these flows of information managed internally?

How is the collection of information managed? Is it done by individuals or systematic? Is this a group effort? How is information disseminated internally? What happens with the collected information?

These questions will help to shape a clearer picture of the **internal aspects of boundary spanning behavior**.

## 1.2. Methodology overview

To explore these questions, the author chose a comparative explorative case study based on semi-structured expert interviews. The author interviewed 7 experts from different SMEs located in the DACH region at the beginning of June 2020. The interviewed companies span a range of industries and produce digital and or physical products that they sell to a broad set of industries including automotive, aviation, telecommunication, oil & gas, and medical equipment manufacturers. The interviews were conducted in a semi-structured way and followed a pre-defined sequence of seven leading questions with optional sub-questions, meant for refinement. Based on the analysis of relevant literature, a framework was developed to visualize the flow of different streams of information into the company as a graph and to highlight the importance of different types of information, sources of information and channels of access to these sources. For each case, information from the interviews was extracted to build such a graph first to analyze each case individually and then to find patterns across cases.

## 1.3. Structure of the thesis

The thesis is structured in five chapters. Chapter 1 presents the context and motivation for the thesis, defines the research questions, and gives an overview of the methodology used to answer these questions. Chapter 2 aims to provide the necessary theoretical background on the topics of boundary spanning, in particular the boundaries that need to be spanned within the context of open innovation. An overview of new and emerging technologies that could facilitate boundary spanning concludes this chapter and offers a frame of reference for the analysis. Chapter 3 describes the research design in further detail and introduces the framework that was developed to analyze the flows of information coming into a company.

It then provides an overview of the cases and the data collection process. Chapter 4 discusses the results and findings. Chapter 5 starts by interpreting the results of the study and offering insights into scientific and managerial implications. The chapter concludes by discussing the limitations and potential avenues for future research.

## 2. Literature Research

This chapter will give an overview of the relevant literature and build a frame for the research conducted in this thesis. It starts by defining some general terms used throughout this thesis and continues by introducing the concept of boundary spanning. In the next part, the concept of open innovation is introduced, and the relevance of boundary spanning is highlighted within this context. The chapter concludes with an overview of the current status of technologies that could support boundary spanning activities in the given context.

A few terms that will be used throughout this thesis need to be defined since some of them can be used interchangeably in everyday life. The terms are **type** of information, **source** of information, and **channel** of access and refer to **what**, **where**, and **how** information was acquired.

Definition of the **type of information**:

The type of information refers to the category that an item of knowledge is associated with. Examples for such categories, among others, are general trends, customer needs, new regulations, patents, new technologies, abilities of partners, developments of competitors, acceptable pricing, or designs.

Definition of the **source of information**:

The source of information refers to the entity, system, or aggregator through which the recipient got exposure to this information. Examples for such sources are customers, suppliers, blogs, or news outlets. It is essential to distinguish between the source of information in this context and the original source of information. E.g., Company X releases information about a new development. The editor of Newsletter Y receives this information and aggregates it with other information and sends it out every week. Company Z is a subscriber to Newsletter Y and receives the information through this newsletter. For

Company Z, Newsletter Y would be the source of information, while Company X is the original source of information.

#### Definition of the **channel of access**:

The channel of access for a piece of information refers to the way the information reached the recipient. Possible channels include direct interactions with customers or suppliers, insights from data, online and offline desk research, or visits to trade shows.

In the example mentioned before, the channel of access would be through subscribing and then reading Newsletter Y.

Finally, certain technologies facilitating this exchange can be used by a company or individuals in order to improve access to information. These technologies often act as a source of information or as a channel of access. Typical examples are search engines, e-mail, or video calls. Technologies that are particularly interesting in the context of this thesis will be described in 2.3.1.

## 2.1. Boundary Spanning

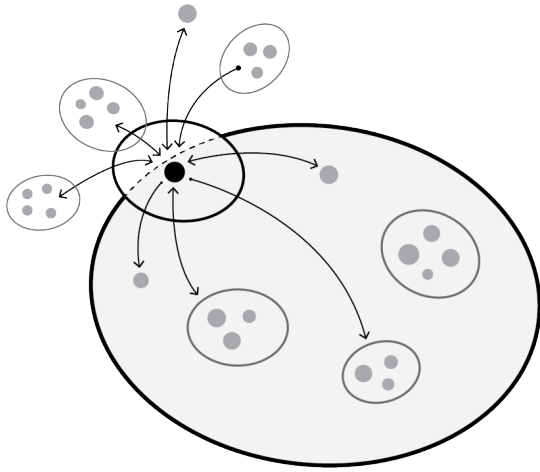
Boundary spanning is a process that creates links between at least two different entities, a group which the boundary spanner belongs to, and one or more external groups. Research has investigated this phenomenon in multiple fields, including a general exchange between groups, international diplomacy, and labor negotiations (Friedman and Podolny, 1992). In the context of business, boundary spanners facilitate the access and exchange of resources and information across company boundaries (Haas, 2015; Tushman, 1977). It is thereby irrelevant if information and resources flow into or outside the company. In many cases, it is a combination of both. Figure 1 illustrates the connections boundary spanners can establish, which include external organizations (companies, academic institutions, public bodies) or individuals, and internal groups or individuals.

The article mostly credited for linking boundary spanning to innovation practices and highlighting its importance was written by Tushman, who introduced the term boundary spanner in his article “Special Boundary Roles in the Innovation Process” (Tushman, 1977, p. 591). Since then, the importance of boundary spanning<sup>3</sup> for innovation has been reinforced by a broad consensus in the literature, as it reduces risk and uncertainty, grants access to

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<sup>3</sup> Including its sub-categories, particularly the gatekeeper (see 2.1.2)

external information, facilitates collaboration with external actors, and can increase innovation performance (Fjeldstad *et al.*, 2012; Hsu, Wang and Tzeng, 2007; Hung, 2017; Tushman, 1977).



**Figure 1:** Boundary spanner (black dot) with interactions inside and outside his company

Research typically refers to boundary spanners as informal roles (Allen and Cohen, 1969; Kleinbaum and Tushman, 2007; Piller, Mitra and Ghosh Mitra, 2019), that emerge naturally within a company (Friedman and Podolny, 1992, p. 45; Tushman and Scanlan, 1981b) and can usually not be found in an organizational diagram. Studies have shown two factors to be strongly related to boundary spanner status. The first and more important one is the perceived competence within a subject (Hsu, Wang and Tzeng, 2007; Tushman and Scanlan, 1981b). An individual who actively distributes new information on a subject of interest is more likely to be perceived as competent and will be among the first people to ask for further information on that subject. The second factor that is contributing to the boundary spanning role is the formal status within an organization (Hsu, Wang and Tzeng, 2007; Tushman and Scanlan, 1981b).

The causal relationship between boundary spanning and status is subject to speculation (Tushman and Scanlan, 1981a). On the one hand, a higher status might lead to more exchange opportunities with external sources. On the other hand, the same characteristics that make good boundary spanners and the value boundary spanners bring to the company might increase their chance for promotion. Tushman and Scanlan argue that perceived competence, formal status, and boundary spanning behavior reinforce each other (Tushman and Scanlan, 1981b). Haas summarizes in her review, that “It takes several competences

which are hard to develop to become an efficient boundary spanner, in particular, breadth of intellectual expertise, social contacts and personality traits enabling the individual to be accepted by different groups” (Haas, 2015, p. 1034).

Boundary spanning can benefit a company in multiple ways. One of the primary advantages of boundary spanning is that it gives a company access to resources and information that it would otherwise not have. Even if the company would get certain information eventually, the direct connections built up by boundary spanners can help to get this access much earlier (Hsu, Wang and Tzeng, 2007), providing an advantage for the company. A broad spectrum of external sources of information can help decrease uncertainty, an ability particularly valuable in a fast-changing environment (Tushman, 1977). At the same time, the breadth of access to knowledge can also be leveraged to better deal with problems that have a high level of complexity (Tushman, 1977). By tapping into a network of suppliers, customers, and competitors, a company might find solutions for its problems that were developed in another context, or it might find partners who can help solve the problem. Finally, Hsu, Wang and Tzeng argue that “Early access to different perspectives and information is important in providing a basis for innovative ideas.” (Hsu, Wang and Tzeng, 2007, p. 1135)

While in theory, any person with external contact points could be a boundary spanner, Tushman and Scanlan suggest a clear distinction between informational and representational roles when it comes to boundary spanning. Representational roles in this context are responsible for pure transactional interactions like buying or selling goods. Unlike their informational counterparts, they do not disseminate relevant information within the company (Tushman and Scanlan, 1981a). Within this thesis, pure representational interactions are, therefore, not considered. It is, however, essential to note that the functional role alone is not an indicator of representational or informational status. A sales representative, for example, could carry plenty of information gathered from customers back into the company and act as a boundary spanner.

Boundary spanning is not only limited to company boundaries but also happens beyond departmental or functional boundaries within the company (Tushman, 1977). While these interactions offer an exciting field for research, especially within large corporations, in the context of SMEs, this behavior is less relevant and will not be considered within this thesis.

### 2.1.1. Boundary Spanning as a 2-step process

The literature describes boundary spanning as consisting of an external and an internal part where the external step is responsible for information acquisition, and the internal step is related to the dissemination of the information inside the company (Allen and Cohen, 1969; Tushman, 1977; Tushman and Scanlan, 1981a). Each step requires very different skills and abilities, but a successful boundary spanner needs to combine both (Tushman and Scanlan, 1981a, 1981b).

The first step is the **external access** to information and resources. One prerequisite is a high amount of relevant external connections (Allen and Cohen, 1969). A boundary spanner could gather these in a wide range of ways, including current and previous work-related activities, educational background, or private interactions. Research shows that boundary spanners tend to specialize in a specific field of expertise (Tushman and Scanlan, 1981a). This specialization is not surprising, and multiple factors contribute to it. One such factor is the context in which a new connection is made. New connections are often either made in a work-related context and thereby directed at a specific field or industry, or they are based on personal interest in a particular topic. Either case will narrow the scope of new connections that an individual actively looks for.

A further reason for specialization is the recoding of information that needs to happen at the boundary (Tushman and Scanlan, 1981a). Previous research argues that different companies or professional communities can have different vocabulary, beliefs, coding schemes, or conceptual frameworks. A boundary spanner needs to have the ability to interpret information shared by either side and translate the knowledge into a form understandable to the other side (Tushman, 1977; Tushman and Scanlan, 1981a). A simple example of such a mismatch in conceptual frameworks might be the understanding of what a fast decision is. For a large company or a governmental body, a fast decision might be reached within a few weeks, while for a small company, fast might refer to a few hours maximum.

Boundary spanners have also been found to differ based on the type of external source they use. While some prefer to rely on oral sources, others prefer literature (Allen and Cohen, 1969).

The second step in the boundary spanning process is the **internal dissemination** of information. In many cases, the boundary spanner himself will not be the final user of the

gathered resources or information. Dissemination then refers to the act of finding the right channels internally to hand it over for further use inside the organization. Literature shows examples of this being a push and a pull process.

Dissemination as a pull process refers to instances, where access to specialized knowledge or resources is needed within the company, and boundary spanners are approached in order to get access to them. Early work on boundary spanning emphasized this line of thinking by investigating the phenomenon from an internal perspective. Tushman and Scanlan started their paper with the exemplary problem of a laboratory technical staff requiring up-to-date market information but not knowing whom to approach (Tushman and Scanlan, 1981a). As boundary spanning is not a formal role and it is subject-specific, finding the appropriate person might be a challenging problem. This challenge can, however, be mitigated by the fact that boundary spanners are also well connected inside the company (Tushman and Scanlan, 1981a, 1981b).

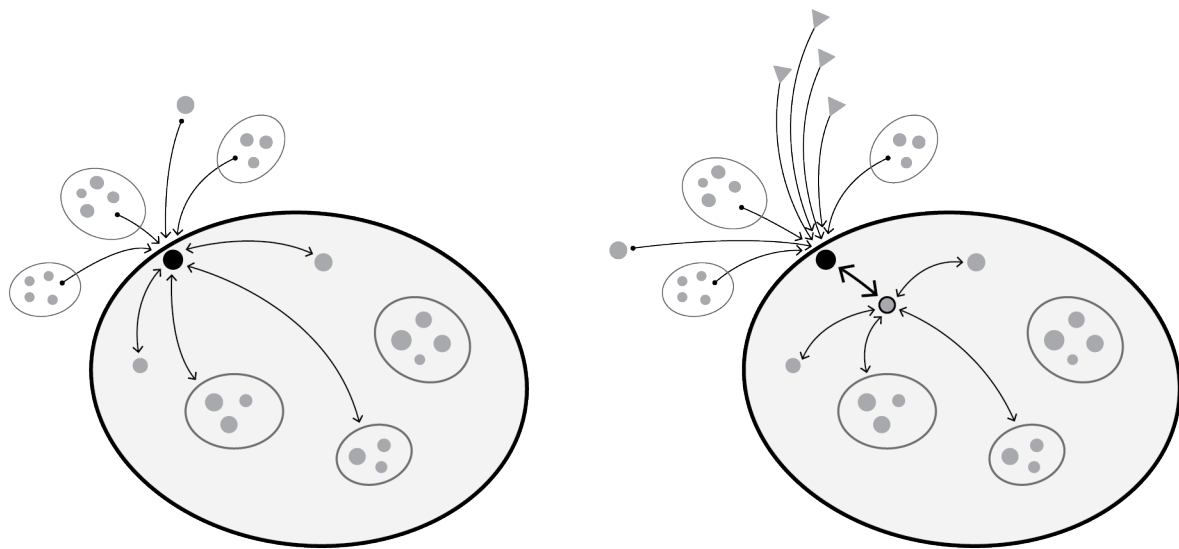
The internal network also helps the boundary spanner become aware of new challenges or projects different people and departments are working on. This knowledge is essential for the push aspect of dissemination, where the boundary spanner actively tries to find the appropriate people to hand over the newly gathered information to (Whelan *et al.*, 2010).

In the context of this thesis, the definition of boundary spanner follows Haas, who defines it “as links between a unit and its environment who can play several different functions, such as information exchange, access to resources and group representation.” (Haas, 2015, p. 1034)

### 2.1.2. Gatekeepers

One particularly interesting sub-category of boundary spanners are gatekeepers (Haas, 2015). The concept of technological gatekeepers was introduced by Allen and Cohen (1969) in their study of information flows in R&D departments and, therefore, pre-dates the introduction of the definition of boundary spanner itself by almost a decade. Allen and Cohen conducted sociometric studies to find out how external information is dispersed within the laboratory. During their investigation, they came across a group of individuals who “had rather extensive outside contacts and served as a source of information for their colleagues” (Allen and Cohen, 1969, p. 18). This observation has two important implications that help refine the concept of the boundary spanner. First, compared to boundary spanners, gatekeepers are much more strongly connected internally and externally. They are

defined as internal and external communication stars, which means they are among the top fifth in internal and in external communication (Tushman and Scanlan, 1981b). Second, gatekeepers are only considered as a source of information, while boundary spanners can also source other resources and make them available to actors outside the organization. Haas, therefore, defines “gatekeepers as a sub-category of boundary spanners whose main role is to monitor the environment and acquire, transfer and, sometimes, diffuse information inside the organization or group” (Haas, 2015, p. 1036).



**Figure 2:** Gatekeeper (black dot) with external and internal connections. Left: original definition following Allen and Cohen (1969); right: updated model with internal star (dark gray dot) and online sources (triangles) following Whelan *et al.* (2010) and Whelan, Golden and Donnellan (2013)

In more recent studies, Whelan *et al.* (2010) and Whelan, Golden and Donnellan (2013) analyzed, if the role of the technological gatekeeper changed due to the introduction of new technologies such as the internet. Both studies observed that the gatekeeper as an internal and external communication star seemed to disappear and that the role of gatekeeper had split into two distinct roles (Whelan *et al.*, 2010; Whelan, Golden and Donnellan, 2013). One type of individual, an external communication star, was primarily concerned with gathering and evaluating external information from a broad range of sources, many of them online and would then transfer and translate the filtered information to an internal communication star. This internal star would handle most internal dissemination activity leading to a 3 stage model (acquisition-translation-dissemination) (Whelan *et al.*, 2010; Whelan, Golden and Donnellan, 2013). Furthermore, they found evidence for a multi-channel push approach based on e-mail and personal communication used by the internal communication star for



dissemination (Whelan *et al.*, 2010; Whelan, Golden and Donnellan, 2013). The two generations of the concept are shown in Figure 2. Walsh expanded on this and found a similar translational function. He also analyzed the internal dissemination of knowledge further and clearly distinguished between interpersonal and electronic dissemination using internal information systems (Walsh, 2015).

### 2.1.3. Further considerations

To conclude the literature research on boundary spanners, several further aspects need to be considered. One concern regarding boundary spanning expressed in literature is the potential role conflict and conflict of interest (Friedman and Podolny, 1992). This conflict might occur when different external and internal frames of reference or cultural norms collide, or when a perceived need for reciprocity arises during information or resource exchange. Clear company policy can be a helpful guideline, but at the same time hinder effective boundary spanning. Either way, in SMEs, such official policies typically do not exist. Boundary spanning can be a very time and attention consuming activity. While one study found no proof of reduced job performance of boundary spanners (Hsu, Wang and Tzeng, 2007), other studies raised concerns in that regard from a managerial point of view (Haas, 2015; Tushman, 1977) and warned that boundary spanners could be perceived as “unfocused and undisciplined” (Davenport and Prusak, 1998, p. 30). Building up and maintaining external ties can also be very time-consuming and should, therefore, only be done by a limited amount of boundary spanners (Hsu, Wang and Tzeng, 2007).

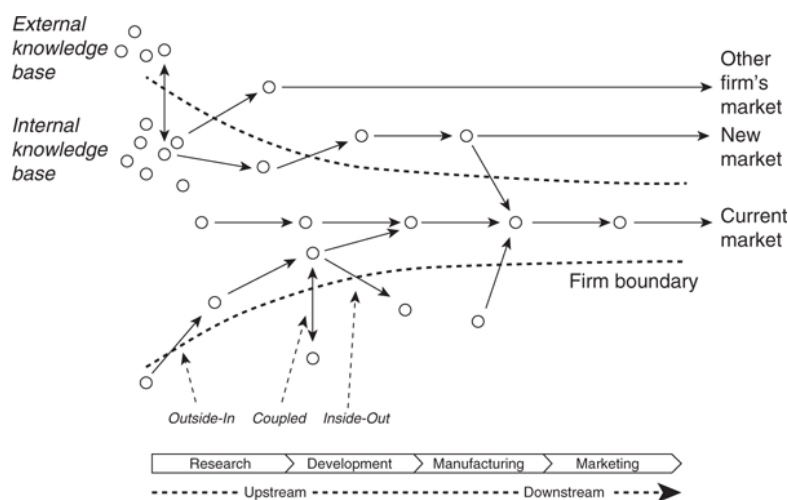
## 2.2. Open Innovation

As the discussion on boundary spanning shows, research and business practitioners were well aware of the idea of openness and its significance for the innovativeness of a firm. In 2003, however, Chesbrough formally introduced the term Open Innovation in his book “Open Innovation: The New Imperative for Creating and Profiting from Technology” (Chesbrough, 2003). He highlighted the changing behavior of large scale companies<sup>4</sup> away from a closed view on innovation and R&D management to a more open approach, where external ideas, as well as external paths to commercialization, were considered as complementary to the previous siloed R&D models. More than ten years later, Chesbrough and Bogers updated the definition and described open innovation “as a distributed

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<sup>4</sup> Companies analyzed were large scale corporations like AT&T, IBM, and Xerox.

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 and Bogers, 2014, p. 3). As the last chapter described, it is precisely this flow of knowledge across boundaries that often requires boundary spanners to enable and facilitate it. Open innovation is no exception to this. While there are other ways for a company to enable this flow by using intermediaries (Nambisan and Sawhney, 2007), or large-scale institutionalized approaches like the ones described by Chesbrough (2003), SMEs often do not have the necessary resources and capabilities to build up such channels.



**Figure 3:** The open innovation model (Chesbrough and Bogers, 2014, p. 19)

Open innovation literature differentiates between three different types of innovation based on the direction of the flow of information and assets. Figure 3 (Chesbrough and Bogers, 2014, p. 19) visualizes these flows. Outside-in (inbound) refers to the use of external knowledge and technologies for the company's internal innovation processes. Inside-out (outbound) allows the flow of assets and ideas out of the company boundaries so that others can use it. The coupled type is a combination of both (Bogers, 2014; Chesbrough and Bogers, 2014) "to collaboratively develop and/or commercialise an innovation" (Bogers, 2014, p. 7).

Besides this differentiation based on the direction of flow, Dahlander and Gann (2010) differentiate between pecuniary and non-pecuniary exchanges. Table 1 (Dahlander and Gann, 2010, p. 702) describes this relationship. Pecuniary exchanges, in this regard, are acquiring and selling of licenses or assets and is typically based on an enforceable and appropriable IP right (e.g., a patent), while non-pecuniary exchanges are sourcing and revealing and can span a wide range of knowledge and ideas (Dahlander and Gann, 2010).

**Table 1:** Structure of [...] different forms of openness. (Dahlander and Gann, 2010, p. 702)

	Inbound innovation	Outbound innovation
Pecuniary	Acquiring	Selling
Non-pecuniary	Sourcing	Revealing

### 2.2.1. Boundary spanning knowledge flows in Open Innovation

As this thesis is primarily investigating the boundary spanning activities within open innovation, the following section will highlight the knowledge and idea exchange described by literature. This part will follow the logic of type of information (what information was transmitted), source of information (where was it transmitted from or to), and channel of access (how was this information transmitted) introduced at the beginning of this chapter.

A broad range of **types of information** can be used in open innovation. It is, therefore, helpful to have some structure for characterization. Diener and Piller (2019) offer a useful categorization for the types of information actively searched externally in the context of open innovation. In their study on open innovation accelerators<sup>5</sup>, they mention two main categories inspired by von Hippel (1988), need information and solution information (Diener and Piller, 2019; von Hippel, 1988). While it is not possible to assign all external information to one of these two categories, they offer a good starting point.

*“Need information is information about customer and market needs, i. e. information about preferences, needs, desires, satisfaction, motives, and etc. of the customers and users of a new (potential) product or service offering.”* (Diener and Piller, 2019, p. 22)

Besides that, need information could include the following types of information: market trends, missing features, complaints by customers or users, and new regulations that will lead to changes in demand (e.g., new legislation requiring the introduction of specific product features).

*“Solution information is information on technological) solution possibilities, i. e. information about how to apply a technology to transform customer needs into new products and services best.”* (Diener and Piller, 2019, p. 22)

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<sup>5</sup> Open innovation accelerators are defined as “intermediaries, brokers, platforms and facilitators helping organizations to profit from open innovation and customer co-creation” (Diener and Piller, 2019, p. 5).

This category also includes knowledge about technologies or procedures that are new to the world or new to the industry, new abilities of partners, or new potential suppliers (Bogers and West, 2012).

Outside these two categories, knowledge about the behavior of competitors (Bogers and West, 2012; Laursen and Salter, 2006), including new offerings, pricing, or marketing strategy, can be useful types of information to influence the innovation process.

