

Open Innovation Services for Third Parties – the case of Vienna

Master Thesis submitted in fulfillment of the Degree

Master of Business Administration

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Vienna, 22nd February 2020

AFFIDAVIT

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ABSTRACT

Open innovation, a term coined by Henry Chesbrough in 2003, has impacted the business and academic worlds in recent years. Companies have implemented their own open innovation initiatives. Likewise, there are open innovation services provided for third parties, which offer organizations the possibility to participate in an open innovation setting without having all the knowhow and networking capabilities in-house. For facilitating the integration of open innovation services for third parties in practice, there are still gaps regarding i) governance, ii) fairness and rules in open innovation settings, and iii) motivating problem solvers to participate in such initiatives. Based on Yin's (1997; 2018) methodological works this study uses a multiple case study design. The two cases studies are i) Industry meets Makers and ii) the Co-Creation Lab Vienna. The results show that there are various ways of practically implementing such open innovation services. Industry meets Makers is an innovation community for particularly hobbyists and makers as problem solvers, while the Co-Creation Lab Vienna is an innovation contest targeting especially innovative SMEs and research organizations as problem solvers. These differences impact the form of governance, how fairness is ensured, and the motivational factors. There is no general superiority of any open innovation practice, such that choosing a suitable approach depends on goals, target groups, context, resources, capabilities, networks and problems. It is essential for practitioners to evaluate those aspects in order to select the most appropriate approach.

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LIST OF ABBREVIATIONS

B2B: Business to Business

FFG: Österreichische Forschungsförderungsgesellschaft (Austrian Research Promotion Agency)

G2B: Business to Government

IoT: Internet of things

IP: Intellectual property

IPR: Intellectual property regulation

LOI: Letter of intent

NDA: Non-disclosure agreement

OECD: Organization for Economic Co-operation and Development

R&D&I: Research, development and innovation

R&D: Research and development

SME: Small and medium-sized enterprise

STEM: Science, technology, engineering and mathematics

1 INTRODUCTION

1.1 Background

The term open innovation was promoted widely by Henry Chesbrough (2003) in the early 2000s and has quickly come to impact the business world. Chesbrough defines open innovation as “*the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively*” (Chesbrough, 2006, p.1). Open innovation changes the logic of research, development and innovation (R&D&I) from an internal approach to a process of external engagement. Open innovation can therefore be viewed not as replacing traditional R&D&I practices, but rather as complementing them (Chen, Vanhaverbeke & Du, 2016). Moreover, there is also innovation without R&D activities (Rammer et al., 2010). The practice of open innovation is very diverse and boundaries to different innovation methods are blurry.

In the industry, various approaches have occurred over the last decade. One popular and effective approach is the utilization of open innovation by large companies through the implementation of own, dedicated open innovation initiatives and, respectively, services. In Austria, for example, ÖBB (the national railway company) has realized an open innovation platform (ÖBB, 2016) that aims to integrate customers in the development of new products and services. Likewise, there are various open innovation services for third parties offered by consulting agencies, public agencies, foundations, etc. The idea behind those services is to offer organizations the possibility to participate in an open innovation setting without having all the knowhow and networking capabilities in-house.

For this study two initiatives have been examined. The project “Industry meets Makers” was initiated by one individual, Sandra Stromberger, to enable new forms of collaboration between established industry partners and “makers”. It is a service for (large) manufacturing companies. These companies (Infineon, Magna Steyr, AVL List, Nokia etc.) define briefings and encourage makers to develop suitable solutions. The Vienna Business Agency – the business support and innovation agency of the City of Vienna –launched in 2015 the initiative “Co-Creation Lab Vienna” to promote the regional innovation system. Established organizations (both private companies and administrative bodies) define challenges and the Vienna Business Agency facilitates processes to find the right partners to co-create solutions.

1.2 Research Aims and Goals

Despite the rise of such open innovation services for third parties, there are still gaps in the literature regarding i) the organization and governance of these arrangements, ii) fairness, rules,

and agency problems in open innovation settings, as well as iii) how to motivate problem solvers to participate in such initiatives. It seems that an information asymmetry often exists in open innovation scenarios and, in many cases, there is also a conflict of interest between the stakeholders. This might be the very reason why open innovation is in practice often a question of how to facilitate the processes and to develop adequate governance structures. Hence, it is important to understand how innovation services for third parties can be effectively put into practice. The study therefore attempts to strengthen the link between research and practice by testing and refining theory using real-world examples. I am also personally involved in the Co-Creation Lab Vienna as an employee of the Vienna Business Agency. Consequently, this study also has the specific goal of providing me, as a practitioner, with more insights on how to implement such initiatives and/or how to improve existing offers.

The methodological approach of this thesis is based on Yin's pioneering works (1997; 2013; 2018) on case study research design. Case studies are a research strategy (Yin 2018). To be more concise, *"A case study is an empirical method that investigates a contemporary phenomenon (the "case") in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident"* (Yin, 2018, p.15). The two cases studies examined here are i) Industry meets Makers and ii) the Co-Creation Lab Vienna. The data is collected for each case study based on interviews. These case studies are not necessarily representative of some specific population, and instead theoretical sampling is used (Eisenhardt & Graebner, 2007). Moreover, case study research does not pursue the goal of discovering a universal and generalizable truth, but rather seeks to observe a given phenomenon in a holistic manner. The starting point for the research is a very broad question: How are open innovation services for third parties facilitated in real-life scenarios? Based on this guiding question, three more concise research question are defined:

1. How are open innovation services for third parties organized (governance form, openness etc.) and why are they organized in these ways? How do they define suitable problems or challenges?
2. How do open innovation services for third parties ensure fairness amongst the parties and how do they handle the principal agent dilemma in an open innovation setting?
3. Why do problem solvers participate and what is their motivation?

1.3 Structure of Thesis

Based on two case studies, this research presents insights on how open innovation services for third parties are implemented. Firstly, based on an extensive literature review, the concept of innovation, the link to R&D, and knowledge surrounding innovation management is presented. Likewise, open innovation is introduced and a theory is postulated based on the state-of-the-art research. This lays the foundation for the proposition of conducting the case study research.

Secondly, the study methodology and the research design are elaborated. Thirdly, the two case studies are described based on the eight interviews conducted. Each interview is summarized and structured to draw a clear picture of the two cases. Fourthly, the cases are analyzed in the context of existing theory, as directed by the research questions. This part also involves a comparison of the two case studies in order to highlight differences as well as similarities. Finally, the conclusion summarizes the answers to the research questions, proposes implications for practitioners, and suggests directions for future research.

2 LITERATURE REVIEW

2.1 Definition of Innovation

The term innovation has its root in the Latin word “innovare” and means to renew something. The Austrian political economist Joseph Schumpeter introduced the term to economics. In general, he can be considered as one of the most important economists of the 20th century. Elliott Green (2016) analyzes, based on “Google Scholar” data, the most cited publications in social sciences. He points out that after works by Karl Marx and Adam Smith, Schumpeter’s “Capitalism, Socialism and Democracy” is the third most cited publication published before 1950. Schumpeter defines innovation as “[...] *the doing of new things or the doing of things that are already being done in a new way*” (Schumpeter, 1947, p.151). In his book “Konjunkturzyklen”, he defines innovation as doing something different in the entire scope of economy (“*Jedes ‚Andersmachen‘ im Gesamtbereich des Wirtschaftslebens*”) (Schumpeter, 1961, p.91). Schumpeter (1942) is also famous for his concept of creative destruction, which is closely linked to innovation. Creative destruction is a core component of capitalism and caused by innovations as new products or services lead to the replacement of older, inferior products, services or processes. However, Ebner (2006) explains that Schumpeter was to some extent pessimistic about these developments and argued that this will eventually undermine the institutional framework of capitalism. The repeated renewal of industrial structures dissolves precapitalistic elements like the bourgeois family, and those extra-capitalist patterns are both a source and incentive for capitalistic and entrepreneurial activities (Ebner, 2006). Nowadays, the process of creative destruction is also often called “disruption”.

Schumpeter (1961) stresses the very important difference between invention and innovation, stating that innovation is possible without any invention and that invention does not necessarily cause innovation. An invention does not cause economic effects by itself and a component of innovation is success on the market. Following Schumpeter’s statement, the identification of innovation can only be concluded as an ex post statement. Only after a new product or service has either succeeded or failed on the market one is able to say whether or not it is an innovation. Consequently, before a new product is launched it cannot be determined to be an innovation.

Over time, different typologies of innovation have been established by differentiating between product, process, and service innovations (Luecke & Katz, 2003). Moreover, the impact of an innovation can be used to distinguish various types, by classifying them as either incremental or radical innovations. An incremental innovation merely does something better, whether relating to a product, service or process, whereas a radical innovation exhibits novelty and represents a significant change to the existing solutions (Norman & Verganti, 2014). However, a radical innovation does not have to be a scientific breakthrough. For example, Apple’s iPhone was a radical innovation but it did not introduce new technologies: only the combination was new

(Norman & Verganti, 2014). The new iPhones which followed can rather be seen as incremental innovations. Moreover, the type of innovation might be also be a question of perspective. From an organizational perspective, a given innovation can be considered as radical for one company but incremental for another (Linton, 2009).

2.2 Research & Development

The concept of research and development (R&D) is also relevant to innovation. When talking about R&D, the Frascati Manual (OECD, 2015) is probably the most important document for definitions which guide understandings and the collection of data. The Frascati Manual was developed in the 1960s by the Organization for Economic Co-operation and Development (OECD) to collect data about research and development. By now, it has become the global standard for research and development statistics. It defines research and experimental development – the manual itself does not use the expression research and development– as, *“Research and experimental development (R&D) comprise creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture and society – and to devise new applications of available knowledge”* (OECD, 2015, p.44).

The Frascati Manual (OECD, 2015) further defines three types of activities relating to research and experimental development: i) basic research, which is acquiring new knowledge of underlying foundations without practical application in focus; ii) applied research, which is also about acquiring new knowledge, but with the primary goal of application; and iii) experimental development, which is systematic work based on existing research results and practical experience directed at the creation of new products or services.

There is a connection between research and development on the one side and inventions and innovation on the other. R&D can be a way to achieve inventions and/or innovation, yet not all innovation is triggered by R&D. There are various other sources for innovation and inventions, including competitors, customers, employees, exhibitions and events etc. In a comprehensive study by Rammer et al. (2010), the relationship between R&D and innovation was researched with a focus on the German innovation system(s). The concrete numbers may not be transferable to other national or regional innovation systems, but the core statement that innovation also happens without R&D is universal. Rammer et al. show that in 2008, in Germany, 12% of market novelties (as calculated from revenues) are put on the market by innovators without R&D activities. Innovation without R&D is mostly to be found in less-knowledge-intensive sectors. Rammer et al. also point out that not the lack of financial resources is relevant for not doing R&D. Another finding of this study is that many innovators without current R&D activities have engaged in R&D activities in the past, with almost half of them pursuing such activities in the preceding three years. Moreover, external research to compensate the lack of internal research activities was not relevant. Sources of knowledge for innovators without

research activities are often suppliers, competitors or consulting companies (Rammer et al., 2010).

2.3 Management of Innovation

The management of innovation has become recognized as very important over the past few decades. Consequently, various models have been developed to describe processes as well as to make innovation more controllable. Roy Rothwell (1994) did a historical analysis of various innovation processes and concludes that the logic of innovation had changed during the preceding decades. Rothwell defines five generations of innovation models:

The first generation is a technology-push model that predominated in the 1950s and mid-1960s. New inventions were created through basic research and these were then handed over to engineering to create a product. Afterwards production took over and, finally, marketing and sales departments were responsible for selling and promoting the product. In a nutshell, the basic idea was that the more basic research was done, the more technology was available, and the more innovation was generated. Rothwell argues that in this concept there is a strong causality between R&D investments and innovation. The second-generation model, according to Rothwell, was common from the mid-1960s until the early 1970s, and is also called the market-pull model. It is still a simple, linear model, but the emphasis is on the market as a source for new innovations. R&D only had a reactive role in this process. Rothwell argues that the third-generation innovation model started in the early 1970s and lasted until the mid-1980s. The oil crisis and resource constraints were central themes of this time period. Moreover, empirical research on innovation became popular and various studies were published suggesting that both the technology-push and the market-push model are rather atypical examples of innovation. The third-generation innovation model is a more interconnected model and is also called the coupling model. It accepts the connection between different elements – new technologies, new ideas, markets, manufacturing, R&D – and includes various feedback loops. Nonetheless, it is still a sequential process. In the early 1980s until the early 1990s the fourth-generation model emerged. In this time companies started to refocus on their core businesses and core competences. In general, strategy became more relevant. Global technology and manufacturing strategies were developed and strategic partnerships became essential. Often alliances were created between companies with the support of governments, with even smaller innovative companies engaging in external networking activities. Rothwell sees especially Japanese companies as the basis of the fourth-generation innovation model as they were able to integrate suppliers in an early stage of the innovation process and also worked with parallel development. This new modus of working simultaneously instead of sequentially in development was the core of the fourth-generation approach and gave the Japanese companies a competitive advantage over western companies. Rothwell furthermore assumes the start of the development of the fifth-generation innovation model in the early 1990s. It is also called the network model. Core aspects are system integration and extensive networking as well as the increasing speed of

innovation. Based on the parallel and integrated approach of the previous generation, it includes a time-base strategy and a new focus on quality and other non-price factors.

Maxim Kotesmir and Dirk Meissner (2016) see a sixth-generation innovation model emerging in the early 2000s, and although networks and alliances also played a role in the preceding innovation models, the new model is focused on inflows and outflows of knowledge to external elements. Most influential for this new generation is Henry Chesbrough's (2003; 2006) concept of open innovation.

2.4 Open Innovation

In the year 2003 Henry Chesbrough published his concept of open innovation (Chesbrough, 2003). His first book on open innovation was rather targeted towards practitioners and managers. Just a few years later, in 2006, he published a more academic and less practically-oriented follow-up book (Chesbrough, 2006). The concept of open innovation describes a new logic of research and development as well as other approaches for acquiring knowledge in organizations that involves a shift from an internal research mode towards external engagement. Chesbrough defines open innovation as *“the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively”* (Chesbrough, 2006, p.1). Chesbrough (2003) focuses on the computer industry, but nowadays the concept can be found in various sectors and industries, such as pharmacological research (Forbes et al., 2011) or the chemical industry (Sieg, Wallin & Krogh, 2010). The concept of open innovation became the star in the innovation research community and also found its way into practical applications in companies all over the world. Likewise, Chesbrough became one of the most popular researchers within the innovation research community, see Figure 1.

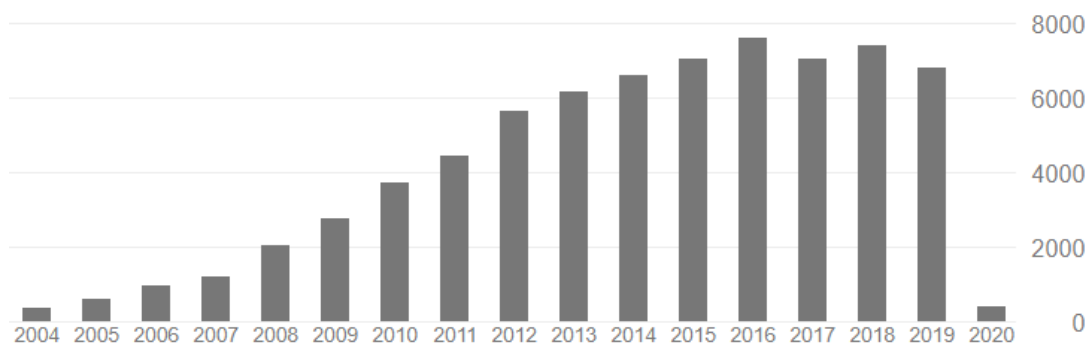


FIGURE 1: CITATIONS OF HENRY CHESBROUGH PER YEAR (DATA FROM GOOGLE SCHOLAR – JANUARY 2020)

The concept of open innovation offers a new managerial paradigm for practitioners as well as academics. Of course, it also builds upon established works and concepts in innovation research, with the foundations for open innovation being increasing interest in business models and various ideas that innovation often comes from outside an organization, amongst others (West,

Salter, Vanhaverbeke & Chesbrough, 2014). Moreover, Eric von Hippel's (2005) user innovation had, and still has, an important influence in this discourse. User innovation refers to a modus of innovation in which the users develop a product, rather than the actual supplier of the good. A user can be an individual consumer, but also a company that is using a product to produce its own products or services. For example, Boeing is a user of machine tools and not only a supplier of airplanes. In general, Hippel sees a trend of democratizing innovation (Hippel, 2005), yet he does not abandon the traditional sources of in-house innovation. He argues that producers will prefer to develop products for a large market and user innovation will target niches which are not adequately addressed by commercial sellers and their products. User innovation and manufacturer innovation are complementary to each other and, in general, user innovation focuses more on generating welfare than the concept of open innovation (Henkel & Hippel, 2003). In Hippel's concept, the focus is on the user (who is also a consumer) and he links his concepts more closely to economics than Chesbrough or other open innovation researchers (Henkel & Hippel, 2003).

In general, open innovation might be a new concept, but the open innovation literature did not create an entirely new field of research and instead builds on works of well-known innovations researchers (Spithofen, Vanhaverbeke & Roijakkers, 2013). West et al. (2014) reflect on the recent developments in open innovation research and find three emerging themes: first, the development of new and better ways to measure open innovation; second, the increasing centrality of appropriability in fostering open innovation; third, the increasing integration of open innovation concepts into established theories of management and economics. West et al. argue that although open innovation was influenced by major trends in management and economics, it failed to achieve integration with existing theories in the beginning.

Those who recognize the importance of external sources for knowledge and expertise often refer to Joy's law – "*no matter who you are, most of the smartest people work for someone else*" – which is attributed to Billy Joy, the co-founder of Sun Microsystems (Huff, Möslin & Reichwald, 2013). This can be seen as relating to Hippel's (1994) observation that knowledge is sticky: the idea that it is difficult and costly to move knowledge from one place to another. Given the recognition that most of the smartest people work for someone else (Huff, Möslin & Reichwald, 2013; Hippel, 1994), it is not surprising that Sun Microsystems advocate open source projects.

2.5 Organizing Open Innovation

Gary Pisano and Roberto Verganti (2008) describe different ways to leverage external creativity and knowledge with a focus the inflow. Pisano and Verganti came up with a two-by-two matrix to guide decisions about what kind of openness is adequate for solving specific problems (see figure 2). One decision is whether to implement a hierarchical or a flat governance structure, while another relates to the level of the openness of participation. Different configurations of

answers yield quite different approaches. A flat governance structure with a closed participation mode is a *consortium*, referring to a specified group of participants that work together on jointly selected problems; Pisano and Verganti cite IBM’s partnership with other companies to jointly develop semiconductors as an example. A hierarchical governance structure combined with a closed mode of participation is an *elite circle*, whereby a company selects a group of experts, identifies the problem that should be solved, and chooses from among the solutions provided by the experts; Pisano and Verganti cite Alessi’s approach of selecting design experts to develop new products. Open participation with hierarchical governance is an *innovation mall*, where a company posts a problem such that anyone can suggest solutions with the company finally deciding which is the right solution; the well-known open innovation and crowdsourcing platform InnoCentive is an example of such an innovation mall, which can also be called an innovation contest as monetary awards are given as incentives to the problem solvers. Finally, Pisano and Verganti argue that an open mode of participation with a flat governance structure is an *innovation community*, where anyone can suggest solutions or problems and the network decides on the solution; the Linux open source community is given by Pisano and Verganti as an example.

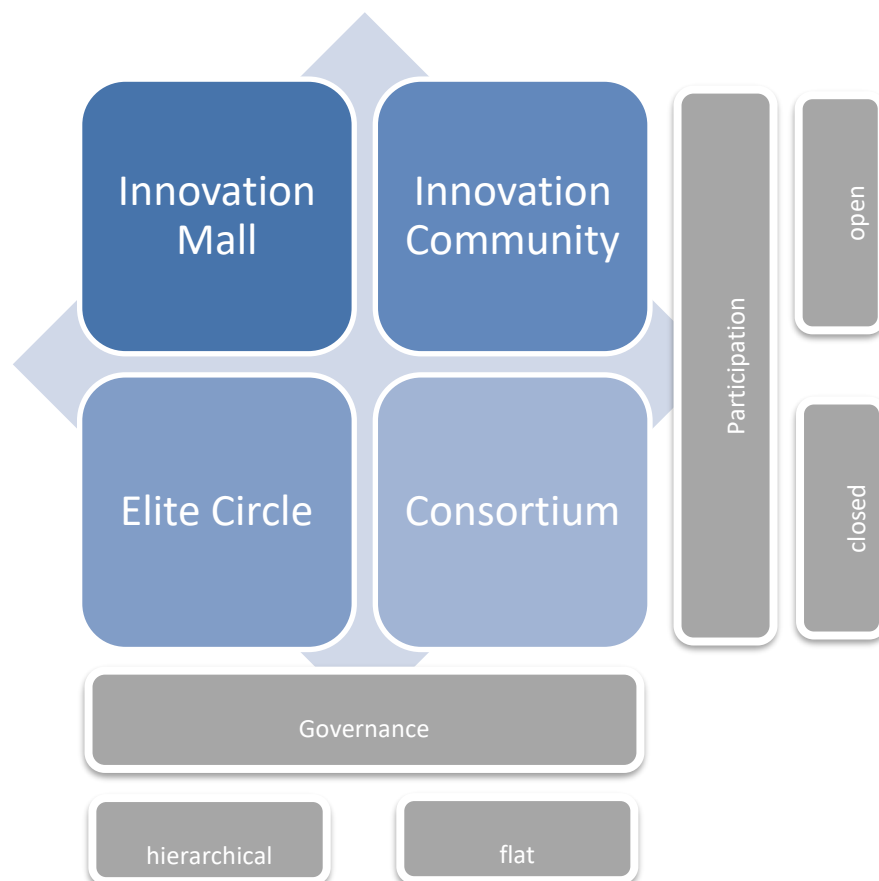


FIGURE 2: COLLABORATION MATRIX ON GOVERNANCE STRUCTURE AND PARTICIPATION MODE. BASED ON PISANO AND VERGANTI (2008).

It can be reasoned that each of these four forms of collaboration represent subsets of open innovation. Frank Piller (2003) writes that the concept of open source used for different products is called open innovation. Similarly, other authors see open source as one way to put open innovation into practice (Munir, Linåker, Wnuk, Runeson & Regnell, 2018). However, there is no consensus when it comes to the question of whether open source is open innovation. For example, Chesbrough (2016) does not consider open source as open innovation. He accepts there are many similarities, but holds that there is a vital difference when it comes to business models. In open innovation the purposive inflows and outflows of knowledge are entirely based on the business model. A company will control their inflows and outflows based on their strategies and their business model. Chesbrough says open innovation does not mean everything is open to anyone – except when the business model so suggests. On the other hand, open source often excludes a business model, or the business model is mostly built on services and consulting while the product itself is for free. As a result, in open source projects the business model follows the innovation concepts, whereas in open innovation the innovation concept follows the business model (Chesbrough, 2016). This is a valid distinction which must be considered, although, given that they share so many attributes, it makes sense to define open source as a special subtype within a larger open innovation paradigm. Consequently, this study follows Piller's (2003) approach.

2.6 Benefits of Open Innovation

Greco, Grimaldi and Cricelli (2019) conducted a survey on the benefits of open innovation. In a first step, Greco et al. collected various potential positive effects based on a literature review: reduce the time-to-market, increase the know-how an organization owns, increase the market success of products and service, extend the target market. In their survey amongst Italian manufacturing SMEs, the best rated effect was the increase in know-how owned by a firm.

In general, the positive effects of open innovation are well documented. Keld Laursen and Ammon Salter (2006) analyze the role of openness to explain innovation performance among UK manufacturing firms, finding a direct correlation between innovative performance and the depth of search through external sources of innovation. However, Laursen and Salter also argue that an effect of over-search sets in beyond a certain point, such that searching through too many external sources eventually decreases innovation performance. Furthermore, Zhao, Sun and Xu (2015) provide an overview on the current state of research regarding how and to what extent open innovation increases a company's innovation performance, finding various studies that suggest a positive effect of open innovation on a company's innovation performance across various sectors.

Open innovation is not just a model for large corporates, as positive effects are also well documented for SMEs. Mokter Hossain and Ilkka Kauranen (2016) conducted a comprehensive literature review on open innovation in SMEs finding broad evidence that also SMEs' innovation

performance is increased by applying open innovation practices. Hossain and Kauranen argue that it might even be true that SMEs are more dependent on open innovation than large firms since they lack resources and have limited time for networking. For SMEs, open innovation is highly relevant for commercialization, but it has not yet been clearly demonstrated as an efficient model for development (Hossain & Kauranen, 2016).

Lakhani, Jeppesen, Lohse and Panetta (2007) analyze empirically the efficiency of problem solving using an innovation contest (innovation mall). Lakhani's et al. research 166 scientific problems posted by the research laboratories of 26 firms on InnoCentive and conclude that opening up problem information to a large group of external experts is a very effective way to solve scientific problems. There was a positive and significant impact of the self-assessed distance between the problem and the submitters field of expertise on the likelihood of developing a winning solution. In other words, winning solutions to a given problem often emerge from a different field. Lakhani et al. argue that this might be because problem solvers from a different field see the problem with fresh eyes and propose new solutions. In the case of InnoCentive, the openness is very limited and the proposed solutions are not shared amongst the problem solvers. Lakhani et al. assume that more openness could deliver higher problem resolution rates.

The finding by Lakhani et al. (2007) that the distance of the problem solver to the actual problem is relevant, links to the concept of analogous markets. Franke, Poetz and Schreier (2014a) research empirically the implications of such analogue market effects. At first glance, different markets and sectors do not have much in common. However, Franke et al. (2014a) observe that players in different markets are often confronted with similar problems. Lead users from so-called analogous markets might therefore help to find innovative solutions. Franke et al. (2014a) demonstrate with an experiment that problem solvers from an analogous market (same problem, but distant market) perform better than problems solvers with expertise in the same market, as solutions coming from an analogous market show a higher level of novelty. This effect is stronger the more distant the markets are. These findings are based on an experiment with analogous markets for inline skating, wherein roofing and carpentry are defined as distant markets facing the same problem. The common problem is that for these markets safety gear to prevent serious injuries is essential, yet the safety gear should not restrain the user's abilities.