The literature on open innovation shows several potential **sources of information**. One source that offers a good starting point is Table 2, compiled by Laursen and Salter (2006), which summarize the “Sources of information and knowledge for innovation activities in U.K. manufacturing firms” (Laursen and Salter, 2006, p. 139). They clearly show that suppliers, clients, and competitors are among the most used external knowledge sources (Laursen and Salter, 2006). In a study focused on sources used for open innovation in SMEs, Brunswicker and Vanhaverbeke (2014) limit this extensive set to direct and indirect customers, suppliers, universities and research institutions, IP rights experts, network partners. A further important source are users (von Hippel, 1988), which are not necessarily the customers themselves. He argues that users can perceive the need for an improvement or new feature of a product much earlier than a producer and often find solutions for these needs (von Hippel, 1988). Newer publications also emphasize digital sources of knowledge, including the analysis of social media and web outlets (Diener and Piller, 2019; Piller, Mitra and Ghosh Mitra, 2019).

**Table 2:** Sources of information and knowledge for innovation activities [...] (Laursen and Salter, 2006, p. 139)

Type	Knowledge source	Percentages			
		Not used	Low	Medium	High
Market	Suppliers of equipment, materials, components, or software	32	20	32	15
	Clients or customers	34	22	28	16
	Competitors	46	27	20	6
	Consultants	62	22	13	3
	Commercial laboratories/R&D enterprises	73	18	7	2
Institutional	Universities or other higher education institutes	73	17	8	2
	Government research organizations	82	14	3	1
	Other public sector, e.g., business links, government offices	76	17	6	1
	Private research institutes	82	14	4	1
Other	Professional conferences, meetings	58	27	12	2
	Trade associations	52	28	17	3
	Technical/trade press, computer databases	47	27	22	4
	Fairs, exhibitions	42	28	23	7
Specialized	Technical standards	43	23	23	11
	Health and safety standards and regulations	37	24	27	12
	Environmental standards and regulations	39	26	24	11
Average		55	22	17	6

The literature on boundary spanning also offers some potential sources of information. A study conducted by Whelan, Golden and Donnellan on how gatekeeping has changed due to new technologies revealed several sources, including blogs, online forums, and Wikis (Whelan, Golden and Donnellan, 2013).

**Channels of access** are investigated to a much lesser extent in the context of open innovation. Personal or face to face exchanges is, of course, a significant channel of access. Another typical channel is desk research (Tushman and Scanlan, 1981a), which could nowadays be conducted either offline or online. Newer channels of access in the literature include Google searches, RSS feeds, and e-mail (Walsh, 2015; Whelan, Golden and Donnellan, 2013).

### 2.2.2. Open Innovation in SMEs

Early research on open innovation focused primarily on large scale enterprises. In recent years, however, research in SMEs and their use of open innovation has increased (Brunswick and van de Vrande, 2014; Hossain and Kauranen, 2016; Hyslop, 2015) and has highlighted a few notable differences to open innovation in larger companies. SMEs have been found to have a sharper focus on open innovation activities than large companies (Vanhaverbeke, 2011). One likely reason for that is their lack of resources for investments on internal R&D connected with the liability of smallness (Vanhaverbeke, 2011). It has been argued that “OI provides indirect benefits for SMEs, such as awareness, connectivity, and reputation” (Hossain and Kauranen, 2016, p. 68). Open innovation has also been linked to performance improvements of SMEs (Brunswick and van de Vrande, 2014; Hossain and Kauranen, 2016). Evidence on the actual innovation performance improvement due to particular open innovation activities is still sparse (Hossain and Kauranen, 2016) since it is not possible to directly transfer findings from large firms to SMEs (Brunswick and van de Vrande, 2014). A notable exception in this regard is a large-scale empirical study by Brunswick and Vanhaverbeke (2014). They built up “a typology of strategic types of external knowledge sourcing” (Brunswick and Vanhaverbeke, 2014, p. 2) and linked them to performance improvements.

Studies have also shown that open innovation activities in SMEs are often dependent on strong personal ties between individuals (Hyslop, 2015; Vanhaverbeke, 2011). While these

ties allow SMEs to engage in external collaborations, they often lack the internal abilities or resources to coordinate the search and manage these connections (Brunswicker and van de Vrande, 2014; Hyslop, 2015). This goes hand in hand with the finding, that SMEs tend to engage more in non-monetary exchanges like sourcing, revealing, or networking (Brunswicker and van de Vrande, 2014). The same study, however, also argues that “studies on SMEs and entrepreneurship literature in particular have a bias towards young and small firms” (Brunswicker and van de Vrande, 2014, p. 136), which might limit the applicability of the results for more mature SMEs.

### 2.3. Digitalization of boundary spanning activities

The term digitalization seems omnipresent nowadays, especially in the context of innovation within companies. Digitalization is seen as the key to many new business models, products, and services.<sup>6</sup> It is, therefore, not surprising that multiple technologies have developed, which digitize or digitalize certain aspects of boundary spanning activities. This chapter will first offer a brief differentiation between the terms digitization and digitalization before covering tools and technologies that support internal and external aspects of boundary spanning.

#### **Digitization vs. Digitalization**

The words digitization and digitalization are sometimes used interchangeably without much regard for their actual implications, which can be profound. According to Gartner’s IT Glossary, **digitization** is the changing of a process from analog to digital, without fundamentally changing the process itself (Gartner, Inc., 2020b). This means that a previously analog process would now be driven by digital technology, for example switching from cassettes to CDs. While this has the advantage that digital data can be much easier copied, stored, processed, and transferred, the act of consuming music (purchase at a store, play with a dedicated player) does not change fundamentally.

**Digitalization** is a very different process and refers to “the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business.” (Gartner, Inc., 2020a) Following the example

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<sup>6</sup> In the context of manufacturing, the term frequently used is Industry 4.0 (Boston Consulting Group, no date), while in the context of new products and services, the term digital business model, such as the ones used by Airbnb, Uber or Amazon, is more common (Täuscher, 2016)

from before, the change from CDs to the distribution of single songs enabled by the introduction of MP3 was a digitalization process and allowed for entirely new business models to emerge.

In the 1990s and early 2000s, many channels started to be digitized fueled by the widespread adoption of the internet. Technologies such as the world-wide-web, e-mail, and ISDN gained broader acceptance and initially digitized written or fax communication and telephony.

Since then, two developments occurred. On the one hand, technologies were developed that could digitalize existing channels of communication and, therefore, channels of access to information. For example, the introduction of high-quality, low-latency video calls (*enabling technology*) allows for face-to-face communication (*channel of communication*) without the need for physical relocation, an often costly and time-consuming process. As demonstrated plentiful during the lockdowns following the COVID-19 pandemic, this technology can offer an adequate solution in a multitude of social, educational, and business contexts.

On the other hand, completely new sources and channels of access to information were developed and are now available to everyone with access to the internet, making every employee a potential boundary spanner. Some of these channels are digitalized versions of traditional channels (e.g., Wikipedia as the digitalized successor of a traditional encyclopedia). In other cases, however, this process led to a merger of channels and sources. One such example would be Facebook. While initially, it was a digitalized registry of friends and acquaintances that allowed some interactions with them, it developed into a platform with almost unlimited access to sources of information around the world. By letting the platform curate the content a user gets exposure to, it de facto acts as the actual source of information (following the definition above) for that particular recipient.

### 2.3.1. Technologies supporting boundary spanning

The spectrum of technologies supporting internal and external aspects of boundary spanning is huge. However, most of these technologies have a few things in common. 1) Most of them offer a limited or full-featured version, free of charge. Even when this is not the case, the full service can often be used for a relatively small recurring fee. 2) These technologies are typically designed for broad adaption and require minimum previous knowledge. 3) They

mostly aim to be globally available over the internet, although some services might be restricted in certain regions for regulatory or political reasons.

Most of these technologies are associated with the paradigm of Web 2.0, where users not only consume but also actively produce and contribute content (Blank and Reisdorf, 2012). Wikis, Forums, and social media belong to the cornerstones of this development. Their most significant contribution to boundary spanning is that they enable new kinds of searches for information and resources by increasing the possible search breadth and depth accessible to a company or individual. Search breadth in this context refers to “the number of external sources or search channels that firms rely upon in their innovative activities” (Laursen and Salter, 2006, p. 134), while “search depth [...] is defined in terms of the extent to which firms draw deeply from the different external sources or search channels” (Laursen and Salter, 2006, p. 134).

The combination of these factors should greatly democratize the potential access to information by removing hurdles, may they be social, financial, or geographical.

#### *2.3.1.1. Professional social networks*

*Examples: LinkedIn, Xing, Facebook*

Social networks have grown in popularity and are nowadays among the most frequented services on the internet, with more than 1/3 of the world population active on some sort of social network (Max Roser, Hannah Ritchie and Esteban Ortiz-Ospina, 2015). While Facebook is currently the largest social network with close to 2.5 bn users (Statista, 2020), LinkedIn is the largest professional social network with over 690 m users as of June 2020, according to their website (LinkedIn Corporation, 2020).

In general, they differ in their focus, but most share a few features that make them particularly useful and relevant for boundary spanning.

1) In addition to having a digital representation of one's actual network of friends, colleagues, and acquaintances, social networks allow members to search, identify and connect with people or institutions that are not in one's existing network, but seem interesting or relevant to the personal context. This search and identification typically happen based on the information shared in a member's profile, active postings, and interactions with content. A member, in this case, could be a person, but also a company, NGO, university, or any other institution.



2) As mentioned above, social networks usually allow a user to express interest in particular kinds of content or topics and create a curated stream of information to keep the user up to date on what happened in the network. This is a particularly important feature, as users need to perceive value from the information they receive. Without this curation and filtering function, the amount of information available within the network would, by far, surpasses the amount of content that a user could consume.

3) By looking at the aspects mentioned above from the opposite point of view, social networks become an ideal platform for the dissemination of information to a targeted or broader audience. This fact has been used extensively in social media marketing, which is claimed to be the third-largest advertising channel behind TV and paid-search (Zenith, 2019). Today individuals, as well as institutional members, use this fact to build a brand and to share information with others. Companies can use social networks to reach potential partners, employees, and suppliers, as well as any other stakeholder.

All three aspects contribute to the development of social networks to viable sources of information. While they have significantly decreased the effort necessary to find new information or interesting contacts, the vast amount of potential connections makes it much harder to evaluate and select the most relevant ones (Diener and Piller, 2019).

#### *2.3.1.2. Online user- and interest groups*

*Examples: LinkedIn Groups, Community Forums, Feedback portals*

Another technology closely related to the social networks mentioned above, and in some cases even part of them, are online user groups and interest groups.

They allow people who share common interests (e.g., based on a certain topic, a brand, or a product.) to exchange their ideas and share relevant news. They can be company administered and sponsored, or completely community organized.

In the context of boundary spanning, they offer a few unique opportunities. First, the association of an individual with one or multiple specific groups makes the search for relevant individuals based on multiple selection criteria much easier. Second, these online groups can be used to communicate directly with a specific target audience. For example, if a company is looking for a coating for high-temperature applications, they could post a

question in an interest group such as “Wear / Corrosion Resistant and Decorative Coatings”<sup>7</sup>, an interest group on LinkedIn with more than 1.600 members. Third, the contents and discussions of these online groups can be observed and analyzed to get a better understanding of latent user needs. The underlying process that can also include the analysis of other social media interactions is called “Netnography” (Kozinets, 2002; Kozinets *et al.*, 2010). Due to this possibility, such online groups are not only a new channel of access but can also act as a rich source of information that would be otherwise hidden.

#### 2.3.1.3. Research tools

*Examples: Google Alerts, Google Patents*

While most people use general-purpose search engines like Google or category-specific search engines like Espacenet<sup>8</sup> on a regular basis, they typically give a list of results without much contextual information. Other tools might be less familiar but offer great opportunities to get insights about customers, competitors, and industry trends. Google Alerts, for example, is a simple way to stay up to date with news regarding specific topics of interest. Once a topic or search phrase is set, the service will automatically send out a notification via e-mail or RSS feed. This way, information about a competitor, product, the own company, or industry can be easily monitored continuously with minimal effort. It is, therefore, a new and automated channel to access this information.

Google Patents is another example of such a research tool. Instead of only showing results for specific patent searches, it also allows for a contextual search for similar patents or searches for prior art. That way, it is possible to get a better understanding of industry trends, or the lines of research customers and competitors are pursuing. For that reason, Google Patents can be considered a potential source of information.

#### 2.3.1.4. Scientific platforms

*Examples: Mendeley, Researchgate, arXiv*

These platforms give broad access to scientific research in different domains. While some of them focus on access to institutionally published content, others depend on user-uploaded content and give free access to research on a diverse field of topics. Besides access to the

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<sup>7</sup> <https://www.linkedin.com/groups/2355311/>

<sup>8</sup> Espacenet is an online tool provided by the European Patent Office to search patents. It can be accessed here: <https://worldwide.espacenet.com/>

actual research, the platforms also allow identifying key individuals who are active in a specific field.

Based on the preferences and interests selected, some of these services frequently compile a list of potentially relevant papers and send these suggestions to the user via e-mail. By doing so, these platforms become much more than just a channel to access information. They also become a source of information that would have otherwise remained hidden to the recipient.

#### *2.3.1.5. Virtual marketplaces and crowd-sourcing platforms*

*Examples: ip-marketplace.org, patentauction.com, 99designs*

Virtual marketplaces exist in many forms, and very commonly known examples are Amazon, eBay, and Alibaba. In general, they can be described as “[a] nonphysical and borderless spatial dimension that exists in the digital domain, in which exchange relations and transactions take place at different levels through digital interactions supported by communication technologies.” (IGI Global, 2020)

While in theory, anything could be sold or exchanged on such virtual marketplaces, some of these platforms have specialized in trading assets and work, that can be very relevant for innovation purposes and have simplified the process of acquiring them considerably (Diener and Piller, 2019, p. 28). Some 2-sided virtual marketplaces, for example, allow inventors and IP holders to offer patents, trademarks, or designs for sale or out-licensing and facilitate the actual transfer of IP rights. Traditionally this process involved intermediaries, sometimes referred to as patent brokers or licensing agents, which can be cut out of the process (Nambisan and Sawhney, 2007). While not all inventions that could be licensed are at display in such marketplaces, they offer a new channel of access to this source of information (patents available for purchase). At the same time, these marketplaces could also be used to broadcast the availability of unused IP to potential buyers.

The introduction of the term crowdsourcing is widely attributed to Howe (2006), and “refers to the outsourcing of a task that is traditionally carried out by an organization’s employee(s) to an undefined, generally large group or network of people in the form of an open call” (Bogers and West, 2012, p. 67). Depending on the complexity of the task, sometimes a rather difficult topic requires the assistance of specialists for successful execution (Diener and Piller, 2019). There are, however, also more convenient forms. One typical example is

the contracting of design work. Crowdsourcing platforms like 99designs digitalize the way design work is acquired. Traditionally a company would look for potential partners, select the best fit, and brief the chosen design agency to do the required design work. Instead, a task can now be posted online, and interested designers can submit their proposals. The company can then select their preferred solution. This simple form of crowdsourcing can be considered open innovation (Bogers and West, 2012) and is easily available even to individuals. It expands the pool of possible designers severely while, at the same time, the skills to look for and pick an appropriate designer beforehand are no longer necessary. This process offers a new channel to additional sources.

Both virtual marketplaces, and crowdsourcing platforms, allow the solution seeker to skip the steps of partner search and a-priori evaluation. Both are steps that companies are often ill-equipped to do, especially if the tasks outsourced are not within the domain of the company (Afuah and Tucci, 2012). Instead, the company only needs the ability to evaluate and select an offered solution or technology. This should be much closer to the actual skill set of most companies.

#### 2.3.1.6. *Internal tools*

The tools discussed so far are mainly useful for the external step of boundary spanning, namely the search and acquisition for information and resources. In the last few years, significant technological developments also enabled more dynamic internal communication and distribution of new knowledge.

Today a broad spectrum of tools with rich features and high usability is available so that every employee can participate in these interactions. Tools like Slack or Microsoft Teams enable global collaboration, communication, and knowledge sharing in dedicated channels based on interests, functions, or projects. Tools like Notion or other knowledge-sharing platforms are more asynchronous and allow for simple structured sharing and documentation of knowledge. For these reasons, such digital channels can be highly valuable for the internal dissemination of information by boundary spanners. They offer a way to push new external information to a broader audience (by posting it on such a platform), while at the same time, they give insights into which information or resource might be needed based on the posts of others. The combination of ease of use, wide availability, and

affordability should allow democratizing internal flows of communication and facilitate information exchange throughout the company.

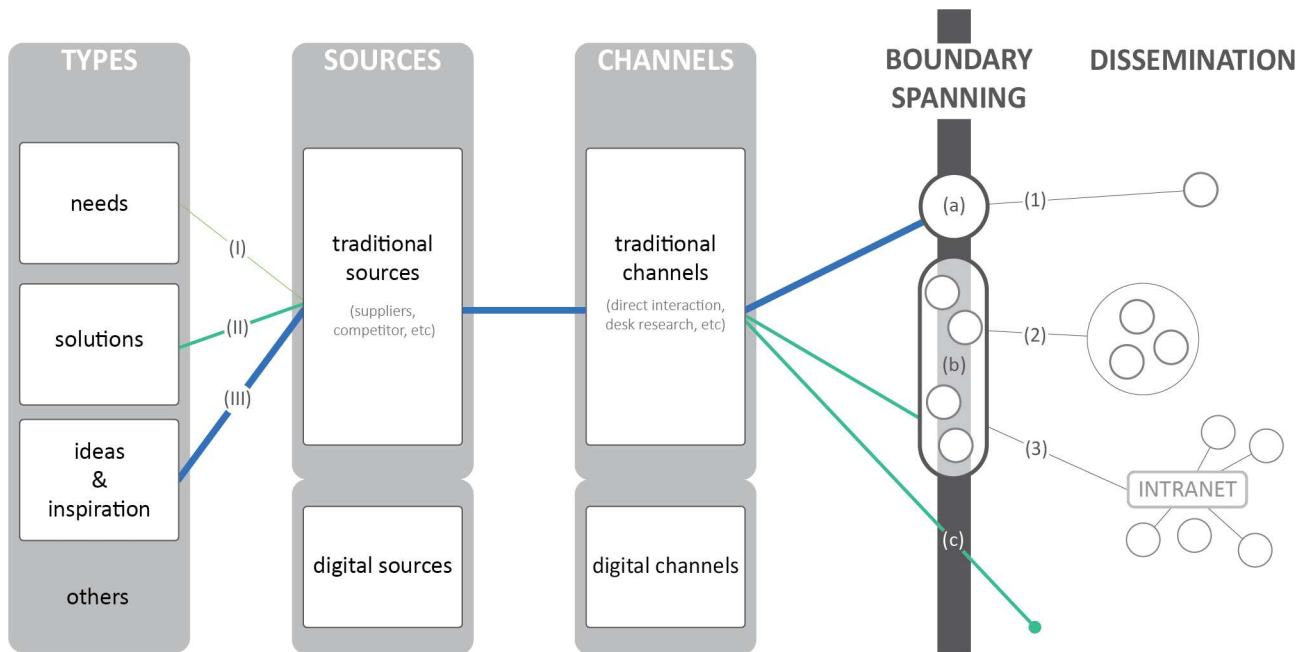
With this broad spectrum of tools supporting internal and external aspects of boundary spanning for free or at minimal cost and the broad set of potential sources of innovation available for open innovation, boundary spanning should be a very attractive and achievable way to drive innovation in SMEs. The next chapters investigate to what extent this is the case and how SMEs could take more advantage of these developments.

### 3. Methods

#### 3.1. Research design

To explore how SMEs use boundary spanning to access external sources of innovation in the context of open innovation, the author chose a comparative explorative case study based on semi-structured expert interviews. The author preferred this research design over a quantitative analysis as the sources, and the ways these sources would be accessed could greatly vary between firms. Furthermore, only limited previous research was available on that subject matter.

The semi-structured interviews followed a pre-defined sequence of seven leading questions covering different aspects of information gathering related to the innovation process. The full set of questions used during the interviews can be found in Appendix A – Interview Questions. Each of these questions has optional sub-questions, meant for refinement. In cases where it was found to be necessary, the interviewer deviated from these questions to investigate further on certain aspects brought up by the interviewee. The seven leading questions fall into three topics. Questions 1-4 focus on incoming flows of information that fuel innovation and their management. Question 5 deals with outgoing flows of information. Questions 6-7 cover joint innovation activities as well as their outsourcing. The optional verification questions 8-10, were used by the interviewer to verify that the responses given by the interviewee covered all the relevant topics.



**Figure 4:** Example - Flow of information into the company

To analyze the interviews, the author developed a framework that allows visualizing flows of information through the boundary into a company. The framework is shown in Figure 4 and consists of five steps following the concepts introduced above.

The first step refers to the **types** of information used. As outlined in 2.2.1, the two primary sources are *need information* and *solution information*. In addition to that, a third category for general *ideas and inspiration* is introduced to capture generic types like industry trends, that can often not be directly associated with either type. Whenever necessary, other types can be added.

The second step reflects the **sources** used to access different types of information. This is separated into two different segments. *Traditional sources* primarily include the sources introduced in Table 2 (Laursen and Salter, 2006, p. 139), while *digital sources* refer to sources on the internet, such as the ones introduced in 2.3.

The third step highlights the different **channels** used to access these sources and is split in a similar way to sources, with the exception that regular desk research is considered a traditional channel, independently if it is conducted online or offline.

In the fourth step, the actual act of **boundary spanning** is analyzed. Depending on the company, the boundary might be spanned by a specific individual (a) or a group of boundary spanners (b). Some channels do not require a boundary spanner but are formalized inflows directly into the company (c). Examples for this would be surveys sent out to customers or

the transfer of new technology based on contractual agreements.

The fifth and final step highlights how the gathered information is **disseminated internally**. This step is strongly dependent on the company and might include peer-to-peer interaction (1), structured dissemination meetings (2), or use of digital communication channels (3).

Following the mapping of the five steps, the flows of information through these steps are added to the diagram. The intensity and thickness of the connecting lines thereby indicate the relevance of a particular connection with the thin, bright line (I) indicating the least significance, and the dark, thick line (III) the highest significance. This weighting is based on direct statements of the interviewee and, when necessary, the contextual interpretation of the interviewer.

#### *Example statement*

‘Our purchasing department has regular meetings with our suppliers, where they are informed about new developments. We know, however, that these suppliers also provide the same information to our competitors.’

This statement indicates a flow of the **type** *solution information* (new developments) through the **source** *supplier* and the **channel** *direct personal interaction* to a **boundary spanner** within the *purchasing department*. The first sentence would indicate a rather high relevance (III) due to the high frequency and regularity of the exchange. The second sentence, however, neutralizes that statement to some extent and will lead to a medium weighting (II) overall.

These graphs offer a visual representation of the different flows of information into each company and help understand their relevance to the company.

### 3.2. Description of the cases

The author intended to get a broad set of views on the subject and not limit the study to a specific field or industry. This decision influenced the definition of the selection criteria for possible interview candidates and led to a rather inclusive definition.

Primary selection criteria for companies:

- Company profile: **SME<sup>9</sup> in the DACH region**, with a focus on Austria
- Type of company: should **develop and produce its own products or services**  
While all types of companies can incorporate some form of open innovation for their development (e.g., business model innovation or service innovation), the development of new physical or digital products is a central aspect the author aimed to observe.
- Openness: the company should have **experience in some form of open innovation**  
The author used three sources to get leads to potential interview partners, each guaranteeing that the company fulfilled the criteria. 1) A list of companies that had previously participated in collaborative projects with the Institute for Entrepreneurship & Innovation at the Vienna University of Economics and Business. 2) Referrals provided by consultants providing companies with external sources of innovation. 3) Direct personal knowledge of the author.

The author decided to exclude the following types of companies for the reasons explained below:

- Professional services (Lawyers, accountants, consultants) or Agencies (design, web, marketing)  
These companies can be highly relevant in the context of open innovation but are typically among the external innovation partners/sources of the focal companies defined above.<sup>10</sup>
- Start-Ups  
Start-Ups are inherently in a constant process of innovation until they find a good product-market fit. They often flourish in an open ecosystem, and while they might exhibit significant boundary spanning behavior in the context of open innovation, this is often not yet formalized within the company and, therefore, not representative for the scope of this study.

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<sup>9</sup> The definition of SMEs by the European Union (European Commission, NaN) offered a guideline for the selection. However, also companies that, would not have classified as SME due to their ownership structure, but were led as independent SMEs were included in the study.

<sup>10</sup> For that reason, the author reached out to such companies to get referrals for potential interview partners.



- Trading firms or re-sellers of products

While these companies could employ open innovation and especially boundary spanning extensively, it is typically not possible to observe the critical aspect of new product or service development using external sources of innovation.

The desired interview partner within the company depended on the size and structure of the company but was typically located either within the executive board, new business development, innovation department, or held another role that has a good overview of the external communication channels. In most cases, the interview partner was the company liaison for previous open innovation activities and a boundary spanner himself.

In total, 7 Interviews were conducted in early June 2020. The interviewed companies span a range of industries and produce digital (2 companies), physical (3 companies), or a mix of products (2 companies) and sell them to a broad set of industries including automotive, aviation, telecommunication, oil & gas and medical equipment manufacturers. While there was no intention, all companies interviewed are offering their products B2B only.

**Company 1**<sup>11</sup> produces ultra-lightweight hydraulic cylinders for multiple applications, including transportation, aviation, and robotics. Within this company, Expert 1 oversees the coordination of developments, marketing, and sales.

**Company 2** manufactures complex plastics parts for the aviation, automotive and railway industry. While this company is mostly manufacturing products for its customers, the fact that it is also co-developing them makes it still an interesting reference case. Expert 2 is the CEO of this company.

**Company 3** develops human-machine-interfaces (HMI) for machines and medical equipment based on an application framework they develop and continuously improve. Expert 3 oversees business development and the Head of Sales.

**Company 4** manufactures metal tubes and cables with integrated optical fibers for a broad range of applications, including oil & gas, telecommunications, security, and sensing. Expert 4 is the Product Manager for this product.

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<sup>11</sup> Company 1, Interview 1, Case 1, and Expert 1 refer to the same dataset.

**Company 5** develops enterprise software for calculating the cost of a product through the entire lifecycle. Their customers are typically large enterprises in manufacturing industries. Expert 5 is the CEO of this company.

**Company 6** develops software solutions and hardware integration for Internet of Things (IoT) applications. They provide their expertise in over 50 branches and industries. Expert 6 oversees Business Development.

**Company 7** develops and manufactures electronic components for monitoring technology, primarily in industrial applications. Their main customers are machine and equipment manufacturers serving various industries. Expert 7 is the CEO of this company.

### 3.3. Data collection

The author collected the data using a series of semi-structured expert interviews. Each expert was only briefly introduced to the general scope of questions to verify he was comfortable with answering questions on the topic. Additional investigation in the expertise of the interview partners on the subject matter was not necessary, as the selection criteria mentioned above ensured that all partners had participated in open innovation activities before the interview.

The author conducted the interviews using three different channels. While the preferred way to conduct these qualitative interviews is in-person, due to the COVID-19 pandemic, there was limited opportunity to do so. As a result, the author conducted only one interview in-person. The second channel used was interview via video chat. Based on the preference of the interviewee, either ZOOM or Microsoft Teams were used. While the interviewer shared his video stream with all three interviewees, unfortunately, not all participants were open to sharing their video stream resulting in a loss of visual cues for the interviewer. Only two interviewees shared their video during the interview. The remaining three interviews had to be conducted over the telephone, leading to the same loss of visual cues and worse audio quality compared to the video chat interviews. According to Novick, however, “there is little evidence that data loss or distortion occurs, or that interpretation or quality of findings is compromised when interview data are collected by telephone” (Novick, 2008, p. 397).

Interviewees were informed about an expected interview time of approximately 30 minutes. The willingness and scope of sharing by the interviewees strongly influenced the actual duration of the interviews, which lasted between 31 and 75 minutes.

All interviews were conducted by the author and documented in interview protocols (see Appendix B – Interview Protocols). Whenever possible, the interviewer conducted the interviews in English. Experts 1 and 7 preferred to answer in German. To accommodate that, the interviewer translated the questions loosely during the interview.

**Table 3:** List of interviews with interview channel and duration

Interview	Expert Function	Channel	Language	Duration
1	Development Coordinator	ZOOM - Video Call	DE	56'
2	CEO	ZOOM - Audio	EN	33'
3	Business Development	Telephone	EN	31'
4	Product Manager	In-person	EN	36'
5	CEO	Telephone	EN	34'
6	Business Development	Telephone	EN	07'
		MS Teams - Video Call		1h 08'
7	CEO	Telephone	DE	52'

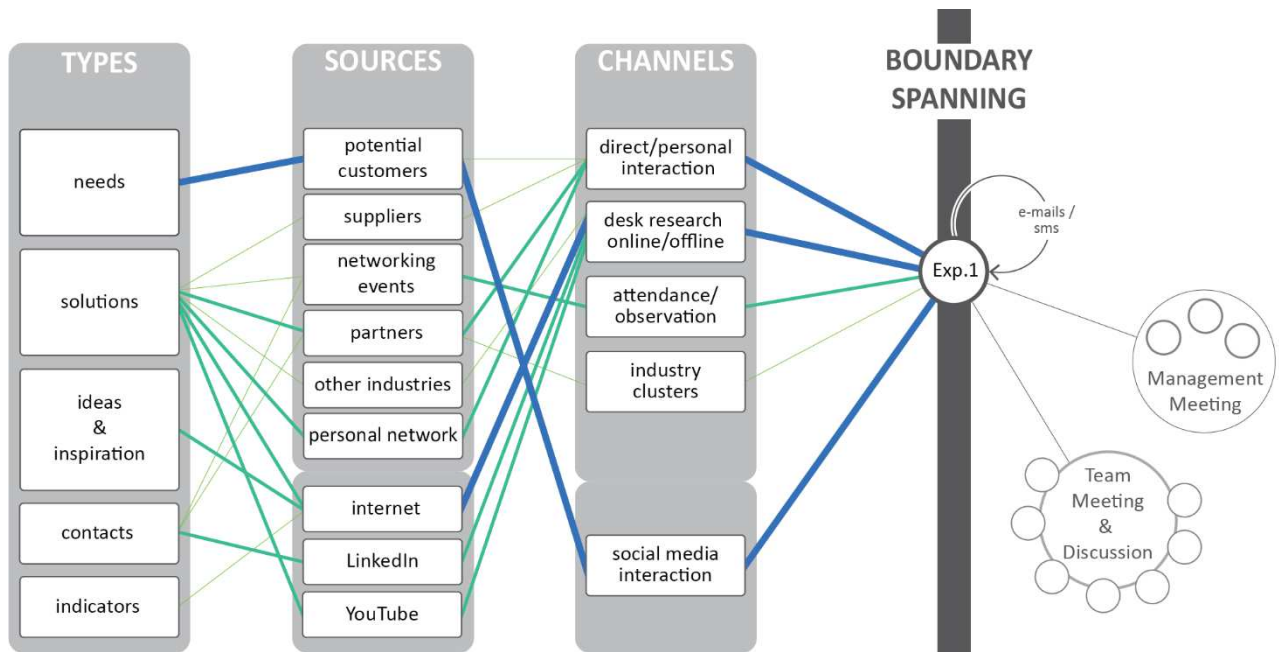
## 4. Findings

This chapter starts by outlining the findings within the 7 cases based on the framework introduced in 3.1. It then continues by summarizing findings in the comparison across all cases.

### 4.1. Case analysis

#### 4.1.1. Case 1

Company 1 produces ultra-lightweight hydraulic cylinders for multiple applications, including transportation, aviation, and robotics. Within this company, Expert 1 oversees the coordination of developments, marketing, and sales. The company caters to large markets but is a niche player in the still rather young high-performance low-weight segment with relatively little direct competition.



**Figure 5:** Case 1 - Flow of information into the company

Company 1 sources need information primarily directly from potential customers. Solution information, however, is gathered from quite a broad range of sources, both online and offline. The primary sources offline are partners and the personal network of Expert 1, but suppliers, industry networking events, and other industries offer valuable information as well. The internet, in general, and YouTube and LinkedIn specifically are further relevant sources for solution information and ideas. Expert 1 also sources contacts of potential partners and potential customers from partners, networking events, and from LinkedIn. Expert 1 uses a workflow that is explained below, to identify indicators for the innovativeness of potential customers (including patents, articles about unique solutions or products) on the internet.

Expert 1 is the primary boundary spanner in Company 1 and accesses this large number of sources through three primary channels. Direct personal interaction with partners, the personal network, suppliers, and customers is the first channel. Online desk research is no less important to access information primarily on YouTube and the internet in general. According to Expert 1, this is a primary part of his daily work. Interaction with people through social media (primarily LinkedIn) with potential customers is the third essential channel.

Expert 1 described a strategy he uses to evaluate potential new markets that highlight the importance of digital channels for gathering need information. Expert 1 first tries to find a

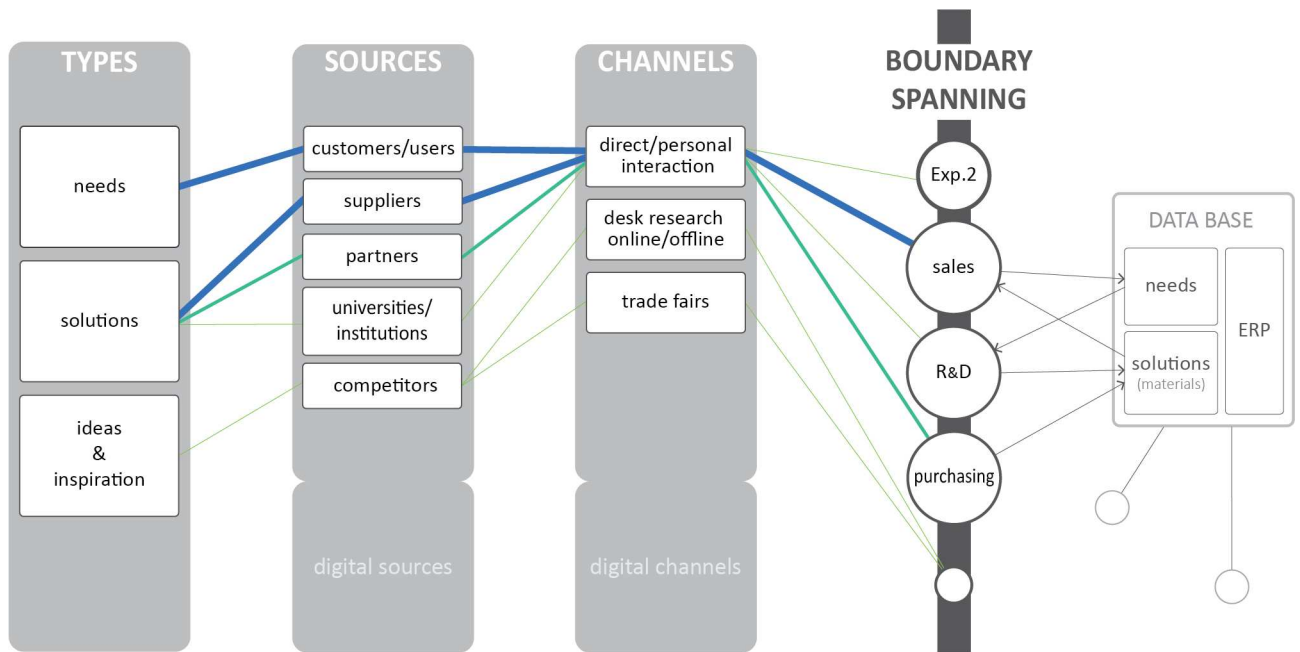
company in that industry that presents itself as innovative by conducting desk research to find the previously mentioned indicators (patents, articles about innovative products, etc.). Once he identifies such a company, he uses LinkedIn to find employees in that company, that work in an innovation-related role. He then reaches out to this person directly through LinkedIn, in order to inquire about their interest in the product in general and the specific need of the company and industry. This process can be repeated iteratively until enough information is collected to make an educated decision about future offerings for that industry.

The internal dissemination in Company 1 is rather direct. As there is no internal system to archive or document information, Expert 1 sends e-mails and SMS to himself as reminders. Relevant information is then disclosed to management in so-called development coordination meetings and, when deemed relevant, discussed with the whole team in regular team meetings.

Besides the use of technical magazines in target industries, the outflow of information is also primarily based on personal contact. Expert 1 handles quite a large external network of information flows, but the company has only a minimal structure for internal dissemination. This makes the company highly dependent on this key boundary spanner to gather new information. While the company sources solution information through a distributed network of sources and channels, it gains access to need information through potential customers. These are, however, not a defined number of particular customers, but a large pool of contacts accessed through the clever use of digital sources and channels. This approach highlights the potential of using digital tools like social media for the innovation process.

#### 4.1.2. Case 2

Company 2 is a manufacturer of complex plastics parts and a development partner for its customer in the aviation, automotive, and railway industry. According to Expert 2, the CEO of this company, they are in a complicated situation in terms of innovation. On the one hand, industry trends are very relevant to them, as they influence their customers directly (e.g., the transition to electro-mobility). On the other hand, Company 2 depends on what their customers require and have no direct impact on their customer's success.



**Figure 6:** Case 2 - Flow of information into the company

Company 2 primarily sources need and solution information from customers, partners, and suppliers. Besides that, only general ideas are sourced by observing competitors. The most relevant channel, in this case, is direct personal interaction with the source. The two main roles involved in boundary spanning are sales and purchasing while R&D and other employees play a lesser role. As Expert 2 put it, “the source of innovation is always a person”. As a result, Company 2 has two clearly defined primary streams of information inflow. Information about customer needs is sourced directly from the customers via direct personal contact with the sales department. Solution information is primarily sourced from suppliers through regular meetings (“every few weeks”) with purchasing and, to a lesser extent, through partners and universities again through personal interaction with R&D and others. While especially the access to solution information through suppliers is a critical source, Expert 2 is aware that these suppliers also provide their products and services to the competitors of Company 2. According to Expert 2, the boundary spanners in these departments need to be excellent active listeners to find issues or needs from a customer, or to get information from a supplier.

There is no dedicated department for this, but Company 2 pursues a very structured approach to internal information dissemination following standardized processes. They maintain internal databases for solution and need information. All customer requests, currently solvable and non-solvable to the company, are documented in one database. This

data about non-solvable customer requests is then used to evaluate potential new business opportunities that could be approached through internal R&D efforts. For Expert 2, many application problems brought to Company 2 by their customers can be boiled down to material problems. Solution information is, therefore, primarily documented in a material database. Purchasing and R&D add new information to this database, which allows the company to answer most incoming questions quickly. In cases that cannot be solved that way, boundary spanners need a good network and knowledge about who could help find solutions for these requests.

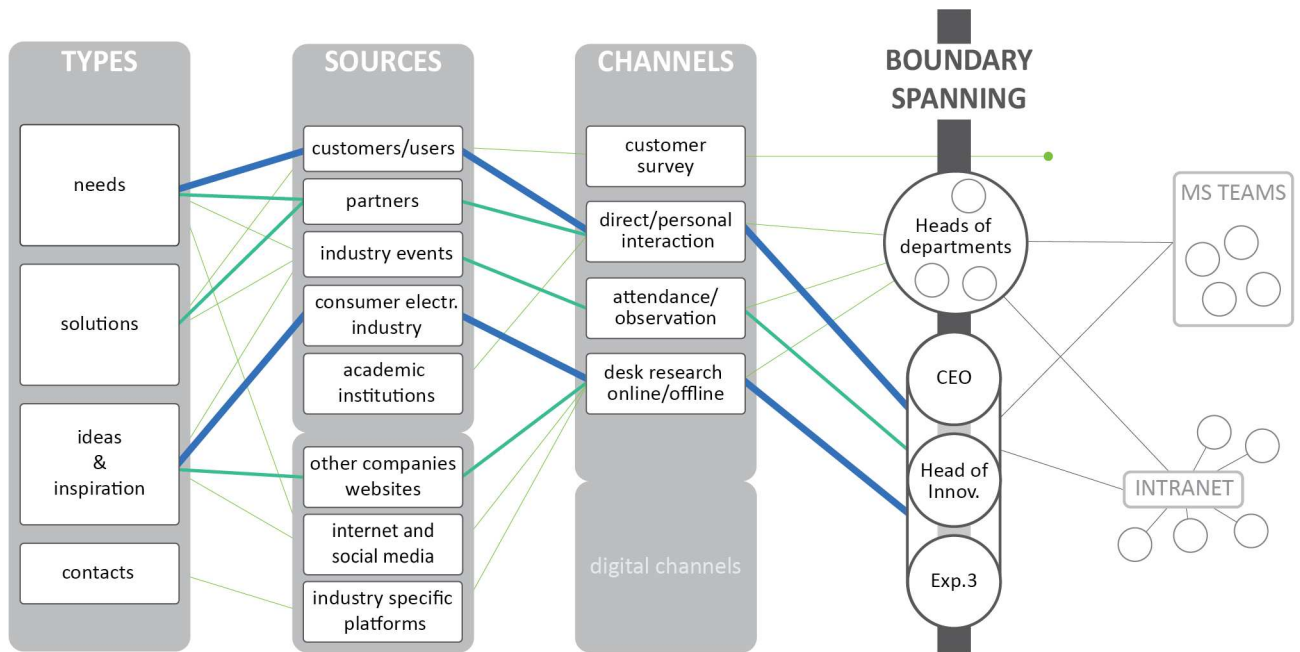
There is a limited focus on outbound communication at Company 2, as they have much information coming in, and the operational business is very busy. The use of Facebook and Instagram are a notable exception. While these channels were primarily opened to reach out to employees, it led to the unplanned event of other companies finding them and starting to communicate.

Overall, Company 2 has a rather simple external pipeline of information inflows, but a well-defined internal system for information dissemination. One notable finding is that, while flows along the value chain (suppliers, partners, customers) are well established, there seems to be much less exchange with alternative sources for innovation. Expert 2 was rather critical about professional social networks mentioning that they never had much success on LinkedIn or Xing. Company 2 is also no longer participating in clusters or cooperation with universities, as they are very time consuming while yielding little output.

The company is still very early in the digital process, and Expert 2 knows that the company is currently not getting all relevant information. At the same time, he is concerned that useful information is either not freely available, or that it is buried under too much information.

#### 4.1.3. Case 3

Company 3 is developing human-machine-interfaces for machines and medical equipment for their customers. They found a particular niche in which they built up long-lasting relationships (10+ years) with their customers. Expert 3 oversees business development and is the Head of Sales.



**Figure 7:** Case 3 - Flow of information into the company

A lot of the trends and new paradigms in user interface design come from consumer electronics. For this reason, that industry is observed very closely by company 3, as it can give valuable ideas for potential future solutions or upcoming customer needs. One way this is done is by observing websites of other companies to find solutions they could combine in customer projects. Another way Company 3 uses to stay up to date on industry trends is by attending industry events like trade shows, conferences, and fairs as well as through online research. Need and solution information are sourced primarily from customers and from partners, but also the industry events mentioned before. According to Expert 3, to leverage all these sources, boundary spanners need the ability to “combine things that are not obvious” and the creativity to find new applications for the technology. Online sources, including social networks like LinkedIn and Facebook, are considered as less useful, but industry-specific platforms offer a valuable source for Company 3 to find partners.

According to Expert 3, three key individuals bring most of the information for innovation purposes into the company. These are the owner/CEO, the Head of Innovation, and himself. To a lesser extent, the heads of the other departments contribute information. In terms of channels used, there is a balance between online desk research, direct/personal interaction, and attendance at industry events. Additionally, Company 3 uses customer surveys to get a better understanding of customer needs.



Company 3 uses multiple channels and sources to access each relevant type of external information. Need and solution information, as well as general ideas and industry trends, are each accessed through three or more independent sources. Online desk research is the primary channel of access to ideas and industry trends, while personal contact with customers and partners, and attendance of industry events are the primary channels to access need and solution information.

Internally the company uses two different channels where new information can be disseminated quickly, a closed one, and an open one. For the closed channel, Company 3 uses Microsoft Teams to build interest groups where information on certain topics can be collected and discussed with interested employees. For broader dissemination of information, an intranet platform is used to publish and discuss new and relevant information with the whole company. This information can then be used in an ongoing innovation process to create so-called “innovation development tasks”.

The outflow of information is considered less relevant by the company in terms of sales. However, the company participates in local networking events organized by the chamber of commerce and is partnering with a local university.

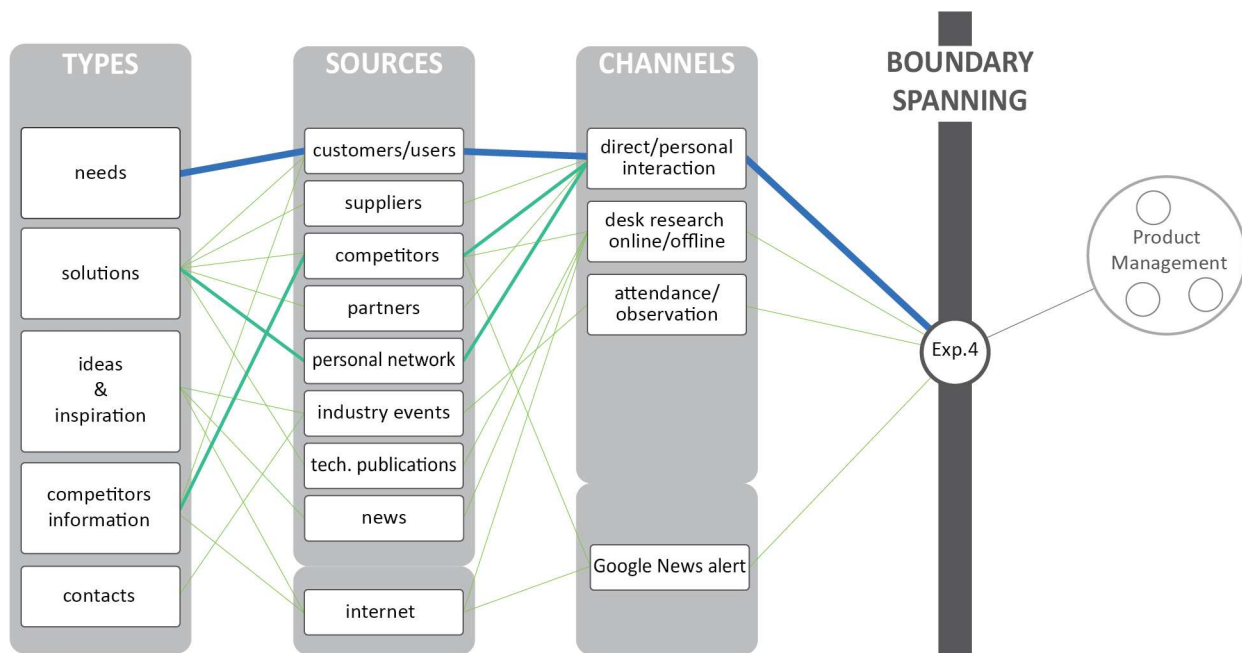
Overall, Company 3 has a balanced internal and external structure for its inbound innovation activities with multiple ways to access and disseminate any kind of information needed. This multi-sourcing approach holds true on many levels. For example, the company uses three different channels only to get need information from the customer. They get this directly in regular interactions, but they also offer dedicated workshops to discuss future needs and conduct customer surveys.