It seems that it is very important who is contributing in an open innovation process. Franke, Lettl, Roiser and Tuertscher (2014b) hence research factors relevant for crowdsourcing tournaments by conducting an idea-based crowdsourcing tournament for a smart phone app. Many researchers argue that there is a deterministic relationship between factors. Consequently, it is essential who is taking part in such a crowdsourcing tournament, how such a competition is organized, and what incentives are offered for the problem solver, etc. Franke et al. (2014b) define 22 such deterministic factors, with analogous domain expertise being identified as one of those factors. They found out that randomness outperforms deterministic

explanations by over 500%. In other words, it is more important to have many people participating in such a competition than having a few selected experts as participants. However, Franke et al. (2014b) emphasize that these very findings have some limitations since the task that was crowd sourced did not require specific technical knowledge. In this sense it does not necessarily oppose the findings of Lakhani et al. (2007) who were researching advanced scientific problems. In general, in a knowledge-intensive setting a deterministic explanation is more suitable, whereas for problems that do not require advanced technical knowledge, like generating ideas for new apps, an explanation based on randomness is more suitable (Franke et al., 2014b).

The inbound processes surrounding the acquisition of external technology and expertise, and the positive effects are especially well researched. Lichtenthaler (2009) also researched the outbound processes, meaning the outward transfer of technology. He clearly shows that also this outbound open innovation has positive effects on a company's performance, and that the degree of patent protection is not relevant to the company's performance (Lichtenthaler, 2009). Despite the evidence that open innovation has various positive effects, open innovation is not yet replacing closed innovation. Closed innovation can be understood as the counterpart of open innovation. In closed innovation, external sources of knowledge are not utilized and problems are solved internally. Chesbrough (2003) emphasizes the interaction of internal and external sources of knowledge, noting that open innovation also includes internal sources, and that internal R&D has to be used to leverage external sources of expertise. The choice of whether open or closed innovation is more suitable depends on the problem, the hiddenness of knowledge, the company's business model, etc. (Felin & Zenger, 2013). Laursen and Salter (2006) suggest that there is a substitutional relationship between internal R&D and open innovation practices. They assume this is caused by the not-invented-here-syndrome. Other effects that they expect to play a role, like higher internal R&D increasing the absorption capacities of a company, were not sufficient to outweigh the not-invented-here-syndrome. Chen, Vanhaverbeke and Du (2016) researched the relationship between internal R&D and various types of external knowledge sources among Chinese companies. Previous studies had often failed to distinguish between different types of external knowledge sources. Chen et al. conclude that there is a complementarity between internal R&D and collaboration with partners in the value chain and horizontal cooperation, such that higher levels of internal R&D activities augment the exploitation of external sources of knowledge. However, Chen et al. do not find evidence for complementarity between higher level of internal R&D and collaborations with universities and other science-based partners.

2.7 Knowledge and Problem Recognition – Governance Structures

The not-invented-here-syndrome describes a negative attitude to knowledge that comes from outside the organization. It is often described, but only few studies quantify the effect of this phenomenon. Chen et al. (2016) were able to show the negative impact in their study.

Nonetheless, the not-invented-here-syndrome is multilayered and complex. Lichtenthaler and Holger (2006) demonstrate that there can also be an excessively positive attitude to knowledge that comes from external sources depending on the specification of knowledge management tasks, which can be divided in knowledge acquisition, knowledge accumulation, and knowledge exploitation. The not-invented-here-syndrome is only relevant for knowledge acquisition (Lichtenthaler & Holger, 2006).

Felin and Zenger (2013) developed a two-by-two matrix based on the complexity of problems and hiddenness of knowledge to determine how to tackle a problem – see figure 3. Felin and Zenger define six different forms of governance: Two forms follow an internal approach of problem solving (authority-based hierarchy and consensus-based hierarchy) and four governance structures are based on external cooperation (partnerships/alliances, markets/contracts, contests/platforms as well as user/community innovation) – see table 1.

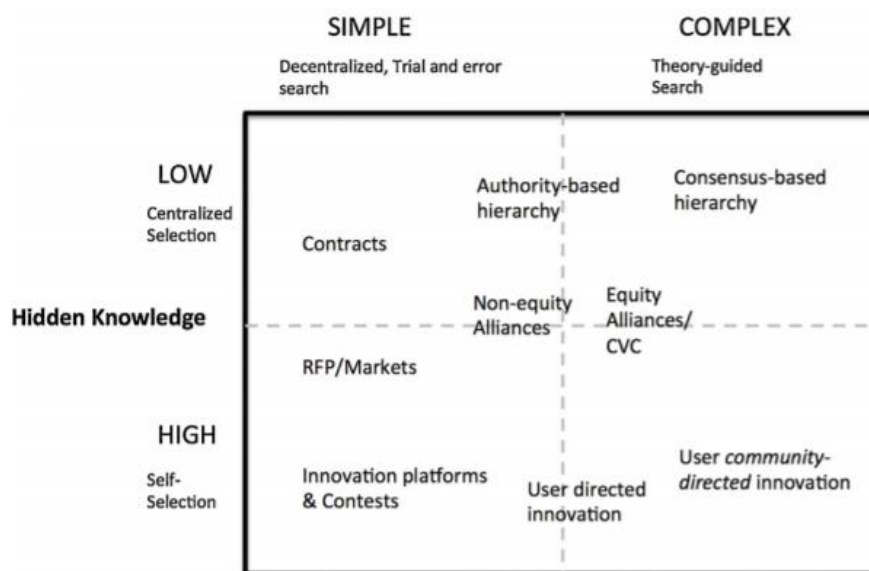


FIGURE 3: FINDING THE RIGHT GOVERNANCE STRUCTURE FOR SOLVING PROBLEMS BASED ON THE COMPLEXITY OF A PROBLEM AND THE HIDDENNESS OF KNOWLEDGE. FROM FELIN AND ZENGER (2013).

Felin and Zenger (2013) analyzed the difference governance forms and summed up their characteristics in tabular form.

	Firm/Closed		Open Innovation			
		Authority-based hierarchy	Consensus-based hierarchy	Markets/Contracts	Partnerships/alliances	Contests/tournament/platforms
Communications channels	Vertically, socially embedded within firm	Horizontal, socially embedded within firm	Limited, selective invitations	Bilateral, socially embedded	Horizontal broadcast, IT supported,	Horizontal, socially embedded outside the firm
Incentives	Low-powered	Low-powered	High-powered	Cooperative, high-powered	Moderate powered	Low-powered
Property rights	Possessed by the focal firm	Possessed by the focal firm	Externally owned and exchanged	Negotiated	Varied (dispersed or focal firm)	None

TABLE 1: ANALYSIS OF THE SIX DIFFERENT GOVERNANCE FORMS. FROM FELIN AND ZENGER (2013).

As already mentioned, open innovation is not a suitable approach for every problem and every organization. At a generalized level, and as a rule of thumb, open innovation is more suitable for radical innovation, whereas closed innovation for incremental innovation, as there are also disadvantages arising from open innovation like high costs and slow processes (Hossain & Kauranen, 2016). Greco et al. (2019) see various challenges in implementing open innovation practices: an organization must develop the skills to absorb external knowledge, transaction and control costs, the not-invented-here-syndrome, efforts to protect intellectual property rights as well as the loss of a competitive advantage. In their survey amongst Italian SMEs they identified the costs of developing skills to handle the inflow and outflow of knowledge (e.g. absorption capacities) as the biggest drawback (Greco et al. 2019).

2.8 Market Failures in Open Innovation

Nola Hewitt-Dundas and Stephen Roper (2017) examine market failures in open innovation and work out that especially micro businesses have lower engagement in open innovation activities than the optimal level. Firms underinvest in open innovation. Due to the improved innovation output possible through open innovation, this has also implications for the bottom-line performance of a company. Hewitt-Dundas and Roper (2017) identify three different types of market failures that could be a reason for the underinvestment, all of which relate to information failures: i) firms lack understanding of the benefits of open innovation, which reduces company efforts to find external innovation partners; ii) there is an information deficit on which potential partner exist; and iii) there are difficulties for companies in assessing the trustworthiness and motives of potential partners for open innovation. Especially, the last point

is what Greco et al. (2019) refer to as transaction and control costs. How can organizations in open innovation scenarios assess the motives of a potential partner? Naturally, also the potential partner is a rational economic agent that wants to maximize its profits as well as other benefits, and to reduce the efforts. This is closely linked to the principal-agent dilemma-

The principal-agent dilemma describes the problems arising when a principal engages an agent to perform a certain service on his or her behalf. These services also include some kind of decision-making which will affect the achievement of the principal's objectives. Schmidt (2016) explains that the dilemma is in determining how the principal can be sure that the agent will conduct the service to the satisfaction of the principal. This can arise not only from an information asymmetry, but also from an actual conflict of interests. In this context, often the relationship between employer and employee is referenced. Schmidt argues that the employer wants to pay as little as possible and wants to have the best possible performance and, on the other hand, the employee wants to maximize his or her remuneration and to reduce his or her work effort. This conflict can bring about a moral hazard where suitable incentives for the agent to take care of the interest of the principal are lacking (Schmidt, 2016).

One might argue that strong intellectual property rights and a strict legal framework could help to overcome issues of possible mistrust. However, as already mentioned, Lichtenthaler (2009) shows that strong intellectual property rights (in this case patents) do not improve the company's performance when engaging in open innovation projects. Maria Cristina Longo and Sonia Caterina Giaccone (2017) explain that agency costs arise from a lack of perfect information and include control costs, signaling costs, and costs associated with a loss of total welfare: Control costs are the costs the principal has to bear to decrease his or her information disadvantage by supervising the agent's behavior; Signaling costs are the costs the agent has to bear for decreasing information asymmetries between him or her and the principal, such as when an employee – the agent – must signal his or her knowledge and expertise by acquiring educational qualifications. Although the employer can, to some extent, rely on those signals, signaling is often very expensive and inefficient. There are various instruments and mechanisms to reduce opportunistic behaviors of agents and align the agent's behavior with the principal's goals. Longo and Giaccone name, for example, state efficiency wages, profit sharing, performance evaluation, commissions and piece rates as effective approaches. Longo and Giaccone (2017) also research agency problems in an open innovation ecosystem, but investigate the practices of only a single innovation hub. Consequently, there are limits when it comes to the generalization of the finding. Nonetheless, the results are a very good starting point for an appropriate framework for open innovation collaborations. Longo and Giaccone define three different approaches to tackling agency problems: i) define a set of success and participations rules that allow multiple stakeholders to interact with each other; ii) provide psychosocial compensations as incentives to support effective collaboration and discourage

opportunistic behaviors; and iii) monitor activities following social control mechanisms to promote a shared intention and prevent opportunistic behaviors.

Roper and Hewitt-Dundas (2016) deal with the policy implications of market failures in open innovation scenarios and the development of policy responses. One approach is the establishment of intermediary organizations that are engaged in supporting open innovation. To be more precise, Roper and Hewitt-Dundas suggest that intermediary organizations should increase awareness of the benefits of open innovation, act as advocates in policy efforts to foster open innovation, and support the development of capabilities in companies to enable them to engage in open innovation. Furthermore, Roper and Hewitt-Dundas argue that such intermediary organizations could help firms to identify and find potential partners for open innovation projects, help to build new partnerships, and support trust-building activities. Various intermediary organizations have already adopted this approach. The Co-Creation Lab Vienna by the Vienna Business Agency is an example of how this can be done.

2.9 Incentives for Participation

Incentives to participate in open innovation practices are relevant. Of course, appropriate incentives depend on the mode of collaboration, the problem complexity, the hiddenness of knowledge, the openness of participation etc. Franke et al. (2014b) show that for certain problems randomness explains the likelihood of finding a solution better than do deterministic variables. In such cases, incentives should trigger high numbers of participants. Moreover, Franke et al. (2014b) and Lakhani et al. (2007) determine that for complex problems that require special technical expertise, distance to the problem increases the chance of solving a problem. Hoffstetter, Zhang and Hermann (2017) demonstrate in an experiment with an open innovation contest that the number of participants tends to decrease in subsequent contests. Over time, this reduces significantly the size of the crowd attracted. In general, Hoffstetter et. al (2017) conclude that in a one-time context a winner-takes-all award causes better results, but for running successive contests they suggest offering multiple prizes to motivate participants to participate again and to put more effort into their ideas for solutions. Moreover, their results show that positive feedback on submissions can motivate problem solvers to continue to participate in such contests. Lakhani et al. (2007) identify that prizes are essential in contests on InnoCentive, but also that there is no significant correlation between the size of the award and the chance of receiving an acceptable solution for a problem. More importantly, a significant relationship between the likelihood of finding a solution and the intrinsic motivation of participants was identified (Lakhani et al. 2007). Likewise, Frey, Luthje and Haag (2011) research motivation on open innovation platforms and emphasize the importance of intrinsic motivation in innovation contest. Frey et al. (2011) state that monetary rewards have positive effects on the total number of contributions, whereas intrinsic motivation is positively related to the most value contributions. There is no universal definition of intrinsic motivation. Huffman and Bognanno (2018) suggest to use the term non-monetary motives instead of intrinsic motivation

as intrinsic motivation is sometimes reduced to solely task enjoyment. In this study the focus is on non-monetary motivational factors when speaking about intrinsic motivation.

Similar findings also exist for innovation communities. However, when it comes to open source software projects, also the pragmatic goal of improving the software and solving one's own technical problems is relevant, as Lakhani and Hippel (2002) describe in their study on an online forum in the open source community that deals with Apache software. Lakhani and Hippel state that almost 98% of the time invested by users is to search for information, and only 2% is spent in answering questions. They further identify both extrinsic factors for participation, such as solving own technical problems and building up one's reputation, and intrinsic motivation – enjoyment in the process itself - as important (Lakhani & Hippel, 2002). Hertel, Niedner and Herrmann (2003) explore the motives of over 140 participants in an open source software project and conclude that engagement was especially driven by the developers' identification as a Linux developer and by the aim of improving their own software. In general, Hertel et al. (2003) argue that there are similarities in motivational patterns between the Linux community and social movements like the civil rights movement or the peace movement.

Schattke and Kehr (2009) summarize the findings that most studies suggest a mix of intrinsic and extrinsic factors and recommend creating open innovation projects in ways which increase especially the intrinsic motivation of participants. This includes adequate design of the problem, clear presentation of a vision, support for questions, and provision of further explanations, additional tools, etc., to increase the intrinsic motivation (Schattke & Kehr, 2009). Nonetheless, in general and not speaking about open innovation practices there is also an effect of extrinsic motivators crowding-out intrinsic motivators as Frey (1997) shows for various aspects of the daily life and the workplace.

3 METHODOLOGY

3.1 Case Studies

In general, the development of a research strategy and methods must follow the research questions. Nonetheless, other aspects have to be considered. Firstly, the level of control over the object of study and its relevant parameters and variables. When the researcher is able to control certain variables, various research strategies can be applied that would not be suitable for another situation (Yin, 2018). Secondly, as Robert K. Yin (2018) describes, also the time horizon is a determinant of appropriate research strategies, resulting, for example, in different approaches to studying contemporary and historical events. In my case I am dealing with contemporary events that I cannot control.

My thesis methodology is based on Yin's (2018) framework for case studies. Yin was the first researcher that was able to codify case study research design (Yazan, 2015). Yin (2018) argues that case studies are an appropriate instrument for i) "how" and "why" questions that are asked about ii) contemporary events which iii) cannot or can only marginally be controlled by the researcher. Case studies help to understand complex phenomena. To increase the use of case studies and improve the quality of studies based in case studies, Yin created a widely recognized textbook which forms the foundation of this study. In Yin's point of view: *"A case study is an empirical inquiry that i) investigates a contemporary phenomenon within its real-life context, especially when ii) the boundaries between phenomenon and context are not clearly evident"* (Yin, 2018, p.15).

It is important that case studies as research methods are not confused with case studies as teaching instruments, as various differences exist. First and foremost, there are very different standards and requirements in terms of validity (Zaidah, 2007). Moreover, case studies are not a specific data collection technique, and various techniques can be used to collect data (Yin, 2018). Likewise, even though most case study are often based on qualitative data, such studies can also include quantitative evidence (Yin, 2018).

Case studies have generally gained popularity as a research strategy across various disciplines. Welch, Piekkari, Plakoyiannaki and Paavilainen-Mäntymäki (2011) show that case studies are even the most popular qualitative research strategy in international business research. Besides Yin, Kathleen Eisenhardt is often quoted. She can also be considered as one of the most influential researchers in this field. Especially Eisenhardt (1989) is frequently cited in various high-ranking journals, which shows the relevance of her theoretical framework (Ravenswood, 2011). Eisenhardt and Yin are often cited in a connected way. Indeed, their theoretical frameworks are not so different and both can be considered as positivists (Cassell, Cunliffe & Grandy, 2018). However, as Cassell et al. (2018) point out, Eisenhardt and Yin differ in three

central aspects: Eisenhardt prefers theory-building case studies, whereas Yin highlights the potential of theory testing; her concept draws from Grounded Theory (Glaser & Strauss, 1967), whereas he clearly differentiates case studies from this approach; and Eisenhardt argues for the superiority of multiple case study designs (Cassell, Cunliffe & Grandy, 2018).

Welch et al. (2011) present a very good overview of current approaches to theorizing from case studies in economic and social studies, and are their main advocate. A research design following Eisenhardt's roadmap has explanation in the form of testable propositions as outcome. On the other hand, Yin's approach delivers explanation in the form of cause-effect relations. In general, Yin can be seen as operating in the context of natural experiments (Welch et al., 2011). As mentioned, Yin (2018) is advocating case studies for situations in which the researcher has no control over the event. If he or she could control the event and manipulate the behavior of participants both directly and systemically, experiments would often be the better choice (Yin, 2018). This means when the researcher can manipulate certain variables an experiment can be conducted. In my case, this is of course not possible. Another key feature of Yin's framework is its theory-driven approach and he clearly differentiates Grounded Theory (Glaser & Strauss, 1967) and case studies as two different strategies (Yin, 2018).

On the contrary, Stake (1995) argues against a theory-based approach and advocates a method based on Grounded Theory. In his point of view, no theoretical development should take place before conducting the case studies. In this sense the case studies itself are the source of theory and the field to test it (Stake, 1995). Eisenhardt (1989), also drawing upon Grounded Theory, advises in her case study roadmap the integration of theory and literature review only in a later stage of the research process. Only after the data is collected and analyzed must it be contextualized with the current state of research (Eisenhardt, 1989). Eisenhardt can be seen between Yin's and Stake's approaches (Steenhuis & de Bruijn, 2006). In general, Yin is often more favored in business research, as his approach is more open, very flexible, and tries to minimize the distance to other research paradigms (Borchart & Göthlich, 2007).

This study follows Yin's approach, as his design seems the most suitable for my research questions. Firstly, I am mostly interested in causalities and, secondly, despite gaps in theory, there is already a solid knowledge base on which to develop my theoretical framework. Consequently, the development of theory is very feasible. The theory development in my thesis is based on a comprehensive literature review. Theory, in this sense, should not be considered with the formality of a complex, fully defined societal theory (Yin, 2018). Yin (2018) explains that it is more a blueprint for a study that will help the researcher to conduct his or her research and generalize the results of the case study. Yin says that the result of a case study research is not statistical generalization and will not answer numerical questions (e.g. how many). The goal is to generalize, apply, test and expand theory. This is what Yin (2018) calls analytic generalization. Again, he compares case studies to experiments. To be more concrete, based on the current

state of research a theory is developed that is then used as a proposition and expanded, validated or rejected by the case study (Yin 2018).

Yin (2018) differentiates between three different types of case studies: i) exploratory case studies ask “what” (for example, what is a company expecting when taking part in third party open innovation services); ii) descriptive case studies describe relations; and iii) explanatory case studies ask “why” and “how” questions. My thesis is mostly explanatory and descriptive. The goal is to test, validate, and expand theories based on the evidence obtained from my case studies.

One can also differentiate between single and multiple case studies. Eisenhardt (1989) strongly discourages single case studies. Yin (2018) also favors multiple case studies, but also sees merit in single case studies: especially for extraordinary and singular cases. I follow a multiple case study design by conducting two case studies. Likewise, a multiple case study design has advantages in terms of analysis. There can be literal replication if the multiple case studies show the same pattern as well as theoretical replication when a diverging pattern in the case studies can be explained by the theoretical framework (Yin 2018).

Eisenhardt and Graebner (2007) note that it is important to consider that case studies follow a different sampling logic than many quantitative approaches. Sampling methods often used in surveys would not be suitable for many cases studies. As mentioned, cases studies are selected by theoretical thoughts and case studies are not intended to be representative of some population. This is also called theoretical sampling (Eisenhardt & Graebner, 2007).

3.2 Research Design

Yin (2018) provides a template for a case study research design. Basically, four points have to be defined (Yin, 2018).

3.2.1 Study’s Question

My starting point is a very broad question: How are open innovation services for third parties facilitated in practice? Based on this question, three more concise research questions are derived to be answered through the case studies:

1. How are open innovation services for third parties organized (governance form, openness etc.) and why are they organized in these ways? How do they define suitable problems or challenges?
2. How do open innovation services for third parties ensure fairness amongst the parties and how do they handle the principal-agent dilemma in an open innovation setting?
3. Why do problem solvers participate and what is their motivation?

3.2.2 Study's Propositions

How are open innovation services for third parties organized (governance form etc.) and why are they organized in these ways? How do they define suitable problems or challenges?

They are organized as innovation contests or crowdsourcing tournaments. This means an open form of participation is used and combined with a hierarchical governance structure (Pisano & Verganti, 2008). This helps the problem owner (the organization that submits a challenge) to stay in charge of the process. The openness increases the chances of finding solutions. Especially the size of the crowd has a strong effect on finding a suitable solution (Franke et al., 2014b). Lakhani et al. (2007) argue that more openness could deliver higher problem resolution rates. Following this approach, it makes sense to share ideas widely amongst the potential problem solvers.

The organization of the process has to be appropriate for the problems at hand. Felin and Zenger (2013) developed a two-by-two matrix based on the complexity of problems and hiddenness of knowledge to determine how to tackle a given problem. For an innovation contest there should be a high amount of hidden knowledge, while the problem complexity has to be rather low: meaning a decentralized or trial and error-based search approach is enough. It can be assumed (despite the lower complexity of the problem) that these are rather select problems that require radical innovation. In general, open innovation is more suitable for radical innovation and closed innovation for incremental innovation (Hossain & Kauranen, 2016).

How do open innovation services for third parties ensure fairness amongst the parties and how do they handle the principal-agent dilemma in an open innovation setting?

There are difficulties for companies to assess the trustworthiness and motives of potential partners for open innovation (Hewitt-Dundas & Roper 2017). This is also closely linked to the principal-agent dilemma. Researching agency problems in an open innovation ecosystem, Longo and Giaccone (2017) define three different approaches to facilitate successful collaboration in an open innovation setting: i) defined a set of success and participations rules that allow multiple stakeholders to interact with each other; ii) provide psychosocial compensations as incentives to support effective collaboration and discourage opportunistic behaviors; iii) monitor activities following social control mechanisms promote a shared intention and prevent opportunistic behaviors. It is assumed that these three approaches have been implemented in the cases under scrutiny. Following Lichtenthaler (2009), a focus on strong intellectual property rights is not relevant for improving companies' performance when engaging in open innovation projects. Hence, it can be assumed that intellectual property rights are also not a major issue for open innovation services for third services.

Why do problem solvers participate and what is their motivation?

Incentives to participate in open innovation practices are important. Franke et al. (2014b) show that for certain problems randomness explains the likelihood of finding a solution better than deterministic variables. In such cases, incentives should aim to trigger a high number of participants. Zhang and Hermann (2017) demonstrate in an experiment with an open innovation contest that the number of participants tends to decrease in subsequent contests. This reduces significantly the size of the crowd. In general, Zhang and Hermann (2017) conclude that in once-off contests, a winner-take-all award causes better results, but for running successive contests they suggest offering multiple prizes to motivate participants to participate again and to put more effort into the solutions they develop. Moreover, their results show that positive feedback on submissions can motivate problem solvers to continue to participate in such contests (Zhang & Hermann, 2017).

Likewise, Frey et al. (2011) argue monetary rewards have positive effects on the total number of contributions, whereas intrinsic motivation is positively related to more value contributions. Schattke and Kehr (2009) summarize the findings that most studies suggest a mix of intrinsic and extrinsic factors, and therefore recommend creating open innovation projects in ways which increase especially the intrinsic motivation of participants. For open source software projects, a strong community effect (similar to social movements) is reported and this effect increases motivation to participate (Hertel et al., 2003).

It is assumed that incentives (e.g. a prize, monetary rewards) are applied in the cases under scrutiny and that, as both case studies are conducting multiple rounds, that they offer multiple prizes. Also, that positive feedback is given to the participants, such that a mix of intrinsic and extrinsic motivators is used. The case studies are also aiming to build up a community to increase motivation. This is also relevant to research question two, as it helps to implement social control mechanisms.

These propositions guide me through the data collection and analysis, and constitute the foundation for the theoretical generalization. The propositions are needed because the research questions alone are insufficient to direct the study. Without a proposition, researchers might end up collecting extensive data, yet be unable to focus on the relevant aspects (Yin 2018).

3.2.3 Study's Unit of Analysis

As mentioned, this thesis is a multiple case study. Multiple case studies also increase the external validity. Data is collected and analyzed from two different case studies which were selected based on the theoretical assumption that they could lead to theoretical replications and partly to literal replication. Also here, my theoretical framework guides my research.

I picked these two case studies as they are individually interesting and to some extent similar in their implementation of third-party innovation services. Moreover, their accessibility for me as a researcher is very high. Thus, the data collection is feasible. The first case study is the project “Industry meets Makers” that was initiated by one individual, Sandra Stromberger, to enable new forms of collaboration between established industry partners and “makers”. It is a service for (large) companies. These companies (Infineon, Magna Steyr, AVL List, Nokia etc.) define briefings and makers are recruited to develop suitable solutions. The second case study is the “Co-Creation Lab Vienna”. The Vienna Business Agency – the business support and innovation agency of the City of Vienna –launched this initiative in 2015 to promote the regional R&D&I system. Established organizations (both private companies and administrative bodies) define challenges and the Vienna Business Agency facilitates a process to find the right partners to co-create solutions in an open innovation contest. I work for the Vienna Business Agency and I am directly involved in the Co-Creation Lab Vienna.

Yin (2018) not only differentiates between single and multiple case studies, but also between embedded and holistic case studies. An embedded case study divides the case study into various subunits (e.g. meetings, events, departments, projects etc.) (Yin 2018). In my case, I will use a holistic case study as there are no logical and suitable subunits for my two case studies.