In their digital strategy, they are just at the beginning, but within the last 2-3 years, the use of online desk research has increased strongly. According to Expert 3, there is no shortage of access to information, but it is more important to make something out of the information than to find it.

#### 4.1.4. Case 4

Company 4 is designing and manufacturing metal tubes and cables with integrated optical fibers for a broad range of applications, including oil & gas, telecommunications, security, and sensing. Expert 4 is the product manager for this product. The industry the company

operates in is used to sharing knowledge within the community but is rather protective towards outsiders.



**Figure 8:** Case 4 - Flow of information into the company

Company 4 accesses multiple types of information from a broad range of sources. Need information is mostly sourced directly from customers, but customers are also a valuable source for solution information and even for information about competitors. Besides customers, Company 4 accesses solution information through suppliers, project partners, technical publications, and the personal network of Expert 4. Competitors are a further source for solution information through information they disclose. Industry events, including conferences, fairs, and networks, are used to get a general technical overview and to get new contacts. The internet and newspapers are less critical sources for general information and ideas and information about competitors.

Expert 4 uses three primary channels to access the required information. The most important channel is direct interaction, enabled by a strong personal connection with customers, partners, suppliers, competitors, and other members of the personal network. Expert 4 explained that the sharing of relevant information is based on trust and only happens face-to-face. This might be one reason why in this case, Expert 4 stated that he was the only boundary spanner in the organization concerned with innovation, as building up this level of trust takes time, effort, and skills. The second channel is desk research to access technical publications, information published by competitors, and general information that

could spark ideas. The third channel is the attendance of industry events to get new contact and ideas. For certain topics and companies of interest, Expert 4 has set up an automatic notification from Google News, that keeps him up to date as soon as new information becomes available.

While Company 4 sources need information primarily directly from its customers through intensive personal customer support, it uses a much broader sourcing approach for solution information with no strong preference for any specific source.

The internal dissemination in Company 4 is rather straight forward, as there is no defined process in place so far. New information is shared person to person within the product management team and with general management, but not documented in a structured way. If there is a consensus that a particular development should be started, the product management department takes responsibility for that project.

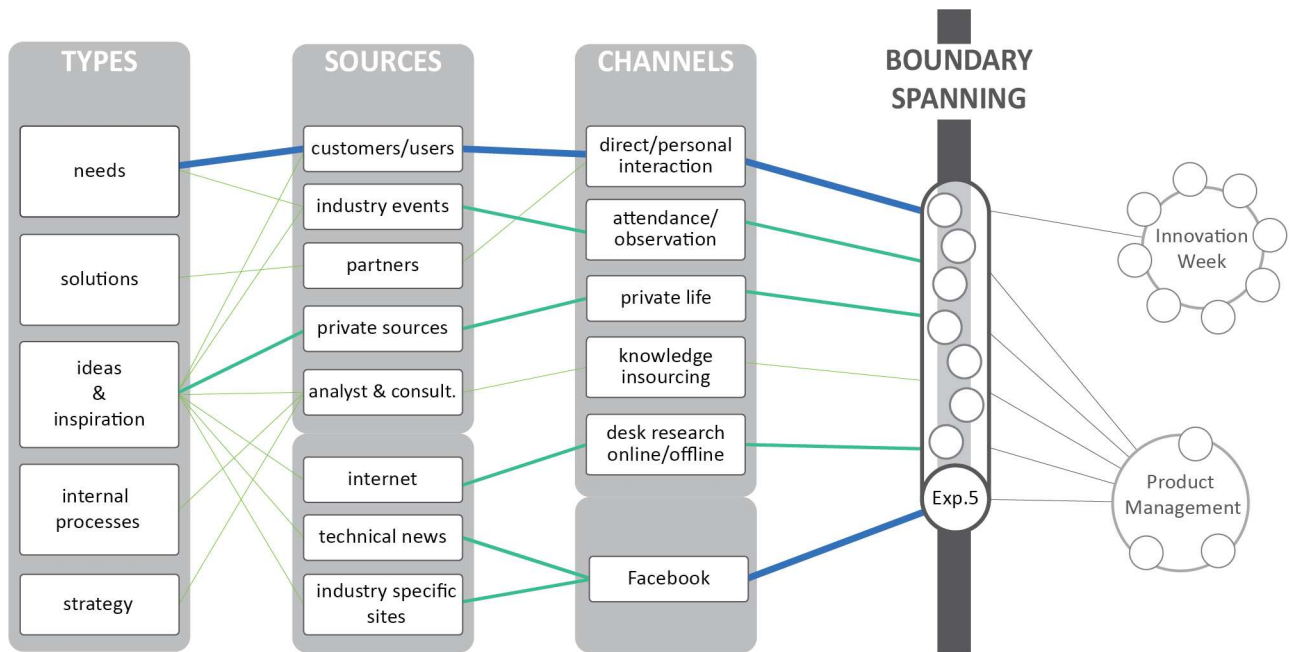
For outbound communication, Company 4 uses its website and LinkedIn. To communicate with potential partners on a technical level, it uses white papers. The most important channel, however, is also person-to-person communication with its partners, clients, and competitors.

Company 4 has an extensive network of sources on the outside, but no structured way to disseminate information inside. According to Expert 4, sharing within the tight-knit industry community is based on trust and reciprocity. Therefore, to participate in this exchange, a boundary spanner needs to be able to build up deep connections and have a willingness and ability also to share information with others. As Expert 4 stated, only superficial contacts are being made at industry events. Company visits typically follow to deepen these relationships.

According to the observations of Expert 4, there is no tendency for the information sources to become more digital. The fact that the industry depends so strongly on personal interaction makes this understandable.

#### 4.1.5. Case 5

Company 5 is developing enterprise software for calculating the cost of a product through the entire lifecycle. Their customers are typically large enterprises in manufacturing industries. They are among a small number of companies with such a level of specific domain expertise. Expert 5 is the CEO of this company.



**Figure 9:** Case 5 - Flow of information into the company

Company 5 sources need information primarily directly from its customers and to a much lesser extent from industry events. Partners give access to solution information by providing complimentary software/features that can be integrated into the software of Company 5. Critical types of information are general ideas and inspiration, including industry trends. These are accessed from multiple sources like the internet in general. Expert 5 gets access to ideas on social media through industry-specific sites and technical news outlets like Wired and TechCrunch. Expert 5 noted that there is only a gradual shift to more online sources, and about 50% of information is sourced that way. Besides that, industry trends are sourced directly from customers, from industry events, of which Company 5 attends multiple per year, and from analysts that have insight into the domain. While industry events are also a source for ideas, Expert 5 mentioned that many of the ideas come from sources in the private life of employees like exchanges with others, events they attend, or reading. In some instances, Company 5 insources knowledge from consultants to get input on internal processes and strategy. As Company 5 is one of the leaders in their field, competitors are of little relevance for them.

An essential channel for Company 5 is direct interaction with its customers through regular exchanges or at the annual user conference, and to a much lesser extent with partners. Online desk research and attendance to industry events and channels in the private life of employees are also relevant. According to Expert 5, culture is essential for innovation. It is a

cross-functional topic, that should happen at every department and every level. Therefore, potentially anyone can act as a boundary spanner and bring new ideas for innovation into the company. The choice of channels is based on personal preference. For Expert 5, Facebook is one of the primary sources to get access to ideas and industry trends. As it allows him to moderate the content, he efficiently gets exposure to this information.

The sourcing of needs through direct interaction with customers is the only strong direct flow into the company. Ideas and inspiration are sourced through multiple sources where each source has separate channels. This multi-sourcing approach gives a comprehensive spectrum of potential influences through similarly important streams.

While Company 5 does not have a structured process of internal dissemination, the responsibility for collecting ideas and facilitating exchange regarding these ideas lays within the product management department. This department is the central node for filtering ideas and roadmap planning. Besides that, the company holds an annual innovation week, where employees are free to work on projects of their choice.

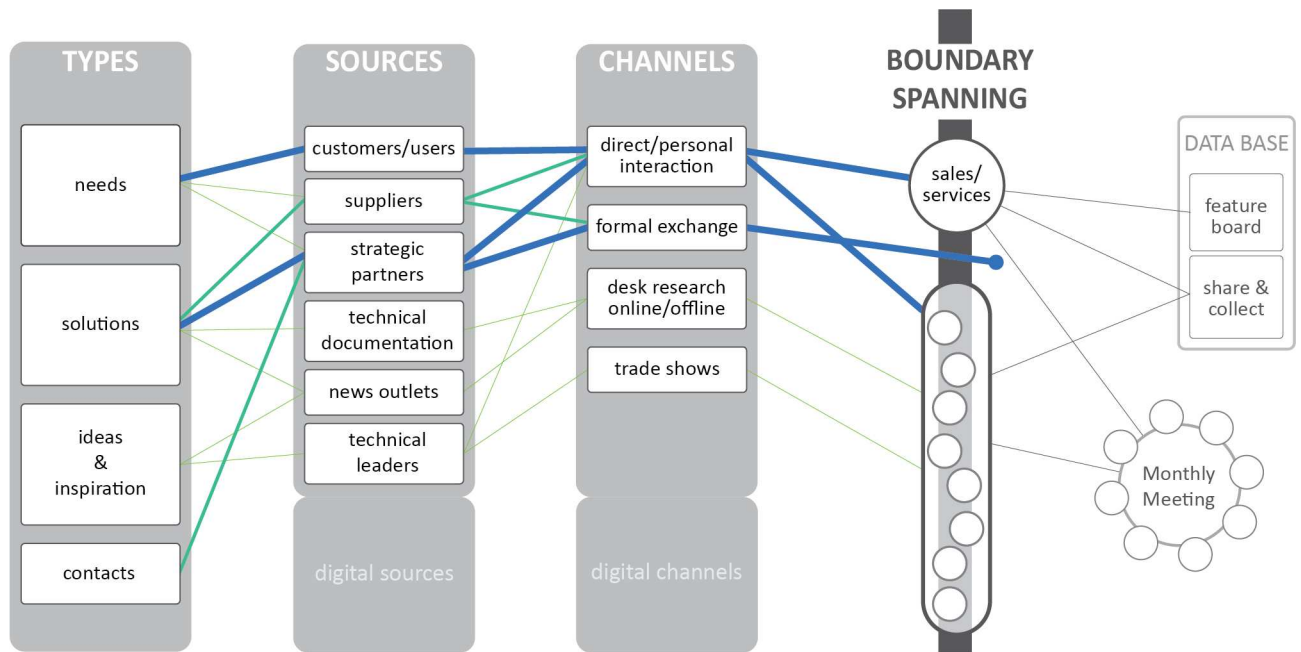
For outbound communication, Company 5 uses press releases, its annual user conference, the company website, and LinkedIn as channels. Expert 5 noted that LinkedIn is their most important channel. He also noted that he has the feeling that he can reach some employees better through LinkedIn than through the internal communication channels.

Company 5 uses an extensive network of sources and channels to access the information most relevant to its innovation process. Interestingly it sources very little solution information. As they are the experts in the field, they need to come up with new solutions based on customer needs, ideas, and industry trends, which they source extensively. In this regard, Expert 5 also highlighted the importance of sources and channels in the private life of its employees, who are typically experts in their specific fields. A further remark Expert 5 made was that “real innovation only happens when someone pays for it”, meaning that only when there is a strong need from an existing or a potential customer, big initiatives are pursued. This observation further highlights the importance of information about customer needs for the innovation process in Company 6.

#### 4.1.6. Case 6

Company 6 is developing software solutions and hardware integration for Internet of Things (IoT) applications. They provide their expertise in over 50 branches and industries. To do

this, Company 6 relies heavily on access to information about new technological developments that are not yet publicly available (e.g., 5G, low energy wireless communication), which requires very particular channels and partnerships. Expert 6 oversees Business Development.



**Figure 10:** Case 6 - Flow of information into the company

Company 6 relies heavily on two primary sources of information. The first one is its customers that have quite different needs based on their industry and specific application. According to Expert 6, boundary spanners accessing this information often need to be able to extract contextual information, and they “need to hear what the customer means and not only do what he says”. The second source are strategic partners, which are critical long-term collaborators of Company 6 that have gone through an evaluation process. These partners are a primary source for solution information as they give Company 6 access to technology roadmaps, information about standardization efforts, and unreleased technology to test. Besides that, they are a valuable source for contacts to potential partners and suppliers for specific applications. Press articles and technical leaders in the industry are additional sources for ideas.

According to Expert 6, everyone is responsible for bringing new information into the company, and every department must understand how to serve the customer best. This approach to innovation is deeply rooted in the company’s culture.

As the most important pieces of information for their innovation efforts are not yet publicly available, employees of Company 6 use two main channels to get access, direct personal interactions, and formal exchanges. Direct personal interactions with customers are mostly handled by the sales and service department and give access to customer needs. Direct interactions and formal exchanges of information with strategic partners and suppliers give access to more technical solution information. Desk research and trade shows play a less relevant role.

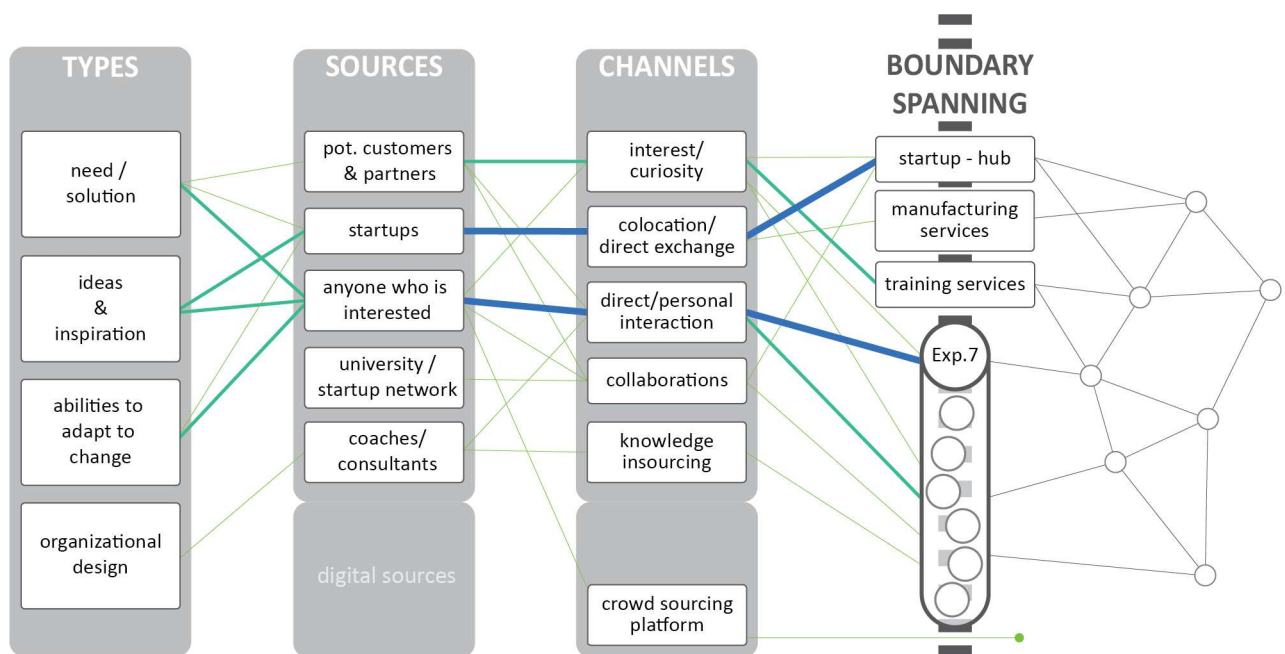
The internal dissemination of information happens over three channels. Requests from customers are documented by sales or service representatives in a database referred to by Expert 6 as feature board. This database is, among other factors, used to decide on features for the future product roadmap. For technical and other information, a separate database exists, that allows everyone to share and collect information in a structured manner. The database allows the categorization and tagging of specific information for future reference. The third channel is a monthly team meeting where new ideas can be brought in by any employee and discussed openly. If the idea is interesting, it is then further evaluated in a dedicated workgroup that always includes the initial idea initiator. Expert 6 explained that it is important to involve that person in the internal decision-making process not only so she could explain the idea in more detail to the experts involved, but also to be part of the decision if an idea is not pursued.

The company mainly uses online channels for outbound communication, namely a blog and a forum in combination with webinars on specific technical topics. Company 6 shares a roadmap to communicate future development interests both internally, and externally to partners on the supplier and distribution side. Facebook and LinkedIn are primarily seen as a tool for internationalization.

Company 6 has a strong network of external sources for solutions based on long-lasting formal relationships and informal exchanges. Internally it has well-established processes for dissemination. Due to the nature of their business, the most relevant information for their innovation efforts is not yet publicly available. Therefore, digital sources and channels play a less important role.

#### 4.1.7. Case 7

Company 7 is developing and manufacturing electronic components for monitoring technology primarily in industrial applications. Their main customers are machine and equipment manufacturers serving various industries. Since 2011 the company switched to a flexible organizational structure without formal hierarchies. For their access to external sources for innovation, they try to follow a radically different approach. Through its open culture, the company wants to attract possible sources to the company. For that reason, Expert 7 sees it as the company's main responsibility to be as interesting as possible for externals. This attitude is strongly reflected in the findings of this case. Expert 7 is the CEO of this company.



**Figure 11:** Case 7 - Flow of information into the company

According to Expert 7, the company needs to be well equipped to adapt to a changing environment and needs “to be able to love change”. He expects this to require managing a high level of complexity and uncertainty. Therefore, the types and sources used by Company 7 are targeted towards that goal. Contrary to the companies in the other cases, however, Company 7 focuses less on particular sources. Instead, it tries to give potential partners for exchanges multiple opportunities to get in touch with them and build up a strong network. For that reason, one of their primary sources is defined in a very generic way as ‘anyone who is interested in an exchange’. This source could be anything including individuals, startups, large multinational corporations, municipalities, and cities giving them access to need and



solution information, ideas, and general inspiration for new products or developments and information and abilities that allow the company to adapt to change. Another vital source for innovation mentioned by Expert 7 are startups, who give them not only insights about potential needs and solutions but, more importantly, ideas and inspiration. For Company 7, it is very valuable to learn how startups approach marketing and where their risks are, but also to get some taste of startup spirit, as the company itself is over 50 years old. Besides that, Company 7 sources need and solution information from potential customers and partners and exchanges information primarily on issues of organizational design (e.g., agile workflows or remuneration schemes) with coaches and consultants.

The boundary of company 7 is very open to external inflows. In order to increase the possibilities for external actors to connect with the company, Company 7 has started multiple initiatives that facilitate boundary spanning. One of these initiatives is a start-up hub, which allows young companies to rent space at the premises of Company 7 and access their knowledge of electronics manufacturing. This colocation allows employees of both companies to learn from each other. Expert 7 mentioned that this exchange has let them understand their own competences better and has led to the development of a new business field, which is its manufacturing service for startups and other companies. Company 7 also created a separate organization to train others in their learning about the change to an agile organization and its approach to openness.

On the personal aspects of boundary spanning, Expert 7 said that “Every employee is responsible to build up a network for his own good [...] and for the good of the company”. This deep root of openness in the company’s culture is another reason why the company’s boundary is much more open. Expert 7 himself is also a boundary spanner, who has built up a strong brand as speaker and ambassador for openness and fluid organizations. At the end, it does not matter to Expert 7 why and through which channel an external partner gets in contact with them. Beyond these efforts, Company 7 also participates in a crowd-sourcing platform to find solutions to certain problems and potential partners interested in collaborating on such solutions.

While Company 7 uses a CRM and an internal network, there is no structured way of collecting and disseminating knowledge internally. According to Expert 7, much organizational knowledge is in the heads of people, but not organized. He also acknowledged that this was one of their biggest issues. New information is spread through

direct communication or multiple messaging tools, including one tool integrated into their internal platform, WhatsApp chats, and MS Teams, which was added due to the COVID-19 lockdown. Through the internal network, people with relevant external information can, however, find out who is responsible for a particular topic and contact this person directly.

While standard channels for outbound communication (website, Facebook, LinkedIn, Xing) exist, Expert 7 considers them much less relevant to the company and sees online channels as a current weakness of Company 7. He would like to be able to communicate with people on the channels they use and mentioned TikTok, WhatsApp, and Medium as future channels of interest. Currently, an internal workgroup is evaluating the future use of digital channels and the skills needed to give an excellent user experience for their audience on these channels. Besides that, most of the outgoing communication is based on the personal presence and brand of Expert 7.

Company 7 uses a very open approach and sources a broad spectrum of external influences through multiple channels and initiatives that facilitate boundary spanning. Every employee is encouraged to be a boundary spanner. Through their open approach and friendliness, they give potential partners and customers the chance to self-select and connect. On the internal side, they are, however, lacking clear mechanisms for dissemination and pursue a “plug and play” approach, as Expert 7 described it. It works well internally and allows the right people to come together to work on a certain topic.

## 4.2. Findings across cases

While there are many differences and unique features among the seven cases, several similarities appeared to exist as well. This section outlines those findings across all cases.

### 4.2.1. External sources and flows of information

The three types initially defined in the framework, need information, solution information, and ideas and inspiration are consistently accessed in all cases. Information about needs is quite relevant to most companies and is almost always directly accessed through customers. This finding is consistent with Laursen and Salter (2006) and makes customers a rather important source of external information for innovation activities.

Solution information and ideas and inspiration are also significant types to the observed companies, but their order of relevance varies strongly between the cases. Companies 1,2, 4,

and 6 show a strong preference for sourcing solution information, with some of them accessing this type of information from up to six different sources. All four companies manufacture physical goods; Company 6 also produces software for IoT solutions. Companies 3 and 5 show a strong preference for sourcing ideas and inspiration; both are software providers.

Besides these three main types, contacts are sourced by more than half of the companies. Only two companies, 5 and 7, mentioned insourcing knowledge for organizational design and internal improvements, not only for product or service innovation.

The importance and use of sources are less consistent and vary strongly between the cases. The only source that was mentioned almost as frequently as customers was partners. Not only the kind of sources but also the number of sources used varies considerably. While company 2, for example, uses primarily three sources (out of five this company uses), other companies like Company 1 use a much broader sourcing strategy and access up to 9 sources. This is particularly interesting, considering the types of information that are being accessed. In the case of solution information, for example, the number of sources used to access it ranges from one (Case 5) to seven (Case 1).