3.2.4 Collecting Data

Conducting the case study is largely about collecting the data. As mentioned, case studies can be based on various approaches of data collection. In practice, interviews are very popular as they allow an in-depth analysis of a particular case, especially when scant other data is available.

For my case studies I mostly used guided interviews with organizers and participants from the two initiatives. In total I interviewed eight people. They were selected based on theoretical assumptions in order to give fruitful insights into the case studies. Moreover, also accessibility of the interviewees is relevant. The interviews were conducted in German. An interview guideline was developed and can be found in the annex. There are three version of interview guidelines that vary to some extent, which were designed: i) for the organizers of such services; ii) for challenge owners and briefing partners; and iii) for contributors and makers.

Methodologically, the conducted interviews can be seen at least partly as expert interviews. Bogner and Menz (2002) point out that the term expert is always seen in relation to the research object. Consequently, a person could be an expert for one study but not an expert for a different one. Interviewing experts or elites has certain implications. As Welch, Piekkari, Penttinen and Tahvanainen (2002) point out, there are four factors in literature that must be considered for interviewing elites: access, balance of power, openness, and feedback. In general, the researcher must perform a balancing act whilst interviewing experts. They must combine various roles: insider and outsider, subordinate and sounding board, sympathizer and critic, therapist

and spy, academic and consultant (Welch et al., 2002). These aspects were considered in the interviews.

Unlike practice in Grounded Theory, Yin (2018) does not recommend transcribing and analyzing the interviews word by word. Yin (2018) argues that this is too much effort and that the effort-benefit ratio is normally not justifiable. Moreover, there is the risk of over interpreting single words and the key is the critical interpretation as researcher as well as an expert (Yin 2018). Following this approach there is transcription of the interviews. All interviews for this study were conducted in German and were recorded. Based on the recordings the interviews were summarized. In this study the case studies are presented as clustered and structured summaries of the interviews. This helps to draw a complete picture of the two case studies and is the foundation for interpreting the results.

3.2.5 Interpretation of the Findings

Data analysis involves examining, categorizing, testing and recombining evidence to address the initial proposition of my thesis. Yin (2018) recommends three strategies: Firstly, to proceed based on one proposition which forms the framework to organize the entire case study by helping to focus on certain data and ignore other data; Secondly, to also consider rival explanations for relationships or causality, which go much beyond merely considering a Null Hypothesis; Finally, it is important to develop a case description, for which Yin endorses certain techniques, such as matching patterns within the case study and comparing it to the theory. When the pattern of the case study and the pattern predicted by theory coincide, this can help to strengthen the internal validity of the case study. Another technique is explanation building, where, Yin explains, the goal is to analyze the data by building explanations about the case. Again, the essential part here is comparing the starting proposition with the case study. The result could be a revised proposition. Both techniques are used in this thesis. This will increase the internal validity.

4 CASE STUDIES

4.1 Case Study: Industry meets Makers

Industry meets Makers was initiated by Sandra Stromberger. Larger companies define briefings with certain problems or questions. Those briefings are presented at a kick-off event to makers, interested people and organizations. Briefing partners and makers then work together on solutions. Six months later the results are presented at a best-of event. The first round took place in 2016. For the case study three interviews were conducted:

Interviews		
Name	Role	Date
Sandra Stromberger	Founder and manager of Industry meets Makers. (organizer)	2.12.2019
Rafael Gattringer	Innovation management at Infineon and is the contact person for Infineon briefings in Industry meets Makers. (briefing partner)	4.12.2019
Philip Gühring	Security Architect in the banking industry. He also founded two startups. One of those emerged out of an idea he had during Industry meets Makers. (maker/problem solver)	9.12.2019

TABLE 2: INTERVIEWS FOR INDUSTRY MEETS MAKERS

4.1.1 Sandra Stromberger, Industry meets Makers

Industry meets Makers. The Idea and Process

Stromberger learnt about open innovation in Don Tapscott's Wikinomics. Especially the example about Gold Corp impressed her. Gold Corp, a gold mining company, crowdsourced the search for new deposits and offered a share of the revenue to the people with the right ideas. The company owner got this idea from listening to a presentation by the open source pioneer Linus Torvald. For her this is quite simply open innovation. Open Innovation means to open up and to disclose or give away something, but in return one gains a lot of speed. That is also the principle behind Industry meets Makers. Large corporations open their doors and disclose certain things, but they get significant input in return and gain speed. For Stromberger one of the starting points of open innovation is Linux. In general, the software sector started to use this openness very early on. Later, the "hardware" sector followed.

The idea behind Industry meets Makers was to connect large manufacturing companies to makers, hobbyists, and the free developer scene. The manufacturers define briefings (they are also called briefing partners) and together with makers they work on those topics. This was the core idea, but in practice the target groups were extended and mixed. On the maker side, there are also research organizations, SMEs, students, and startups: in fact, anyone who wants can participate. This evolved over the time. In the first round in 2016, a SME with 150 employees wanted to participate as a maker. In the beginning, Stromberger did not allow them to take part as maker as she thought this would be unfair – especially as her first idea was a competition between the makers. However, the concept of a competition did not work out. The term maker in this sense is very broad. On the briefing side (the manufacturers) it also became less distinctive and companies like the Austrian Post, T-Mobile, and Nokia defined briefings for Industry meets Makers. It turned out that non-manufacturing companies were interested in taking part, too. Their briefings were mostly about the Internet of Things, which suits very well the topic of manufacturing. Consequently, the industry partners are also broadly defined. Industry meets Makers brings them together and supports them in their collaborations. The process lasts about half a year. The goal is that briefing partners and makers together develop new prototypes, concepts or business models regarding issues about future technologies.

The briefings are presented at a kick-off event. At this event the participants are already in communication. After the kick-off, makers (again in a very broad definition) and companies work together and follow-up meetings or workshop take place. When people sign up on the Industry meets Makers webpage, Stromberger connects them to the briefing partners via email. This is not automated. Nonetheless, many people meet at the events and she does not know exactly how people meet each other and who meets whom. It is not a controlled environment and many things happen in a decentralized manner. The follow-up meetings are organized by the briefing partners. In the beginning, Stromberger was attending every meeting, but now it has grown too big and she is not able to do it. In general, many tasks in Industry meets Makers are done by the companies. The briefing partners are very autonomous in how this process is managed. From Stromberger's experience it works best if a company has a young community manager that has a direct connection to the decision makers. Alternatively, a decision maker directly takes care of the collaboration with the makers, but in practice this is often not possible because of a lack of time resources in such a position. Briefing partners and makers also get help from the community. Anyone who wants can join a briefing as a maker. The first step is that the briefing partner and the maker(s) meet and clarify whether it makes sense to do something together. The next step is to develop a plan. It is not about immediately starting to develop solutions. Six months after the kick-off event the results are presented at the best-of event. However, the best-of is often not the end of the process, as further and deepened collaboration sometimes takes place after this event. This collaboration is often based on traditional business models and participants are typically contracted for certain tasks by the companies.

Stromberger mentioned that one of her most important tasks is expectation management. In the beginning she did not do it. However, over the course of time she learnt that she must ask the people why they actually participate and what motivates them. This makes it easier to match the right people. Some participants just want to have fun, others want to work in a workshop, the next is looking for a job or a contract, etc. It is easier to connect people when you know what they really want. Stromberger says that this may seem obvious, but it is something she had to learn. In general, it is important to know what both sides really want. For example, some briefing partners want to invest in a startup or even want to buy a startup. Some are looking for external developers to gain speed or searching for new employees.

Overall, Stromberger's role in Industry meets Makers is as some kind of troubleshooter for both sides. Various problems arise: during the summer many projects become stuck; or the first meeting with the makers shows the briefing partners that they did not think the problem through and they have to further reflect what they really want; or the briefing partner talked to the specialized department too late. Within the community people help each other. For example, one maker is now offering workshops on how to collaborate. Stromberger has the impression that the community which has emerged is to some extent self-regulating.

The Briefings and Format

Stromberger defines technologies for the briefings and each briefing partner thinks of a suitable briefing. Stromberger differentiates three types of briefings. Firstly, solutions for problems that really exist in the daily business of a briefing partner. For example, Magna uses automated guided vehicles in their plants, but lacked a proper monitoring solution for maintenance. Finding such a solution was a briefing in 2017. Secondly, new applications for existing hardware or software. The goal of those briefings is to build new prototypes and check whether there is a new way of using the existing hardware or software. For instance, T-Mobile had a briefing to find applications for the Internet of Things developer box. A very interesting application was a smart bed for flowers and vegetables. Finally, briefings are used to find new business models. Fronius believed that it was too early for products or services that combine blockchain and energy. However, they wanted to see what concepts for the future exist even if there was no concrete plan to implement anything. Fronius is now opening a living lab in the Tabakfabrik to test some of the ideas.

Stromberger helps to define briefings and checks the first drafts of the briefings. Normally, she talks to a few makers from the community about the briefing and they can give feedback on what is feasible. It is an iterative process. The briefing partners do not sign a contract in order to participate; they just say they want to take part and shake on it. This service also used to be for free, yet, due to an ever-growing community, in the fourth year (2019) Stromberger asked for a small fee from the briefing partners for the first time, to cover the increasing costs of the events. Therefore, starting in 2019 she began to sign contracts with the participating briefing partners.

It turned out to be complicated to sign those contracts with such big companies, so the contracts were signed long after the 2019 round of Industry meets Makers started. However, this was no issue and the briefing partners took part without having signed the contract. The fee is based on a share of the costs of the events and not based on any collaboration output. Stromberger does not give any guarantee that someone will work on a certain briefing. In Industry meets Makers the briefing partners have to do many things, if the fee is too high, they might expect that someone will do it for them and lean back.

There is no rule that says when a briefing is too broad or too narrow it does not work. Having said that, normally this is the case and those briefings do not work well. For instance, Fronius had two briefings in 2018, including the aforementioned briefing on blockchain and energy. This was very broad and Stromberger expected that this topic would not attract many people, but in the end it worked very well. The second briefing by Fronius was very narrow. Stromberger thought that someone would instantly be able to solve it and would receive a contract from Fronius. The briefing was about data communication of welding machines, but the software requirements for these welding machines were so specific that nobody was interested and the briefing failed because it was too narrow. Moreover, overly broad topics often fail as well. In 2018, Bosch had a briefing called the air around us. The task was to develop something for air quality monitoring and to use Bosch sensors for this purpose. The makers worked out very different concepts. One of the concepts was about smart glasses that detect pollutants in the air, which Stromberger considered a fantastic idea. The Bosch employees and a team of makers developed a working prototype that was very impressive and then asked the sales unit in Germany whether they wanted to integrate it in their portfolio. The sales unit said that it is a great product but that it did not fit to Bosch's customers, so the project came to nothing. The briefing was so broad that the briefing partner was not able to do anything with results. Stromberger learnt from this. It is extremely vital that the briefing partner has to think in advance about what they can really use. It is a very common mistake that the innovation department fails to talk to the specialized departments.

Collaboration

As mentioned, Industry meets Makers turned very quickly from a competition to a community. Everybody was sharing their ideas and soon it became obvious that a competition would not work. This emerged already in the first round. People who participated wanted to meet likeminded individuals and to discuss the briefings and the problems. They did not want to compete against each other. As it was no competition anymore it made sense to make participation more open. This helped the community to grow and to become more diverse. Also, the briefing partners agreed to this change.

The cooperation between the different people – both makers and briefing partners – was without any problems until 2018. Stromberger explains that in 2018 for the first time there were

“complicated” people on the maker side and conflicts emerged. She says as there is no filter on the maker side and anyone can contribute, it is not surprising that there are also “extreme personalities”. Stromberger talked to those people directly and finally deleted them from the mailing list. In the beginning she was overchallenged with this issue, but she noticed that the community self-regulated it a bit and supported her in this issue. She states that if someone does not fit to the community he or she will not get invited anymore. Except for this incident, everyone was always fair and respectful. Stromberger thought about formulating a code of conduct, but never did. She talks to the briefing partner beforehand and explains what is expected and how to be fair and respectful. There are no explicit rules but those norms are deeply rooted in the core community of Industry meets Makers and are carried further to new people in the community. To ensure fairness also transparency and publicity are important. Everyone is on stage: At the kick-off the briefing partners are telling what they look for and at the best-of event the makers show what they have developed. Through this publicity some things are already regulated, as nobody wants a “shitstorm”. Furthermore, Stromberger argues that people who are participating in such an initiative are mostly pleasant and appreciate the value of a community. Otherwise they would not participate.

Stromberger does not know of any case in which a briefing partner copied the ideas of a maker but, of course, this can happen. It is almost impossible for her to control it because the briefing partners do many things autonomously. She does not always know who is working with whom and it is also difficult to keep track of the results. There are no overall rules regarding what happens with ideas and prototypes. This is often a topic for the first follow-up meeting after the kick-off. Rules are defined individually in the briefings between the briefing partners and the makers. Stromberger says that she tries to help but she is no lawyer. One maker is also offering workshops to briefing partners and makers, in which they define a code of collaboration and write it down. It is not a contract in legal terms but a third party is present. In the end the involved parties have to define for themselves what is fair and they just have to trust in the fairness of all involved people.

When Industry meets Makers started, one of the first questions from the briefing partners was about IPR (intellectual property rights) and how this will work. Some predicted many problems regarding IPR. Stromberger told people they could talk to the IP unit of Austria Wirtschaftsservice and they would offer support. Nobody ever asked for it but it was enough to counter those fears. Just the option was sufficient. For Stromberger it would be useful to have some best practices of IPR to show others possible solutions, but this has not eventuated so far. Nonetheless, from her experience, one should not start a collaboration by talking about IPR, as starting with IPR too early will kill the project. It is important to leave enough space for human interaction in the beginning. Likewise, makers sometimes ask about IPR. However, they ask the companies directly and not Stromberger. There is no clear pattern. Sometimes it is an issue, sometimes it is not. It depends on the background and motivation of the maker. For example, a

startup that already has a business model and wants to launch a product is different than someone who is tinkering for fun in his or her garage.

In general, social control, transparency, and the norms of the community are essential; otherwise the format would not be possible. Fairness cannot be controlled centrally. Briefing partners and makers that were onboard from the very beginning defined the norms and the way things work, and they still carry on those norms. The community is the core of Industry meets Makers. There is a group of people that is constantly participating in every round and there are people that are coming when it suits them, depending on the briefing topics and their time resources. Stromberger thinks that the bigger and more transregional Industry meets Makers becomes, the more explicit the rules must be. Nonetheless, for scaling the initiative it is necessary to find network partners that share the same values.

Stromberger thinks that feedback is essential. For the feedback each briefing partner is responsible. This works very well in some cases, but in others there is still room for improvement.

Motivation of Participants

In the beginning, Industry meets Maker was for Stromberger just an experiment to test an idea for the market. After the first round the companies wanted to continue. That was something she did not expect but she continued to organize further rounds. Industry meets Makers was growing fast and became a community building format, as she noticed that this was just the way it worked best. The main driver was, and is, that people want to get to know each other and meet likeminded persons.

The motivational factors of the makers are very diverse. Some want to generate contacts and win contracts. Others want the knowhow from the industry partners: something that they would normally not be able to access. Moreover, makers can get hardware that one normally cannot otherwise get. In addition, it is attractive to meet likeminded people and learn from peers. Still others have a product or service that matches the briefing and they hope that they can use the sales network of the briefing partner. There are also makers that are looking for a topic for a thesis. Stromberger says that the most committed makers are those who want to understand the issue and want to solve problems. In general, intrinsic motivation is an important factor.

There are two types of briefing partners, each with different goals. Firstly, there are companies that use it mostly for marketing purposes and want to position themselves as innovative organizations. This often does not work very well because with such an approach it is difficult to have the internal support to actually develop a new product or service, while the makers always want to create something. Moreover, the marketing budget of Industry meets Makers is very little. Secondly, there are briefing partners that really want to find new partners and to develop new products. This type of briefing is normally far more successful. The briefing partners have

to think about what happens after the best-of. If a maker or a team of makers works hard for six months on a briefing and then it is just over, they may become extremely frustrated and this would endanger Industry meets Makers. In this case it would be unlikely that the maker will participate again and this could endanger the entire community.

Stromberger openly communicates the needs and motivational factors of makers and briefing owners to each party. This is essential for connecting the right people. Makers and briefing partners tell Stromberger what they really want. However, she has to ask them these things and tell them that it is an advantage if they are honest. For her that is part of expectation management. In Industry meets Makers there are no monetary prizes. As written, in the beginning it was supposed to be a competition with prizes. Before the kick-off event of the first round in 2016, Stromberger organized a briefing check with some makers. There, cash prizes were highly criticized by makers. For example, Wien Energie wanted to award a 2,500€ cash prize and an internship. The reaction was very negative. Nobody was interested in developing a prototype for 2,500€ and also the internship was not appealing. Stromberger concluded that monetary prizes are not suitable for this initiative. Moreover, she recognized that defined rewards do not work in general. The motivation of the makers is very diverse and a briefing would lose many people if there was a defined reward that is the same for everyone. The rewards have to be flexible. Makers and briefing partners have to define something that makes sense for them as reward or perspective. In many cases this has to be done on an individual level. Nonetheless, by now there are some smaller, exceptional prizes for a few briefings. For instance, Magna was awarding a drive at their test track: something that cannot be bought. Of course, this was probably not the main motivator for individuals to participate in the briefing but an additional incentive on top.

4.1.2 Rafael Gattringer, Infineon

Industry meets Makers. His Relationship and Thoughts about it.

When Gattringer speaks about open innovation he refers to Chesbrough. In this sense, open innovation is to transfer IP to others. However, many people consider it in a broader sense as innovating in a very open way. In the narrow definition it has not much to do with open source or open hardware. Gattringer accepts the broader usage: that open innovation is to open doors and work on innovations with external partners. Industry meets Makers is a good example for such an approach. It is a big step for a company to reveal what they are currently doing, what they cannot do alone, and that they need support. Open innovation must not be confused with outsourcing unpleasant tasks. It is about interacting as equals and communicating on an equal footing.

In a nutshell, Gattringer's role at Industry meets Makers is to build bridges between people who do not know each other. Therefore, it is necessary to know the needs of the people he wants to

connect. On the one hand, he is building bridges to the makers and on the other hand he also reaches out internally to the specialized departments at Infineon. Moreover, it is vital to know who can do certain things very well. However, this is sometimes difficult at Infineon because there are over 40,000 employees. Furthermore, he also has to raise awareness and motivate colleagues for such networking activities. The biggest challenge for Gattringer in Industry meets Makers is getting the internal commitment from the specialized units. They have different priorities and are focused on the daily business. However, this runs the risk of focusing too much on existing customers and not thinking about the future.

Gattringer believes in Industry meets Makers. He was already involved in the planning in 2015 and has participated in every round. In the beginning he was working for Infineon, later for a different company, and now for Infineon again. For an organization it is a great opportunity to learn. It can learn how to open up and receive input as well as to handle feedback. For example, in 2019 Infineon was looking for smart Internet of Things applications that are based on Infineon's security chips. These chips are manufactured in Graz. Normally the involved people are just talking to other large companies or to governments. In Industry meets Makers these people are suddenly talking to makers and see how people actually use their products and what problems arise. Even more important, in Industry meets Makers real problems are getting solved with partners. In 2019, they met a startup that now is using Infineon chips in their products.

In Gattringer's view, Stromberger's role is primarily to connect the right people with matching needs. She also has a vision, pushes the format, and is an idealist. For years, Industry meets Makers was for free for everyone, indicating that she is completely intrinsically motivated. Only in 2019 was a fee for the briefing partners introduced. Gattringer argues that the opposite of Industry meets Makers are consultants paid by the hour who just work when they get enough money. However, in innovation you do not get money back for investments promptly. That makes it important to work with idealists. Those idealists can also be found amongst the makers.

Industry meets Makers does not provide explicit rules for the briefing partners on how to collaborate with the makers. Naturally, Stromberger's attitude influences the norms and values of the community. Gattringer says that Stromberger helps to build a community around Industry meets Makers. She is essential for the initiative. It is not so much about the governance form, but more about which people you are able to crowd around. They have to have the right attitude and the right mind set. People who are really interested in Industry meets Makers are evolving the initiative and enlarge the community. He concludes that Stromberger, as the central person, is trying to integrate everyone.

The Briefings and Processes

To define a briefing respectively a problem for Industry meets Makers, Gattringer has to find colleagues from the specialized departments that are interested in working with makers and are

intrinsically motivated as they have to do it on top of the daily business. Afterwards, one has to find topics that are new to the market or at least new to the maker community. Industry meets Makers is also suitable for complex problems as there is sufficient time – six months – to deal with such issues. It is not like a hackathon that only lasts 24 or 48 hours. For 2020, the briefing will most likely be about shorrange radar sensors. It is a topic that has not yet much maker support. They chose this topic to develop open source software for these sensors. Moreover, in 2020 Gattringer is working with his colleagues from Linz so they will also learn how to collaborate in such a way. In the best case, they will be able to do it alone in the future, without the support of the innovation management. Indeed, the 2019 team from Graz will likely have their own briefing without Infineon's innovation management in 2020.

New briefing partners normally check what the previous briefing partners had done. This inspires the new briefings. Stromberger helps if needed with the definition of briefing topics. Nonetheless, Infineon does it mostly alone as the briefing depends on finding internally someone from the specialized department who is motivated to collaborate in such a setting. Whether a briefing should be a broad or narrow topic depends on the goal of the company. Infineon usually sets broad briefings. Basically, Infineon just requires that Infineon technology is used for the prototype. For example, in 2019 the briefing was to find applications for their Internet of Things security chip. They choose such open topics because they want find new applications for a certain technology. Infineon has the challenge that they are one of Austria's most R&D intensive companies and they invent many new things every year but they do not always know the field of application. New ideas of application which emerge can then be shared with the customers of Infineon. Infineon itself is only supplying chips and sensors and is not producing end products. Gattringer mentions that also highly specific problems can make sense for a briefing if there is an urgent need. However, this is not the case for Infineon. Moreover, he advises against formulating a briefing if the results are already known by the briefing partner. When the solution is obvious, no innovation is needed. Furthermore, it does not make sense to use a briefing just as an assessment center. Moreover, a very complex briefing might also fail. In 2016, Frequentis had such a briefing with the aim of printing electronics and was not successful. It is important to not be too restrictive on who can participate. It makes sense that anyone who wants is allowed to take part. Often complementary skills from people you had not thought of are very helpful.

Collaboration

Gattringer explains that there is no universal solution on how to regulate the collaboration. All companies are different and well-suited approaches are necessary. What works at Infineon could be a failure at another company. In general, the collaboration with the makers works well. Of course, there are also makers you just see once and then never again. Nonetheless, for Gattringer that is fine. Those makers just want to look around, check out different briefings and decide later for a specific one. Infineon briefings have a low dropout quota. The expectations

must be clear. Further, it is essential that a personal contact is established in order to clear misunderstandings but also to create a personal relationship and to form a group. Usually, Gattringer personally calls the people who signed up for the briefing and asks them what they want to do. It is a very customized approach. Personal meetings of the group also take place very soon after the kick-off event. These are very important. In 2019 there were three such group meetings, respectively workshops, between the kick-off and the best-of event. According to him, personal meetings are vital because they create a better and more meaningful relationship amongst the team and to the topic itself. When people meet a feeling of belonging and community emerges, thus, more can be achieved as a team. Furthermore, technical support is essential in this phase in order to support the makers in developing their prototypes. Otherwise they could get stuck in a certain subproblem and will become frustrated.

The way Infineon and makers work together is mostly defined by Infineon. Stromberger is more involved with newer briefing partners, whereas with Infineon she just provides the framework. Nonetheless, the briefing partner carries the main responsibility for the collaboration and each company does it differently. Makers that are discontent with the way things work normally just leave the group.

IPR is not an issue at Infineon's briefings. In the beginning it was discussed a bit, but in practice it was no matter. Likewise, contracts are not a big issue. Similarly, in the cooperation with startups IPR is not very relevant. It is about the exchange of knowledge. An NDA is signed but more is not necessary. Infineon gets more information on what the startup is doing with the chips and the startup gets more insights into the advantages and drawbacks of certain technologies, or they get samples of new chips that are not available yet. In general, this form of cooperation is not very formal. Gattringer says that it is rather the startups which ask for an NDA. That briefing partners copy ideas of makers cannot be ruled out, although there has never been such a case at Infineon. In the beginning it was discussed a lot but it is not an issue anymore – at least at Infineon briefings. Gattringer thinks this has changed because the makers believe now in the fair culture of Infineon, which has built up a trustful reputation. Moreover, there is a very practical reason as Infineon does not produce products and is just a supplier. Consequently, Infineon cannot be a competitor to the makers. Furthermore, it makes no sense to copy ideas because news of this will spread and cost the company credibility in the long-term. Thus, it is also important that Gattringer completely trusts his colleagues from the specialized departments who are taking part.

Rules are necessary for collaboration, yet at Industry meets Makers they are mostly not explicit. Many things are regulated by the culture of this initiative. Nobody really defines these implicit rules, which include no discrimination or a ban on developing prototypes for weapons. There is no one who wants to work on a proprietary basis and does not want to share. Of course, it is also influenced by the culture of the company. At Infineon there is a maker culture. When there are problems Gattringer reaches out personally. Especially after the summer, he has to get

things started again by organizing a workshop to boost the projects. Further, peer support is vital and it is not only Infineon supporting the makers. Also, other makers support makers. In general, it is not about competing, but about building a community. Gattringer feels part of many communities in the Industry meets Makers ecosystem. He defines three relevant communities: There is an Infineon community that goes beyond Industry meets Makers and also includes people from hackathons and other events; there is a community for a specific briefing during a round of Industry meets Makers; and there is the overarching Industry meets Makers community. Of course, those communities become mixed over time and many people are active in all the communities.

Motivation of Participants

The participants in the Infineon briefings are mostly students because the problems are very demanding and require a good technical background. Companies also take part to a lesser extent, in order to try out Infineon technology and to speed up with support from Infineon experts. In 2019, the startup Tributech participated and now is using Infineon chips for their products. Furthermore, there are a few older makers who want to work on prototypes on the weekend. The participants are motivated by various reasons. They are interested to work on challenges, solve problems, build something new, build open source software and upload it on GitHub in order to get recognition, etc. Moreover, it works well if the briefing is also dealt with in a master thesis. Nonetheless, there is no clear return for the makers, as there is no compensation except for some hardware. Almost all the makers are intrinsically motivated, and those who are not normally drop out during the process. Perhaps paradoxically, if companies also offer money in such a setting it is often considered as exploitation – especially once you calculate the effective hourly rate. In general, it is problematic to combine intrinsic motivation with money. Another motivational factor is simply working with such a high-tech company as Infineon. Through these processes, Infineon opens up and allows people access to the exceptional experts in house. These exchanges are especially interesting for startups.

4.1.3 Philipp Gühring, Maker

Industry meets Makers. His Relationship and Thoughts about it.

For Gühring, open innovation means that different people come together and work on innovation. In this setting it is important to be clear about the goals. For him Industry meets Makers is a format in which companies can present topics and problems. Startups, makers, students, other companies, etc., can then work with those companies to solve the problem. Starting a project in Industry meets Makers works well, but it is often difficult to finish a project within the timeframe of six months. Furthermore, most ideas are never put into practice. This, however, is how he thinks innovation works in general. One starts with 1,000 ideas, continues with 100, realizes 10, and one will turn out to be a success. For innovation you have to try many

things. This is exactly what happens in Industry meets Makers. Different people and teams are trying different things. So far, many things have failed, but there are also success stories like the smart bed for vegetables.

Gühring has participated three times as a maker in Industry meets Makers. In 2016 he developed a quadcopter in the Infineon challenge and was able to realize a working prototype. In 2017 he contributed to a briefing on the electronic factory of the future (TELE Haase, ABB, COPA-DATA and IKARUS Security Software). For this briefing he came up with 15 to 20 ideas and developed a few prototypes. One tool was implemented by TELE Haase and Gühring was contracted to develop a second tool. Both tools are still in use at TELE Haase. In 2019 he participated in the Infineon briefing on their security chip. In addition, he offers cybersecurity audits for other makers and projects. He does not charge anything for this service.

These activities began in 2016, when Gühring read an article in Futurezone about Industry meets Makers and discovered that there is a briefing on quadcopters. He checked out the website and signed up for the kick-off event. At the kick-off he talked to the people from Infineon about his ideas and what he needs. They liked his ideas, told him that there are difficulties with his approach, and said he should try it anyway. In the beginning he was alone, as the format started as a competition. However, it became clear that the 10 teams working on this briefing preferred to work together and did not want to compete against each other. Infineon accepted this approach and supported the new setting. Especially the people based in Vienna worked well together, while those more remotely located were a bit excluded. This cooperative setting was a great success. Nonetheless, Gühring thinks it was an advantage that it was a competition in the beginning in order to get more people interested. However, for actually building working prototypes it was better to switch to a cooperative mode.

The 2017 briefing on the electronic factory of the future turned into a regular meeting in which interested parties met and talked to each other. Manufacturing electronics is a very complex topic and not an issue that many people are able to relate to, but it was a very interesting topic for Gühring, who worked alone on those topics and presented his developments at the meetings.

He says that Stromberger had the initial idea for Industry meets Makers and is organizing the main events as well as connecting people. Further, she is organizing some of the follow-up meetings, but some briefing partners also do this alone. She also attends many meetings and offers various forms of support to all parties. Nevertheless, she is not so much involved in how companies collaborate with makers. Although she gives a timeline for the kick off and best-of event, most others parameters are dependent on the briefing, the briefing partner, and the makers.

Briefings and Problems

Suitable problems for Industry meet Makers are problems that people could encounter in their daily life. It should be about something people can relate to. Overly exotic problems might not work well. For example, a briefing about a new oil platform would probably fail as the regular maker cannot relate to this issue. It is important to start from a real need, meaning that the problem should really exist. Depending on the problem, a broader or more focused approach is advisable. Some briefings in Industry meets Makers seemed to Gühring more like recruiting platform than a topic focusing on innovation. If a maker later notices that the project is not really about building prototypes and innovation it can be frustrating for him or her. In order to prevent dissatisfied people in such a setting it is essential to be honest and clear on the objectives. Furthermore, it is vital that people are communicating on an equal footing. In Industry meets Makers the briefing partners have more power than the makers, but they can try to interact as equals. Until recently, Industry meets Makers has been free for both the briefing partners and the makers, which has also helped the parties to collaborate on equal terms.

Collaboration

Industry meets Makers is a community. There is some fluctuation among members, but there is also a group of people that are continuously involved. The community includes the makers and most of the briefing partners. Gühring sees the interaction between everyone as fair, and says that there was one very simple rule that really helped: Everyone is on a first name basis (“per Du” in German). This helped to ensure communication on an equal footing. Otherwise it is difficult to have universal rules as every company and every briefing is unique. The collaboration between the makers and the briefing partners works well, but there are also problems. In 2016 the experts from the specialized departments of Infineon were not always available or did not answer questions in a timely manner, which left both the Infineon department that organized the briefing and the makers hanging partly in limbo. Likewise, in 2017 the developments in the TELE Haase briefing came to almost nothing. The head of production at TELE Haase, who was also the driving force of the briefing, left the company and collaboration stopped. Later, a new person joined TELE Haase and restarted the partnership.

IPR highly depends on the briefing, respectively the briefing owner. For example, collaboration with Magna turned out to be complicated because of the regulations in the automotive sector. Many NDAs and other contracts had to be signed. Gühring even recalls that a maker founded a company just to be able to sign the agreements. Likewise, during the presentation at the best-of, they said that it was a great briefing yet the actual results were not revealed. Nonetheless, it seemed to have worked for Magna. Gühring was not afraid that his ideas might get stolen. The Infineon briefings are not really based on problems, and the briefings are more about spreading their products. In the case of TELE Haase, it was clear that this company is not capable of

implementing such ideas and that they look for support. There was a common goal to improve TELE Haase to make it easier for everyone to produce their own products.

Gühring has never signed any contracts during his participation in Industry meets Makers, either with the briefing partners or with Stromberger. As mentioned, after the TELE Haase briefing, he was contracted to develop a tool, for which a contract was set up. Gühring says it is one of the advantages that you do not have to sign contracts in order to take part in Industry meets Makers. This allows the initiative to grow quickly. Signing contracts is a big hurdle and scares people off. The accessibility of Industry meets Makers is a success factor. He might not have participated in the beginning if he had had to sign anything.

As a maker, Gühring was generally provided with feedback, and he found this feedback important. When the head of production left TELE Haase, he no longer received any insightful feedback, and this was frustrating.

Motivation of Participants

Gühring was motivated to participate by a personal problem. He plays canoe polo and wanted to record and analyze the matches. As it is played on open water it is impossible to install cameras. One of his ideas was to use a drone to make a recording, but a tournament lasts for two days of 10 hours each day. Current drones are not nearly capable of flying for such a long time. The alternative is a drone with a fixed power cord, but such drones are not available on the market. As a result, you have to make them yourself. Gühring read about Industry meets Makers and Infineon's briefing about building quadrocopters. He thought this might be the chance to really develop the needed drone. He had developed a functional quadrocopter prototype by the end of this project, but it was far away from being usable for canoe polo. Working at home is fine for making a first prototype, but more serious engineering and production requires professional electronic manufacturing, so he stopped working on the drone. But this experience built his interest in the TELE Haase briefing the following year. When he read that TELE Haase wanted to open up its factory and allow anyone to manufacture their products in TELE Haase's factory, he saw an opportunity and was able to relate to the problem. The challenge for TELE Haase was to become more flexible and acquire the necessary capabilities. His main motivation was to check whether he can improve TELE Haase and what can be implemented. It was really important to him to see that his ideas were being put into practice. One tool he developed got implemented in the factory. Afterwards, he was contracted for a second tool. Nevertheless, this was not a very accessible topic as most people do not care about manufacturing electronics.

In general, Gühring thinks that makers are motivated to take part because of interesting topics; they want to try out something or have a good idea to solve the problem. Some briefing partners

might also use their briefings for recruitment purposes and, indeed, some makers got a job through Industry meets Makers, but finding a job is not a motivational factor for many makers.

4.2 Case study: The Co-Creation Lab Vienna

The Co-Creation Lab Vienna is a program by the Vienna Business Agency. The Vienna Business Agency is a fund administered by the City of Vienna. Its mission is to support the regional economy of Vienna and is active in real estate development and consulting as well as offering funding. The conception of the Co-Creation Lab Vienna started in 2015 as part of the Technology Services department of the Vienna Business Agency. The first round took place in 2016. The goal of the department is to increase R&D and innovation activities in Vienna, to enable cooperation with a focus on R&D&I and to raise awareness amongst children and youth for STEM. The department's unique selling point is that through networking activities and through the funding activities of the Vienna Business agency, a large and broad network of companies that do research and development exist. This is not focused on a specific sector and reaches from ICT, green technologies, urban planning, and manufacturing to life science and medical technologies.

Based on my experience working at the Vienna Business Agency, I here briefly describe the process of the Co-Creation Lab Vienna. It is a free service offered to companies. Companies use a standard form to submit a challenge. A challenge is often a technical, non-trivial problem a company is facing. The companies sign terms of participation which also regulate basic IPR issues. Those companies are called challenge owners. Once a challenge is accepted by the Co-Creation Lab Vienna, a workshop with external experts is organized to reflect and specify the challenge. An employee of the Vienna Business Agency is responsible for the process coordination. The external experts, mostly experts from research organizations or researching companies, sign a non-disclosure agreement. Moreover, an external moderator (a so-called facilitator) is engaged for this workshop. During the workshop the innovation project is further reflected and specified. The output of the workshop is a short description of what the problem is, why it is a problem, what they are looking for, and what the challenge owner is offering to organizations that provide solutions. This first phase is called the define the challenge phase.

The second phase is the call for contributions. The Vienna Business Agency activates its network to match partners with complementary skills and knowledge. For this matching an open call is announced. In this call, the needs of the challenge owners and their offers are presented. Previously, there was a co-create day and all challenges were presented on one day, yet this changed in 2019. After the co-create day it is possible for companies and research organizations to submit ideas for solutions. Those organizations are called contributors. Partial solutions are also searched for. Contributors have about five weeks to submit ideas. There is also a standard form for the submission and the contributors have to sign the terms of participation. After the deadline, all submissions are evaluated by external experts and experts from the Vienna Business Agency. The external experts are selected by the Vienna Business Agency and the

challenge owner. A standard form is given to the evaluators and once they have finished the process the evaluation sheets are handed over to the challenge owner. In a next step, the challenge owner decides which contributors should be invited to a hearing. The evaluation by the experts is intended as non-committal support to make this decision. During the hearing the contributors present their ideas and there is room for questions and discussion. Besides the challenge owner, also the external experts and experts from Vienna Business Agency take part. Up to 7 contributors are invited to such hearings. Of course, each contributor has their own timeslot.

After the hearing the challenge owners can choose the organizations with which they want to continue to work together. Depending on the complexity of the challenge, a consortium with different partners may be necessary. This is the last phase of the Co-Creation Lab Vienna. It is called the define the project phase. Together with the selected organizations the challenge owner takes part in a workshop organized by the Vienna Business Agency. The goal is to define and specify the next steps for a concrete innovation project. In the first round in 2016, six companies with eight challenges participated.

In the beginning, the process was very structured and formalized. However, the Co-Creation Lab Vienna has evolved over the past years. In the following year there was a stronger focus on the define the challenge phase and only four calls took place. Furthermore, the workshops in the define the challenge phase proved to be more important than the actual calls. Consequently, the Co-Creation Lab Vienna was modularized and it also became possible to just apply for a workshop with experts. In 2019, only one call took place and about 15 workshops were conducted. Moreover, the strict timetable was abolished and there is no longer a co-create day. If there is a relevant challenge that is suitable for a partner search a call can be started immediately. Such a call is now linked to a smaller focused event. As interviewees for this thesis, I selected only persons that were involved in such a call that was presented during a co-create day. As mentioned this co-create day does not exist anymore and is replaced by thematic events. For instance, in 2019 the City of Vienna was looking for solutions for rainwater management in the city and to fight urban heat islands. A so-called “business treff” with companies and researchers active in this field was organized and within this event also the call was presented. After the call for contributions, a small exhibition was arranged to show the submitted ideas. Furthermore, in 2019 the Co-Creation Lab Vienna introduced awards (monetary rewards) for the best contributors. The following summaries present the case study, but only reflect the point of view of the interviewee.

Name	Role	Date
Eva Czernohorszky	Head of the Technology Services department at the Vienna Business Agency and initiator of the Co-Creation Lab Vienna. (organizer)	6.11.2019

Kristina Wrohlich	Project manager of the Co-Creation Lab Vienna. (organizer)	12.11.2019
Alexander Biegenzahn	Corporate Communication and Branding Manager at Austrian Standards International. Challenge owner together with the managing director Barbara Stampfl-Blaha and the head of digital integrated services Peter J. Wimmer-Nistelberger for the challenge “from standards taker to standards maker”. (challenge owner)	11.12.2019
Friedrich Kirnbauer	Operation Manager for the incineration plant Simmeringer Haide (Wien Energie). He was one of the challenge owners for the “digital twin” challenge. (challenge owner)	5.12.2019
Georg Ogris	Senior Data Scientist and Deputy Head of Emerging Technologies at Catalysts. He was one of the contributors in the “digital twin” challenge. (contributor/problem solver)	26.11.2019

TABLE 3: INTERVIEWS FOR CO-CREATION LAB VIENNA

4.2.1 Eva Czernohorszky, Vienna Business Agency

The Co-Creation Lab Vienna. The Idea and Format

The starting point for the Co-Creation Lab Vienna was the innovation strategy of the City of Vienna (Innovatives Wien 2030). During workshops for this strategy, an expert from ETH Zurich brought up the topic of co-creation and open innovation. Czernohorszky was fascinated and implemented, with her team from the Technology Services department at the Vienna Business Agency, a program to foster co-creation and open innovation in Vienna. Open innovation means for Czernohorszky that an organization opens up for an innovation project, wants to interact with others, and integrates others' knowhow into the project. For open innovation you define your goal but work together with partners in order to reach this goal. In this sense, an open end has to be accepted. It is not like a tender with specific criteria where one just chooses the best offer.

The biggest challenge in the Co-Creation Lab Vienna is to define a standardized process and still make the program understandable. A formal process helps, in that done need not start every time from scratch. At the same time, it is very difficult to have standardized processes because every innovation project is unique. The Co-Creation Lab Vienna has to consider the needs, goals and motivation of every challenge owner. These parameters are different for every project.

Furthermore, the program has to be manageable and should be implementable with the resources of the Vienna Business Agency. Czernohorszky explains that this balancing act works very well. Likewise, the Co-Creation Lab Vienna is not just a marketing bubble. In many cases, open innovation programs end up very communication driven and are a tool for an organization to position itself as an innovation leader. The Co-Creation Lab Vienna has evolved over the last three years. In the beginning it was a very standardized process and over the years it has become more modularized and individualized. In the beginning there was just a yearly call for challenges with certain deadlines for every challenge, as all the calls for contribution we presented on the annual co-create day. Nowadays it is more flexible and calls start on an individualized level.

Organizations submit challenges by completing a form and send it with the signed terms of participation to the Vienna Business Agency. Together, Czernohorszky, the project manager and the challenge manager decide whether a challenge is accepted. The most important factor for making this decision is whether the goal is understandable and whether they think that their network of technology developers is able to provide relevant ideas and solutions. The call for contributions to the challenge is communicated through the newsletter, webpage, and social media. The most vital part is to activate the network of the Vienna Business Agency. Through various activities there is a broad network of companies and organizations that are doing research, development and innovation. Building up this network is one of the main goals of the Technology Services department. One lesson learnt from the past rounds is that there are not many projects implemented. Czernohorszky thinks it would make sense to combine the Co-Creation Lab Vienna with a funding program. Many challenge owners are coming from the public sector, where is a huge need for innovation but scant resources for such projects. Consequently, a funding mechanism would be very fruitful and could be an enabler.

Contributors in the Co-Creation Lab Vienna are about 60% SMEs, 20% startups, and 20% research organizations. They are mostly from Vienna, but the program is intended to be trans-regional and there are also contributors from outside Vienna. Also, student groups became contributors. This is something new in the Co-Creation Lab Vienna. Czernohorszky argues that good ideas are not defined by the type of organization. Consequently, also individuals are now entitled to contribute. The Co-Creation Lab Vienna started at a time when startup cooperation and collaboration was a trending topic. However, SMEs were missing in this picture. The Co-Creation Lab Vienna shows that they are a vital source of innovation.

The Challenges and Problems

In general, problems that are suitable for the Co-Creation Lab Vienna are those with a concrete goal, but where the way to reach this goal is not yet defined. However, the topic must not be too broad. For example, a large corporation had the idea to start a call with the question: what could be solutions for a smart city? Such a broad challenge does not make sense. Furthermore, there must be a real need for the challenge owner. The ideal combination for a challenge is a

real need, where it is clear what next steps a challenge owner wants to undertake and the motivation of the challenge owner is transparent. Once you know what is needed and why it is needed then it makes it easier for partners to contribute. Normally, solutions that are sought are concrete technical solutions (like the thermal twin challenge by Wien Energie) or, to a lesser extent, also ideas (like the challenge by Austrian Standards International).

Collaboration

Czernohorszky says that there are problems when challenge owners and the contributors work together. A big issue is a lack of clarity. For the contributors it is often unclear what will happen during, and respectively after, a challenge, whether there might be future collaboration, and who else will be involved if an innovation project is to be implemented. Furthermore, there is mistrust - partly justified – that challenge owners just want to absorb knowledge and interesting ideas and there is no real commitment to implement an innovation project together. In general, a project cannot be guaranteed. The Vienna Business Agency reacted to this by offering an award in the form of a monetary prize to the best contributors of a challenge. The goal is that the best contributors do not leave empty handed and are compensated for their effort. So, if no innovation project is implemented and the contributors are not rewarded for their ideas by the challenge owner there is at least a prize awarded by the Vienna Business Agency to reward them. Of course, this prize is also awarded in the case a common project is implemented. This is probably also a motivator for participating.

Furthermore, the challenge owners do not always think the entire process through. Once they meet the selected contributors after the hearing there are strong expectations that the challenge owner will define the next steps. In many cases different contributors with partial solutions will be matched and create a consortium with the challenge owner. The challenge owner is sometimes overstrained by this situation, as they had not thought everything through in advance, and had not anticipated the strong expectations of the contributors. Another issue occurs when the innovation department of a company takes part in the Co-Creation Lab Vienna, but another specialist department is responsible for implementing the innovation project. In general, it is not so simple to really implement a project. These hurdles sometimes frustrate the team, but, at the same time, such incidents show that the program is truly innovative.

To ensure that the cooperation between the partners is fair, the Vienna Business Agency designed terms of participation. Likewise, they guarantee that IP is protected and respected. The Vienna Business Agency clearly communicates that it is a broker and not a lawyer for any side. In addition, it is made clear that everyone is taking part at his or her own risk in such a process. In practice, IP regulation is not very relevant, as it has never been an issue so far.

In order to prevent opportunistic behavior, nudging is used rather than punishment. Employees of the Vienna Business Agency always keep track of a challenge as well as the implementation

of innovation projects and check back regularly. This helps to further push the project and makes sure that the collaboration is fair. Those mechanisms can also be considered as social control mechanisms. Moreover, the Vienna Business Agency is generating understanding between the two sides and helps to translate each partner to the other. The terms of participation define the rules for the entire process. Further, it is important to clearly define the needs of the challenge owner. Also, the commitment of the challenge owner to implement an innovation project is checked.

The community plays an essential part in the Co-Creation Lab Vienna. On the one hand it generates the substance and matter, and on the other hand it helps to further develop the program.

Motivation of the Participants

Czernohorszky explains that contributors participate because they are hoping for a contract or a common research project with the challenge owner. When it comes to individuals and private persons, also job opportunities are relevant. Nonetheless, the main motive is to start a project with the challenge owner. Other motivation factors are curiosity, the possibility to position themselves and to get a first foot in the door. Czernohorszky says that there are also prizes, but it is still unknown whether they are a big motivator. The prize money for a challenge is 10,000€ (split up into 5,000€ for first place, 3,000€ for second place, and 2,000€ for third place). The Vienna Business Agency awards those prizes to reward the contributors for their efforts to come up with new ideas and proposals. Czernohorszky is aware that this is far too little money to foster and enable the implementation of the ideas that emerge in the co-creation process. Moreover, feedback is provided to the contributors, but it could be more specific.

4.2.2 Kristina Wrohlich, Vienna Business Agency

Co-Creation Lab Vienna. The Idea and Format.

Wrohlich says that open innovation means that the one who starts an innovation project is not just doing R&D in his or her lab, developing a prototype, later a product, and finally bringing it on the market. In open innovation, this initiator involves other parties in this process. These could be partners for development, but also future customers. Initially, the main goal of the Co-Creation Lab Vienna was to bring parties together that would not otherwise know each other. Those parties should work together in an R&D project. By now the goals have changed a little and become broader. The call for contributions is not necessary anymore and also workshops with peers and experts have become an interesting service. Moreover, the focus on R&D has shifted and now any kind of innovation is a suitable topic. The calls in the Co-Creation Lab Vienna are often not open innovation in a narrow sense. For example, the automotive supplier and electronics contract manufacturer Melecs was looking for a new material for housing electronic components. They found a research center for plastic engineering as a partner. In this case, the

research center was contracted by Melecs. When the challenge owner is just looking for a specific contractor for only a small section in a bigger innovation project, this is not normally termed open innovation.

Of course, there are difficulties in the Co-Creation Lab Vienna. The complexity of decision-making processes in large international corporations should not be underestimated. In the case of a large international company participating in the Co-Creation Lab Vienna, the Vienna office was so autonomous that they could decide to participate in the program, define a challenge, and start a call for contributions. However, for the next steps they always had to check back with headquarters. It seems that this is a common pattern for global companies. Apart from that, also startups are not as agile and flexible as one might think. For instance, a startup contributed to a challenge and was selected to join a consortium in order to collectively implement a solution. However, a shareholder who invested in this startup was holding back the startup's engagement because it did not fit his strategy. Many problems have their roots in the structure of the stakeholder. Similarly, challenge owners from the public sector – who play an important role in the Co-Creation Lab Vienna – face challenges as they have to comply with public procurement laws. Furthermore, innovation projects are often cross-sectional topics and this is sometimes difficult for the organizational structure of public authorities. A factor of success, no matter what kind of organization the challenge owner represents, is that the person who is responsible as the challenge owner is very motivated and is able to convince his or her colleagues internally.

The structure of the Co-Creation Lab Vienna – especially the public call – was chosen because the Vienna Business Agency is a public entity and it cannot give any one company preference. This is why there is an open call, whereby everyone can see that a challenge owner is looking for something and can submit ideas. This process ensures transparency.

The Challenges and Problems

Wrohlich says that they figured out that narrow problems work the best. The challenge should be as concrete as possible. For example, it is not a suitable problem for the Co-Creation Lab Vienna when the challenge owner just says that he or she is interested in solutions for future mobility in a smart city. Something like this is too broad and no contributor would take part in such a call. Moreover, well suited challenges tackle questions that a challenge owner is not able to answer within its network. Consequently, a challenge should go beyond the expertise of the challenge owner. The solutions that are looked for in the calls are very diverse and the topics are very broad. There is no focus on a specific sector or field. Of course, it is always about innovative solutions. A call makes sense only if the solution is not something that is already easily available on the market and the challenge owner is merely seeking offers from different companies. It is about creating something new with partners coming from a different field. Ideally, not only one contributor is selected but two or more with complementary knowhow and skills.

In order to submit a challenge, the organization has to complete a standard form. This form already contains various questions designed to evaluate the reasonableness of the challenge and the likelihood of project implementation. Those questions include: a description of the problem and its relevance, whether the challenge is part of an (innovation) strategy, how they want to collaborate with partners, and what they offer to such partners as well as what resources they want to invest in the project. The Vienna Business Agency decides to accept the challenge on behalf of the Co-Creation Lab Vienna based on the answers and on the commitment as well as resources of the challenge owner. Moreover, it has to be an interesting challenge and there should be suitable partners in Vienna. The most common reason to reject challenges are, on the one hand, when the Vienna Business Agency thinks that there is no market for such a project and, on the other hand, when it is more about finding customers and not about implementing an innovative project.

Contributors are technology developers, most of whom are based in Vienna. There is a strong emphasis on Vienna as the focus of the Technology Services department is on Vienna and the calls are promoted amongst the already existing networks. Thus, the contributors represent a similar structure to the general network of the department. As the challenges are very diverse, so too are the backgrounds of the contributors. Most of them are SMEs, but also research organizations and startups submit their ideas for solutions.

Collaboration

There can be problems in the collaboration between challenge owners and contributors. Probably the biggest reason for such problems are expectations that are not met. Often those situations are caused unknowingly and unwillingly by the involved parties. Contributors that are selected after the hearing have the expectation that now, after going through this process of submitting a solution and presenting it in a hearing, a project will be implemented (with them as a partner). However, sometimes the challenge owner does not implement anything. For the Vienna Business Agency as broker it is hard to predict how a challenge owner or contributor will act and whether a project will be implemented. For instance, an international corporate took part in the Co-Creation Lab Vienna and selected contributors after the hearing for further collaboration. They had a workshop and planned a common project. At the same time, however, this corporate bought a startup in the USA that was also capable of delivering a solution to the challenge. Suddenly, external involvement was not necessary anymore as the knowhow was available internally. In general, it is important for the challenge owners and the contributors to agree on when reimbursement is due, for what, and by whom. This is something the parties have to define for themselves and is not governed by the Co-Creation Lab Vienna. In general, a lot in the Co-Creation Lab Vienna is done without a contract. Although the challenge owners and contributors have to sign the terms of participations, those terms do not overly constrain them. The terms of participation were also set up to ensure fairness between the challenge owner and contributors. They were set up by a law firm and cover IPR issues, conflicts of interest, what a

challenge owner is allowed to do with the ideas, etc. As mentioned, they do not regulate reimbursement of partners and how a cooperation is organized. Moreover, to reduce opportunistic behavior, there is a passus in the terms of participation that requires a challenge owner to notify the Vienna Business Agency when it gets a solution or approach that is already known to the organization. Wrohlich says this reduces the likelihood that challenge owners will copy ideas coming from the contributors. Besides the terms of participation, there are no explicit rules in the Co-Creation Lab Vienna. Likewise, more specific IP regulations are not part of the terms of participation as there cannot be a one-size-fits-all solution. Nonetheless, Wrohlich explains that when it actually comes to a project implementation with the challenge owner and one or more contributors, IP regulations are very relevant.