The most consistently used channel of access is direct personal interaction followed by desk research (online and offline) and attendance or observation of events. The actual choice of channels, seems to depend on the sources used on the one hand, and the personal preference of the boundary spanner on the other hand. Companies 1 and 5 use a broad spectrum of channels to access their sources, while Cases 2 and 4 indicate a clear preference for a particular channel (direct personal interaction) to access multiple sources.

#### 4.2.2. Use of digital sources and channels

While most companies used some digital sources or channels to get access to external innovation, companies 2 and 6 have not mentioned any. Only for three companies, either a digital source or channel was at least of medium relevance for their innovation process. Throughout the cases, digital sources are more used than digital channels, with the most used source being the internet in general. Social media is explicitly used as a source by Companies 1, 3, and 5. For Companies 1 and 5, social media is not only an important source, but they also embrace it as a channel of access. In the case of Expert 1, it is used on a daily

basis. He also developed a workflow to evaluate potential target industries, which fully leverages the potential of LinkedIn.

Companies 2, 3, and 7 acknowledge that they are just at the beginning or working on their digital approaches, while for Company 4, this source and channel are simply less relevant.

#### 4.2.3. Boundary spanning

The importance of boundary spanning for information sourcing is evident since every case strongly depended on it. Only three experts mentioned established systematic channels that do not require boundary spanners in the process. Company 3 uses customer surveys as one of the channels to access customer needs. Company 6 has established mechanisms for the formal exchange of confidential information and technologies through strategic partnerships, and Company 7 uses crowdsourcing. In addition to that, it has established separate units, including a start-up hub, that support boundary spanning by bringing potential partners for exchanges closer to the company.

The extent to which boundary spanning exists in a company varies strongly between the cases. On the one end of the spectrum, Companies 1 and 4 have a single boundary spanner, who brings most of the external knowledge into the company. Companies 2 and 3 have multiple clearly identifiable boundary spanners. Companies 5, 6, and 7 show the other end of the spectrum and see every employee as a potential boundary spanner, as openness becomes more engrained in the company's culture.

While boundary spanning seems to happen in each company, the experts found different characteristics that are important for successful boundary spanning. The most frequently mentioned characteristic was some sort of creativity or the ability to connect information from different sources to the field of the company. The ability to build up and maintain a network of external connections was also seen as necessary. Besides that, factual knowledge about the industry was mentioned as an enabling factor. Expert 4 shared the valuable insight that boundary spanning depends on reciprocity, and it is crucial also to have the ability and willingness to give something.

#### 4.2.4. Internal dissemination

Internal dissemination in the seven cases is done by using a few different mechanisms and channels. Most companies use more than one such mechanism, which can be differentiated by three criteria. The first one is **open vs. closed group dissemination** and refers to the

degree of accessibility of the information internally. Company 4 again offers one end of the spectrum, where the boundary spanner only discloses information to a distinct group of people, including the CEO and colleagues in the product management department. Employees outside this group typically do not have access to this information. A similar mechanism is used by Company 3, where certain types of information are shared in Microsoft Teams channels dedicated to a specific topic. Information disclosed there is only available to members of that channel. The other end of the spectrum is the monthly team meeting of Company 6, where every employee can bring up innovation-related topics for internal discussion. This gives every employee the possibility to access this information. Similarly, information posted on the intranet in Company 3 is accessible to everyone. Besides company 4, all experts mentioned some form of open dissemination of information.

The second criterion is **ad-hoc vs. scheduled dissemination**. Ad-hoc dissemination offers a possibility for the boundary spanner to transfer the information whenever it is received, while scheduled dissemination would only happen at pre-planned occasions. All Companies use some form of ad-hoc dissemination, either through direct transfer to a recipient inside the company (Company 4, 5, and 7), by using a dedicated database (Company 2 and 6), or by using digital messaging platforms like WhatsApp and MS Teams inside the company (Company 1, 3 and 7). Company 1 is particular in that regard, as the boundary spanner, in that case, uses e-mail and short messages only to himself as a form of direct dissemination, before sharing it in scheduled meetings. Scheduled dissemination happens in companies 1, 5, and 6 either in the form of team meetings or during an innovation week.

The third criterion is **structured archiving vs. loose communication**. Companies 2 and 6 use dedicated databases to store and sort information in a structured way. This structure makes information easily retrievable at any time. Company 3 uses MS Teams to disseminate information in interest groups according to the topic. In all other cases, the interviewees did not mention similar mechanisms. While the information is disclosed internally, this happens based on loose communication, and the information is not accessible in a structured way.

## 5. Discussion

### 5.1. Interpretation

#### *Information sourcing strategies*

The companies observed use somewhat different strategies to access external information for their innovation process. Many of them have found ways to access the most critical information to them through a combination of multiple sources and channels. Using such a multi-sourcing strategy makes sense for various reasons. Using a single source or channel to access certain information can be risky as this source might be biased or deliver only a narrow spectrum of the information available. The same source (e.g., a customer, a supplier, or an online source) can also deliver the same information to competitors, making it less valuable. Using a combination of multiple sources and channels can give a more unique and complete view of a certain type of information and lead to relevant insights.

One of the main challenges in a company's innovation process is to combine different streams of information and develop a compelling product that not only fulfills the current latent customer needs but delights the customer by going a step beyond. Sometimes these non-latent or future customer needs can be deduced from the customer directly. Expert 6 referred to this as "active listening" to find out what the customer really means. In other cases, different types of information, like ideas or market trends, offer insights into possible future customer needs. Company 3, for example, pays close attention to shifts in user interaction design within the consumer electronics industry. Once users are used to a certain way of interacting with technology in their private life, they might expect similar behavior from user interfaces in their work environment.

The changing preference for different types of information between the investigated companies and might depend somewhat on the industry or the type of products the company produces. In the cases investigated, companies producing software appear to prefer sourcing ideas, while manufacturing companies tend to source more solution information. It is, however, not possible to argue on the reasons for this observation based on the data collected.

#### *Boundary spanning*

The importance and intensity with which ideas and inspiration are sourced can hint at the

necessary abilities of the boundary spanner accessing this information. While the relevance of solutions and needs are often easy to understand, it requires a higher mental effort to see the potential implications and possibilities for future developments when sourcing ideas and inspiration. Understanding the potential relevance of a piece of information and connecting it to the field of the company also requires creativity, a personality trait mentioned by multiple experts.

An interesting observation that can be made when looking at the cases is that the external networks in Companies with a single boundary spanner (Case 1 and 4) seem more complex than the networks in the other cases which have multiple boundary spanners. Following the observations of Laursen and Salter (2006), who found an inverse U-shaped correlation between the number of sources used and the innovation performance of companies, one question becomes obvious: How much is too much? Because boundary spanners must not only gather this information but also process and disseminate it, the question seems more than fair. Answering this question, however, is beyond the scope of this study.

#### *Dissemination strategies*

Like many other aspects, the approaches and available channels for internal dissemination seem to vary based on the circumstances and needs of the company. Two noticeable factors, however, are worth mentioning. First, structured archiving is important for some companies to keep information usable at a later point in time. Information might not be relevant when it is gathered or might not reach the right recipient at the moment of ad-hoc dissemination. It can, however, bring valuable insights later on. The use of databases for customer needs and solution information and continuous use of them in Case 2 offers a good example of this. While Companies 2, 3, and 6 seem to be used to this kind of thinking, others cannot benefit from such an explicit internal repository and depend on the memory of their employees.

Second, some sort of open dissemination is used by almost every company in this study. It allows internal recipients to identify relevant information for themselves and does not require the boundary spanner to have specific knowledge about what might be interesting for whom. In large corporations, this sort of dissemination might easily lead to information overflow. In SMEs, the amount of information disseminated openly should be more

manageable for employees as boundary spanners already filter it for relevance to the company.

### *Use of new technologies*

While the use of new technologies offers vast potential to improve boundary spanning as outlined in 2.3.1, the cases show that this might not be universally applicable and that the actual usefulness depends on the environment in which a company operates. Company 1 relies heavily on the internet and social media to access all types of information it needs. This approach makes sense since the company is primarily looking for publicly available information, such as solutions used in other industries or contacts of potential customers. For information that is not freely available, digital sources and channels might be much less valuable. Company 4, for example, exchanges information in a rather closed community, where access to important information is strongly based on trust and face to face interaction. Company 6 needs access to preliminary information and technology that is still under development and not available to the general market. This information is shared under partnership agreements. In both cases, highly relevant information would not be accessible through digital channels.

The use of digital tools is also not a general solution to internal dissemination but can be helpful for the innovation process. This is demonstrated by Companies 2, 3, and 6, which are using information stored in databases or collected in digital communication platforms for planning R&D projects and roadmaps. Company 7 offers the contrary example. While multiple digital tools are used for internal communication, the dissemination of these channels is not coordinated and can lead to fragmentation of information. Later use of the information is less feasible in such cases.

## 5.2. Implications

The findings in this thesis lead to several scientific and managerial implications that must be considered. Particularly the managerial implications offer valuable guidelines for companies on what they need to take into account when accessing external information for their innovation activities and how they can support boundary spanners in doing this.

### 5.2.1. Scientific implications

Consistent with the expectations based on literature, access to external sources is very important for the innovation process in the investigated cases and boundary spanners play a



vital role in the process. The framework introduced in this thesis, however, allows for a more detailed investigation of the actual flows of information into an organization and can offer a valuable tool for future scientific investigations. By analyzing the five steps outlined in the framework, including type, source, and channel, it is possible to better understand the strategies used by the boundary spanners, and by the company in general to access and internalize external information.

The specialization on a particular topic or channel, as found by Tushman and Scanlan (1981a) in gatekeepers in large R&D departments, could not be observed in boundary spanners in SMEs. Boundary spanners showed the rather opposite behavior in Case 1 and 4. Both boundary spanners gather information of different types from a broad network of sources and channels.

The development of the internal dissemination into two separate steps, as proposed by Whelan *et al.* (2010) could also not be directly observed. However, a stronger reliance on internal systems for dissemination combined with open dissemination could hint in a similar direction and reduce the need for the boundary spanners' ability to know precisely, where information should be disseminated internally.

### 5.2.2. Managerial implications

#### *External sources and sourcing strategies*

The cases show that some companies rely strongly on a single source or channel for information, which is critical for their innovation potential. Companies should, therefore, consider the channels and sources their employees can use and should encourage boundary spanners to access the same type of information through multiple ways in order to reduce dependency on and potential bias of a single source.

Managers should also consider to what extent they could gather the information they need frequent access to without this strong reliance on a boundary spanner. Examples for this are the formal exchanges of information as in Case 6 or market research, including customer surveys as in Case 3. This approach would reduce the load of the boundary spanner while at the same time de-risking the information-sourcing strategy.

While the use of new technologies might not be applicable in every case, they seem to be underutilized in SMEs based on comments made by the experts. Companies should evaluate the strategic use of such sources, channels, and tools on a case-by-case basis. For example,

companies doing regular desk research on the internet could automatize part of their job by setting up news alerts on specific topics.

### *Culture and management style*

The responses given by the experts show that successful boundary spanning depends much more on personal abilities and personality traits than on tools or resources that are provided. It is, therefore, essential for companies to hire the right people and actively support and encourage boundary spanning. The right individuals will find ways to access valuable information from the networks they can build up. Culture and strategy should support this by creating meaningful guiding lines. An open culture enables boundary spanners to access different sources (Piller, Mitra and Ghosh Mitra, 2019), while clear strategies help the boundary spanners to identify potentially valuable information.

While SMEs can take advantage of the significant positive effects on the access to external information that boundary spanners can bring, they also need to be aware of the potential risks. Especially in cases where only a single boundary spanner is responsible for most of the external information sourcing, the company has an unusually high dependence on that single person. By introducing a second boundary spanner, a company can reduce this risk while increasing the potential scope of access to external information.

New technologies like social media are omnipresent in our lives and have become a valuable tool to access certain types of information. Companies should, therefore, not limit access to certain websites like Facebook out of fear that employees might become unproductive and use them for private purposes.

### *Internal dissemination*

Internally, boundary spanners can disseminate information either by directly transferring it to a colleague or by using a system to store or broadcast it. To make sure information ends up in the right hands internally, companies should aim to make meaningful dissemination as easy as possible for boundary spanners. This can be done by introducing a balanced mix of scheduled meetings and channels for open and closed dissemination.

The cases have shown that systematic knowledge management seems to be a potential weak spot for SMEs. The ability to quickly disseminate and retrieve information in a structured way should be considered when introducing the aforementioned internal

channels. One relatively easy to implement example is the use of MS Teams channels for specific topics, that are accessible to everyone.

### 5.3. Limitations

Several limitations need to be considered regarding this study. The first set of limitations is based on the dataset. While for a study of this kind, 7 cases are sufficient, it still only represents a tiny fraction of the SME population. While certain conclusions can be drawn from singular case studies, it is not possible to generalize the results. In order to do that, the findings should be validated on different datasets and quantified in a more extensive study. In addition to that, the study is focused on the DACH region, with most companies being Austrian. The applicability of the results to other regions and especially other cultures, is therefore not necessarily possible. The sample also did not include any companies focused on B2B business, which might use very different sources and channels, particularly to get need information. Boundary spanning in these cases may look very different.

There might be a certain bias based on the position held within the company. The CEO of a company (as interviewed in Cases 2, 5, and 7) could have a better overall view on the flows of information, but not be equally aware of the details of boundary spanning as a member of the product or business developments (Cases 1, 3, 4, and 6). The CEO might, therefore, perceive boundary spanning as a much broader phenomenon across the company. In comparison, other employees might perceive it as a narrower phenomenon but with a much higher level of detail. Besides that, the interview with one person does not necessarily give an objective result or a holistic picture of the actual happenings within the firm. Many streams of information inflow and outflow could be completely unobserved by this individual.

A final limitation might be due to the interpretations of the author. While the author tried to be as diligent as possible in the process, the interviews, and the extraction of information from the interviews were done by a single person without the controlling effect of a second author or review by the interviewees. The author attempted to be consistent between all cases, but the results are partially based on subjective interpretation.

## 5.4. Future research prospects

This thesis opens the door to a different kind of analysis of the information flows into companies enabled by boundary spanners. While some questions could be answered, probably more were uncovered, and offer interesting topics for future research. These topics include the following:

### *Investigate the same firm with different levels of granularity*

As mentioned above, the current study only analyzed each firm from the point of view of one member of this company, which could lead to bias or unawareness of other streams of knowledge exchange with the outside. Expert 5 hinted at this when he mentioned the private life of employees as an important source and that the choice of channels is based on personal preference. A future study should, therefore, conduct a similar analysis based on interviews with multiple employees in different positions within the same firm to find out if, and to what extent such discrepancies exist.

### *Conduct a quantitative study on these flows*

Another interesting line of investigation would be to quantify the relevance of different streams of inflow. In the current study, the weighting is based on the interpretation of the author. A future study could use the findings as a starting point and aim to quantify the importance and frequency of such flows.

### *Investigate the criteria for choosing specific external channels and sources*

The cases in this study showed a broad spectrum of different sourcing strategies, from very focused ones such as in Case 2 to much more broad ones like in Case 5 or 7. A future study could aim to find out which factors influence the choice of certain strategies. What role does the environment and industry of the company play? To what extent do the needs for certain types of information of the company dictate the choices? What influence do personal characteristics and preferences of the boundary spanner(s) play?

### *Investigate the influence of company culture on boundary spanning behavior*

Companies 5, 6, and 7 had two main things in common. On the one hand, they have a rather open approach to boundary spanning and encouraged their employees to engage in external exchanges. On the other hand, they see innovation as strongly linked to the company culture. It was, however, beyond the scope of this study to investigate causality or

correlation between these two factors. A future study could, therefore, investigate if there is an actual correlation between culture and boundary spanning activity by its employees.

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# Appendix

## Appendix A – Interview Questions

### Information:

#### *Inbound*

1. To what extent are you gathering information for your innovation processes from outside the company?
  - a. How do you access information about:
    - i. Competitors
    - ii. Industry trends
    - iii. New technologies (also outside your industry)
    - iv. Customer needs
  - b. Are there other ways in which you gather ideas and solutions for new products or services?
  - c. To what extent is this happening in the digital world? Why do you think that is?
  - d. Do you think with these sources you are getting all the information you need?
2. How has the way you access this information changed over the last 5-10 years?  
Can you elaborate on that? Why do you think that is?
3. Who is collecting this information?
  - a. What competences and abilities does this person need to have?
  - b. In your opinion, what resources and tools are needed for that?
4. How is this collection of information managed internally?
  - a. What happens with the information that is being collected?
  - b. How and by whom is the collected information being used?

#### *Outbound*

5. What are the channels you use to communicate information about your company?
  - a. In which cases are you using online or offline channels?
  - b. How are you trying to reach/attract new potential partners?
  - c. What person is managing these communication channels?

### Resources:

6. To what extent do you participate in joint research or product/service development projects?
  - a. How do you get in contact with such partners and who initiates the contact?
  - b. How are these collaborations managed?
7. Do you outsource part of your innovation process to partners or suppliers? E.g. do you outsource design, use consultants, etc.
  - a. How was this initiated?
  - b. Who is managing this connection?

### Verification questions (optional):

8. Have you licensed intellectual property/technologies from or to another company?
  - a. Can you briefly describe the process?
9. Do you participate in any networks (industry, regional, etc.), consortia, strategic alliances?
  - a. Please describe the nature and objective of this group.
  - b. How was it initiated? Who is managing it? What is your company contributing/gaining?
10. Do you own part of a joint venture or share substantial assets with another company?
  - a. Please describe the nature of your involvement.
  - b. How was it initiated? Who is managing it? What is your company contributing/gaining?

## Appendix B – Interview Protocols

Case 1 – 9 pages

Case 2 – 9 pages

Case 3 – 9 pages

Case 4 – 9 pages

Case 5 – 10 pages

Case 6 – 10 pages

Case 7 – 12 pages

Interview Number <i>1</i>	Date: <i>08.06.2020 10:10</i>
<b>Interview Partner</b> Name <i>Expert 1</i> Company <i>Company 1</i> Function/Title <i>ENTWICKLUNGS KOORDINATION</i>	Interview conducted via <i>ZOOM / VIDEO CALL</i> Recording approved YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>

**Warm-Up:**

Can you briefly describe your company and what your role in the company is?

COMPANY IS PART OF A LARGER GROUP, BUT OPERATES INDEPENDENTLY.  
FOUNDED IN 2008 TO DESIGN AND BUILD LIGHTWEIGHT HYDRAULIC CYLINDERS  
EXPERT 1 JOINED IN 2009  
LONG DEVELOPMENT PHASE + TESTS  
SINCE 2016/17 CONTINUOUS DELIVERIES TO CUSTOMERS  
EXPERT 1 IS ORIGINALLY FROM A DIFFERENT INDUSTRY THAN COMPANY 1  
→ HE HAD TO ACCEPT/DEPEND ON A LOT OF EXTERNAL HELP!

## Information:

### Inbound

1. To what extent are you gathering information for your innovation processes from outside the company?
  - a. How do you access information about:
    - i. Competitors
    - ii. Industry trends
    - iii. New technologies (also outside your industry)
    - iv. Customer needs
  - b. Are there other ways in which you gather ideas and solutions for new products or services?
  - c. To what extent is this happening in the digital world? Why do you think that is?
  - d. Do you think with these sources you are getting all the information you need?

• MASSIVE, NOTHING IS EXCLUDED!

- STRUCTURE  
- MATERIALS  
- CORROSION, ...

} → LOOK FOR PARTNERS AND SOLUTIONS IN  
THEMATIC CLUSTERS

• LOOK AT OTHER INDUSTRIES, THAT USE LIGHT-WEIGHT CONSTRUCTION  
• DESK RESEARCH ON INTERNET (WEBSITES, YOUTUBE) TO GET INSPIRATION  
• IS PRIMARY PART OF DAILY WORK

• INTERNAL: EMAIL/SMS TO HIMSELF WHEN HE FIND SOMETHING INTERESTING!

• EXTERNAL PARTNERS FOR CALCULATIONS AND TESTS THEY CAN'T DO.

↳ HAVE EXPERIENCE WITH SIMILAR MANUFACTURING TECH  
AND CAN GIVE ADVICE / MAKE CONNECTIONS

iv) ANALYSIS OF POTENTIAL MARKETS / BRANCHES FROM SELECTION CRITERIA

1) LOOKS FOR POT. CUSTOMERS FOR INITIAL CONVERSATION  
TO GET BETTER IDEA ABOUT CUSTOMER NEEDS AND REQUIREMENTS

2) LOOKS FOR COMPANIES IN THAT BRANCHE, THAT LOOK INNOVATIVE  
(PRESENT THEMSELVES AS INNOVATIVE)

→ PATENTS, ARTICLES WITH SPECIAL SOLUTIONS / PRODUCTS THEY SHARE  
ACT AS INDICATOR

3) LOOKS FOR EMPLOYEES OF THIS COMPANY ON LINKEDIN, THAT  
APPEAR TO BE WORKING ON INNOVATION (R&D → CEO)

4) DIRECT CONVERSATION WITH THAT PERSON  
(IF THIS CONTACT IS NOT INTERESTED → NEXT CONTACT IS TRIED)  
→ IF NO ONE REACTS → SOLUTION IS EITHER NOT NEEDED, OR

↳ PARTICULAR INDUSTRY IS NOT INNOVATIVE ENOUGH

ii) THROUGH CONVERSATIONS WITH POTENTIAL CUSTOMERS IN THAT INDUSTRY

i) MARKET IS <sup>>10bn</sup> HUGE AND ONLY SMALL NUMBER OF PLAYERS IN  
LIGHTWEIGHT SEGMENT → NO NEED TO OBSERVE YET.

COMPETITION WOULD BE GOOD TO IMPROVE ACCEPTANCE FOR THE  
PRODUCT (→ CREDIBILITY THROUGH A MAJOR PARTICIPANT)

2. How has the way you access this information changed over the last 5-10 years?  
Can you elaborate on that? Why do you think that is?

- SEARCH POSSIBILITIES GOT BETTER  
- COMPANIES GOT MORE OPEN AND TRANSPARENT } → SEARCH GETS FASTER

◦ EXPERIENCE / INSTINCT TO INCREASE EFFICIENCY

◦ MORE SOURCES (E.G. VIDEOS) ON TECHNICAL/MANUFACTURING SOLUTIONS

→ LOOKING FOR INNOVATION DOESN'T MEAN THAT YOU INVENT SOMETHING NEW,  
BUT THAT YOU FIND THE RIGHT SOLUTION (CROSS-INNOVATION)

◦ PERSONAL NETWORK IS ESSENTIAL FOR SEARCHING SOLUTIONS

◦ SUPPLIERS CAN ALSO BE VALUABLE SOURCES (BRING EXPERIENCE FROM OTHER APPLICATIONS / INDUSTRIES)

AD 1) a) iii)

3. Who is collecting this information?

- a. What competences and abilities does this person need to have?
- b. In your opinion, what resources and tools are needed for that?