Wrohlich says that the Co-Creation Lab Vienna does not create a community and there are no common events anymore. In the past there was a co-creation day for presenting all the calls for the entire year, but now the program is modularized and calls can start whenever it makes sense. Moreover, the challenges address very different target groups. Consequently, pooling all the challenges was not very fruitful. The Co-Creation Lab Vienna is too diverse to create a community around it. Both the challenge owners as well as the contributors have very different backgrounds. There are developers, physicists, chemists, electronical engineers, business model experts, meteorologists, urban planners, architects, publishers, etc. The involved people have too little in common. However, there are various activities in the Technology Services department that create smaller communities around certain topics. These communities already exist and have only to be activated for suitable calls in the Co-Creation Lab Vienna. Nonetheless, the communities are rather loose and do not promote common values.

Currently, contributors that are not selected for the hearing or are not selected after the hearing for a common project receive an email from the Vienna Business Agency notifying them that the challenge owner did not chose them. Wrohlich says that only a have asked back for specific feedback, and they were referred to the challenge owner. Contributors that are selected by the challenge owner get direct feedback from the challenge owner.

Motivation of the Participants

Both challenge owners and contributors participate in such a program because they trust the Vienna Business Agency and believe that it is a neutral player and ensures neutrality as well as fairness. There are similar initiatives that are directly organized by larger corporations. In those programs the corporation is looking directly for partners and ideas without a broker like Vienna Business Agency. Why contributors chose the Co-Creation Lab Vienna over such initiatives is that the Vienna Business Agency is a neutral proxy. Just by the presence of the Vienna Business Agency there is some kind of social control. In addition, the challenge managers frequently check back on the current status. In this way, the Vienna Business Agency also applies social pressure on the challenge owners to do what they have agreed on. Moreover, the process fosters

neutrality and fairness. There are very formalized processes in place. As a funding agency, the Vienna Business Agency knows how to be fair and transparent. Parts of processes of the Co-Creation Lab Vienna are inspired by the processes for distributing public funding. This is especially true for the hearing.

The specific motivators for the contributors, besides the neutrality of the Co-Creation Lab Vienna, are very diverse and highly dependent on the concrete challenge and challenge owner. In the last call that started in summer 2019, the challenge owner was the City of Vienna's main office for construction. In this case, many contributors were interested in getting one foot into the door and getting in contact with the City of Vienna and the primary decision makers. This is true for many challenges involving public authorities, as a project implementation is often difficult because of public procurement law. For challenges coming from the private sector the biggest motivator for organizations (SMEs, startups, research organizations) is to win a contract. However, when the contributors are individuals or groups of students, they are often motivated by putting their ideas and research into practice. It is important to ask the challenge owners what they offer to the contributors. It has to be clear for everyone what they can expect so they are not motivated by false expectations. Offers can be a joint venture, a common research project, a contract, an award, etc. Those are the motivators for the contributors. It is of utmost importance that the challenge owner keeps its promises. Of course, this is only true when there are suitable approaches for a solution.

4.2.3 Alexander Biegenzahn, Austrian Standards International

Co-Creation Lab Vienna. His Relationship and Thoughts about it

Austrian Standards International participated as a challenge owner in the Co-Creation Lab Vienna in 2018. Austrian Standards International is non-governmental organization. Its goal is the development of standards in Austria (ÖNORM), as well as coordinating the contribution of Austrian experts to European norms and the integration of European norms into Austrian norms. For Biegenzahn, the standardization process and open innovation are very similar approaches. Standardization used to be an open process from the very start and does not pre-judge the outcome. The process also never stops, as standards always evolve. Various people work together in different ways to define a standard. Digitalization and digital communication are changing this process and will be a big topic in the future. For Austrian Standards International, open innovation is very relevant as it is at the core of standardization.

The challenge was named "from standards taker to standards maker". In the define the challenge phase, a workshop with external experts was organized by the Vienna Business Agency and the challenge was reflected and specified. Moreover, a short text for the call was agreed on. The challenge addresses a very special part of the standardization process. It is about standards that are already published. It is possible to give feedback on published standards, but this service

is currently not used so much. This part had to be made simpler and reach people that are not involved in the actual making of the standards. For the experts who are defining standards it is important to get user feedback from the people who are applying those standards. Consequently, Austrian Standard International was looking for a solution to get more feedback and suggestions for improvements from the standards users (ÖNORM, EN, ISO). In general, the standardization community should grow, new experts should be reached, and standardization should become more transparent. Likewise, how to connect the offline world with the online world was a big question. The challenge did not specify the way in which this objective should be reached and only presented the ideal goal.

For Biegenzahn the biggest challenge is to integrate the innovation process in his daily business: something that most challenge owners probably face. The Co-Creation Lab Vienna reduces the effort for the challenge owner as it offers a lot of structure and defined milestones. This is something that relieves the challenge owner.

The Challenges and Problems

The problem of the challenge was defined internally. As mentioned, it is already possible to give feedback on published standards, yet there is not much feedback from the standards users. Austrian Standard International chose this phase because there is a lot of potential for improvement. In other words, there is an actual need. Moreover, to innovate this part is very feasible. Changing the standardization process itself would have to be done internationally. Focusing on the feedback process made it easier to implement solutions.

Five contributors submitted ideas for solutions in the call. Out of those five, three organizations were selected for the hearing. After the hearing Austrian Standards International decided to do separate workshops with all three organizations. The contributors were contracted for this workshop by Austrian Standards International. Each contributor had a different idea for solutions. Nonetheless, an innovation project will not be implemented with any of those organizations in the medium term as it turned out that the challenge owner is not yet ready for such an undertaking. Currently, there is no collaboration with the contributors.

Biegenzahn thinks that there are no limitations for challenges for the Co-Creation Lab Vienna, but it is important that a challenge owner agrees on one concrete problem: in this case, to find solutions to get more feedback. Biegenzahn explains that they deliberately left the way to reach it very open. It could be a technical solution, but could also be a communicational solution. Hence, the submitted solutions were very broad and covered technical and non-technical approaches. The workshop with the experts before publishing the call was very important to reflect and specify the problem and the goal.

Collaboration

Biegenzahn says the way of working with the contributors was always fair, open, and on an equal footing. Especially communication on an equal footing was essential for fair interaction. It was also important to always answer in time and be very open about the goals and objectives. Austrian Standards International contracted the contributors for the workshops, including preparation time. This was also done to ensure fairness and in order to reimburse the contributors for their efforts. The moderation for parts of these workshops was organized by the Co-Creation Lab Vienna. The contributors challenged Austrian Standards International in those workshops and generated impactful insights. The workshops were used to define next steps before implementing bigger projects. The conclusion was that Austrian Standards International is not yet ready to implement such a new feedback process and stopped further collaboration with the contributors. This was openly communicated and there was understanding from the contributors that the cooperation had ended for now. The challenge was some kind of organizational development process for Austrian Standards International and they learnt much about their own organization.

Opportunistic behavior was not an issue during the entire process. There were rules set by the Vienna Business Agency that defined milestones and the process, like workshops and the hearing, etc., for the overall process. Rules ensuring communication on an equal footing, etc., were defined by Austrian Standards International. In general, the Co-Creation Lab Vienna helped to find solutions, but was not so much involved in how to communicate and dealing with the contributors after selecting them. No NDA was signed with any of the contributors, but then no commercial secrets were shared either. The entire process that was discussed is public and IPR was therefore not relevant. Contracts were signed with the contributors in order to contract them for the workshops.

Biegenzahn does not see himself as part of a Co-Creation Lab Vienna community. There is a close relationship with the Vienna Business Agency, but no contact with others who participate in the program. It is more a bidirectional relationship than a community.

Motivation of the Participants

Biegenzahn thinks that the contributors participated because they thought they could fix the problem. Two contributors already had some experience with standards. The third contributor did not have any experience with this topic but got to know the challenge at the co-create day. The most important motivator is that the contributors wanted to win a contract and work together with Austrian Standards International. However, there must also be a general motivation that triggers the interest for this topic. For contributors, the call in the Co-Creation Lab Vienna is uncharted territory. They do not know how many other organizations will participate in a challenge and what really happens with their ideas. Thus, there is a lot of

uncertainty for contributors. Consequently, there must be something that triggers the interest. So there must be some personal motivation – mostly that they already had some experience with standardization – in addition to the fact that all the contributors hoped for an in-depth cooperation (meaning to get paid to implement a project).

4.2.4 Friedrich Kirnbauer, Wien Energie

Co-Creation Lab Vienna. His Relationship and Thoughts about it

Wien Energie is the biggest energy provider in Austria and is a subsidiary of the Wiener Stadtwerke, which belongs to the City of Vienna. Wien Energie also owns and operates four waste incineration plants in Vienna. One of them is the plant Simmeringer Haide. Wien Energie participated in the Co-Creation Lab Vienna in 2017, looking for a digital twin for their rotary kiln at Simmeringer Haide. The objective was to make the rotary kiln more controllable. The oven is used to burn special waste. Currently, it is controlled by using traditional parameters such as pressure and temperature. Different kinds of waste are burnt in the kiln and the combustion behaviors as well as the impact on the oven are unknown. Shutting down the machine and maintenance is not plannable. A digital twin for the kiln is needed to enable predictive maintenance and make it more controllable.

Kirnbauer sees open innovation as an open approach. The thermal twin call was open for many different solution approaches and no concrete suggestion on how to solve the problem was provided in the call. During the search the solution was defined. For Kirnbauer, the major challenge in the process was to find the time, as they are always in operation and their mission is to keep the machines running. Moreover, it was sometimes difficult to find the responsible person internally, as Wien Energie is a large corporate.

The challenge was specified in a first workshop with external experts and experts from the Vienna Business Agency. The goal was to create a digital twin and for that two aspects have to be considered. On the one hand a concept for a mathematical and thermodynamic model is needed, and on the other hand an IT solution for data analytics, software and hardware architecture, and visualization is necessary. 13 ideas for solutions were submitted by contributors from Austria - mostly from Vienna. Seven organizations were invited to the hearing and presented their solutions. Two companies – Catalysts and a SME specialized in mathematical simulations – and the TU Wien were selected as cooperation partners. A workshop with external moderation was organized by Vienna Business Agency to define the next steps and the three contributors and Wien Energie took part. Wien Energie wanted to realize this project as a funded research project. As a consortium they submitted a proposal to FFG (Austrian Research Promotion Agency), but did not receive any funding. In a second attempt they submitted a proposal for a research funding call at the Vienna Business Agency targeted at production companies in Vienna. This proposal was accepted and the project started in 2019. Besides this

common research project, smaller projects – Kirnbauer refers to them as quick wins – were implemented by Catalysts for Wien Energie. For those smaller projects Catalysts was directly commissioned by Wien Energie.

For the bigger research project Wiener Energie is the lead partner but did not contract the partners. Consequently, they are full project partners and receive public funding by the Vienna Business Agency. The funding quote is between 35% and 80% (plus overheads) depending on the size of the company and the classification of the tasks (whether it is experimental development or research). This means that the companies have to invest their own funds to be part of the project.

The Challenges

For Kirnbauer, a good and fruitful challenge should be based on a multidisciplinary research question. A challenge has to be innovative and should look for solutions coming from different fields. In this challenge everybody can get new insights from new approaches. Data scientists, chemical engineers, experts for thermodynamics, and practitioners have very different approaches. Moreover, a suitable challenge should not be a problem that is easily solvable with a product or service that is already commercially available. However, if Kirnbauer could do it again he would be more specific for the call and focus on the combustion process from the very beginning. The focus on the combustion process developed during the Co-Creation Lab Vienna. In general, the program helped to specify the problem during the process with the external experts and the moderation.

In their case, the topic for the challenge was need driven. The kiln was and is the biggest issue at the facility. Both the oven and the process are dated, so something had to be done: Either the more radical and very costly approach of renewing the kiln, or exploiting digitalization to get more insights into the process in order to improve it. They decided for the latter option. They received information about Co-Creation Lab Vienna from a higher management level. No alternatives to the program were known – at least none with a similar network.

Collaboration

The cooperation between the four partners was and is always fair. Nonetheless, it took some time until every partner had the same understanding of the goals and objectives for the common project. Wien Energie had the lead and also suggested writing a research proposal for an FFG call. It turned out that the call did not fit to the project, but the project was suitable for another call by the FFG about energy research. Wien Energie submitted a proposal with the contributors as project partners. It was evaluated well, but ranked lower than competing proposals. Kirnbauer met with all the partners regularly to work on the proposal. Finally, they submitted a project proposal in a funding call of the Vienna Business Agency and it was accepted. The project started in fall 2019 and will run for three years. The timeline for writing the proposal was given

by the program deadline. Kirnbauer tried to define the workflow so that it was feasible for everyone.

With Catalysts, also frequent bilateral meetings took place to plan two smaller side projects - the quick wins. Those projects were intended to test the opportunities and limits of data science in this context. Wien Energie directly commissioned Catalysts for those small side project.

As mentioned, Kirnbauer found the cooperation between the organizations to always be fair. He explained that he was always open about goals and possibilities. In this context it was important to communicate clearly. The relationships with all project partners became very trustful. In the case of Catalysts, the small projects helped further to build up a trusting relationship. The TU Wien was already known by Kirnbauer, as the responsible professor was also his PhD supervisor. There was no reason for the contributors to believe that Wien Energie would absorb interesting ideas and implement them on their own, according to Kirnbauer, as Wien Energie lacked the resources and knowhow to implement such a project alone. Moreover, this would not fit the ethos or core competency of Wien Energie in general, and especially of the facility Simmeringer Haide. Its competency is to run a waste incinerator.

Kirnbauer does not feel part of a Co-Creation Lab Vienna community. Further, there were no specific rules on how collaborate. Likewise, Wien Energie and the contributors never defined any rules by which to interact. However, it was always clear that Wien Energie was leading. The Vienna Business Agency gave the framework for defining the problem as well as for evaluating and finding partners and solutions. Once the partners were found a last workshop was organized. Then the Co-Creation Lab Vienna ended and further collaboration between the partners was not supervised. Kirnbauer says that there was no letter of intent for writing a proposal. Only the personal commitment of the involved partners to work on such a proposal existed. This personal commitment was sufficient for everyone and nobody asked to draw up a contract. A common trust base had been established. NDAs were not signed yet, although they would be part of the funded research project that had just started. In parallel, however, NDAs were signed with Catalysts for the small side projects, as huge amounts of data were handed over. In summary, there were no contracts signed except the contracts that are now set up for the funded research projects and for the small, already implemented side projects with Catalysts. Furthermore, he states that IP regulations were in practice not so important, but these, of course, were an issue for the legal departments. Kirnbauer was not sure about the concrete agreements on IP, but thinks that things that are developed by one organization also belong to that organization. Nonetheless, he concludes that when you have partners in the consortium you trust and each partner shares the same understanding, IPR is not a big issue.

Motivation of the Participants

Kirnbauer assumes that the contributors were motivated by showcasing their capabilities and competencies as well as by getting in contact with Wien Energie. Wien Energie positions themselves as a modern and innovative company. For a smaller company it is very attractive to find a customer or partner like Wien Energie. Moreover, it is motivating to have Wien Energie as a testimonial. Kirnbauer also mentions intrinsic motivation as a relevant factor because the problem is very interesting and sophisticated. This is primarily relevant for the TU Wien.

4.2.5 Georg Ogris, Catalysts

Co-Creation Lab Vienna. His Relationship and Thoughts about it.

Catalysts develops custom software and, since fall 2019, is a member of the German Cloud Flight Group. As a custom software developer, they are a service provider and do not have concrete products. Catalysts has about 350 employees at its headquarters in Upper Austria, but also runs an office in Vienna with more than 100 employees. Catalysts contributed a solution idea to the digital twin challenge by Wien Energie and became a project partner in the publicly funded research project alongside Wien Energie, TU Wien and an SME. Moreover, they realized two small pre-projects with Wien Energie. Ogris thinks that open innovation is something different for a service provider than for a company that has products. Open innovation has to be implemented in culture of the company. There must be the possibility for interdisciplinary teams to test ideas and also to fail fast. Moreover, open innovation is different in companies and in science. Likewise, open source is related to open innovation. Catalysts almost exclusively uses open source software and sometimes even patches back own developments to the open source community. Ogris does not see the Co-Creation Lab Vienna as entirely open compared to open source, because the research projects and outputs that emerge out of the Co-Creation Lab Vienna normally belong to the challenge owner. Nonetheless, it is open since there is a lot of exchange and interaction with different organizations. Both challenge owner and contributors obtain insights into how other organizations work and there is the opportunity to learn from each other.

The Challenges and Problems

Regarding what problems are suitable for the Co-Creation Lab Vienna, Ogris says that it is difficult to rule out any questions, respectively challenges. If the challenge is too narrow, the number of possible contributors becomes smaller. If it is too broad and open the challenge owner might have difficulties to commit in advance, as he or she does not know what the solution will be and who is responsible internally. In such cases it could easily eventuate that a challenge comes to nothing. Furthermore, a challenge should not be trivial and solvable with standard solutions. Challenges in the Co-Creation Lab Vienna are normally rather sophisticated and this is necessary for attracting contributors. Even if the challenge is complex, the solution

can be still very narrow. For narrow problems a normal tender is more suitable, as the Co-Creation Lab Vienna makes it more complicated to submit a normal offer to companies. The Co-Creation Lab Vienna is not the right instrument for normal tenders.

Collaboration

The financing issue (how to finance such a project) was the biggest issue during the cooperation with the partners. It took a long time to find a source for financing the project. The idea of Wien Energie was to implement it as a state-funded research project. Consequently, the first step was to create and submit a proposal and to acquire funding. This cost a lot of time that could have been used to implement the project.

Contributing to a challenge is a big effort and it must have a payoff. For normal customer queries, Catalysts gets contacted by the customers and does not invest much to acquire projects. Thus, it is not worth the effort to contribute to a simple challenge. It takes time, there is a lot of competition and uncertainty, and there is no direct contact to the challenge owner, as Vienna Business Agency acts as proxy, etc.

Ogris rates the cooperation as always fair and very good. Each partner has its competencies and the roles are clearly distributed based on these competencies. This is very important for working together. Of course, the project has just started and a final judgment still has to wait. Ogris did not recall any explicit rules, yet Wien Energie was leading the project, interacting with partners, and setting the pace. The research project proposal also specified that Wien Energie is the project lead and the other organizations are project partners. Besides the bigger research project, Wien Energie also worked together with Catalysts on two smaller pre-projects.

IPR was an issue. Ogris recalls that there was a discussion about IP between Wien Energie and TU Wien, but not between the companies. For the project proposal a distribution of IP was agreed on, which Ogris considered a very fair solution. The partners are allowed to use the gained insights and knowledge from the research project for activities with other energy providers or waste incinerators.

Ogris thinks that open innovation is always some kind of analysis of markets. This means that through open innovation one is checking what is available on the market and, of course, there is the risk that once you find a very interesting approach one could implement it with his or her regular service provider, or by oneself. This is true not only for the Co-Creation Lab Vienna and applies also to tenders, market research, etc. He thinks that it is important for the organizer of such programs as the Co-Creation Lab Vienna to ensure that the challenge owner is really committed to implementing the project based on a call, and also to make sure that the challenge owner has the capabilities to implement such a project. This could reduce the likelihood of opportunistic behavior by a challenge owner. In working together with Wien Energie there was absolutely no fear that Wien Energy would copy anything. As mentioned, the competencies are

very clearly distributed. It would not be possible to justify the expenditures necessary to build up such competencies. Especially, when it comes to machine learning it is very difficult to build up a dedicated department. Regarding the SME and the TU Wien, the competencies were not so clearly distributed, but they figured out complementary roles. Now with the approved research project there is a concrete framework and timeline for working together. The project will last 3 years.

For the small pre-projects, a contract between Wien Energie and Catalysis was signed in order to commission Catalysts. This happened very soon after the hearing. For the common research project, no pre-contract or letter of intent was signed. Signing such documents was never an issue. It was clear to everyone that they are going to do it. Ogris says that one might think that it is naïve to start a cooperation without knowing what will be the result, yet there was a lot of trust generated during the meetings and an open way of communicating. In general, Ogris had a good feeling in this setting, which is why it was not important for him to sign a letter of intent. Moreover, he questions, what is the good of such a document? If the cooperation had failed and they had signed a letter of intent they would have not sued Wien Energie. If one projects fails there will be probably other projects. Establishing trust is essential. It was very important, however, that Wien Energie had a small budget to realize the small pre-projects very fast, as those activities helped to build trust and to properly get to know each other.

Ogris also states that feedback is very important, especially when an idea is not accepted. Ogris does not see himself as a part of a Co-Creation Lab Vienna community.

Motivation of the Participants

The motivation for Catalysts participating was business driven. The goal was to find new customers. However, the motivation depends also on the challenges. Catalysts has also contributed to two other challenges in the Co-Creation Lab Vienna. In one relatively simple challenge, it was just a tool to find a new customer – however, Catalysts was not selected. In the other two challenges – Wien Energie being one of them – it was also to have such a project in the portfolio as a testimonial to show that Catalysts is able to implement such sophisticated projects. Ogris says that having such a reference project is a big motivator. In general, Ogris thinks contributors are motivated by getting exposure and creating awareness for their services and capabilities. It is interesting to submit ideas if the challenges are not looking for standard solutions. Furthermore, intrinsic motivation is also important.

5 ANALYSIS AND INTERPRETATION

5.1 Industry Meets Makers

How are open innovation services for third parties organized (governance form, openness etc.) and why are they organized in these ways? How do they define suitable problems or challenges?

The starting point for Industry meets Makers was the goal of connecting manufacturing companies (briefing partners) to makers in an open setting. The target groups on both sides were soon extended and quickly got blurred. On the maker side, there are now also research organizations, SMEs, students and startups: Anyone is allowed to participate. Likewise, on the briefing partner side, non-manufacturing companies are now also participating. This evolved over the time (Stromberger). Originally, Industry meets Makers was intended as an innovation contest (Stromberger, Gühring), yet Gühring and Gattringer describe how the Infineon briefing in 2016 changed from a competitive format to a cooperative format. Stromberger mentions that other briefings, like Wien Energie in 2016, changed even before the official start to a less competitive format. She says that people want to share their ideas, rather than compete. By applying Pisano's and Verganti's (2008) matrix in the context of Industry meets Makers it can be concluded that it changed from a so-called *innovation mall* into an *innovation community*. An innovation community is defined by flat governance and an open form of participation. Nonetheless, Industry meets Makers does not fit into this matrix category in every aspect. Stromberger describes that in the beginning an SME with 150 employees wanted to take part as a maker and was not allowed to because of the very fact that it was intended as a competition targeting a specific group (makers). Moreover, Stromberger describes that the reason for opening up Industry meets Makers to anyone who wants to participate was exactly that it was no longer a competition. Now, as a cooperative format, it makes sense that anyone can participate and the community is growing. Growing the community became a goal and openness in terms of who can participate helps to support this goal (Stromberger).

Gattringer, Gühring and Stromberger state that the governance form depends on the briefing partner. Gattringer mentions that Industry meets Makers provides a framework and a community, but the rules are defined individually in every briefing. This framework is set by the kick-off event and the best-of event. Gattringer, Stromberger, Gühring say that the briefing partners are in a more powerful position than the makers, meaning that there is a hierarchical structure. This contrasts Pisano and Verganti's (2008) definition of an innovation community, as they describe a flat governance structure for innovation communities. In this sense, Industry meets Makers also has elements of an *innovation mall*, respectively *contest*. Despite the hierarchical form of governance, also the makers can influence the process. Gühring describes that the makers in the Infineon briefing in 2016 decided to cooperate and to share ideas. They

did not want to compete against each other as originally intended. This was supported by Infineon. It seems, despite the fact that the briefing partners are leading the process, they are trying to meet the makers on an equal footing and act as equals (Stromberger, Gattringer, Gühring). Stromberger compares Industry meets Makers to the *open source community*. Also Gattringer mentioned open source and open hardware as best practices.

Likewise, following Felin's and Zenger's (2013) approach, Industry meets Makers has many elements of a *community*. As Gattringer describes, the incentives are low-powered. He also describes, as Felin and Zenger do (2013), that communication is horizontal and embedded outside the firm. Gattringer explains that it can be difficult to connect this communication outside the firm to the internal processes. Nonetheless, it must not be ignored that there is also a vertical structure, as the briefing partners are in a more powerful position. Felin and Zenger (2013) see no property rights for communities, like in the open source community. Various ways of regulating IP are used in Industry meets Makers, but in practice it is not a big issue. In a nutshell, Industry meets Makers is an innovation community, albeit one in which the briefing partners still have the power to define the problems and to select the solutions. Nonetheless, they are trying to interact as equals.

Industry meets Makers might not be open innovation, according to Chesbrough (2003), as he does not consider open source as open innovation. He accepts there are many similarities, but notes a vital difference when it comes to business models. In open innovation, the purposive inflows and outflows of knowledge are entirely based on the business model, whereas in open source projects the business model follows the innovation concept (Chesbrough 2016). In Industry meets Makers the inflows and outflows are not always based on the business models of the briefing partners. In contrast, Frank Piller (2003) writes that the concept of open source used for different products is called open innovation. Similarly, other authors see open source as one way to put open innovation into practice (Munir et al. 2018). Those authors would probably consider Industry meets Makers as an open innovation practice. In general, there is a strong focus on inflows of knowledge as makers support the briefing partners. However, the Infineon briefings show that there are also outflow activities.

Moreover, *decentrality* seems to be important as it enables flexibility. As already mentioned, the briefing partners define the ways in which they proceed and interact with the makers on their own. Stromberger simply provides the broader framework and a vision. This vision is also a strong motivator, as Schattke and Kehr (2009) state. Stromberger says that Industry meets Makers is not centrally controlled and that many occurrences in Industry meets Makers happen on their own, respectively that the companies do many things alone.

Lakhani et al. (2007) argue that more openness could deliver higher problem resolution rates and it makes sense to share ideas amongst the problem solvers. This is exactly described by Gühring when he talks about the Infineon briefing in 2016: The maker teams switched from a

competitive mode to a *cooperative mode* and everybody worked together as well as shared their ideas. This helped to build the prototypes. Likewise, Gattringer describes this openness in *Industry meets Makers* and mentions that no one wanted to work proprietarily. It can be assumed that a higher problem resolution rate is desired. Hence, it makes sense that they share ideas. Briefing partners do lose some control through this process, but there is no clear picture of the extent to which sharing ideas undermines the hierarchical structures. Interestingly, this was not planned or intended, but just evolved. Stromberger claims that she only wanted to have one round, yet after the first round ended the briefing partners asked her to continue.

Hossain and Kauranen (2016) argue that open innovation is rather suitable for *radical innovation*. This can be also found in *Industry meets Makers*. Although the term radical innovation is not explicitly used, Stromberger, Gattringer, and Gühring state that the briefings should be something entirely new and that original briefings work best. In general, the distinction is made between *new and standard solutions*. Stromberger describes three types of briefings. Firstly, solutions for problems that really exist in the daily business of a briefing partner. Secondly, new applications for existing hardware or software. Finally, briefings are used to find new business models. At Infineon, as Gattringer describes, the problems of the briefings are following the maker culture. Interesting topics for the target groups is one starting point for defining suitable briefings. Moreover, Gattringer says the briefing highly depends on finding motivated colleagues from the specialized departments. He starts by finding a person first and a topic second. Interestingly, Gattringer describes that the briefings are also an opportunity for the specialized departments to learn to interact in such a setting.

Felin and Zenger (2013) see problems with a high amount of *hidden knowledge* as suitable tasks for innovation contests as well as innovation communities. Moreover, they see contests rather suitable for simple problems (trial and error) and innovation communities as suitable for complex problems with a theory-guided search. Stromberger, Gattringer and Gühring describe, as expected, a high amount of hidden knowledge in the briefings. As Gühring mentions, for the complex task of constructing a quadcopter a community approach was better than a competition. This validates the statements of Felin and Zenger (2013). Gattringer mentions that because of the six-month timeframe, also complex problems are interesting for *Industry meets Makers*. Nonetheless, overly complex briefings might also fail, and Gattringer describes one such highly complex briefing which failed in 2016. Gattringer and Gühring also state the challenges have to be somewhat difficult in order to become attractive. Finding the right amount of complexity seems essential, although far from self-explanatory. Thus, as Stromberger describes, an iterative process with feedback from selected makers is applied.

A further distinction generally made is that between *broad and narrow problems* (Stromberger, Gattringer and Gühring). The broadness and narrowness of the problems is a big issue. Stromberger says that briefings should not be too narrow and not too broad, citing Bosch as an example. It seems that broad problems lead to interesting outputs – she was very impressed by

the prototype – but run the risk that the solution might not fit to the portfolio or strategy of the company. On this issue, Chesbrough's (2003) argument regarding purposive inflows and outflows of knowledge is valid. In the case of Bosch, the *inflow was not purposive* as it did not fit their business model. On the other hand, as Stromberger describes, overly narrow topics, like the Fronius briefing on welding data, do not attract makers. It seems that *overly narrow topics are not interesting* to many participants.

How do open innovation services for third parties ensure fairness amongst the parties and how do they handle the principal-agent dilemma in an open innovation setting?

The community – *a group of people that share and reproduce values and culture* – is the central instrument to ensure fairness. Gattringer, Gühring and Stromberger state that they belong to a community. Stromberger explains that *social control, transparency and the norms of the community* are essential. Otherwise the format would not be possible. Fairness cannot be controlled centrally. Briefing partners and makers that were on board from the very beginning defined the way things work initially, and they still carry on those norms. She also mentions that the *community is self-regulating* and people who do not fit are excluded. Gühring identifies one essential rule in Industry meets Makers: *Everyone is on a first name basis* ("per Du"). This helped to ensure *communication on an equal footing*. Also, Gattringer describes personal contact as a vital factor for successful collaboration. He also mentions the significant role played by personal meetings in creating more binding relationship. When people meet, a feeling of *belonging and community* emerges.

In Industry meets Makers there is a lot of pressure exerted by the community to be fair and honest. Another essential element is *transparency and publicity* that reduces the likelihood of opportunistic behavior. Stromberger says that everyone is on stage. Moreover, the intentions are very open. Stromberger soon learnt that she has to ask people what their true intentions are, and that people are open about it when asked. Furthermore, matching people with fitting expectations and capabilities is essential. Expectation management is a fundamental condition.

An interesting finding is that further and deepened collaboration sometimes takes place following after the six-month period between the kick-off and best-of events, and, as Stromberger explains, this is often based on traditional business models. Gühring is a good example for such a case, as he was contracted by TELE Haase once Industry meets Makers ended. They had already collaborated for a long time and built up trust during Industry meets Makers. Despite this new phase being just a contract between the two parties, as they were both part of the same community any opportunistic behavior which ensued would probably lead to sanctions through the community. Thus, where contracts are signed they tend to be formed at a very late stage. The principal-agent dilemma results largely from information asymmetries, and therefore occurs more often when one does not really know the service provider (Schmidt,

2016). As Industry meets Makers helps to find the right partners and *build up trust*, it also tackles the principal-agent dilemma to some extent.

Stromberger says there are *no explicit rules* for collaborations and instead the community provides implicit regulations. Those *norms are deeply rooted in the core community* of Industry meets Makers and are carried further to new people. Moreover, as Gühring describes, it is difficult to have universal rules as every company and every briefing is unique. This refers again to *the importance of decentrality* in Industry meets Makers. Gattringer also mentions that Industry meets Makers does not provide explicit rules for the briefing partners on how to collaborate with the makers. Further, he points out the valuable role played by Stromberger in this context. She is essential for the initiative, as she provides a vision, integrates people, and connects the right dots to build a community around Industry meets Makers. It is not so much about the governance form and more about the people you are able to crowd around. It seems there is some kind of self-recruiting effect. Stromberger says that people who participate in such an initiative are mostly nice and appreciate the value of a community: otherwise they would not participate.

Opportunistic behavior is also reduced when collaborators bring complementary competencies to the partnership. Gattringer says that Infineon cannot be a competitor of the makers as it is just a supplier and does not develop end products. Likewise, Gühring notes that TELE Haase lacks the resources and knowhow to copy the makers' ideas. Of course, when the possibility of opportunistic behavior is reduced, this also generates trust. It therefore seems advisable to form partnerships with complementary skills. Despite these differences, Gühring says that all partners shared the same intention and had a common goal in the TELE Haase briefing. Gattringer even observes that there was no clear return for the makers in the Infineon briefings, meaning that *the motivation of the makers is mostly intrinsic*. Stromberger and Gühring confirm this, noting that intrinsic motivation is incompatible with opportunistic behavior in many aspects. The *high level of trust* in the community can also be seen in the fact that contracts do not play an important role. Contracts are largely irrelevant for the briefing partners as well as the makers (Stromberger, Gattringer, Gühring). Moreover, Gühring describes that the lack of contracts makes Industry meet Makers attractive, as it become more accessible as a result.

Following Lichtenthaler (2009), a focus on strong intellectual property rights is not relevant for improving companies' performance when engaging in open innovation projects. Although it was discussed before the start, Stromberger recognizes that IPR is not essential in practice. She advises to *not focus on IPR*, at least in the beginning. Likewise, Gattringer says that IPR is not an issue for Infineon briefings. Lichtenthaler's (2009) statement that strong intellectual property rights are not relevant in open innovation projects is not only corroborated by this evidence, but could even be extended by the proposition that focusing on such issues may even be harmful in certain cases.

Industry meet Makers has no defined set of rules for participation or success, just as Longo and Giaccone (2017) suggest for open innovation settings. In general, the community and the shared values define the interaction. Longo and Giaccone also advise psychosocial compensations as incentives to support effective collaboration: using monitoring activities and social control mechanisms to promote a shared intention and prevent opportunistic behaviors. Stromberger sees publicity as a vital factor to ensure fairness, which can be seen in the context of monitoring activities. As many important activities take place on a public stage, this transparency allows the community to monitor the activities of the briefing partners and makers. While psychosocial compensations are not mentioned directly by the interviewees, the combination of a strong community, personal meetings, and transparency support the notion that correct behavior will be also rewarded in psychosocial aspects.

Roper and Hewitt-Dundas (2016) suggest that intermediary organizations should help firms to identify and find potential partners for open innovation projects, help to build new partnerships, and support trust-building activities. Industry meets Makers seems to be a good practice for such an approach. *A community has emerged in Industry meets Makers, with a strong trust base as well as common values and shared intentions.* This minimizes the principal-agent dilemma. The principal can trust that services conducted by the agent on his or her behalf will be performed to his or her satisfaction.

Why do problem solvers participate and what is their motivation?

Franke et al. (2014b) show that for certain problems randomness explains the likelihood of finding a solution better than deterministic variables. In such cases a high number of participants is advisable. Stromberger and Gattringer observe that the *community is constantly growing*. This should increase the likelihood of finding an appropriate solution in the briefings. Zhang and Hermann (2017) show in an experiment with an open innovation contest that the number of participants tends to decrease in subsequent contests. This is, as mentioned, not the case in Industry meets Makers. The most likely reason for this is that Industry meets Makers is more an innovation community than an innovation contest. It seems that *participants and stakeholders in Industry meets Makers are enjoying this initiative*. Stromberger and Gattringer describe that participation is also largely motivated by the *exchange with likeminded people*.

Zhang and Hermann (2017) mention also the importance of feedback in order to motivate problem solvers to continue to participate. This also true for Industry meets Makers as Stromberger, Gattringer and Gühring state. Feedback is essential. In Industry meets Makers *the quality of feedback depends on the briefing*.

Frey et al. (2011) argue that monetary rewards have positive effects on the total number of contributions, whereas intrinsic motivation is positively related to the value of the contributions. At Industry meets Makers *monetary rewards seem to have a negative effect*. This supports Frey's

(1997) findings and suggest that they are also applicable in the context of open innovation. Stromberger describes that the makers reacted with extreme skepticism when a monetary reward for the Wien Energie briefing in 2016 was announced. Likewise, Gattringer mentions that monetary rewards can have a bad influence as it might undermine intrinsic motivation. Again, this might be caused or boosted by the fact that Industry meets Maker is a community and not a contest. Moreover, most participants are highly intrinsic motivated. Consequently, it does not disprove Frey et al. (2011) and the case study is just describing different phenomena. In some briefings there are small prizes as incentives, like a drive on a test track. They are not comparable to a monetary reward and rather intended as a nice gesture. Moreover, they are normally not purchasable on the market. Such Incentives do not play an important role and they are just a nice add-on (Stromberger). In Industry meets Makers, the *makers are strongly motivated by non-monetary factors*. They want to solve a problem, put something in practice, and solve problems they face (Stromberger, Gattringer, Gühring).

Stromberger found out that the rewards as *extrinsic motivators have to be agreed individually between the stakeholders*. For one person a job might be a very attractive reward, while for the next person it is not. For Stromberger, this individualization and the openness about the goals are essential success factors for Industry meets Makers. Connecting people with matching goals is one of her key tasks. Gattringer describes that for startups it can be very interesting to participate in order to obtain *deeper insight into Infineon technology and get support by experts* (outflows of knowledge). Of course, this is also partly an extrinsic motivation. Gühring was contracted in the follow-up of a briefing and even founded a startup based on one of his ideas. Nonetheless, he describes that he was intrinsically motivated and wanted to solve a problem as well as to test his ideas.

Schattke and Kehr (2009) summarize the findings that most studies suggest a mix of intrinsic and extrinsic factors, and they recommend creating open innovation projects in ways which increase especially the intrinsic motivation of participants. This can be seen in Industry meets Makers. Extrinsic rewards are agreed on individually. Moreover, there is a strong focus on the intrinsic motivation of the participants. There seems to be an *interrelation between intrinsic motivation and the focus on a community*, respectively the change from a competitive format to a cooperative one.

For open source software projects, a strong community effect (similar to social movements) is reported and this effect increases motivation to participate (Hertel et al. 2003). Stromberger mentions open source as a role model in the very beginning. Industry meets Makers is closely linked to the idea of open source software projects. There is a *strong community effect* and this increases the motivation to take part.

5.2 Case Study Co-Creation Lab Vienna

How are open innovation services for third parties organized (governance form, openness etc.) and why are they organized in these ways? How do they define suitable problems or challenges?

Wrohlich says the goal of the Co-Creation Lab Vienna is to bring people together that would not otherwise know each other. The focus in the beginning was clearly on R&D, but it *became broader and more flexible* over the past years. On the one hand, it is no longer only about R&D and any kind of innovation is now considered suitable and, on the other hand, the structure has become more flexible: There is no co-create day anymore, calls are becoming less relevant, etc. Likewise, Czernohorszky describes the process as becoming more flexible. This was extremely valuable and increased the benefits for the target groups. Nonetheless, the Co-Creation Lab Vienna is still *structured and formalized*. Czernohorszky reports that the biggest challenge for the organizer of the Co-Creation Lab Vienna is to make it as standardized as possible, but still flexible enough to consider the needs of the briefing owners.

Similarly, regarding who can participate, Czernohorszky says that the Co-Creation Lab Vienna has become more flexible. In the beginning, only companies and research organizations were allowed. Nowadays, also individuals are permitted as contributors, as there were many good ideas coming from students. So far, the contributors in the Co-Creation Lab Vienna are about 60% SMEs, 20% startups, and 20% research organizations. Wrohlich explains that challenge owners are corporates, but also from the public sector. Especially the City of Vienna is important as a challenge owner. She also says *the structure of the Co-Creation Lab Vienna – especially the public call – was chosen because the Vienna Business Agency is a public entity and it cannot give preference to any one company*. This is the reason for using an open call. Everyone can see that a challenge owner is looking for something and can submit ideas. This process ensures transparency.

For Czernohorszky, the challenges in Co-Creation Lab Vienna are problem driven. *All challenges should be based on a real need and problem*. There is a formal process for challenges to be accepted into the Co-Creation Lab Vienna. Czernohorszky explains that the challenge owners have to submit a detailed description of the challenge as well as signed terms of participation. Wrohlich also describes that the *Vienna Business Agency determines whether to accept a challenge*. This is decided based on the answers to certain questions in the application form, as well as the resources and the commitment of the challenge owner.

Czernohorszky says that suitable challenges should have a *very concrete goal*, but leave the way of reaching this goal open. Normally technical solutions are sought, but also, to a lesser extent, ideas. Wrohlich says that *narrow problems work the best*. The challenge should be *as concrete as possible*. In the calls there is no focus on a specific field, although there have been calls for

various disciplines. Likewise, Biegenzahn thinks that challenges in the Co-Creation Lab Vienna should be based on concrete problems. At Austrian Standards International they selected the problem because there is a real need and a solution could be implemented easily. They defined a goal in the challenge, yet were very open about possible solutions. Kirnbauer argues that *a good challenge should be based on a multidisciplinary research question. It should be something new and innovative and nothing that is easily solvable*. In his point of view the thermal twin challenge by Wiener Energie was too broad. If he were to do it again, the call would be more specific. The problem was selected as there was an urgent need and a solution was required. The reason why he chose the Co-Creation Lab Vienna was that he did not know of any other platform with such a network of companies and research organizations.

For Ogris it is difficult to rule out certain problems for the Co-Creation Lab Vienna. *If it is too narrow the number of contributors becomes smaller. If the challenge is too broad and open, the challenge owner might have difficulties in committing in advance, as he or she does not know what the solution would be the responsible person internally*. In this case it could easily happen that a challenge comes to nothing. Moreover, Ogris says the problem should not be a trivial or solvable with standard solutions. The Co-Creation Lab Vienna is not a good instrument to replace a normal tender as it is very demanding for the contributors. They cannot talk directly to the challenge owner and they do not know how many other contributors are taking part. A challenge must be worth the effort and uncertainty.

The process in the Co-Creation Lab is centrally defined by the Vienna Business Agency. As mentioned, there are defined terms of participation everyone has to agree on. Wrohlich says *the unique proposition of the Co-Creation Lab Vienna is its neutrality*. The Vienna Business Agency as a public body guarantees neutrality. In this sense *the Co-Creation Lab Vienna is very hierarchical*. As described, the Vienna Business Agency has to accept the challenges and defines the process. Moreover, the relationship between the challenge owner and contributors is hierarchical. The challenge owners select who they want to see in a hearing and later on with whom they want to collaborate.

Biegenzahn says that the difficult part for him was to integrate innovation activities in his daily business, as this is something he does on top of his regular activities. The Co-Creation Lab Vienna offers a lot of structure and defined milestones, which relieves the challenge owner to some extent. However, it also means that many decisions regarding the process are taken by the Vienna Business Agency. *In the Co-Creation Lab Vienna there is a lot of external support to find the right partners*, including facilitation and access to external experts as well as experts from the Vienna Business Agency. Biegenzahn and Kirnbauer recount that this expertise was helpful to specify the challenge, to select the right partners and, in the case of Kirnbauer, even to plan the next steps for the implementation of the project.

Wrohlich says *the Co-Creation Lab Vienna has not created a community*. Kirnbauer, Biegenzahn and Ogris also state that they do not belong to a Co-Creation Lab community. Wrohlich explains that the challenges in the Co-Creation Lab Vienna are extremely broad and are not suitable for the creation of a community, as the people have overly diverse backgrounds. Moreover, there are no longer common events which target all stakeholders. On the other hand, Czernohorszky describes community building as essential for the Co-Creation Lab Vienna, and building such communities for certain technological fields is one of the main goals of her department. Wrohlich concurs that those communities which do exist are built around more specific and focused activities. Similarly, Biegenzahn recognizes that Austrian Standards International has a good relationship with the Vienna Business Agency, but does not interact with the other stakeholders in the Co-Creation Lab Vienna on a regular basis. Although not directly linked to the Co-Creation Lab Vienna, Czernohorszky says it is vital to activate existing communities for suitable calls. Wrohlich says the contributors in the Co-Creation Lab Vienna resemble the general network of the department. This might be an indicator that this activation is successful. Nonetheless, common values and identities seem not be very present. It seems more like a loose connection.

According to the model of Pisano and Verganti (2008), *the Co-Creation Lab Vienna is an innovation contest*. Elements like the external experts that help to specify the problem and to select the right partners is something that could be seen as *elite circle* (Pisano & Verganti 2008). However, in the Co-Creation Lab Vienna, the Vienna Business Agency helps to find the experts and the goal is not so much to find a solution, but rather to get feedback. In a sense it is only partly an elite circle that normally also offers the solutions (Pisano & Verganti 2008).

The innovation contest in the Co-Creation Lab Vienna is about *finding the right partners with suitable ideas for solutions*. The implementation can be done in various ways and is not part of the Co-Creation Lab. As Kirnbauer describes in the case of the Wien Energie challenge, the implementation was done in a consortium. This consortium is now working on a three-year funded R&D project.

Moreover, there is a hierarchical governance structure, as expected in an innovation contest (Pisano & Verganti 2008). Further, the Vienna Business Agency strictly defines the process. This causes a loss of control for the challenge owner, but on the other hand this predefined process helps to relieve them. It seems that this is appreciated by certain companies. The *openness is rather limited*. The contributors do not know who is participating and what solutions others suggest. Only the challenge owners and the experts have the full picture. Following Lakhani et al. (2007), this might decrease the chances of finding suitable solutions.

The problems have a high amount of hidden knowledge, which fits with Felin and Zenger (2013). The complexity is very high, as the R&D project on the thermal twins shows. At first glance, this does not comply with Felin and Zenger (2013). However, the contest in the Co-Creation Lab

Vienna is about finding the right partners and a first draft of a solution. They do not look for an already working solution, which developed only later on. Normally, like Wien Energie and its partners, they *switch to the governance form of a partnership, which is more suitable for complex problems* and less suitable for a high amount of hidden knowledge (Felin & Zenger 2013). It could be argued that *the contest in the beginning was able to unveil hidden knowledge*.

Hossain and Kauranen (2016) argue that open innovation is more suitable for radical innovation. This is also true for the Co-Creation Lab Vienna. *The Co-Creation Lab is not suitable for looking for standard solutions*.

How do they ensure fairness amongst the parties and how do they handle the principal-agent dilemma in an open innovation setting?

Czernohorszky says that there can also be problems when the challenge owners and the contributors work together. The biggest issues are a lack clarity and unmet expectations. Likewise, there is no guarantee that a project will be implemented. Contributors invest a lot of time and might not get anything in return, even if their idea was the best one. Similarly, Wrohlich acknowledges that problems in the collaboration between contributors and challenge owners exist. The biggest reason for such problems is that *expectations that are not met*. This is similar to Czernohorszky's insights. It is important to recognize that these *problems are normally not caused intentionally*.

The Co-Creation Lab Vienna is to some extent *a legally regulated space*. Everyone has to sign *terms of participation*. Czernohorszky says that for fair collaboration terms of participation have to be signed by the challenge owners as well as by the contributors. These terms define the entire process to ensure a fair interaction of the involved parties. Also, IP is to some extent regulated in those documents. For Czernohorszky that is the *main instrument to guarantee fairness*. Nonetheless, she says it is more about nudging than punishment or legal consequences. Employees of the Vienna Business Agency frequently check back with the challenge owners, which can be considered as some kind of social control and monitoring mechanism. Moreover, Czernohorszky explains that the Vienna Business Agency generates understanding for either side and translates each stakeholder to the other. In this regard, the neutrality of the Co-Creation Lab Vienna is important.

Wrohlich says the terms of participation do not overly force the actions of the signatory. Nobody can be forced to implement a project. However, a lot of time and resources were invested by the Vienna Business Agency to set up the terms of participation and a law firm was contracted to formulate them. They address IPR issues, conflicts of interest, what challenge owners are allowed to do with the ideas of a contributor, etc. However, they do not regulate the form of reimbursement of partners or how cooperation is organized. Likewise, specific IPR are not part of the terms. There cannot be a one-size-fits-all solution. In general, the *concrete collaboration*

is not part of the terms of participation as it is not part of the Co-Creation Lab Vienna. Wrohlich thinks that IPR becomes relevant in cases where a project is actually implemented.

IPR was not an issue in the Austrian Standard International challenge because it was not relevant for this challenge. In general, IP did not play an important role for this problem, as there were just workshops and no concrete project was implemented. In the Wien Energie challenge the picture is not so clear. Kirnbauer says that IP for the project implementation was exactly defined in the research proposal, as it is mandatory for such a proposal. However, in practice he thinks IPR is not so relevant if the partners are on the same page and there is a common trust base. However, Ogris mentions that there was a discussion on IPR between Wien Energie and TU Wien. Of course, this could also be caused by regulations coming from the university.

Lichtenthaler (2009) holds that a focus on strong intellectual property rights is not relevant for improving companies' performance when engaging in open innovation projects. There is no clear picture of the relevance of IPR in the Co-Creation Lab Vienna, as it largely depends on the challenges and the involved stakeholders. However, it has at least some relevance. When it comes to the implementation, IPR is an issue and has to be agreed on individually. However, as Kirnbauer describes, *in practice shared intentions and a common trust base is at least as important as contractual regulations.*

The terms of participation regulate the process and are a mechanism to ensure fairness. However, the concrete collaboration and the implementation are not part of these terms. As mentioned, the Co-Creation Lab is a process that helps to find the right partners with suitable solutions and is not so much about implementing the solutions. Similarly, Kirnbauer says that *the Co-Creation Lab Vienna provides the framework for defining the problem as well as for finding the right partners and the solution.* The experts help to evaluate the solutions. Once the partners have been found, a last workshop is organized and the Co-Creation Lab Vienna ends. Any further collaboration is not part of the Co-Creation Lab Vienna and is therefore not supervised. Likewise, Biegenzahn says that the Co-Creation Lab Vienna helps to find the solutions and the partners. The experts provide a lot of insights and help to specify the problem and to select the right partners. Similarly, the feedback and evaluation of the experts in the workshops was useful to make the right decisions. Of course, this also addresses the principal-agent dilemma by helping to select the right partners (agents). However, the Co-Creation Lab Vienna is not so much involved in how to communicate and deal with the contributor. That is something the contributors and the challenge owner have to agree individually.

In the Co-Creation Lab Vienna, the Vienna Business Agency plays *a strong gatekeeper function.* The commitment and the capabilities of the challenger owners are checked. Wrohlich revealed that the Vienna Business Agency has to be convinced of the commitment of the challenge owner in order to accept a challenge in the Co-Creation Lab Vienna. Moreover, Ogris sees the Vienna Business Agency as gatekeeper and recognizes this as a very important task in order to prevent

opportunistic behaviors of the challenge owners. Yet, for the Vienna Business Agency as broker, it is hard to predict how a challenge owner or contributor will act and whether a project will be implemented. As mentioned, problematic actions, when they occur, are often coincidental and not intended by the person who is responsible as the challenge owner. Wrohlich says if projects are not implemented or come to nothing this is not normally caused knowingly and willingly by any party.

The collaboration in the Co-Creation Lab is *always fair*, as Kirnbauer, Ogris and Biegenzahn explain for their challenges. Biegenzahn says the collaboration with the contributors was always fair and very open. It was clear for Austrian Standards International that they should talk to the contributors on an equal footing. They reimbursed and contracted the contributors for their services, so that they did not come away empty-handed. Of course, the contributors hoped for a bigger contract, but also ending the collaboration was done very openly and there was understanding from the contributors. In general, Austrian Standards International tried to be *very open about their goals, and communicate honestly and respectfully*. Biegenzahn explains that this was done directly with the contributors. By this phase the Vienna Business Agency was not involved anymore. This process is clearly led by the challenge owner and they define how to proceed.

Likewise, Kirnbauer states that the collaboration with the partners was always fair. He, respectively Wien Energie, was leading the way. Likewise, Ogris states that Wien Energie was pushing and promoting the topic. Smaller pre-projects were implemented quickly with Catalysts. Kirnbauer was always open about goals and possibilities. He says that in this context it is *important to communicate clearly*. Kirnbauer explains that there was *a lot of trust amongst the partners, and a common goal*. He says a LOI was not necessary and the personal commitment was enough for everyone because there was trust. Moreover, Kirnbauer says that the competencies of every partner were complementary, which makes it clear that no one party can easily take over the role of another partner. This also fosters trusts as everyone is needed. Ogris sees the *distribution of competencies* in a very similar way. There was not much possibility of copying ideas of other partners.

A pre-check is performed by the Vienna Business Agency, which can be seen as some kind of *quality seal and creates trust*. In this context, also the *neutrality of the Vienna Business Agency* is central. Trust in the Vienna Business Agency accrues not only on account of its neutrality, but also the fact that it is a *public authority*. Wrohlich says challenge owners and contributors participate in such a program because *they trust the Vienna Business Agency and believe that it is a neutral player and ensures fairness*. Just by the presence of the Vienna Business Agency, there is some kind of *social control*. Moreover, the process itself fosters neutrality and fairness. There are formalized processes in place. As a public funding agency, the Vienna Business Agency knows how to be fair and transparent. Parts of processes of the Co-Creation Lab Vienna are inspired by the processes for funding and grants. This is especially true for the hearing.