EXPERT 1

a) GOOD ABILITY TO MAKE CONNECTIONS FROM MULTIPLE SOURCES  
(MULTI-CHANNEL)

OPENNESS TO REACH OUT TO PEOPLE

b) • NETWORKING

• NETWORKING EVENTS

• NETWORK PLATFORMS (LINKEDIN)

ADS)

LINKEDIN TO ALSO REACH OUT TO POTENTIAL CUSTOMERS!

• GIVES MORE REACH (US)

• ASYNCHRONOUS (TIME DIFFERENCE)

4. How is this collection of information managed internally?
- a. What happens with the information that is being collected?
  - b. How and by whom is the collected information being used?

DEVELOPMENT COORDINATION MEETING (ALSO AS WAY TO INFORM  
CENTRAL INSTANCE CEO)



TEAM MEETINGS  
(PEOPLE WHO WOULD WORK ON  
THE PROJECTS)

5-7  
PEOPLE

→ INTERNAL COMMUNICATION  
AND DISCUSSION



PROJECT FOR  
IMPLEMENTATION

~ 20 PEOPLE  
IN TOTAL

↗ FROM GROUP  
DEPENDING ON  
TOPIC



## Outbound

5. What are the channels you use to communicate information about your company?
- In which cases are you using online or offline channels?
  - How are you trying to reach/attract new potential partners?
  - What person is managing these communication channels?

o PERSONAL / FACE2 FACE WITH CUSTOMER IS ESSENTIAL  
→ ALSO DEPEND ON REFERRALS BY CUSTOMERS / PARTNERS

o TECH - MAGAZINES IN TARGET INDUSTRIES

o FAIRS ONLY AS VISITORS TO CONTACT PEOPLE DIRECTLY  
(NO SHARE)

a) ONLINE SEE BEFORE!

g) EXPERT 1 (BECAUSE OF SMALL SIZE)  
NO FIXED STRUCTURE

## Resources:

6. To what extent do you participate in joint research or product/service development projects?
- How do you get in contact with such partners and who initiates the contact?
  - How are these collaborations managed?

DONE IN THE PAST, BUT A HIGH AMOUNT OF EFFORT!

- MOSTLY TOGETHER WITH SUPPLIERS

→ EXPERT 1 TRIES TO FIND PROJECTS, THAT ARE ALSO ATTRACTIVE FOR SUPPLIERS

a) INITIATED AND PAID MOSTLY BY COMPA / EXPERT 1

b) DIRECTLY TECH. ↔ TECH. REPRESENTATIVE

7. Do you outsource part of your innovation process to partners or suppliers? E.g. do you outsource design, use consultants, etc.
- How was this initiated?
  - Who is managing this connection?

PARTLY ANSWERED IN 1)

WOULD LIKE TO DO THIS MORE, BUT IS TOO COSTLY  
- HE WOULD HAVE ACCESS TO SUITABLE PARTNERS

Verification questions (optional):

8. Have you licensed intellectual property/technologies from or to another company?
  - a. Can you briefly describe the process?
9. Do you participate in any networks (industry, regional, etc.), consortia, strategic alliances?
  - a. Please describe the nature and objective of this group.
  - b. How was it initiated? Who is managing it? What is your company contributing/gaining?
10. Do you own part of a joint venture or share substantial assets with another company?
  - a. Please describe the nature of your involvement.
  - b. How was it initiated? Who is managing it? What is your company contributing/gaining?

9) VERY GOOD REGIONAL CLUSTER!  
→ VALUABLE FACE 2 FACE NETWORK FOR PARTNERS

Interview Number 2	Date: 08.06.2020, 14:00
<b>Interview Partner</b> Name Expert 2 Company Company 2 Function/Title CEO	Interview conducted via Zoom AUDIO ONLY  Recording approved YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
<b>Warm-Up:</b> Can you briefly describe your company and what your role in the company is?	
<ul style="list-style-type: none"><li>◦ DEVELOPMENT &amp; PRODUCTION OF COMPLEX PARTS FOR AVIATION, RAILWAY, AUTOMOTIVE</li><li>◦ PLASTICS RESINS, RUBBER AND MULTI-MATERIAL</li><li>◦ PROD. IN EUROPE, ALSO OFFICE IN US → INTERNATIONAL COMPANY WITH FOCUS ON EUROPE &amp; NAFTA</li></ul> <p>EXPERT 2 → CEO</p>	

## Information:

### Inbound

1. To what extent are you gathering information for your innovation processes from outside the company?
  - a. How do you access information about:
    - i. Competitors
    - ii. Industry trends
    - iii. New technologies (also outside your industry)
    - iv. Customer needs
  - b. Are there other ways in which you gather ideas and solutions for new products or services?
  - c. To what extent is this happening in the digital world? Why do you think that is?
  - d. Do you think with these sources you are getting all the information you need?

- a) NO DEDICATED DEPARTMENT FOR COLLECTING INFORMATION
- iv) → ALWAYS RELATED TO CUSTOMER REQUEST OR PROBLEM  
(APPLICATION PROBLEM RELATED TO CUSTOMER PRODUCT / SERVICE)
- FOR GENERAL TOPICS → COOPERATIONS WITH UNIVERSITIES AND OTHER COMPANIES
- i) COMPETITORS → ARE OBSERVED (INSPIRATION)  
MARKET OBSERVATION THROUGH TRADE FAIRS / INTERNET  
→ LOOK FOR IDEAS
- CONTACT WITH OTHER SMEs THROUGH CLUSTERS
- ii) IND. TRENDS  
VERY RELEVANT (e.g. AUTOMOTIVE → TRANSITION TO EV)  
BUT DON'T HAVE DIRECT IMPACT ON SUCCESS OF THEIR CUSTOMERS  
  
THEY DEPEND ON WHAT THEIR CUSTOMER WANTS TO DEVELOP, BUT HAVE LIMITED INPUT.
- iii) SUPPLIERS  
◦ LONG PARTNERSHIPS WITH FREQUENT UPDATES (EVERY FEW WEEKS)  
→ BUT SUPPLIERS ALSO SUPPLY COMPETITORS!
- INNOVATION IS ALWAYS A TIER PROBLEM → EVERYONE DEPENDS ON OTHERS AND HAS HIS NICHE.
- c) ALWAYS PEOPLE BEHIND IT.  
◦ NOT USING AI TO IMPROVE PROCESSES  
◦ THINKS THEY ARE EARLY IN DIGITAL PROCESS, JUST USING SOME COMPONENTS  
→ „THE SOURCE OF INNOVATION IS ALWAYS A PERSON“
- d) DOING THE BEST THEY CAN, BUT KNOW THEY ARE NOT GETTING ALL  
→ HIDDEN INFORMATION  
→ FILTER PROBLEM → TOO MUCH DATA

2. How has the way you access this information changed over the last 5-10 years?  
Can you elaborate on that? Why do you think that is?

HAS CHANGED BECAUSE OF COMPANY DEVELOPMENT

CHANGED FROM PURE MANUFACTURING TO DEVELOPMENT PARTNER  
FOR CUSTOMER

⇒ REQUIRES NEW SOURCES OF INFORMATION  
(BUT ALSO GIVES ACCESS TO NEW SOURCE OF INFORMATION)

→ MAIN SOURCES ARE SUPPLIERS, CUSTOMERS, (INSTITUTIONS)

↓  
L.P. FUEL CELL PROJECT  
WITH 10 COMP., BUT THEY HAD  
JUST A SMALL PART IN IT

3. Who is collecting this information?

- a. What competences and abilities does this person need to have?
- b. In your opinion, what resources and tools are needed for that?

MULTIPLE PEOPLE - R&D DEPARTMENT

- SALES DEPT → BRING IDEAS TO R&D AS WELL
- PURCHASING (SUPPLIER CONTACTS)

>50% FROM SALES (CUSTOMER NEED)

o) TO GET INFORMATION: LISTEN (ACTIVE LISTENING AND LEADING)

- TO FIND ISSUE OR NEED OF CUSTOMER
- TO GET INFORMATION FROM SUPPLIERS, ETC.

→ THEN INTERNAL PROCESSES TO EVALUATE POSSIBILITIES

1) o) HAVE A DATABASE ON USE OF MATERIALS → SEE IF SOLUTION IS AVAILABLE (95% OF QUESTIONS ARE QUICKLY ANSWERED)

◦ NETWORK → NEED TO KNOW WHO TO CALL WHEN YOU DON'T HAVE INFORMATION AVAILABLE

◦ SUPPLIERS, WHO EVER YOU THINK MAY HELP YOU

◦ CUSTOMER REQUESTS ARE ALSO DOCUMENTED IN INTERNAL SYSTEM (ALSO WHEN NOT SOLVED)

→ R&D IS DOING A NUMBER OF PROJECTS BASED ON DEMAND / SKILL DEV.  
OLD DEMANDS ARE USED TO EVALUATE POTENTIAL FOR NEW BUSINESS



4. How is this collection of information managed internally?
- What happens with the information that is being collected?
  - How and by whom is the collected information being used?

FROM PREV. ANSWER

o CUSTOMER REQUESTS ARE ALSO DOCUMENTED IN INTERNAL SYSTEM (ALSO WHEN NOT SOLVED)

→ R&D IS DOING A NUMBER OF PROJECTS BASED ON DEMAND / SKILL DEV.  
OLD DEMANDS ARE USED TO EVALUATE POTENTIAL FOR NEW BUSINESS

ADAPTATION OF STANDARD PROCESSES / VERY BASIC APPROACHES

5. What are the channels you use to communicate information about your company?

- In which cases are you using online or offline channels?
- How are you trying to reach/attract new potential partners?
- What person is managing these communication channels?

- OPERATIONAL BUSINESS SO BUSY, THAT THERE WAS NO REAL NEED (OR NO AVAILABLE RESOURCES)
  - MORE INFORMATION COMING TO THEM
- IF THERE IS NEED FOR A CERTAIN PROJECT → REACH OUT TO PARTNERS
- REACHING OUT TO EMPLOYEES WAS PRIMARY REASON TO USE CERTAIN PLATFORMS (INSTAGRAM, FACEBOOK)
  - LED TO OTHER COMPANIES FINDING THEM AND COMMUNICATING! (BECAUSE THEY COULD FIND MORE INFORMATION)
  - ⇒ ONE OF THEIR POT. BIGGEST CUSTOMERS FOUND THEM ON INSTAGRAM!
- NEVER HAD SUCCESS ON LINKEDIN / XING
- MEETINGS WITH UNIVERSITIES & CLUSTERS ARE VERY TIME CONSUMING AND LITTLE OUTPUT → STOPPED IT, BECAUSE THEY FOUND IT USELESS!
  - NO PARTICIPATION IN CLUSTERS (ONLY NICE TO COLLECT BUSINESS CARDS)

## Resources:

6. To what extent do you participate in joint research or product/service development projects?
- How do you get in contact with such partners and who initiates the contact?
  - How are these collaborations managed?

IN MANY SECTORS FIRST DEV PHASE, THEN MULTI-YEAR PRODUCTION

- AUTOMOTIVE 5 YEARS
- AVIATION LONGER

AS SOON AS PROD. PHASE STARTS ⇒ DEV. PHASE FOR SUCCESSOR STARTS

- 2nd GENERATION USUALLY
- IMPROVE PRODUCT
  - REDUCE COST
  - INCREASE MARGIN
- } REQUIRES INNOVATION

◦ MOSTLY CUSTOMER DRIVEN DEVELOPMENT PROJECTS

◦ JOINT DEV. OFTEN NOT POSSIBLE BECAUSE OF TRADE SECRETS !  
PAT. NOT POSSIBLE IN THESE CASES

7. Do you outsource part of your innovation process to partners or suppliers? E.g. do you outsource design, use consultants, etc.
- How was this initiated?
  - Who is managing this connection?

- TRIED IT DUE TO LACK OF RESOURCES, BUT NOT SUCCESSFUL
  - ONLY FOR ACTIVITIES, THAT THEY CAN'T COVER IN-HOUSE
    - ↳ SPECIAL TOOL MAKERS
    - ↳ SOURCING OF METAL PARTS THEY DON'T PRODUCE (REQUIRES SHARING OF KNOWLEDGE)
  - RATHER INSOURCING TREND OVER LAST YEARS (DESIGN)
    - EXPENSIVE
    - HIGH FLUCTUATION OF PEOPLE
- } → NEC. EXPERIENCES WITH OUTSOURCING

Verification questions (optional):

8. Have you licensed intellectual property/technologies from or to another company?
  - a. Can you briefly describe the process?
9. Do you participate in any networks (industry, regional, etc.), consortia, strategic alliances?
  - a. Please describe the nature and objective of this group.
  - b. How was it initiated? Who is managing it? What is your company contributing/gaining?
10. Do you own part of a joint venture or share substantial assets with another company?
  - a. Please describe the nature of your involvement.
  - b. How was it initiated? Who is managing it? What is your company contributing/gaining?

NOT COVERED

Interview Number 3	Date: 08.06.2020 17:30
<b>Interview Partner</b> Name Expert 3 Company Company 3 Function/Title BUSINESS DEVELOPMENT / HEAD OF SALES	Interview conducted via TELEPHONE Recording approved YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>

Warm-Up:

Can you briefly describe your company and what your role in the company is?

- 20 YEAR OLD DEVELOPMENT COMPANY FOR  
 HMI - SOLUTIONS FOR MACHINE & MED. DEVICE MANUFACTURERS.  
 CREATING OWN SW TO COMMUNICATE WITH MACHINES  
 HMI ... HUMAN-MACHINE-INTERACTION
- BUSINESS DEV / HEAD OF SALES

## Information:

### Inbound

o NOTE AUTHOR

1. To what extent are you gathering information for your innovation processes from outside the company?
  - a. How do you access information about:
    - i. Competitors
    - ii. Industry trends
    - iii. New technologies (also outside your industry)
    - iv. Customer needs
  - b. Are there other ways in which you gather ideas and solutions for new products or services?
  - c. To what extent is this happening in the digital world? Why do you think that is?
  - d. Do you think with these sources you are getting all the information you need?

- 1) a) o WEBSITES OF OTHER COMPANIES, THAT THEY COULD COMBINE  
... TO NEW SOLUTIONS
- o A LOT OF INSPIRATION FROM CONSUMER ELECTRONICS → TRANSFER TO MACHINE INTERFACES (INDUSTRIAL ENVIRONMENT)
  - o NETWORK (PARTNERS / CUSTOMERS) VERY USEFUL!
    - GET INPUT ON PROCESSES AND PROBLEMS OTHER COMPANIES ARE FACING → HELP DEVELOPING NEW SOLUTIONS
- i) COMPETITION IS NOT TOO RELEVANT
- o ACADEMIC INSTITUTIONS
  - o TRADE SHOWS, CONGRESSES, CONFERENCES RELATED TO THEIR FIELD
  - ONLINE RESOURCES MORE FOR INDUSTRY TRENDS
  - OPEN AVAILABLE INFORMATION IS MOSTLY FACT-BASED;
    - SOMETIMES CUSTOMER NEEDS CAN BE READ OUT OF THIS, BUT NOT A RELIABLE SOURCE!
- iv) o ACTUAL CUSTOMERS (10+ YEARS RELATIONSHIP) SHARE ISSUES THEY ARE FACING
- o CUSTOMER SURVEY
  - o OFFER WORKSHOPS TO DISCUSS NEW NEEDS
  - NEW CUSTOMERS: WHEN THEY APPROACH COMP. 3, THEY ALREADY HAVE A SPECIFIC NEED THAT THEY WILL SHARE
- ii) TREND SCOUTING TO SEE WHAT TRENDS ARE COMING OR ARE HERE
- c) NETWORK IS ALWAYS PERSONAL
- SOCIAL NETWORKS (LINKED IN, FB), IND. SPECIFIC)
- TREND SCOUTING IS COMBINATION OF TRADE SHOWS & ONLINE / DESK RESEARCH
- LOOKING INTO COMPANIES / SERVICES, THAT OFFER TRENDSCOUTING AS A SERVICE
- d) YOU NEVER KNOW, WHAT YOU DON'T KNOW.
- MORE IMPORTANT TO MAKE USE OF TECHNOLOGY, THAN TO FIND IT.
- MORE ACCESS WOULDN'T NECESSARILY MAKE THEIR OFFER BETTER.

2. How has the way you access this information changed over the last 5-10 years?  
Can you elaborate on that? Why do you think that is?

CAN'T ANSWER, BECAUSE ONLY IN COMPANY FOR 2 YEARS  
HARDLY USED DIGITAL RESEARCH / DESK RESEARCH SO FAR  
→ THIS IS QUITE NEW (2-3 YEARS)  
BEFORE MOSTLY • FACE TO FACE (MEETINGS, TRADE SHOWS, CONF.)  
• MAGAZINES  
DIGITAL PART IS JUST STARTING



3. Who is collecting this information?

- a. What competences and abilities does this person need to have?
- b. In your opinion, what resources and tools are needed for that?

HEADS OF DEPTS ARE USUALLY INITIATING NEW PROJECTS.  
SOMETIMES THEY ARE ALSO PROVIDING THE TECH.

→ MOSTLY NEW INPUT FROM OWNER/CEO, HEAD OF INNOVATION,  
AND EXPERTS

a) EXPERIENCE;

MOST IMPORTANT: ABILITY TO COMBINE THINGS THAT ARE NOT OBVIOUS

→ CREATIVITY IS NEEDED TO CHANGE USAG. OF TECHNOLOGY  
AND FIND NEW APPLICATIONS

b) TIME

• SOME METHODOLOGY HOW TO USE, PRIORITIZE, STRUCTURE INFORMATION

e.g. THEY USE SERVICE DESIGN METHODS TO CREATE/DEVELOP  
INNOVATION

4. How is this collection of information managed internally?
- What happens with the information that is being collected?
  - How and by whom is the collected information being used?

(IT IS MANAGED...)

- a) ○ USE TOOLS TO DOCUMENT INNOVATION PROJECTS
- MS TEAMS FOR COLLECTION & DISCUSSION OF INFORMATION IN INTEREST GROUPS
  - INTRANET TO PUBLISH AND DISCUSS NEW & RELEVANT IDEAS WITH THE REST OF THE COMPANY TO GET INPUT
- TRIGGER COULD BE:
- INTERNALLY
  - CUSTOMER
  - NEW TECHNOLOGY SOMEBODY IS SEEING
    - CAN BE CHECKED INTERNALLY AND DEVELOPED INTO NEW PROD. OR SERVICE
- b) ○ ONGOING STRATEGY PROCESS (SINCE 1 YEAR), WHERE "INNOVATION DEVELOPMENT TASKS" ARE CREATED
- TASK FORCE CONSISTING OF 6 PEOPLE THAT ARE DRIVING INNOVATIONS (AND HAVE TIME)
    - ARE INTERNAL PROJECT LEADERS FOR SUCH PROJECTS

## Outbound

5. What are the channels you use to communicate information about your company?
- In which cases are you using online or offline channels?
  - How are you trying to reach/attract new potential partners?
  - What person is managing these communication channels?

CLASSIC: WEBSITE, LINKEDIN (NEWSLETTERS)

SPECIAL MARKET PLATFORMS (MICROPAGES)

BUT: 80-90% OF CUSTOMERS ARE REFERRALS  
(NO NEED TO COMMUNICATE TOO MUCH)

• SOMETIMES TRADESHOWS, BUT LESS IMPORTANT

• LOCALLY: - EVENTS WITH CHAMBER OF COMMERCE

• SPONSORINGS

• FH COLLABORATIONS

SOMETIMES PR (TOO EXPENSIVE)

OPERATIONAL

CONTENT  
STRATEGIC INPUT

c) 2 PEOPLE MANAGING ONLINE CHANNELS: MARKETING, EXPERT 3

## Resources:

6. To what extent do you participate in joint research or product/service development projects?
- How do you get in contact with such partners and who initiates the contact?
  - How are these collaborations managed?

\* SOME RESEARCH, BUT MOSTLY INTEGRATION OF OTHER PRODUCTS INTO THEIR PLATFORM.

b) MOSTLY COMP. 3 INITIATES, IF THERE IS AN INTERESTING TECH. THEY WOULD LIKE TO BE INTEGRATED

• EU BASED PLATFORMS FOR B2B COLLABORATIONS

b) DEPENDING ON TASK.

◦ NEW DEVELOPMENT: HEAD OF INNOVATION

◦ ONCE IT'S MORE CONCRETE → HANDED OVER TO RELEVANT DEPARTMENT

7. Do you outsource part of your innovation process to partners or suppliers? E.g. do you outsource design, use consultants, etc.
- How was this initiated?
  - Who is managing this connection?

⚠ NOT IN CORE BUSINESS (CORE SW DEV.)

COULD OUTSOURCE IF • RESOURCES ARE NOT ENOUGH

- IT'S A TECH. THEY ARE NOT COVERING WITH THEIR COMPETENCES.

Verification questions (optional):

8. Have you licensed intellectual property/technologies from or to another company?
  - a. Can you briefly describe the process?
9. Do you participate in any networks (industry, regional, etc.), consortia, strategic alliances?
  - a. Please describe the nature and objective of this group.
  - b. How was it initiated? Who is managing it? What is your company contributing/gaining?
10. Do you own part of a joint venture or share substantial assets with another company?
  - a. Please describe the nature of your involvement.
  - b. How was it initiated? Who is managing it? What is your company contributing/gaining?

8) ALL SW IS LICENSED ; NOTHING SPECIAL

9) SOME COMPANY NET WORKS / ACADEMIC NET WORKS, BUT LESS RELEVANT

Interview Number 4	Date: 09.06.2020 13:15
<b>Interview Partner</b> Name Expert 4 Company Company 4 Function/Title PRODUCT MANAGER	Interview conducted via IN PERSON Recording approved YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
<b>Warm-Up:</b> Can you briefly describe your company and what your role in the company is?	
PRODUCT MANAGER FOR FIBER IN METAL TUBES AND CABLE PRODUCTS.  BACKGROUND IN R&D WITHIN THE COMPANY	

Information:

Inbound

o NOTE AUTHOR

1. To what extent are you gathering information for your innovation processes from outside the company?
  - a. How do you access information about:
    - i. Competitors
    - ii. Industry trends
    - iii. New technologies (also outside your industry)
    - iv. Customer needs
  - b. Are there other ways in which you gather ideas and solutions for new products or services?
  - c. To what extent is this happening in the digital world? Why do you think that is?
  - d. Do you think with these sources you are getting all the information you need?

2 WAYS : o CUSTOMERS (INTENSE CUST. SUPPORT IS PART OF THE JOB)  
 o EXISTING TECHNOLOGIES → NEED TO BE UP TO DATE ON NEW DEVELOPMENTS

iii) - RESEARCH IN WHITE-PAPERS (DESK RESEARCH)

- DIRECT ACCESS TO INFORMATION THROUGH NETWORK

↳ CLIENTS

↳ PROJECT PARTNERS

→ INFORMATION COULD BE RELATED TO CORE BUSINESS (CABLE INDUSTRY)

OR THROUGH "OUT OF THE BOX THINKING" → NEWS FROM INTERNET, NEWS PAPER

GIVES EXAMPLE OF ONE PRODUCT THAT WAS INSPIRED BY "OUT OF THE BOX" → GREAT SUCCESS

i) COMPETITORS PUBLISH PATENTS (COMPANY 4 NOT), THAT ARE OBSERVED

↳ TECHN. STATE, WHAT ARE THEY WORKING ON

- INTERNET : o GOOGLE NEWS FOR KEYWORDS ii) → AUTOMATIC NOTIFICATION  
 o COMPETITORS SHARE PRE-RELEASE TO PROMOTE/GET FEEDBACK

- INFO DIRECTLY FROM COMPETITORS THROUGH NETWORK

- THROUGH CLIENTS (CONFLICTING, BECAUSE FLOW ALSO GOES IN OTHER DIRECTION)

⇒ PROTECT HOW YOU DO IT, NOT WHAT YOU DO

→ DEPENDENCE ON TRADE SECRETS.