It is important to understand that the actual implementation of a project is not part of the Co-Creation Lab Vienna. However, the process helps to find the right partner. Hewitt-Dundasa and Roper (2017) describe the difficulties for companies to assess the trustworthiness and motives of potential partners for open innovation. The Co-Creation Lab Vienna addresses this problem. The evaluation of the solutions and the hearing are vital to *make sure that the most suitable partner is selected*. The experts can check the feasibility of solutions and reveal unrealistic or useless approaches. Nonetheless, for the actual implementation the challenge owners and the contributors have to resolve issues on their own. It seems that for implementing projects, building up a trust base is essential. Therefore, personal contact and, *ideally, smaller pre-projects are very helpful*. Moreover, parties having *complementary skills and competencies is important for collaborating*. In this situation everyone is needed and difficult to replace.

Longo and Giaccone (2017) suggest three different approaches to tackle problems in open innovation settings. They can be partly found in the Co-Creation Lab Vienna. There are *clearly defined rules of participation* that allow multiple stakeholders to interact with each other. However, the psychosocial compensations as incentives to support effective collaboration and discourage opportunistic behaviors do not play an important role in the Co-Creation Lab Vienna. Finally, Longo and Giaccone (2017) advise monitoring activities and social control mechanisms. Those can be partly found in the Co-Creation Lab Vienna. Nonetheless, the *focus is on clear and legal binding rules in combination with the Vienna Business Agency as public authority*. The Vienna Business Agency provides processual fairness as a neutral and transparent proxy.

Why do problem solvers participate and what is their motivation?

Czernohorszky explains that contributors participate because they are hoping for a *contract or a common research project* with the challenge owner. When it comes to individuals and private persons, also job opportunities are relevant. Nonetheless, the *main motive is to start a project with the challenge owner*. Other motivation factors are curiosity, the possibility to position themselves and to get a first foot in the door.

Likewise, Biegenzahn sees the chance of winning a contract as the biggest motivational factor for the contributors. However, there must be a general motivation that triggers the interest for this topic. Biegenzahn thinks that participating in the Co-Creation Lab Vienna is demanding for contributors and creates a lot of uncertainty. They do not know how many other organizations will participate in a challenge and what really happens with their ideas. Hence, the motivation must be strong.

Wrohlich explains that offers by the challenge owner can be a joint venture, a common research project, a contract, or an award. For challenges from private sector firms it is mostly about winning contracts. For challenges from the public sector it is more about getting in contact with the right people, as an immediate implementation is unlikely because of public procurement

laws. However, when the contributors are individuals or a group of students, they are often motivated by putting their ideas and research into practice.

Kirnbauer assumes that the contributors were motivated by showcasing their capabilities and competencies as well as by getting in contact with Wien Energie. For a smaller company it is very attractive to find a customer or partner like Wien Energie. Moreover, it is motivating to have Wien Energie as a *testimonial*. Kirnbauer also says that the complexity of the problem is also a motivator, especially for universities.

Ogris explains that the motivation for Catalysts to participate in the Wien Energie Challenge was *business driven*. However, the motivation depends also on the challenges. Catalysts has contributed to three challenges in the Co-Creation Lab Vienna. In one relatively simple challenge, the Co-Creation Lab Vienna was *just a tool to find a new customer*. In the other two challenges – Wien Energie being one of them – it was also in order to have such a *reference project* in the portfolio and to show that Catalysts is able to implement such sophisticated projects. In general, Ogris thinks contributors are motivated by getting exposure and creating awareness for their services and capabilities. It is interesting to submit ideas if the challenges are not looking for standard solutions.

Franke et al. (2014b) showed that for certain problems randomness explains the likelihood of finding a solution better than deterministic variables. It seems that increasing the number of contributors is not a primary goal in the Co-Creation Lab Vienna, however, as the challenges are too complex. It appears that randomness is not the most vital factor. *It is more about finding the right contributors*. Kirnbauer and Ogris explain that the right distribution of competencies is vital. Challenge owners are looking for solutions they cannot implement alone. In addition, analogue market effects (Franke et al., 2014a) are not relevant.

Zhang and Hermann (2017) explain that in open innovation contests the number of participants tends to decrease in subsequent contests. This reduces significantly the size of the crowd. For the Co-Creation Lab Vienna this effect cannot be observed. However, the number of calls is dramatically reducing. Zhang and Hermann (2017) also state the relevance of feedback to keep the participants motivated. All interviewees think that *feedback is important* for the contributors. Having no feedback is frustrating. Wrohlich explains that rejected contributors do not get specific feedback, but can ask the challenge owner for more information. However, this rarely happens. Likewise, Czernohorszky says the *feedback could be more insightful for the contributors*.

Frey et al. (2011) argue that monetary rewards have positive effects on the total number of contributions, whereas intrinsic motivation is positively related to the value of the contributions. The monetary prizes in the Co-Creation Lab Vienna cannot be evaluated yet. The *intrinsic motivation is rather low* in the Co-creation Lab. The *motivation in the Co-Creation Lab Vienna*

seems to be extrinsic. It is mostly about winning contracts, implementing projects, and getting in contact with people to increase the chances of future projects. This is by far the most important motivational factor.

Contributors also appear interested in getting *complex reference projects*. Catalysts and the other partners are even willing to invest money in this project, as the public funding only covers parts of their expenses. Consequently, in the short run they are losing money as contributor. In the long-term, they should have a great reference and be able to show that they can implement such projects. Of course, as it is an R&D project they will also learn new skills and insights during the project. There is also intrinsic motivation, but it plays only a minor role. To have a sophisticated and challenging reference project seems to be a big motivator, perhaps more so than just winning a contract.

Schattke and Kehr (2009) summarize the findings that most studies suggest a mix of intrinsic and extrinsic factors and they recommend creating open innovation projects in ways which increase especially the intrinsic motivation of participants. This is not done in the Co-Creation Lab Vienna. However, there is a strong *business to business (b2b) focus*. In this context, intrinsic motivation might be seen differently. As mentioned, the Co-Creation Lab Vienna does not have a strong community effect, as Hertel et al. (2003) describe it. The community effect is probably not a big motivator. Here too, the strong b2b focus might be relevant. Besides the chances of winning a project or getting a contract, Wrohlich says that *trust in the Vienna Business Agency is also a motivational factor*. That is something the others did not mention, but it appears vital. It can be assumed that trust is a prerequisite and otherwise the participants would not take part in such a process.

5.3 The Comparison of the Case Studies

Industry meets Makers and the Co-Creation Lab Vienna are different approaches to implementing open innovation services for third parties. One is an innovation community and the other is an innovation contest. In the table below, the differences and similarities are described. It is important to be aware of the different terminology used in both case studies. Briefing partner and challenge owner are comparable and also makers and contributors are similar.

Organization, Governance and Problems		
	Industry meets Makers	Co-Creation Lab Vienna
Who can submit problems?	Manufacturing companies and related fields (ICT, logistics)	Companies and public sector

Topics	Manufacturing, Internet of Things and related topics	No focus on a discipline – focus on R&D&I in general
Suitable problems	Firstly, solutions for problems that really exist in the daily business of a briefing partner. Secondly, new applications for existing hardware or software. Finally, briefings are used to find new business models.	Solutions for complex problems that really exist in the daily business
Hiddenness of knowledge	High amount of hidden knowledge	High amount of hidden knowledge
Complexity	Challenging and complex problems – but not too complex. Focus on radical innovation	Very complex problems. Focus on radical innovation
How broad or narrow should problems be defined?	Not too broad and not too narrow	Very specific and narrow. The goal should be as specific as possible, yet open on how to reach it.
Output	Finding of suitable partners, development of prototypes or concepts, reflection within the group	Finding of the right partners with suitable solutions. No concrete implementation
Strategic goals of the initiative	Build a community (Vienna, Austria, Europe) as a marketplace for the target groups	Fostering R&D&I in Vienna, foster collaboration in Vienna
What happens after the end?	Sometimes, deepened collaboration based on traditional business models (contracts).	Sometimes, implementation of the project based on a common research project with public funding or a direct contract.
Role of the organizer	General framework, community, brand, matching services, integrating opinions, community building, event organization, promotion	Centralized organization of a contest to find suitable partners, access to Vienna Business Agency's network, professional and specialized support by

		selected experts, external assessment of partners and their ideas, organization of events, handling of communication activities
Role of the briefing partner/challenge owner	Defining the problem, taking care of the process, organizing meetings with the makers, finding agreements, working with the makers for six months	Defining the problem and selecting the right partners with external help
Form of collaboration	Innovation community with elements of an innovation contest. Open source community as best practice	Innovation contest with some elements of an elite circle
Governance	Flat hierarchy but the briefing partners are more powerful: they define the problems, select solutions and outline how to collaborate. Decentralized – briefing partner do many things on their own	Hierarchical structure. Very centralized – the Vienna Business Agency defines the entire process and handles all the communication centrally.
Who is participating as a problem solver?	Initially makers, but now anyone	Innovative SMEs and partly startups and research organizations. Now also open to individuals.
Openness of participation	Open form of participation, but they should fit with the community culture and values.	Open form of participation, but they should be able to solve complex problems. Solution must be business driven.
Relationship: briefing partner/challenge owner and maker/contributor:	Focus on business to hobbyist, and to a smaller extent also B2B	B2B but also G2B (government to business)

Relationship: maker/contributor amongst each other	Cooperative - ideas are shared amongst the makers	Competitive - non-disclosure of ideas
Relationship: briefing partner/challenge owner amongst each other	At the same event, part of the same community.	Almost no interaction. Centralized communication through Vienna Business Agency

TABLE 4: COMPARISON OF CASE STUDIES REGARDING ORGANIZATION, GOVERNANCE AND PROBLEMS

Rules and collaboration		
	Industry meets Makers	Co-Creation Lab Vienna
Rules	Almost no explicit rules	Terms of participation with explicit rules
Definition of processes and rules	Centralized framework, but decentralized processes. The briefing partners define the processes.	Centralized process with milestones defined by the Vienna Business Agency
Accessibility and commitment of maker/contributor	No clear participation rules: come as you are. Very accessible	Defined rules, standard forms have to be signed. Formal and legally binding
Main mechanisms to ensure fairness	Community ensures fairness	Processes, rules, and Vienna Business Agency as public authority ensure fairness. For the project implementation (after the Co-Creation Lab Vienna has ended) trust in the project partners/contractors and legal agreements.
Social control	Social control through community	(Social) control through a public authority
Personal meetings	Personal meetings, personal relationship to create trust	Most communication through the Vienna Business Agency. For implementation after the Co-Creation Lab Vienna, personal meetings and personal relationships are important
Monitoring	Publicity and transparency. Monitoring activities by the community	Monitoring by Vienna Business Agency

Reasons for problems in the collaboration	Not intentional, expectations not met	Not intentional, expectations not met
Trust and values	High level of trust in the community. Shared values, shared intention	High level of trust in the Vienna Business Agency. For project implementation, high level of trust in the project partner and shared intention essential.
IPR	IPR not so relevant	Not so important In the Co-Creation Lab Vienna itself. Some relevance for project implementation, but not entirely clear picture.
Principal-agent dilemma	Industry meets Makers builds up trust between the parties. Principal-agent dilemma is not a big issue	Co-Creation Lab Vienna helps to find the right partners (external experts, pre-check by the Vienna Business Agency).

TABLE 5: COMPARISON OF CASE STUDIES REGARDING RULES AND COLLABORATION

Motivation		
	Industry meets Makers	Co-Creation Lab Vienna
Type of motivation	Intrinsic motivation, but also extrinsic to a lesser extent	Extrinsic motivation
Motivational factors	Community effect as motivator, meet likeminded people and learn from peers, implement solutions, access know-how, support, contracts, contacts	Win a contract, become a project partner, networking, implement an outstanding reference project
Compensation	Compensations and rewards are very flexible. There is no universal solution. It has to be agreed individually	Besides the cash prize the compensation is mostly to win a contract or alternately to join a public funded project.

Prizes/Awards	No prizes and no monetary rewards, but there are small incentives	10,000€ for each call. Prizes for the three best contributors. Prize is endowed by the Vienna Business Agency.
Makers/contributors	High number of makers are desired (growing). They should fit the values of the community.	Contributors have to be able to solve complex problems. The right contributors are sought (total number is not so important).
Feedback	Feedback is important – quality depends on the briefing.	Feedback is important but no universal process is in place.

TABLE 6: COMPARISON OF CASE STUDIES REGARDING RULES AND COLLABORATION

6 CONCLUSION

6.1 Summary of the Research Answers

In general, the propositions have to be revised for all research questions. The analysis showed that in practice there are different approaches used. However, they can be also explained by theory.

6.1.1 How are open innovation services for third parties organized (governance form etc.) and why are they organized in these ways? How do they define suitable problems or challenges?

The case studies show, as Pisano and Verganti (2008) and also Felin and Zenger (2013) describe, that open innovation is not practiced using a single approach. There are various ways to implement open innovation services (for third parties). The reasons for the application of different approaches in the case studies are diverse. In the case of Industry meets Makers, the governance and structure evolved and adapted to the target groups – mostly makers and hobbyists. The problems follow the organization, respectively the participants and the community. The problems are not the starting point to define such a program. Industry meets Makers is foremost a community and this impacts various aspects, as it can be perceived as the guiding principle. On the other hand, the Co-Creation Lab Vienna is organized as a centralized, formalized, and hierarchical innovation contest to ensure neutrality. This might be closely linked to Vienna Business Agency's experience as a funding agency.

Industry meets Makers and, to a lesser extent, the Co-Creation Lab Vienna show that openness of participating is a huge advantage, as it is often unknown who could be a problem solver and what could be the solution to the problem. Felin and Zenger (2013) define as suitable problems for innovation contests as well as innovation communities, tasks with a high amount of hidden knowledge. The findings support this point of view. As Hossain and Kauranen (2016) argue, open innovation is more appropriate for radical innovation. This can be confirmed by the two case studies. Neither format is suitable for standard problems. The Co-Creation Lab Vienna is an inappropriate instrument to replace a normal tender, as it is very demanding for the contributors. Likewise, this is true for Industry meets Makers. Greco et al. (2019) describe positive effects of open innovation. Open innovation might reduce the time-to-market, increase the know-how an organization owns, increase the market success of products and service, as well as extend the target market. There are indications that most of these effects can be found in both case studies.

Governance in Industry meets Makers

Industry meets Makers connects manufacturing and, by now, also ICT companies to makers. Topics that are dealt with are mostly in those fields. Hossain and Kauranen (2016) mention the positive effects of open innovation for SMEs, yet most briefing partners are larger companies. However, there is awareness for this issue. Moreover, it is not only about makers anymore, but also research organizations, SMEs, students, and startups can become problem solvers. This might cause an increase of problem-solving capacity through a more diverse and larger group of problem solvers. However, Industry meets Makers was opened up primarily to enlarge the community.

Originally, Industry meets Makers was intended as an innovation contest, but soon changed into an innovation community (Pisano & Verganti 2008). This was driven by the problem-solvers, the so-called makers, but was accepted and also supported by the organizing team and the companies. The role model for Industry meets Makers is the open source community. This development has to be seen also in the context of their target group. Problem solvers are still often hobbyists who are not generally trying to win a contract, so there is only little motivation to compete against each other. Adapting to a cooperative format was essential for Industry meets Makers to become an established platform and to grow. The governance structure was not chosen because of the problems that should be solved. The target group defined the governance structure and Stromberger, the founder and manager of Industry meets Makers, used it as an opportunity. Likewise, Lakhani et al. (2007) argue that more openness could deliver higher problem resolution rates and it makes sense to share ideas amongst the problem solvers. This can be confirmed in this case study, it seems that the cooperative mode is more successful than the competitive approach for the problems at hand.

There is a rather flat governance structure in Industry meets Makers, but an in-depth analysis shows that the element of decentrality is vital in this context. The concrete arrangement of the collaboration depends on each briefing partner. This means there can also be more hierarchical governance structures on occasion, as long as they fit to the community and its values. Likewise, the problem definition is done by the briefing partners. Hence, it is not a completely flat governance structure and still has hierarchical elements of an innovation contest. As it is intended as a service for companies to work on their problems in an open environment, it makes sense that they also have the decision power on what should be developed. In general, Industry meets Makers offers a framework and community, but many things have to be done by briefing partners on their own. This makes it more flexible but also more demanding for the briefing partners. They have to invest a lot of time.

Problem definition in Industry meets Makers

Open innovation in both Industry meets Makers and the Co-Creation Lab Vienna is focused on the inflows of knowledge (Chesbrough, 2003). The companies are getting expertise from makers, respectively contributors. However, Chesbrough's (2003) outflow aspect is also present in Industry meets Makers. Problem solvers get new technology and expertise to work on their personal or business-related problems. This is also a motivational factor. In general, there are three types of briefings in Industry meets Makers, seeking: solutions for problems that really exist in the daily business of a briefing partner; new applications for existing hardware or software; and new business models. There is no finding that suggests that one type is working better than the others, as there have been big successes and also failures in all three types.

As the governance structure at least partly follows the demands and needs of the problem solvers, it also seems that the target group is essential for defining suitable problems. The problems have to fit the interests and capabilities of the problem solvers. This has to be seen again in the context of Industry meets Makers as a community. Problems, structure, etc., have to fit the community and not the other way around. In general, Industry meets Makers is extremely community driven. Hobbyist play a vital role in this community. This focus on the target group is the reason for many attributes of Industry meets Makers. Of course, the problems also have to fit the briefing partners. Here the challenge is to internally find interested and motivated people from the specialized departments. Solving problems is not the only positive outcome for the briefing partners, but also learning to interact in such a setting and increasing the absorptive capacities of the company.

Complexity in Industry meets Makers

Problems should not be too narrow or too broad, as neither extreme works well in Industry meets Makers. For narrow problems there are often not enough interested people and for broad problems the solutions often do not fit the company. While broad problems may lead to interesting prototypes and concepts, they may also be inappropriate for the company. This fits to Chesbrough's (2003) claim that open innovation is defined by purposive inflow and outflow. Inflow that does not have a purpose (i.e. is too broad) is not the goal of open innovation. The problems should be challenging and complex, but overly complex briefings also do not work. In practice, briefings are inspired by previous briefings and if necessary there are pre-checks as to whether a problem is suitable.

Governance in the Co-Creation Lab Vienna

The Co-Creation Lab Vienna differs in various aspects from Industry meets Makers. The Co-Creation Lab Vienna is an innovation contest (Pisano & Verganti 2008). Moreover, there is no thematic focus and challenges address very diverse problems. Like Industry meets Makers, the Co-Creation Lab Vienna has evolved over the past four years. In the beginning there was a focus

on R&D, but this became broader and any kind of innovation is now suitable. Similarly, the structure became more flexible. In both cases studies, the need and demand triggered these changes. Despite the growing flexibility, the Co-Creation Lab Vienna has, in comparison to Industry meets Makers, a very structured and centralized process. Most aspects are managed by the Vienna Business Agency and there is a concrete defined process in place. The Vienna Business Agency is a public authority and is probably more used to process-driven and structured approaches, and partly obliged to act in such a way. The unique proposition of the Co-Creation Lab Vienna is its neutrality. As a public body, the Vienna Business Agency guarantees neutrality. Also, the Co-Creation Lab Vienna is not creating a community: it is thematically too broad, too hierarchical, and too centralized to create a community. However, it feeds partly from communities and networks that are generated through other activities of the Vienna Business Agency. These networks are activated in order to get suitable ideas for solutions. Nonetheless, common values and identity seem not be very present. It seems more like a loose connection and not comparable to the community found in Industry meets Makers.

The goal of Co-Creation Lab Vienna is to bring people together that would not know each other without the program. The challenge owners are mostly larger companies and the public sector. The contributors in the Co-Creation Lab Vienna are about 60% SMEs, 20% startups, and 20% research organizations. More recently, also individuals are allowed to participate. Nonetheless, the clear focus is to connect organizations and businesses. This difference from Industry meets Maker is probably the most essential one and the root cause of many other divergences. Furthermore, unlike Industry meets Makers, the Co-Creation Lab Vienna does not include the phases of actual collaboration and development of solutions. The output is that challenge owners know with which partners they can implement a project. Experts help to specify the problem and to select suitable partners. Projects should ideally be implemented after the Co-Creation Lab Vienna, but here the Vienna Business Agency is not so much involved. Challenge owners and contributors often switch to the governance form of a partnership at this stage, which is more suitable for complex problems and less suitable for problems with a high amount of hidden knowledge (Felin & Zenger 2013). It could be argued that the contest in the beginning is able to unveil hidden knowledge, whereas for the following implementation the knowledge is not hidden anymore.

The actual structure is also chosen because the Vienna Business Agency has to be completely neutral as a public authority. The call is a public process and does not give any one company preference. The Co-Creation Lab Vienna is a very centralized format. The Vienna Business Agency manages most aspects and always acts as proxy. Moreover, it has a very hierarchical structure. Vienna Business Agency has to accept the challenges and defines the entire process. Moreover, the relationship between challenge owners and contributors is very hierarchical. Challenge owners select who they want to see in a hearing and later on with whom they want to collaborate. This structure and hierarchy also support the challenge owners, as many tasks

are handled by the Vienna Business Agency. In contrast, participating is more resource intensive in Industry meets Makers and the briefing partners are responsible for many things. The openness in the Co-Creation Lab Vienna is rather limited, as the contributors do not know who else is participating or what solutions they suggest. Only the challenge owners and the experts have the full picture. Following Lakhani et al. (2007), this might decrease the chances of finding suitable solutions. This is a drawback, but at the same time, managing such openness might be too complex. Moreover, for the implementation in a consortium the knowledge is normally shared amongst the partners.

Problem definition in the Co-Creation Lab Vienna

In the Co-Creation Lab Vienna there is more or less just one type of challenge, which is always problem-driven. The other forms that can be found in Industry meets Makers are not allowed. This was a conscious decision, as previous initiatives showed that starting from an actual need helps to increase the likelihood that projects get implemented. Mostly complex technical solutions are looked for. There is a formalized process in place to submit a challenge and Vienna Business Agency determines whether a challenge is accepted. This is decided based on the answers to certain questions in the application form as well as the resources and the commitment of the challenge owner.

Complexity in the Co-Creation Lab Vienna

It seems that narrow problems work the best in the Co-Creation Lab Vienna. The challenge should be as concrete as possible. Whereas the goals should be very specific, the way to reach these goals should be open to various approaches. In general, the problems seem to be more specific in the Co-Creation Lab Vienna than in Industry meets Makers. A reason might be that there is not so much interaction and feedback loops in the Co-Creation Lab Vienna. In the Co-Creation Lab Vienna, contributors submit a written idea for a problem and there is no direct contact between contributor and challenge owner until the hearing. In Industry meets Makers there is a lot of room to work together on a problem, to test things and adapt certain aspects. Consequently, it is not so important to commit to a certain goal in the beginning and the problems evolve over a period of time. Overly broad problems cause similar results in Industry meets Makers and the Co-Creation Lab Vienna. The outputs are often not usable for the organizations as they do not fit their strategies. In the Co-Creation Lab Vienna challenges should be very complex - probably more complex than in Industry Meets Makers. Here again the focus on companies and research organization is a probable explanation, as they are used to handling more complex issues compared to hobbyists (Industry Meets Makers). The Co-Creation Lab Vienna matches organizations with complementary skills, such that especially multidisciplinary research questions are very well suited.

6.1.2 How do open innovation services for third parties ensure fairness amongst the parties and how do they handle the principal- agent dilemma in an open innovation setting?

The two case studies also show different approaches when it comes to ensuring fairness between the stakeholders and preventing opportunistic behavior. Nonetheless, ensuring fairness and building up trust is extremely relevant for both. One is a contest in a neutral setting and the other is a community with common values. In Industry meets Makers, the community is the most important mechanism to ensure fairness. In the Co-Creation Lab Vienna, legal documents, a structured process, and the Vienna Business Agency as a public authority are mechanisms to ensure fairness. However, there are also similarities: problems in collaboration are normally not intentional; it seems there is no opportunistic behavior or exploitation of trust; problems are mostly caused by mismatching or false expectations; and expectation management is at the core of both initiatives.

The reasons for dissimilar approaches in the two case studies are the different target groups (hobbyists and makers respectively businesses), the different legal setting (private versus public), and the focus on building up a community versus running a contest. Moreover, Industry meets Makers also includes the actual implementation of an innovation project, whereas the Co-Creation Lab Vienna is limited to finding the right partners.

Control and fairness in Industry meets Makers

In Industry meets Makers, social control, transparency, and the norms of the community are essential. There are no explicit rules for the collaboration and the community provides implicit regulations. Those norms are deeply rooted in the core community of Industry meets Makers and are carried further to new people in the community. This creates trust and ensures fairness. Other essential elements are transparency and publicity, which reduce the likelihood of opportunistic behavior as everyone is on stage. Likewise, personal contact between the stakeholders is vital for a successful collaboration.

Despite the decentrality, Stromberger is essential for the initiative as she provides a vision, integrates people, and connects the right dots. It seems it is not so much about the governance form and more important who is participating. It appears that there is some kind of self-recruiting effect. Furthermore, the motivation of the makers is mostly intrinsic, which is incompatible with opportunistic behavior in many aspects. The high level of trust in the community can also be seen in the fact that contracts do not play an import role. Contracts are not relevant for either the briefing partners or the makers. Moreover, the lack of contracts make Industry meet Makers attractive, as it is very accessible.

In practice, IPR are not so relevant in Industry meets Makers. On the one hand there is a high level of trust, while on the other hand IP is simply not relevant to many briefings. Where it could be an issue, it should nevertheless not be the first thing that is addressed, as starting with this topic could end potential collaborations at a very early stage. This confirms Lichtenthaler's (2009) findings.

The approach Longo and Giaccone (2017) suggest to ensure fairness is only partly implemented, as there are no clear participation rules. This makes Industry meets Makers very accessible and scalable. Explicit rules are not necessary because the community regulates many issues. Monitoring activities, on the other hand, can be found in Industry meets Makers. The publicity can be considered as monitoring activities. Likewise, psychosocial compensations as incentives to support effective collaboration can be found in the community (Longo & Giaccone, 2017).

The principal-agent dilemma in Industry meets Makers

The principal-agent dilemma is not so relevant in Industry meets Makers. The relationship between makers and briefing partners is not entirely a principal-agent relationship as Schmidt (2016) describes it. Makers do not provide a service to the briefing partners as they are not contracted. Moreover, there would be one principal and many agents working collaboratively, and the briefing partner does not have to select anyone. After Industry meets Makers, further and deepened collaboration might take place and this is often based on traditional business models. Consequently, there might be contracts and a principal-agent relationship, but they have already collaborated for a long time at this point and built up trust during Industry meets Makers. The principal can therefore trust that the agent will conduct the service on behalf of, and to the satisfaction of, the principal. Moreover, despite being a contract between two parties, they are both part of the same community. Opportunistic behavior by either would probably lead to sanctions through the community. Industry meets Makers builds up trust and tackles what Hewitt-Dundas and Roper (2017) describe as the difficulty in assessing the trustworthiness and motives of potential partners for open innovation.

Control and fairness in the Co-Creation Lab Vienna

The Co-Creation Lab Vienna is to some extent a legally regulated space. Everyone has to sign terms of participation. The terms of participation regulate the entire process and define rights and duties. They are essential for ensuring fairness. Of course, in practice many things are not controlled. Moreover, nobody can be forced to implement a project. Likewise, those rules only address the process in the Co-Creation Lab Vienna. The implementation of a project happens after the Co-Creation Lab has ended. The Co-Creation Lab Vienna only helps to specify the problem and find the right partners. Hence, the actual collaboration between the stakeholders is not part of the terms of participation. This collaboration can take on various forms and cannot be regulated easily. There is no one-size-fits-all solution.

There is no clear picture of the relevance of IPR in the Co-Creation Lab Vienna. This depends probably on the challenges and the involved stakeholders. However, it has at least some relevance. When it comes to the implementation, IPR is an issue and has to be agreed on individually. A common trust base is also at least as important. Longo and Giaccone (2017) suggest three different approaches to improve collaboration in open innovation settings. They can be partly found in the Co-Creation Lab Vienna. There are clearly defined rules of participation that allow multiple stakeholders to interact with each other. However, the psychosocial compensations as incentives to support effective collaboration and discourage opportunistic behaviors do not play an important role in the Co-Creation Lab Vienna. Finally, Longo and Giaccone (2017) advise monitoring activities and social control mechanisms. Those can be partly found in the Co-Creation Lab Vienna. Nonetheless, the focus is on clear and legally binding rules in combination with the Vienna Business Agency as public authority. The Vienna Business Agency provides for processual fairness as a neutral and transparent proxy.

The principal-agent dilemma in the Co-Creation Lab Vienna

By helping to find the right partners, the Co-Creation Lab Vienna is also addressing agency problems. There are external experts that evaluate solutions, a hearing to discuss those solution, etc. Again, the neutrality of the Vienna Business Agency is vital in this context. Likewise, the Vienna Business Agency has a strong gate keeper function. The commitment and capabilities of the challenger owners are checked. In general, the Co-Creation Lab Vienna builds up trust and some kind of social control is exerted just by the mere presence of the Vienna Business Agency. Moreover, the process itself fosters neutrality and fairness as there are formalized processes in place. As a funding agency, the Vienna Business Agency knows how to be fair and transparent. Parts of processes of the Co-Creation Lab Vienna are inspired by the processes for funding. This is especially true for the hearing. This shows that open innovation services have to be seen in their specific context.

6.1.3 Why do problem solvers participate and what is their motivation?

The different forms of organization and the different target groups lead to varying motivational factors. In Industry meets Makers, intrinsic motivation is the most important factor. Again, this has to be seen in the context of the focus on hobbyists and the community as an organizational form. There seems to be an interrelation between intrinsic motivation and the focus on a community, respectively the change from a competitive format to a cooperative one. Hertel et al. (2003) describe a community effect in open source software projects and this effect increases motivation to participate. This effect can be found in Industry meets Makers. Schattke et al. (2009) argue that a mix of intrinsic and extrinsic factors works best, but that there should be a focus on non-monetary factors, as can be found in Industry meets Makers. There are also extrinsic factors in Industry meets Makers, but there is no universal rule, as rewards and compensations have to be agreed individually between the stakeholders. This is a smart

approach, because for one person a job offer could be interesting and for the next it may be a contract or something completely different. The problem solvers are extremely diverse in Industry meets Makers. Thus, also appropriate compensations are varying. Of course, this is only possible in a decentralized setting and is also demanding to implement. Here again, expectation management is essential. Interestingly, it seems that money prizes can have a negative influence and reduce intrinsic motivation. This supports Frey's (1997) who describes an effect of extrinsic motivators crowding-out intrinsic motivators and suggests that his findings also applicable in the context of open innovation. As Schattke and Kehr (2009) mention, providing a vision is an important factor for improving intrinsic motivation. This can be also seen in Industry meets Makers, as Stromberger has been able to provide such a vision for the community.

Zhang and Hermann (2017) describe the problem that with multiple, consecutive open innovation contests, the number of participants decreases in subsequent contests. This is, as mentioned, not the case in Industry meets Makers. Most likely, the reason for this is that Industry meets Makers is more an innovation community than an innovation contest, and growing the community is also a goal. Zhang and Hermann (2017) mention also the importance of feedback in order to motivate problem solvers to continue to participate. In both case studies there is a strong awareness for the benefits and necessity of feedback, but a lack in terms of implementation of a proper feedback process: most likely because it is very demanding and the benefits of such a process are rather seen in the long-term. In Industry meets Makers there is likewise an outflow of knowledge. For certain participants this is also a motivational factor because they can acquire knowledge by taking part.

In the Co-Creation Lab Vienna extrinsic motivational factors are most relevant. Contributors want to win a contract or become a partner for a funded research project. It seems that it is attractive to work on very complicated problems in order to get reference projects. Demanding reference projects help companies to showcase and improve their capabilities and might be a way of winning future costumers. This also means that there is also a long-term perspective for contributing in the Co-Creation Lab Vienna. For universities and other research organizations, complex problems are even more interesting. In this sense the Co-Creation Lab Vienna is not just for customer acquisition by the contributors. In general, the Co-Creation Lab Vienna is demanding for contributors and creates a lot of uncertainty. They do not know how many other organizations will participate in a challenge, nor what really happens with their ideas. Hence, the motivation must be strong. Franke et al. (2014b) showed that for certain problems randomness explains the likelihood of finding a solution better than deterministic variables. It seems that increasing the number of contributors is not a primary goal. Probably the challenges in the Co-Creation Lab Vienna are too complex. It seems randomness is not the most vital factor. It is more about finding the right contributors.

The monetary prizes in the Co-Creation Lab Vienna cannot be evaluated yet. Nonetheless, the primary goal is not to motivate participants, but to compensate contributors when no projects

are implemented. This also implies that there is no community effect as in Industry meets Makers. But the trust in the Vienna Business Agency as neutral authority is a big motivator. It can be assumed that trust is prerequisite and otherwise the participants would not take part in such a process.

6.2 Implications for Practitioners

Various points can be deduced to implement open innovation services (for third parties).

Governance

- An open innovation approach makes sense when one knows neither the solution, nor where to look for a solution. Of course, open innovation has drawbacks, and it can be slow and tedious when used for simple standard problems. It is advised to rather focus on radical innovation when embracing open innovation practices.
- Taking part as an organization in such a process is very demanding. It should be clearly stated that this is effortful. As this task is often taken on by innovation management departments, it is essential to integrate the relevant specialized departments from the very beginning and synergize the process effectively.
- There is no superiority of any open innovation approach. This means that it cannot be concluded that an innovation contest is better than an innovation community, or the other way around. It all depends on the goals, the target groups, the context, the network, the resources and capabilities, and the problems. It is essential for practitioners to evaluate those aspects and chose a matching approach. A two-dimensional matrix (Pisano & Verganti 2008) is probably not enough. Each of the mentioned parameters has to be taken into consideration. Of course, not all parameters are relevant in all cases, but disregarding any should be a conscious decision.
- Likewise, hierarchy in an open innovation depends on the mentioned parameters. A contest is mostly more hierarchical than a community. For contests, the organization has to have the capabilities and knowhow. In a community, tasks, efforts, and costs can be shared. This also means that for the participants an innovation community is often more effortful.
- A process can be implemented in either a more centralized or more decentralized manner. Decentralization always means a loss of control, but increases flexibility. Consequently, a contest is mostly centralized and a community is normally decentralized.

Problem Definition

- Problems should not be too broad or too narrow. It is advised to describe a goal an organization wants to reach, but it is important to be very flexible and open on possible solutions to reach this goal.
- Broad problems in an open innovation setting lead to an inflow of knowledge (i.e. solutions) that is not purposive. It is important to increase the absorption capacities of organizations in order to increase the inflow of knowledge, and thus improve the success rate of open innovation practices.
- Complexity has to be adequate for the target groups. An iterative approach or a precheck can help to determine whether a problem is suitable.
- For more complex problems, a cooperative approach is better suited (consortium, innovation community, etc.). Different governance forms can be combined. For instance, a contest can be used to find possible partner, but the solution may be implemented in a consortium.

Fairness and trust

- Trust and fairness are essential for an open innovation process. It is important to build up trust between the stakeholders. Likewise, there is not just one way to do this and it depends on the mentioned parameters. It can be based on explicit rules and processes, a strong community, transparency, social control mechanisms, etc. They are not randomly combinable, however, and have to fit the chosen strategy. These mechanisms can also discourage people. For example, legal contracts easily scare off hobbyists.
- In general, there is difficulty in assessing the trustworthiness and motives of potential partners for open innovation. This has to be addressed in such a service. Especially working with external experts acting as a third party to evaluate the ideas of possible partners is a fruitful approach.
- Before starting a larger project with partners, it is useful to have smaller pre-projects in order to build up trust and get to know each other.
- Sharing ideas and fostering the collaboration of the problem solvers makes sense. Of course, this increases the complexity of managing such a process. Moreover, it could discourage companies that are not used to working in such a way.
- IPR might be relevant in certain settings. However, trust is at least as important and one should never start a collaboration with talking about IPR. Starting with this topic too early can endanger the collaboration process.
- There will be many questions on IPR, despite not being extremely relevant in practice. It is important to be able to answer those questions. For instance, name a person they can contact in the case of problems.

- The feedback process is essential for initiatives that run multiple rounds over a period of time. Without proper feedback, problem solvers will get frustrated quickly. Implementing such a feedback process is demanding and has to be thought through. Who gives feedback and in what form? Moreover, the specialized departments have to be involved in the feedback process.
- It is important to raise awareness for open innovation and make stakeholders aware of the benefits of open innovation. This helps to get more and more interesting problems as well as more problem solvers.

Motivating problem solvers

- There are various ways to motivate problem solvers. Again, there is no universal approach. For businesses as problem solvers extrinsic motivation is extremely important. Without at least a long-term prospect of creating revenue they will be discouraged. It is not advised to underestimate extrinsic motivation. For individuals and hobbyists, intrinsic motivation is even more important. They want to put ideas into practice, improve something, show that they can fix problems, etc.
- Monetary prizes can also have a negative impact on intrinsic motivation (crowding-out effect). If intrinsic motivation is the most important factor it is advised to not use extrinsic motivators.
- Complexity is interesting for most types of problem solvers. Nonetheless, challenges and briefings have to match the capabilities of the target group. This can be evaluated in a pre-check.
- Implementing interesting reference projects is also a strong motivational factor. A reference project should show the skills and know-how of a business or individual. Of course, this depends on the problem solver.
- In an open multi-stakeholder setting, expectation management is essential. False or mismatched expectations are a main source for conflicts. Intentions should be cleared with each stakeholder and be transparent. This has to be done in a setting that ensures trust and fairness. As already mentioned, this is linked to explicit rules and processes, a strong community, transparency, social control mechanisms, etc.

6.3 Limitations of the Study

This study is based on case studies (Yin 2018). Hence, the goal is not to discover a universal and generalizable truth. Case studies are not representative of some population and consequently theoretical sampling is used (Eisenhardt & Graebner, 2007). It cannot be concluded that certain findings in the case studies can be generalized to all open innovation services (for third parties). The result of this study is not a statistical generalization and it does not answer numerical questions. The outcome is what Yin (2018) calls analytic generalization, thus, theory is tested, validated and expanded.

It turned out that both case studies are extremely broad and diverse. Generalization from one challenge, respectively briefing, to the entire initiative was not always feasible. In this context embedded case studies (Yin, 2018) - case studies that contain more than one subunit - might have been the better choice to identify commonalities and differences even more clearly. This is especially true for Industry meets Makers because there exists a decentralized structure. Hence, each briefing could be a subunit of the case study.

Mostly interviews were used for data collection purposes. There are various drawbacks of interviews, like subconscious bias and social desirability (Alshenqeeti, 2014). The interviews were conducted in a professional manner, but this might be still a limitation. Furthermore, there were time constraints which led to fewer interviews than originally planned. Nonetheless, the saturation point was achieved, so it turned out that the eight interviews were sufficient.

6.4 Future Research

The study shows that in most aspects existing theories can explain the similarities as well as the divergences between the two case studies. However, more research is necessary to analyze the impact of different target groups in open innovation settings. The study demonstrates that this is an extremely important factor. Future research should investigate the benefits of working with different target groups and reflect on possibilities to combine different types of problem solvers.

Moreover, a trust base amongst the stakeholder is a vital success factor. More research is necessary to find out how open innovation services for third parties can foster trust. It would be great to work out various instruments and mechanisms that support practitioners. Evaluation of the efficacy of such instruments could be done in experiments. Nevertheless, this will be a very demanding endeavor.

Likewise, a quantitative approach is necessary to get more insights. It would be interesting to find out how relevant open innovation is becoming, how many are participating, who is participating and what the outputs are. Certain mechanisms in such settings can be also evaluated quantitatively. Especially, instruments like prize money can be researched well. Similarly, it would be an insightful supplement to research the two case studies based on quantitative methods.

Diversity can drive innovation. It is necessary to research diversity, inclusion and exclusion in open innovation settings. How can open innovation benefit from diversity and how diverse have open innovation initiatives already become? It also makes sense to investigate the governance structure in the context of diversity.

6.5 Contribution to Knowledge

As mentioned, there is already a well-established theoretical framework for open innovation settings. This study was able to confirm many aspects that were presented in the theory section. This can be seen as a contribution to the existing knowledge. Moreover, there is a lack of research when it comes to different target groups. It is influential whether hobbyists or companies are intended as problem solvers. This impacts the entire structure, the motivation factors, and how to ensure fairness. It seems that the importance of this distinction has not yet been fully acknowledged. Many statements about open innovation contests and communities are not generalizable without referring to a specific group of problem solvers. This study shows clearly the relevance of the target group.

Moreover, the study reveals clearly the importance of trust in open innovation settings. However, there is no universal solution to create trust. Nonetheless, it seems that trust is essential and underrepresented as a factor in the literature. As with other aspects, trust must also be considered in the context of the specific target group.

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8 APPENDIX

8.1 Interview Guidelines

8.1.1 Interview Guideline: Organizer

Allgemein

1. Was bedeutet Open Innovation für Sie? Was sind für Sie best and worst practices und warum?
2. Um was geht es im Co-Creation Lab Vienna bzw. bei Industry meets Maker (was ist das Ziel). Was ist Ihre Rolle?
3. Was sind die größten Herausforderungen?
4. Was funktioniert gut?

RQ1

5. Wie werden Probleme bzw. Challenges ausgewählt? Welche eignen sich besonders für das Format, welche nicht?
6. Warum?
7. Was für Lösungen werden gesucht?
8. Wer darf Lösungen einreichen?
9. Wie ist die Lösungssuche organisiert und weshalb wurde diese Form gewählt?

RQ2

10. Gibt es Probleme in der Zusammenarbeit der verschiedenen Partner (Organisationen, die Challenges einreichen und die die Lösungen einreichen)?
11. Wie wird ein fairer Umgang zwischen den Organisationen, die sich über die Initiative gefunden haben, gewährleistet?
12. Welche Maßnahmen werden genutzt, um opportunistisches Verhalten zu verhindern?
13. Welche Rolle spielen definierte Regeln in der Zusammenarbeit zwischen den Organisationen? Definieren Sie überhaupt Regeln?
14. Wie relevant ist soziale Kontrolle in diesem Setting? Nützen Sie dieses Element aktiv?
15. Welche Relevanz haben IPR-Regelungen für die Zusammenarbeit?

RQ3

16. Wer reicht Lösungsvorschläge ein?
17. Von wem (welche Personen, Organisationen etc.) wollen Sie Lösungsvorschläge generieren?

18. Warum reichen Einreicherinnen und Einreicher ein?
19. Welche weiteren intrinsischen und extrinsischen Faktoren der Motivation gibt es?
20. Wie setzen Sie diese ein? Welche Faktoren sind die wichtigsten?
21. Falls noch nicht beantwortet: Gibt es Feedback für die Lösungsideen, Gibt es Preise (wie hoch, wie oft, wie viele)?
22. Welche Rolle spielt die Community bzw. das Community-Building?

Abschluss

23. Haben ich noch etwas vergessen, was für Sie wichtig ist? /Gibt es noch etwas, dass Sie sagen möchten?

8.1.2 Interview Guideline: Organizer. In English (the interviews were conducted in German)

Introduction

1. What does open innovation mean to you, what are, according to you, best and worst practices and why?
2. What is the goal of the Co-Creation Lab Vienna resp. Industry meets Maker? What is your role?
3. What are the biggest challenges?
4. What works well?

RQ1

5. How are problems or challenges selected? Which are particularly suitable for the format, which are not? Why?
6. What solutions are being looked for?
7. Who is allowed to submit solutions?
8. How is the search for solutions organized and why was this form chosen?

RQ2

9. Are there any problems when the different partners (organizations that submit challenges and organization that submit the solutions) collaborate?
10. How do you ensure fair play between the organizations that have found each other through the initiative?
11. What measures are used to prevent opportunistic behavior?
12. What role do defined rules play in collaboration between organizations? Do you define rules at all?
13. How relevant is social control in this setting? Are you using this element actively?

14. What is the relevance of IPR arrangements for cooperation?

RQ3

15. Who submits proposed solutions?

16. From whom (which persons, organizations etc.) do you want to get solutions?

17. Why do applicants submit solutions?

18. What other intrinsic and extrinsic factors of motivation exist?

19. How do you use these? Which factors are the most important?

20. If not yet answered: Is there feedback for the solution ideas, are there prizes (how high, how often, how many)?

21. What role does the community or community building play?

End

22. Did I forget something else that is important to you? / Is there anything else that you want to say?

8.1.3 Interview Guideline: Challenge Owner and Briefing Partners

Allgemein

1. Was bedeutet Open Innovation für Sie? Was sind für Sie best and worst practices und warum?
2. Was war Ihre Rolle im Co-Creation Lab Vienna bzw. bei Industry meets maker
3. Wieso haben Sie sich für das Co-Creation Lab Vienna bzw. Industry meets Maker entschieden?
4. Was sind die größten Herausforderungen?
5. Was funktioniert gut?

RQ1

6. Was war der Gegenstand Ihrer Challenge?
7. Welche Aufgabenstellungen eignen sich besonders für das Co-Creation Lab Vienna bzw. Industry meets Maker, welche nicht? Warum?
8. Wie haben Sie Ihre Challenge ausgewählt?
9. Welche Rolle spielen bei der Problemauswahl die Organisatorinnen und Organisatoren des Co-Creation Lab Vienna bzw. von Industry meets Maker?

RQ2

10. Gab es Probleme in der Zusammenarbeit der verschiedenen Partner (Organisationen, die Challenges einreichen und die die Lösungen einreichen)?

11. Wie wird ein fairer Umgang zwischen den Organisationen, die sich über die Initiative gefunden haben, gewährleistet?
12. Welche Rolle spielen definierte Regeln in der Zusammenarbeit zwischen den Organisationen?
13. Wie relevant ist soziale Kontrolle und soziale Normen in diesem Setting?
14. Welche Relevanz haben IPR-Regelungen für die Zusammenarbeit?
15. Wann und welcher Vertrag wurde geschlossen? Warum?
16. Welche Rolle spielen hier die Organisatorinnen und Organisatoren des Co-Creation Lab Vienna bzw. von Industry meets Maker? Gab es hier konkrete Vorgaben?

RQ3

17. Von wem (welche Personen, Organisationen etc.) wollten Sie Lösungsvorschläge generieren und wer hat Lösungsvorschläge eingereicht?
18. Warum - glauben Sie - reichen Einreicherinnen und Einreicher ein?
19. Welche weiteren intrinsischen und extrinsischen Faktoren der Motivation gibt es bei den Einreicherinnen und Einreicher?
20. Welche Rolle spielt die Community bzw. das Community-Building? Wurde eine Community um das Creation Lab Vienna bzw. Industry meets Maker erschaffen? Sehen Sie sich als Einreicher als Teil einer Community?
21. Welche Rolle spielen hier die Organisatorinnen und Organisatoren des Co-Creation Lab Vienna bzw. von Industry meets Maker?

Abschluss

22. Haben ich noch etwas vergessen, was für Sie wichtig ist? /Gibt es noch etwas, dass Sie sagen möchten?

8.1.4 Interview Guideline: Challenge Owner and Briefing Partners. In English (the interviews were conducted in German)

Introduction

1. What does Open Innovation mean to you? What are best and worst practices for you and why?
2. What was your role in the Co-Creation Lab Vienna or at Industry meets maker
3. Why did you choose the Creation Lab Vienna or Industry meets maker?
4. What are the biggest challenges?
5. What works well?

RQ1

6. What was the subject of your challenge?
7. Which problems are particularly suitable for the Co-Creation Lab Vienna or Industry meets maker, and which are not? Why?
8. How did you choose your challenge?
9. What role do the organizers of the Co-Creation Lab Vienna or Industry meets Maker play in the selection of problems?

RQ2

10. Have there been problems in the collaboration between the different partners (organizations that submit challenges and that submit the solutions)?
11. How is fair play ensured between the organizations that have found each other through the initiative?
12. What role do defined rules play in the cooperation between the organizations?
13. How relevant is social control and social norms in this setting?
14. What relevance do IPR regulations have for collaboratio?
15. Which contract was sign? Why and when?
16. What role do the organizers of the Co-Creation Lab Vienna and Industry meets Maker play here? Have there been any specific regulations?

RQ3

17. From whom (which persons, organizations, etc.) did you want to generate proposed solutions and who submitted proposed solutions
18. Why do you think problem solvers submit ideas?
19. What other intrinsic and extrinsic motivational factors are there for the submitter?
20. What role does the community or community building play? Was a community created around the Creation Lab Vienna or Industry meets maker? Do you see yourself as a submitter as part of a community?
21. What role do the organizers of the Co-Creation Lab Vienna and Industry meets Maker play here?

End

22. Have I forgotten something else that is important to you? / Is there anything else you want

8.1.5 Interview Guideline: Contributors and Makers (problem solvers)

Allgemein

1. Was bedeutet Open Innovation für Sie? Was sind für Sie best and worst practices und warum?
2. Was war Ihre Rolle im Co-Creation Lab Vienna bzw. bei Industry meets Maker
3. Wieso haben Sie sich für das Creation Lab Vienna bzw. Industry meets Maker entschieden?
4. Was sind die größten Herausforderungen?
5. Was funktioniert gut?

RQ1

6. Bei welcher Challenge bzw. bei welchem Briefing haben Sie teilgenommen?
7. Welche Aufgabenstellungen eignen sich besonders für das Co-Creation Lab Vienna bzw. Industry meets Maker, welche nicht? Warum?
8. Wie haben Sie die Lösungssuche wahrgenommen. Beschreiben Sie den Prozess aus Ihrer Sicht.
9. Warum glauben Sie, dass dies so organisiert ist?

RQ2

10. Gab es Probleme in der Zusammenarbeit der verschiedenen Partner (Organisationen, die Challenges einreichen und die die Lösungen einreichen)?
11. Wie wird ein fairer Umgang zwischen den Organisationen, die sich über die Initiative gefunden haben, gewährleistet?
12. Welche Rolle spielen definierte Regeln in der Zusammenarbeit zwischen den Organisationen? Wer definiert Regeln?
13. Wie relevant sind soziale Kontrolle und soziale Normen in diesem Setting?
14. Welche Relevanz haben IPR-Regelungen für die Zusammenarbeit?
15. Wann und welcher Vertrag wurde geschlossen? Warum?
16. Welche Rolle spielen hier die Organisatorinnen und Organisatoren des Co-Creation Lab Vienna bzw. von Industry meets Maker? Gab es hier konkrete Vorgaben?

RQ3

17. Warum haben Sie eingereicht?
18. Warum reichen andere Einreicherinnen und Einreicher ein?
19. Welche weiteren intrinsischen und extrinsischen Faktoren der Motivation gibt es?
20. Haben Sie Feedback zu Ihren Einreichungen erhalten? Falls ja, in welcher Form? War es hilfreich? Falls nein, war das für Sie ein Problem?

21. Welche Rolle spielt die Community bzw. das Community-Building? Wurde eine Community um das Creation Lab Vienna bzw. Industry meets Maker erschaffen? Sehen Sie sich als Einreicher als Teil einer Community?
22. Welche Rolle spielen hier die Organisatorinnen und Organisatoren des Co-Creation Lab Vienna bzw. von Industry meets Maker?

Abschluss

23. Haben ich noch etwas vergessen, was für Sie wichtig ist? /Gibt es noch etwas, dass Sie sagen möchten?

8.1.6 Interview Guideline: Contributors and Makers (problem solvers). In English (the interviews were conducted in German)

Introduction

1. What does Open Innovation mean to you? What are best and worst practices for you and why?
2. What was your role in the Co-Creation Lab Vienna or at Industry meets Maker
3. Why did you choose the Creation Lab Vienna or Industry meets Maker?
4. What are the biggest challenges?
5. What works well?

RQ1

6. In which challenge or briefing did you take part?
7. Which problems are particularly suitable for the Co-Creation Lab Vienna or Industry meets maker, and which are not? Why?
8. How did you perceive the search for a solution? Describe the process from your point of view.
9. Why do you think that it is organized like this?

RQ2

10. Have there been problems in the collaboration between the different partners (organizations that submit challenges and that submit the solutions)?
11. How is fair play ensured between the organizations that have found each other through the initiative?
12. What role do defined rules play in the cooperation between the organizations? Who defines rules?
13. How relevant are social controls and social norms in this setting?
14. What relevance do IPR regulations have for cooperation?

15. Which contract was signed? When and Why?
16. What role do the organizers of the Co-Creation Lab Vienna and Industry meets Maker play here? Have there been any specific requirements?

RQ3

17. Why did you submit?
18. Why do other submitters participate?
19. What other intrinsic and extrinsic motivational factors are there?
20. Did you receive feedback on your submissions? If so, in what form? Was it helpful? If not, was that a problem for you?
21. What role does the community or community building play? Was a community created around the Creation Lab Vienna or Industry meets maker? Do you see yourself as a submitter as part of a community?
22. What role do the organizers of the Co-Creation Lab Vienna and Industry meets maker play here?

End

23. Did I forget something else that is important to you? / Is there anything else you want to say?