MARKET IS SMALL ON HIGH-END SIDE → EVERYONE CAN PROFIT A BIT FROM KNOWLEDGE OF THE OTHER COMPANIES.

b) SOMETIMES IDEAS/REQUESTS COME FROM OTHER UNITS INSIDE THE COMPANY  
 → CAN TRIGGER IDEA FOR NEW DEVELOPMENT

c) ALWAYS CHANGING, BUT A LOT OF INFORMATION AT CUSTOMER VISITS.  
 EXPERIENCE

DIGITAL AS SECOND BEST OPTION. EMOTIONAL LEVEL MISSING.

⇒ FACE 2 FACE IS MUCH MORE IMPORTANT, WHEN AVAILABLE!

d) CAN NEVER BE ENOUGH INFORMATION, BUT YOU NEVER GET EVERYTHING  
 → EVERYONE TRIES TO KEEP SOME SECRETS/EVERYONE IS COMPETING  
 AGAIN, TRADE SECRETS



2. How has the way you access this information changed over the last 5-10 years?  
Can you elaborate on that? Why do you think that is?

ONLY IN PROD. MANAGEMENT SINCE 3 YEARS.

BEFORE MORE INTERNAL PERSONAL EXCHANGE

NDU .. CONNECTIONS WITH CUSTOMERS & SUPPLIERS ALL OVER THE WORLD

OPINION:

TREND IS NOT BEING MORE DIGITAL. → WILL REMAIN THE SAME

ACCESS TO 'SECRET SOURCES' IS BASED ON TRUST AND CAN ONLY HAPPEN  
◦ FACE 2 FACE.

3. Who is collecting this information?

- a. What competences and abilities does this person need to have?
- b. In your opinion, what resources and tools are needed for that?

PROD. MGMT NEEDS GOOD OVERVIEW AND IS MAINLY RESPONSIBLE FOR THE COLLECTION.

[NO SUPPORT FROM OTHER DEPARTMENTS]

a) GOOD UNDERSTANDING OF STATE OF THE ART (TECHNOLOGY)

- GOOD UNDERSTANDING OF CUSTOMER NEEDS
- TRENDS: WHAT IS HAPPENING IN
  - ◀ APPLICATIONS ⇒ FOR PULL INNOVATION
  - ◀ RAW MAT. SUPPLIERS ⇒ FOR PUSH INNOVATION
- FOR BUILDING UP PERSONAL CONNECTIONS:
  - SOFT SKILLS TO GET TRUST (FOR PARTNER TO BE WILLING TO SHARE CONFIDENTIAL INFORMATION),

→ TRUSTFUL SURROUNDING

b) IF YOU WANT INFORMATION, YOU ALSO NEED TO BE ABLE TO GIVE SOMETHING

→ GIVE AND TAKE → NEED TO HAVE KNOWLEDGE TO SHARE

PARTNER SHOULD FEEL, THAT YOU DON'T TAKE THE INFORMATION AND USE IT AGAINST HIM, BUT THAT YOU BOTH TRY TO PUSH THE INDUSTRY TOGETHER

„MAKE THE PIE BIGGER FOR EVERYONE“

- ATTEND EVENTS FOR PHYSICAL ACCESS TO CONTACTS → BUT YOU JUST GET SUPERFICIAL INFORMATION AND TECHN. OVERVIEW

→ AFTERWARDS COMPANY VISITS FOR IN-DETAIL EXCHANGE

⇒ NEED TIME & MONEY TO DO THIS

4. How is this collection of information managed internally?
- What happens with the information that is being collected?
  - How and by whom is the collected information being used?

NO REAL INNOVATION PROCESS SO FAR

→ STOMACH FEELING IS CRUCIAL RIGHT NOW

a) INFORMATION EXCHANGE WITH GM, IN PROD. MANAGEMENT DEPT  
OTHER DEPARTMENTS WHEN NECESSARY.

b) DEVELOPMENT IS LEAD BY PROD. MANAGEMENT

5. What are the channels you use to communicate information about your company?
- In which cases are you using online or offline channels?
  - How are you trying to reach/attract new potential partners?
  - What person is managing these communication channels?

- SOCIAL MEDIA (LINKEDIN)
- WHITE PAPERS (TECHNICAL COMMUNICATION) } ONLINE
- OFFLINE: FACE 2 FACE WITH PARTNERS, CLIENTS, COMPETITORS
- ON EXHIBITIONS/EVENTS MAINLY MARKETING

b) l.p. SPECIFIC PROJECT:

IDEA FOR NEW PRODUCT IN COMPANY 4, BUT NEEDED EXTERNAL PARTNER

→ DIRECT APPROACH OF POTENTIAL PARTNERS → SMALL INDUSTRY, MOST COMPANIES KNOW EACH OTHER.

→ COMMUNICATION ABOUT IDEA LED TO OTHER COMPANIES ASKING IF THEY COULD JOIN!

COMMUNICATION WITHIN NETWORK (PERSON 2 PERSON), IF INNOVATION IS NEW, TO PROTECT IT.

⇒ MAIN THREAT IS CHEAP MANUFACTURERS FROM FAR EAST (OUTSIDE THE TEAM COMMUNITY)

→ INITIALLY NO COMMUNICATION OVER INTERNET.

c) LINKEDIN: MARKETING WITH INPUT OF TECHN. DEPARTMENTS  
PERSON 2 PERSON: TECHN. PEOPLE WITHIN THE DEPARTMENTS

6. To what extent do you participate in joint research or product/service development projects?
- How do you get in contact with such partners and who initiates the contact?
  - How are these collaborations managed?

6) NOT COMMON SO FAR

MAJOR REASON TO DO THIS IS MARKETING SYNERGIES!  
(ALL PARTICIPANTS COMMUNICATE TO THEIR INDUSTRIES)

MARKETING ASPECT MORE IMPORTANT THAN TECHNICAL ASPECT OF THE COLLABORATION.

IDEAS OFTEN COME FROM COMPANY 4, PARTNERS ARE ALSO RESOURCE TO GAIN TRACTION ON THE MARKET.

- 8) DIRECT NETWORK CONTACTS → MET LAST PARTNER BY CHANCE AT A CONFERENCE AND STARTED TALKING.  
→ OTHERWISE PROJECT WOULDN'T HAVE HAPPENED

7. Do you outsource part of your innovation process to partners or suppliers? E.g. do you outsource design, use consultants, etc.
- How was this initiated?
  - Who is managing this connection?

YES, WHEN RIGHT KNOWLEDGE IS MISSING

(i.e. SOME COMPOUNDS THEY NEED)

→ SPECIFICATION IS DEFINED BY COMPANY 4 AND DEV. IS OUTSOURCED TO PARTNER

- TYPICALLY SUPPLIER, THAT WANTS TO SELL HIS PRODUCT OR
- JOINT COMMUNICATION/MARKETING FOR NEW DEVELOPMENTS

a) THROUGH CONTACTS / EXPERIENCE

MOSTLY EXISTING SUPPLIERS WITH GOOD EMOTIONAL CONNECTION

→ OPEN COMMUNICATION

b) PROD. RIGHT.

## Verification questions (optional):

• NOTE AUTHOR

8. Have you licensed intellectual property/technologies from or to another company?
  - a. Can you briefly describe the process?
9. Do you participate in any networks (industry, regional, etc.), consortia, strategic alliances?
  - a. Please describe the nature and objective of this group.
  - b. How was it initiated? Who is managing it? What is your company contributing/gaining?
10. Do you own part of a joint venture or share substantial assets with another company?
  - a. Please describe the nature of your involvement.
  - b. How was it initiated? Who is managing it? What is your company contributing/gaining?

8) NO

 9) YES, TO GET/PUBLISH INFORMATION  
 INCREASE THE NETWORK

INFORMATION SHARING IS MANAGED BY PROP. MGMT + CM

10) NO

Interview Number 5	Date: 12.06.2020 11:30
<b>Interview Partner</b> Name Expert 5 Company Company 5 Function/Title CEO	Interview conducted via TELEPHONE  Recording approved YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
<b>Warm-Up:</b> Can you briefly describe your company and what your role in the company is?	
CEO COMPANY DEVELOPS & DISTRIBUTES SU, THAT ALLOWS MANUFACTURERS TO CALCULATE PRODUCT COST. → ENTERPRISE PRODUCT COSTING <sup>S</sup>	



## Information:

### Inbound

1. To what extent are you gathering information for your innovation processes from outside the company?
  - a. How do you access information about:
    - i. Competitors
    - ii. Industry trends
    - iii. New technologies (also outside your industry)
    - iv. Customer needs
  - b. Are there other ways in which you gather ideas and solutions for new products or services?
  - c. To what extent is this happening in the digital world? Why do you think that is?
  - d. Do you think with these sources you are getting all the information you need?

INNOVATION IS CROSS-FUNCTIONAL TOPIC.

NO DEDICATED DEPT. BUT SHOULD HAPPEN AT EVERY DEPARTMENT AND LEVEL.

DIFFERENT SOURCES:

STRUCTURED: GARTNER (ANALYSTS)

CUSTOMERS → MOST IS CUSTOMER DRIVEN

EMPLOYEES, WHO ARE EXPERTS IN THEIR FIELD COME ACROSS TOPICS IN THEIR PRIVATE LIFE (EXCHANGES, EVENTS, READING)

A LOT OF INNOVATION IN BACK-OFFICE / ORGANISATIONAL

- GARTNER: IND. TRENDS → ii), iv)  
FUNCTIONAL ANALYSTS → GO TO MARKET INTERNAL PROCESSES } → GET INSPIRATION
- PRIVATE EXCHANGE: EXAMPLE AI → INITIAL SPARK AT ALUMNI CONF. ON THAT TOPIC THAT STARTED THOUGHT PROCESS.  
→ THEN GATHERING OF INFORMATION
  - READING
  - FB/TWITTER → TRIGGERS FOR ADDITIONAL THOUGHTS  
↓  
INTERNAL DISCUSSION
- INDUSTRY EVENTS TO GET EXPERTISE AND INSIGHTS ABOUT INDUSTRIES (MULTIPLE EVENTS PER YEAR)

INNOVATION IS MORE A CULTURAL THING, THAN A TOOL YOU USE!

→ TRIED TO GET INPUT FROM CONSULTANTS ON INNOVATION, BUT NOT FRUITFUL

## Information:

### Inbound

1. To what extent are you gathering information for your innovation processes from outside the company?
  - a. How do you access information about:
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    - iii. New technologies (also outside your industry)
    - iv. Customer needs
  - b. Are there other ways in which you gather ideas and solutions for new products or services?
  - c. To what extent is this happening in the digital world? Why do you think that is?
  - d. Do you think with these sources you are getting all the information you need?

b) INNOVATION WEEK → EMPLOYEES GET CHANCE TO WORK ON THINGS THEY FIND INTERESTING (WORK ON NEW FEATURES, FINISH OTHER PROJECTS, ...)

→ THINKS STAY IDEAS, BECOME PART OF ROADMAP OR GET INTEGRATED CURRENTLY ONLY INTERNALLY, BUT IN FUTURE MAY BE WITH PARTNERS  
→ REQUIRES A LOT OF DOMAIN EXPERTISE, SO NOT SUITABLE FOR "HACKATHON" WITH OUTSIDERS

c) 50+ % ONLINE

BUT ALMOST AS MUCH FROM CUSTOMERS

(ANNUAL USER CONFERENCE SPARKS CONVERSATION)

CHANNELS DEPEND ON PERSONAL PREFERENCES

FOR EXPERTS:

MAIN CHANNEL IS FACEBOOK → GETS MORE RELEVANT CONTENT (FOLLOWS LINKEDIN, TC, SPECIFIC SITES)

AND GETS THAT CONTENT

ON LINKEDIN; MORE ADVERTISEMENTS AND IRRELEVANT CONTENT.

d) NOTHING HE IS ACTIVELY WISHING FOR

→ IF SOMETHING WOULD COME UP, HE WOULD EVALUATE IT.

2. How has the way you access this information changed over the last 5-10 years?  
Can you elaborate on that? Why do you think that is?

DOESN'T THINK IT HAS DRAMATICALLY CHANGED.  
ONLY GRADUAL SHIFT TO ONLINE, BUT NOT FUNDAMENTAL

3. Who is collecting this information?

- a. What competences and abilities does this person need to have?
- b. In your opinion, what resources and tools are needed for that?

ANSWERED IN 1)

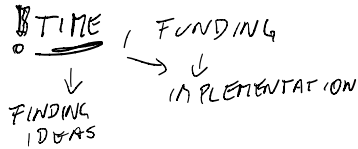
a) • CURIOSITY } OPENNESS AND ABILITY TO  
 • GOOD UNDERSTANDING OF FIELD / EXPERTISE } CONNECT TO YOUR FIELD  
 ↓  
 CREATIVITY

b) NOTHING SPECIAL (EVERYONE HAS ACCESS TO THESE TOOLS)

BUT: • CULTURE IS ESSENTIAL

• PROCESSES THAT ALLOW EXCHANGE OF INFORMATION INTERNALLY

• PROVIDE RESOURCES TO TURN IDEAS TO ACTUAL INNOVATION



THIS IS THE HARDEST THING

4. How is this collection of information managed internally?
- What happens with the information that is being collected?
  - How and by whom is the collected information being used?

### DISTRIBUTED PROCESS

4) PROD. MANAGEMENT DEPARTMENT OWNS THIS PROCESS

- o COLLECT IDEAS
- o FACILITATE EXCHANGE

→ FILTER IDEAS → PUT IT ON ROADMAP

### NEEDS

TOP MANAGEMENT INVOLVEMENT BECAUSE MOST INTERESTING IDEAS ARE FURTHER AWAY FROM DAYL DAY BUSINESS AND NEED STRONG EXECUTIVE SPONSOR.

a) NOT MUCH STRUCTURED WAY (HAPPENS IN THE HEADS OF THE EXPERTS)

ONLY 4 PEOPLE IN PROD. MGMT + 3 VPs ⇒ EACH CAN CHAMPION IDEAS, → BUT CONSTRAINT IS TIME AND BUDGET.

„ACTUAL INNOVATION MOSTLY HAPPENS WHEN SOMEONE PAYS FOR IT“

→ EXISTING CUSTOMER OR REALLY STRONG LEAD HAS TO REQUEST A FEATURE → THEN YOU INVEST IN DEVELOPMENT

## Outbound

5. What are the channels you use to communicate information about your company?
- In which cases are you using online or offline channels?
  - How are you trying to reach/attract new potential partners?
  - What person is managing these communication channels?

MOST IMPORTANT CHANNEL BY FAR IS LINKED IN

- CONTENT ON • COSTING
  - INNOVATIONS
  - HOW THEY WORK
- WEBSITE
- PRESS RELEASES → NOT SURE ABOUT IMPACT/EFFECTIVENESS
- ANNUAL USER CONFERENCE → NEW DEVELOPMENTS ARE PRESENTED
  - ↳ EXISTING CUSTOMERS + A FEW NEW ONES
  - ↳ COLLECT NEW CUSTOMER DEMANDS

LINKED IN MORE FOCUSED ON „COSTING“ IN GENERAL  
CONFERENCE FOCUSED ON PRODUCT?

! → SOMETIMES HE HAS THE FEELING HE CAN REACH SOME EMPLOYEES BETTER VIA LINKED IN, THAN THROUGH INTERNAL CHANNELS

→ ALSO REACH OUT TO POT. PARTNERS, INVESTORS

↳ MOST COOPERATIONS HAPPEN ON PERSONAL LEVEL (TRIGGERED BY PERSONAL CONTACT)

↳ e.g. MEET AT FAIR, ...

EXPERT 5 SHARED A STORY ABOUT MEETING A PARTNER BY CHANCE AT A FAIR AND GOT TALKING. → NOW THEY HAVE INTERFACE BETWEEN THE PRODUCTS AND SOME JOINT MARKETING ACTIVITIES

## Resources:

6. To what extent do you participate in joint research or product/service development projects?
- How do you get in contact with such partners and who initiates the contact?
  - How are these collaborations managed?

IT'S THE EXCEPTION → CHANGED MIND DURING CONVERSATION  
(HAPPENS QUITE OFTEN)

- a) PERS. CONTACT: → OFTEN STARTS ON EXECUTIVE LEVEL  
• CAN HAPPEN ON PROD. MANAGEMENT LEVEL  
• SOMETIMES CUSTOMER FACING

b) PROD. MANAGEMENT + EXEC. SPONSOR  
WHEN THEY ARE ALSO SERVICE RELATED PROJECTS → PROF. SERVICES DEPT.

7. Do you outsource part of your innovation process to partners or suppliers? E.g. do you outsource design, use consultants, etc.
- How was this initiated?
  - Who is managing this connection?

- GARDNER → ONLY ANALYSTS ; TALK A FEW HOURS FOR IDEAS, BUT NO CONSULTING PROJECTS.
- VERY FEW COMPANIES KNOW ABOUT COSTING AS MUCH AS COMP. 5 DOES, SO CONSULTING DOESN'T MAKE SENSE.
- CONSIDERS BRINGING IN SOMEONE WITH FUNCTIONAL INNOVATION KNOW-HOW. → BUILD UP INTERNAL PROCESSES



Verification questions (optional):

8. Have you licensed intellectual property/technologies from or to another company?
  - a. Can you briefly describe the process?
9. Do you participate in any networks (industry, regional, etc.), consortia, strategic alliances?
  - a. Please describe the nature and objective of this group.
  - b. How was it initiated? Who is managing it? What is your company contributing/gaining?
10. Do you own part of a joint venture or share substantial assets with another company?
  - a. Please describe the nature of your involvement.
  - b. How was it initiated? Who is managing it? What is your company contributing/gaining?

8) NO  
9) NO

Interview Number <i>6</i>	Date: <i>15.06.2020 15:00</i> <i>10:30/</i>
<b>Interview Partner</b> Name <i>Expert 6</i> Company <i>Company 6</i> Function/Title <i>BUSINESS DEVELOPMENT DIRECTOR</i>	Interview conducted via <i>7' TELEPHONE</i> <i>REST 175 TEAMS - VIDEO</i> Recording approved YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> <i>REQUEST TO DELETE (DSGVO)</i>
<b>Warm-Up:</b> Can you briefly describe your company and what your role in the company is?	
<i>IoT BUSINESS / DIGITALISATION OF SENSORS &amp; DEVICES AND THE DIGITAL WORLD</i>	

Information:

Inbound

NOTE AUTHOR

1. To what extent are you gathering information for your innovation processes from outside the company?
  - a. How do you access information about:
    - i. Competitors
    - ii. Industry trends
    - iii. New technologies (also outside your industry)
    - iv. Customer needs
  - b. Are there other ways in which you gather ideas and solutions for new products or services?
  - c. To what extent is this happening in the digital world? Why do you think that is?
  - d. Do you think with these sources you are getting all the information you need?

NO ESTABLISHED SYSTEM OR PROCESS, BUT NEED TO BE UP TO DATE ON LATEST TECHN. DEVELOPMENTS FOR THEIR BUSINESS.

- CLOUD RELATED TECHNOLOGIES } ⇒ WORKING TOGETHER  
- WIRELESS TECHNOLOGIES & MODULES } WITH PARTNERS/SUPPLIERS

NEED TO PRE-INTEGRATE NEW TECHNOLOGIES (e.g. 5G) TO GET IDEA ABOUT APPLICATIONS (FOR CUSTOMERS)

ii, iii) → ACCESS THROUGH ESTABLISHED STRATEGIC PARTNERSHIPS

• THEY GET TECHNOLOGY ROADMAPS, LATEST STANDARDISATION EFFORTS, ... (CONFIDENTIAL, SOMETIMES RESEARCH DRIVEN INFORMATION)

• GET INFORMATION WHO TO CONTACT/WORK WITH FOR CERTAIN APPLICATIONS → WHAT WORKS WELL TOGETHER

• ACCESS TO TEST PRELIMINARY TECHNOLOGY BEFORE ENTERPRISE CUSTOMERS HAVE ACCESS → THEY NEED TO BE ABLE TO INTEGRATE IT.

→ WORK IN ECO SYSTEM WHERE THEY DEPEND ON EARLY ACCESS

SIMILAR ON SW-SIDE → NEED CONSTANT SECURITY UPDATES!

ii) NO PARTICULAR BRANCH FOCUS (5G+ BRANCHES SO FAR) → NOT TOO RELEVANT COMPANY SPLIT IN RESEARCH & APPLICATIONS

BUT:

TECHN. WISE NOT HAVE IMPROVEMENTS, OFTEN MORE MARKETING (ENERGY CONSUMPTION) OF HARDWARE

WHAT'S NEW/COMING UP

- PRESS PROFILES
- TALK TO PARTNERS
- TRADE FAIRS TO

→ MEET TECH. LEADERS AND TALK

ARE THERE NEW BUSINESS MODELS POSSIBLE WITH NEW TECH

- REDUCED COST
- REDUCED BATTERY SIZE

ONLY THEN IT MAKES SENSE TO USE THE TECHNOLOGY

→ NEED TO TEST, WHAT NEW TECH. CAN REALLY PROVIDE IN TERMS OF REAL WORLD PERFORMANCE

END MORNING

## Information:

Inbound

• NOTE AUTHOR

1. To what extent are you gathering information for your innovation processes from outside the company?
  - a. How do you access information about:
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    - iii. New technologies (also outside your industry)
    - iv. Customer needs
  - b. Are there other ways in which you gather ideas and solutions for new products or services?
  - c. To what extent is this happening in the digital world? Why do you think that is?
  - d. Do you think with these sources you are getting all the information you need?

iii) INFORMATION ABOUT TECHN. POSSIBILITIES IS CLEARLY AVAILABLE → NEED TO FIND POSSIBLE BUSINESS MODEL!

TECH. COMES FROM CONSUMER ELECTRONICS (APP)

→ COST NEEDS TO BE LOW

iv) EVERY CUSTOMER REQUEST IS DIFFERENT

CLEAR PLATFORM STRATEGY, BECAUSE ALL FEATURES NEED TO BE UPDATED/MAINTAINED

IF THERE IS A FEATURE REQUEST THAT CAN'T BE FULFILLED THE PROJECT IS REJECTED!

→ ROADMAP FOR NEW FEATURES FOR ALL •

• INFORMATION BASED ON CUSTOMER REQUESTS → ADDED TO FEATURE BOARDS  
↓  
ATLASSIAN PRODUCTS

i) NOT REALLY RELEVANT

→ BIGGER PROBLEM IS CUSTOMERS TRYING TO DEVELOP THEMSELVES!

COMPARISON ON FEATURES IS IRRELEVANT → COMPARE ON RESULTS

ALL CONTACTS SEEM TO COME PRIMARILY FROM DIRECT COMMUNICATION

A LOT OF INFO DIRECTLY BROUGHT IN BY CUSTOMERS → QUALITY MANAGEMENT  
↳ NOT JUST DIRECT COMMUNICATION, BUT ALSO CONTEXTUAL

(e.g. CUSTOMER REQUESTED „QUICK START GUIDE“ → FIX THE ROOT CAUSE AND MAKE THE SW SELF EXPLANATORY (WIZARD))

„YOU NEED TO HEAR, WHAT THE CUSTOMER MEANS AND NOT ONLY DO WHAT HE SAYS“ → FIND THE REAL NEED

2. How has the way you access this information changed over the last 5-10 years?  
Can you elaborate on that? Why do you think that is?

SIMILAR, BUT USING BETTER TOOLS / PROCESSES

→ MOVE FROM START-UP TO STABLE COMPANY / SCALABLE

SOUNDS LIKE HE IS REFERRING TO ROADMAP-PLANNING,  
DOCUMENTATION OF REQUESTS + STRATEGIC DECISION ON WHAT TO IMPLEMENT  
AT WHICH TIME.

3. Who is collecting this information?

- a. What competences and abilities does this person need to have?
- b. In your opinion, what resources and tools are needed for that?

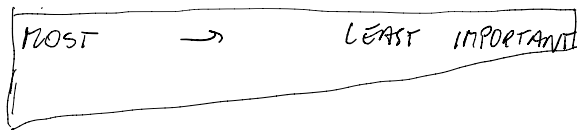
EVERYONE (SALES, SERVICE → CUSTOMER RELATED  
OTHERS → TECHNOLOGY RELATED)

EVERY DEPARTMENT HAS TO UNDERSTAND HOW TO BEST SERVE THE CUSTOMER (3D-DESIGN → CHOICE OF CONNECTORS, SU → WHAT PROGRAMMING LANGUAGE WILL CUSTOMER PREFER, UX, ...)

AND NEED TO COORDINATE WITH EACH OTHER

a) NO → CULTURE IS ESSENTIAL

CULTURE - STRATEGY - TOOLS



→ TOOLS WILL COME UP AUTOMATICALLY, WHEN CULTURE FITS.

4. How is this collection of information managed internally?
- What happens with the information that is being collected?
  - How and by whom is the collected information being used?

• TOOLS TO SHARE / COLLECT INFORMATION (IN CONFLUENCE)

→ INFORMATION IS CATEGORIZED AND TAGGED IN DATABASE FOR OTHERS TO EASILY FIND IT.

(INF. ABOUT: COMPETITORS, TECHNOLOGY PARTNERS, PARTNERS)

o MONTHLY MEETING WHERE NEW IDEAS ARE DISCUSSED → OPEN CONVERSATION

↳ WHEN SOMETHING INTERESTING COMES UP → TEAM RELATED TO TOPIC IS ASSEMBLED TO DISCUSS TOGETHER WITH THE INITIATOR!

↳ DECISION, IF IDEA IS INTERESTING OR NOT, AND WHY.

INVOLVEMENT OF ORIGINAL IDEA BRINGER IS ESSENTIAL!

→ ONLY THEN YOU GET ENGAGEMENT. THIS MAKES IT EASIER TO UNDERSTAND THE REASONING BEHIND A DECISION.

1 ONLY WHEN PEOPLE ARE INVOLVED IN DISCUSSION PROCESS YOU WILL  
2 GET SIGNIFICANT INPUT FROM THEM.

## Outbound

5. What are the channels you use to communicate information about your company?
- In which cases are you using online or offline channels?
  - How are you trying to reach/attract new potential partners?
  - What person is managing these communication channels?

IN THE PAST VERY BAD (ONLY PARTNERS DURING TRAINING)

NOW: ONLINE:

- WEBINARS
  - FORUM
  - BLOG
- } → TO INFORM PEOPLE ABOUT NEW THINGS (BLOG)  
↳ THEN DEEPER TECHN. DETAILS IN WEBINARS
- ROADMAPS
- INTERNAL COMMUNICATION  
→ EXTERNAL PARTNERS (SUPPLIERS AND CUSTOMERS/  
INTEGRATORS)

LINKEIN / FB → TOOLS TO INTERNATIONALIZE

OFFLINE:

IN PAST: FAIRS, BUT TOO LONG CYCLES → NOT USEFUL

c) MANAGED BY INTERDISCIPLINARY / CROSS-FUNCTIONAL TEAMS



Resources:

6. To what extent do you participate in joint research or product/service development projects?
- How do you get in contact with such partners and who initiates the contact?
  - How are these collaborations managed?

USUALLY NOT WITH CUSTOMERS FOR NEW TECHNOLOGIES  
(IP-RIGHTS)

OFTEN VERY COMPLICATED, BECAUSE MANY CUSTOMERS DON'T HAVE  
PROCESSES IN PLACE TO TAKE ADVANTAGE OF NEW TECHNOLOGY.  
(CUSTOMERS HAVE LONG DEV. CYCLES OF 5+ YEARS)

SUPPLIER SIDE:

PROJECTS WITH SUPPLIERS ARE ESSENTIAL TO LEARN TO KNOW POTENTIAL  
NEW STRATEGIC TECHNOLOGY PARTNERS

EVAL. OF STRATEGIC PARTNER ON VERY "HUMAN" METRICS

- DIRECT ACCESS TO CHIP MANUFACTURER
- DIRECT SUPPORT WITH MANUFACTURER
- TEST/EVALUATE SUPPORT QUALITY
- TEST FLEXIBILITY → REDUCE RISK

6) TECHNOLOGY EXPERTS MAKE PRE-SELECTION  
→ THEN PROCESS WITHIN AN R&D PROJECT TO FIND RIGHT PARTNER



7. Do you outsource part of your innovation process to partners or suppliers? E.g. do you outsource design, use consultants, etc.
- How was this initiated?
  - Who is managing this connection?

YES, CONSULTANTS

DESIGNS → WHEN RESOURCES ARE LACKING

↓ PREFERRED TO DO THINGS BY THEMSELVES, BUT OUTSOURCE SOMETIMES

PROBLEM: VERY COMPLEX TECHNOLOGY, SO DIFFICULT TO TRANSFER ALL THE NECESSARY (HIDDEN) KNOWLEDGE TO PARTNERS TAKES LONGER THAN JUST DOING IT THEMSELVES.

→ A LOT OF TIME SPENT ON SUPPORTING EXTERNAL PARTNERS

a) OFTEN THROUGH PROJECTS / REFERRALS IN NETWORK!

↳ EASIER TO EVALUATE, WHAT THEY CAN DO DURING A PROJECT.  
(INTERNAL EVALUATION PROJECT)

b) SYSTEMATIC / WITHIN THE PROJECT

Verification questions (optional):

8. Have you licensed intellectual property/technologies from or to another company?
  - a. Can you briefly describe the process?
9. Do you participate in any networks (industry, regional, etc.), consortia, strategic alliances?
  - a. Please describe the nature and objective of this group.
  - b. How was it initiated? Who is managing it? What is your company contributing/gaining?
10. Do you own part of a joint venture or share substantial assets with another company?
  - a. Please describe the nature of your involvement.
  - b. How was it initiated? Who is managing it? What is your company contributing/gaining?

NOT COVERED

Interview Number 7	Date: 15.06.2020 17:00
<b>Interview Partner</b> Name Expert 7 Company Company 7 Function/Title CEO	Interview conducted via TELEPHONE Recording approved YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>

### Warm-Up:

Can you briefly describe your company and what your role in the company is?

50+ YEARS OLD COMPANY

ORIGINALLY SALES OF ELECTRONICS

NOW: DEVELOPMENT & PRODUCTION OF ELECTRONICS

DIFFERENT TYPES OF RELAYS

BIG GERMAN CUSTOMERS (AUTOMATISATION)

AMERICAN CUSTOMERS

} MOST REV. FROM  
FROM ~ 8 LARGE CUSTOMERS  
REST FROM SMALLER  
CUSTOMERS

SINCE 2011 → AGILE ORGANISATIONAL STRUCTURE (COMPANY OF THE FUTURE)

↳ BASIC INTENTION WAS TO INCREASE INNOVATIVENESS OF THE COMPANY TO REACH OTHER SEGMENTS.

(NOT YET COMPLETELY SUCCESSFUL)

◦ STARTED START-UP HUB, WHERE STARTUPS CAN WORK VERY CLOSE TO CORE COMPANY

(START-UPS PAY RENT, NO OWNERSHIP BY COMPANY 7)

→ GET NEW INNOVATIONS INTO THE COMPANY THROUGH START-UPS

EXAMPLE: A START-UP IN IOT SECTOR → COMPANY 7 HELPED WITH DEVELOPMENT AND IS NOW MANUFACTURING

◦ RENEWABLE ENERGY / SOLAR

→ COMPANY 7 TRIES TO FIND POSSIBILITIES FOR COLLABORATIONS!

→ LEARNING FROM START-UPS IS IMPORTANT FOR EMPLOYEES

◦ HOW DO THEY DO MARKETING

◦ START-UP SPIRIT

◦ WHERE ARE RISKS

} → HELPED COMPANY 7 TO UNDERSTAND THEIR OWN COMPETENCES BETTER  
→ LED TO DEVELOPMENT OF NEW BUSINESS FIELD!  
(MANUFACTURING SERVICE FOR START-UPS IN HIGH QUALITY OF COMPANY 7)

→ NOW FURTHER EXPANSION OF THE HUB (2 NEW EMPLOYEES) → INTERNATIONALIZATION

Interview Number	Date:
Interview Partner Name	Interview conducted via
Company	Recording approved
Function/Title	YES <input type="checkbox"/> NO <input type="checkbox"/>

Warm-Up:

Can you briefly describe your company and what your role in the company is?

GOAL IS TO GET MORE START-UPS TO THEM

→ HUB AND CHANGE OF ORGANIZATIONAL STRUCTURE LED TO A LOT OF PUBLIC ATTENTION (MARKETING)

→ BIG COMPANIES COME TO VISIT & LEARN

→ COMPANY 7 CREATED A SEPARATE COMPANY TO TEACH OTHERS (LEADS TO EXCHANGE WITH OTHERS!)

BUT: ALSO BIG PROBLEMS IN NEW ORGANIZATIONAL STRUCTURE (→ HORIZONTALITY) (NO REAL HIERARCHIES)

↳ IT'S A DEVELOPMENT PROCESS

PERSONAL ROLE OF EXPERT 7 → CEO (HE WANTED MORE FLAT STRUCTURE, BUT EMPLOYEES DIDN'T ACCEPT IT)

→ ROLE NOW MORE EXTERNAL COMMUNICATION AND MENTOR

## Information:

### Inbound

NOTE AUTHOR

1. To what extent are you gathering information for your innovation processes from outside the company?
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    - iii. New technologies (also outside your industry)
    - iv. Customer needs
  - b. Are there other ways in which you gather ideas and solutions for new products or services?
  - c. To what extent is this happening in the digital world? Why do you think that is?
  - d. Do you think with these sources you are getting all the information you need?

### COMPLETELY DIFFERENT APPROACH

→ BY OPENING THE COMPANY → OTHERS SHOULD COME TO COMPANY, NOT THE OTHER WAY AROUND

⇒ MAIN RESPONSIBILITY IS TO MAKE THE COMPANY AS INTERESTING AS POSSIBLE! HUB, EXTERNAL EVENTS LEAD TO COMPANIES COMING

◦ IN THE FUTURE THEY WANT TO BE SEEN AS THE INTELLIGENT CONNECTOR OF CURRENT TECHNOLOGIES → NO NEED TO DO EVERYTHING BY THEMSELVES.

→ INVITE DIFFERENT PEOPLE TO DISCUSS WITH THEM AND TO CONNECT THEM

⇒ OPEN AND COLLABORATE → AS ORGANISATION → CREATE PARTNERSHIPS BY GETTING THINGS STARTED  
→ AS TECHNOLOGY

◦ WAS HARD FOR EXTERNAL PARTNERS TO UNDERSTAND THIS PROCESS (CUSTOMERS, BANKS)

→ NOW ACCEPTED

◦ AUTHENTIC OPEN ORGANISATION

→ ACTIVELY SHARING KNOWLEDGE AND EXPERIENCE IS IMPORTANT FOR THEIR STRATEGY (THEY TRAIN RAILWAY COMPANIES, MUNICIPALITIES/CITIES, ...)

WHICH LEADS TO MORE CONTACTS AND TO BUILDING UP A STRONG NETWORK.

◦ EVERY EMPLOYEE IS RESPONSIBLE TO BUILD UP A NETWORK FOR HIS OWN GOOD [...], AND FOR THE GOOD OF THE COMPANY!

→ "GO OUT AND TALK TO PEOPLE" ON EVERY LEVEL

◦ NO PATENTING → FUTURE IS OPEN SOURCE!

NEED TO BUILD SYSTEM, THAT ALLOWS OTHERS TO BUILD ON TOP OF IT TO BE SUCCESSFUL

◦ OPENNESS IS ALSO IMPORTANT FOR EMPLOYEES OF THE FUTURE TO IDENTIFY WITH.

→ CURRENTLY MAIN GOAL IS TO BUILD UP AND INCREASE NETWORK.

## Information:

Inbound

o NOTE AUTHOR

1. To what extent are you gathering information for your innovation processes from outside the company?
  - a. How do you access information about:
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  - c. To what extent is this happening in the digital world? Why do you think that is?
  - d. Do you think with these sources you are getting all the information you need?

o CURRENTLY COMMUNICATION WITH EXTERNAL PARTNERS HAPPENS ON 3 CHANNELS:

- o TECHNICAL COMMUNICATION
- o NEW ORGANISATIONAL MODELS
- o MANUFACTURING HUB

→ DOESN'T MATTER, WHY THEY GET IN CONTACT.

o NEED CERTAIN ATTITUDE AND FRIENDLINESS AND OTHERS WILL COME  
→ THIS IS ALSO VERY GOOD FOR EMPLOYER BRANDING!

c) ONLINE IS STILL A WEAKNESS!

MUCH OF EXTERNAL COMMUNICATION THROUGH PERSONAL BRAND OF EXPERTS AND PERSONAL PRESENCE!

o WEBSITE OVERHAUL

o SOI (FACEBOOK, XING, LINKEDIN) EXIST, BUT IS BORING FOR EXPERTS

→ WOULD LIKE TO USE INFLUENCERS AND MORE PERSONAL COMMUNICATION BY EMPLOYEES.

o PARTICIPATION IN ONLINE IDEA FINDING PLATFORM (CROWD SOURCING)

↳ ALSO FOR MARKETING REASONS (NEW CONNECTIONS)

o NEW CHANNELS (TIKTOK) → TRY TO PRESENT CLASSIC INDUSTRY THERE

↳ CAN REACH FUTURE CUSTOMERS AND EMPLOYEES THROUGH MOBILE CHANNELS.

o NEW INTERNAL WORK GROUP "DIGITAL OFFENSIVE" → WORKS ON FUTURE INTERNAL AND EXTERNAL DIGITAL STRATEGY

→ IF CUSTOMER WANTS VIDEOS, THEN HE SHOULD GET THEM

↳ THIS IS MUCH MORE USEFUL THAN CLASSIC FAIRS

→ COVIDA IS CLEAR INDICATOR, THAT DIGITAL TRANSITION IS HAPPENING

→ COMPANY NEEDS TO REACT TO THIS → HOW DO YOU GET ON PEOPLES DEVICES

→ WEBSITE WILL JUST BE ONE TOUCH POINT, BUT NOT ENTRY POINT

## Information:

### Inbound

1. To what extent are you gathering information for your innovation processes from outside the company?
  - a. How do you access information about:
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    - iii. New technologies (also outside your industry)
    - iv. Customer needs
  - b. Are there other ways in which you gather ideas and solutions for new products or services?
  - c. To what extent is this happening in the digital world? Why do you think that is?
  - d. Do you think with these sources you are getting all the information you need?

COMPANIES WILL USE SIMILAR <sup>(NATURAL)</sup> CHANNELS FOR COMMUNICATION AS PRIVATE PEOPLE (WHATSAPP, MEDIUM, LINKEDIN, XING, ...)

→ POSSIBLE CHANNELS ARE CURRENTLY BEING EVALUATED

EXAMPLE CHINA: WECHAT PRIMARY COMMUNICATION CHANNEL ALSO FOR BUSINESS COMMUNICATION

LINKEDIN PROFILE IS CURRENTLY BEING BUILT UP, BUT NOT RELEVANT TO TALK ABOUT

AD 5  
a) HUB-WEBSITE: ANY PERSON CAN JUST BOOK AN APPOINTMENT  
↳ UNIVERSITY INCUBATOR & NETWORKS TO ATTRACT START-UPS

• OFFERING SEMINARS AND COMPANY BUILDING

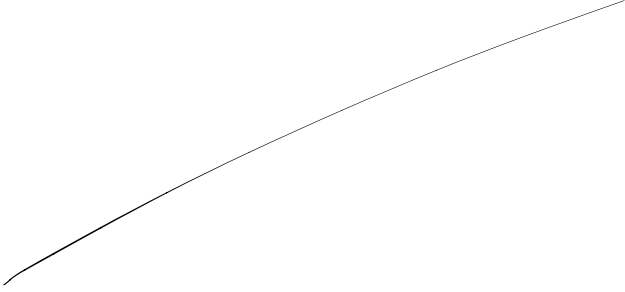
→ THEY LOSE MANY EMPLOYEES THAT START THEIR OWN COMPANIES

(THIS IS ENCOURAGED AND COMPANY 7 COLLABORATES WITH THEM)



2. How has the way you access this information changed over the last 5-10 years?  
Can you elaborate on that? Why do you think that is?

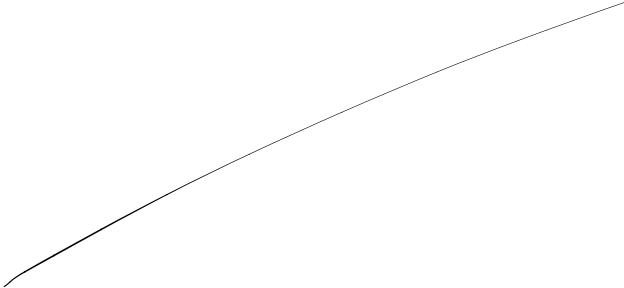
COVERED BY EXPERT  
BEFORE



3. Who is collecting this information?

- a. What competences and abilities does this person need to have?
- b. In your opinion, what resources and tools are needed for that?

COVERED BY EXPERT  
BEFORE



4. How is this collection of information managed internally?
- What happens with the information that is being collected?
  - How and by whom is the collected information being used?

- o NOT DONE PROPERLY (JUST SIMPLE CRM) → TRY AND ERROR
  - o A LOT OF „ORGANIZATIONAL KNOWLEDGE“ IN PEOPLE'S HEADS, BUT NOT ORGANISED
  - o STRUCTURAL/TASKS FALL SHORT WHEN YOU DO A LOT OF THINGS.  
→ ONE OF THEIR BIGGEST ISSUES
  - o ALMOST NO DIGITAL NATIVES IN THE COMPANY, THAT COULD HELP WITH DIGITALIZATION OF KNOWLEDGE.
- Q) INTERNAL NETWORK WITH INFORMATION ABOUT THE COMPANY (A BIT OUTDATED)
- o MESSAGING TOOL (CHATGRAP) LIKE WHATSAPP
  - o MS TEAMS (BECAUSE OF CORONA)
  - o WHATS APP
- BUT NOW MULTIPLE CHANNELS, BUT NO CENTRAL KNOWLEDGE MANAGEMENT
- o THROUGH INTRANET PEOPLE KNOW, WHO IS RESPONSIBLE FOR WHAT/  
WHERE TO DISSEMINATE CERTAIN INFORMATION!
- FRAGMENTED

## Outbound

5. What are the channels you use to communicate information about your company?

- In which cases are you using online or offline channels?
- How are you trying to reach/attract new potential partners?
- What person is managing these communication channels?

c) CURRENTLY CHALLENGING BECAUSE OF ORGANIZATIONAL STRUCTURE

r.p. -> EMPLOYEE IN US IS PRE-RELEASING INFORMATION

• VIDEOS NOT CONFORMAL WITH CI

• TRAINEES GIVING INTERVIEWS AT FAIRS (AND BEING CITED AS  
"HEAD OF MARKETING")

• WHEN A NEW CHANNEL e.g. INSTAGRAM IS USED, THEN IT HAS TO BE  
DONE PROFESSIONALLY -> 100000 FOLLOWERS! -> NEEDS RELEVANCE FOR THE  
CHANNEL.

• CONTENT IS IMPORTANT (QUALITY AND DENSITY)

-> THIS IS A BOTTLE NECK FOR COMPANY ?

-> COORDINATION OF TECHNICAL AND OTHER TOPICS IS VERY HARD.

## Resources:

6. To what extent do you participate in joint research or product/service development projects?
  - a. How do you get in contact with such partners and who initiates the contact?
  - b. How are these collaborations managed?

1) FUNNEL, WHERE EVERYTHING ENTERS, THEN INTERNAL FILTERING AND INFORMATION IS FORWARDED TO RESPONSIBLE PERSON

↳ "PLUG AND PLAY" → WORKS WELL INTERNALLY!  
THE RIGHT PEOPLE FOR A CERTAIN REQUEST ARE ASSEMBLED INTERNALLY AND COME TOGETHER FOR A MEETING

7. Do you outsource part of your innovation process to partners or suppliers? E.g. do you outsource design, use consultants, etc.
- How was this initiated?
  - Who is managing this connection?

YES.

CURRENTLY MAKE „PARTNERS“ IN THE NETWORK

- WHEN EMPLOYEES NEED SOMEONE FOR A CERTAIN TOPIC, THEY CAN HIRE THEM
- AGILE COACH ONCE IN A WHILE (EXISTING PARTNER)
- CONSULTANTS FOR REMUNERATION, WHEN EMPLOYEES WANT TO CHANGE INCOME SCHEME
- CONSULTANTS ALSO WANT TO LEARN FROM COMPANY ?  
→ EXCHANGE OF KNOWLEDGE

FLUID ORGANIZATION IS SOMETIMES AN ISSUE, WHEN IT COMES TO FORMALITIES

- CERTIFICATION / AUDITS } → REQUIRES A LOT OF EFFORT TO FORMALIZE AND COMPLY WITH IT
- TIME RECORDING

↳ WE NEED TO BE ABLE TO LOVE CHANGE<sup>s</sup>

→ ANTICIPATION AND ADAPTATION TO ENVIRONMENT

◦ BUT: THEY ARE TRUE TO THEIR VALUES !

↳ EVERY ONE ; PULL

FUTURE IS TO MANAGE A HIGH LEVEL OF COMPLEXITY AND UNCERTAINTY

Verification questions (optional):

8. Have you licensed intellectual property/technologies from or to another company?
  - a. Can you briefly describe the process?
9. Do you participate in any networks (industry, regional, etc.), consortia, strategic alliances?
  - a. Please describe the nature and objective of this group.
  - b. How was it initiated? Who is managing it? What is your company contributing/gaining?
10. Do you own part of a joint venture or share substantial assets with another company?
  - a. Please describe the nature of your involvement.
  - b. How was it initiated? Who is managing it? What is your company contributing/gaining?

NOT COVERED