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Identifying and engaging with startups
A case study conducted at Volvo Cars' Silicon Valley R&D Tech Center

Master's Thesis in the Quality and Operations Management Programme
Innovation and R&D Management

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Pleasant reading,

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Abstract

The automotive industry is currently facing enormous changes, driven by globalisation, governmental regulations, and accelerating technological advances. Thus, as a corporation that strives towards being market leading within the field, it is important to be able to adapt to these changes to be in the forefront of technology development. A part of this, suggested by open innovation literature, is that it is necessary to look for external knowledge to complement the internal innovation. In order to do so, identifying and engaging with startups in early stages of technology development can be of great importance. Partly for this reason, several of the world's largest automotive OEMs have established offices in Silicon Valley, which is one of the world's most famous innovation clusters.

This master's thesis, conducted for Volvo Car Corporation, aims to pinpoint the challenges and key factors for automotive OEMs to successfully engage with startups. The data collection for the qualitative case study was conducted during two months in Silicon Valley, by interviewing 24 professionals from the area. Interviewees from three different groups: startups, automotive OEMs, and experts, were targeted in order to get multiple perspectives.

The empirical findings, which correlate strongly to previous research on the topic, suggest that the biggest challenges related to engagements of this nature are the cultural differences, different organisational clocks, and the bureaucracy in automotive OEMs, that can be devastating for a startup. To overcome these challenges, automotive OEMs must make sure to understand the startup's point of view, by having people in the organisation that have experience in and understand the startup world. Also, in order to cope with the bureaucratic challenges, large firms need to have a separate unit that is able to act like a startup, as well as be well prepared before starting and have procedures in place to be able to act fast when the opportunity arises. The key factors for successful engagements are summarised in a process of how to identify and engage with startups at the end of the report.

Glossary

AI	Artificial Intelligence.
Automotive OEM	Original Equipment Manufacturer in the automotive industry.
Engagement	In this report, any kind of collaboration between an automotive OEM and a startup is referred to as an engagement.
CVC	Corporate Venture Capital.
IP	Intellectual Property.
Light engagement	A light engagement refers to a relatively small engagement that takes place during a short period of time. Examples of light engagements are pilot projects and proof of concept projects.
OI	Open Innovation.
POC	Proof of Concept.
Startup	In this report, a startup is defined as an organisation that is seeking a scalable and repeatable business model.
VC	Venture Capital.

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1. Introduction

This chapter presents the background, purpose, research questions, and delimitations of the study. At the end of the chapter, the disposition of the remaining chapters of the report is presented.

1.1. Background

Mary Barra, the Chairman and CEO of General Motors, has expressed that she expects the automotive industry to change more in next the five to ten years than it has during the past 50 (Barra, 2016). After having represented the very definition of a mature industry for many years, with a clear dominant design, the customer preferences within the automotive industry are changing from the vehicle as a product towards mobility as a service (Schulze, MacDuffie & Taube, 2015).

According to Schulze et al. (2015), there are three main driving forces behind the changes in the automotive industry: globalization, governmental regulations, and technological advances. First, the accelerating globalization has entailed increased foreign direct investments, global production, and cross-border trade (Sturgeon, Memedovic, Biesebroeck & Gereffi, 2009). Second, socio-political issues, such as the desire for less oil dependency, climate change concerns, air pollution, and congestion, have pushed for new regulations concerned with energy consumption, emissions, and safety (Schulze et al., 2015). Third, the technological advances within the area of electronics, communication, and internet have been developed faster than ever before. This has entailed that players within sectors such as chemistry and electricity have entered the automotive industry. Also, the changes in customer preferences have facilitated new business models (Schulze et al., 2015).

One indicator of that the technological advances has entailed that the automotive industry is becoming more software driven rather than hardware driven is that several of the world's largest automotive OEMs have established offices in Silicon Valley (Nelson, 2014). The innovation cluster has long been known for being in the forefront of technology development. One of the reasons why corporations have established presence in the area is to scout and look for emerging technologies by approaching the startups scene (Nelson, 2014). Entrepreneurial startups can be a valuable source of new knowledge for large corporations (Kortum & Lerner, 2000; Shane, 2001), since they are much more agile compared to large corporations (Hogenhuis, van den Hende & Hultink, 2016; Weiblen & Chesbrough, 2015). On the other hand, startups does not have the same resources as large corporations have, which makes collaborations between the two parties seem like an obvious win-win (Chesbrough, 2006). However, it is in fact very difficult to succeed with such engagements (Weiblen & Chesbrough, 2015).

One main challenge related to engagements between corporations and startups is the cultural differences, which makes it difficult to understand one another and align the ways of working (Weiblen & Chesbrough, 2015). Other important challenges that have been emphasised in previous research is the different the organisational clocks, the bureaucracy in corporations, and the unbalanced power relationship (Weiblen & Chesbrough, 2015), to mention a few. In order for corporations and startups to engage successfully, it is crucial that both parties understand the other's perspective (Usman & Vanhaverbeke, 2017). Despite this fact, previous research has predominantly been focusing on the corporations' perspective solely.

This study addresses the challenges that automotive OEMs must address in order to engage successfully with startups. The study is sponsored by Volvo Car Corporation, hereinafter referred to as Volvo Cars, a company that is striving towards becoming the world's most

progressive and coveted premium car brand (Volvo Cars, n.d.). The company recently opened a research innovation center in Mountain View, California, where one of the focus areas will be autonomous vehicle research. Autonomous cars are dependent on other types of technologies, primarily within the IT area, then previous generations of cars. Therefore, it is highly relevant to have a well formulated strategy regarding how to identify and engage with startups that possesses these types of technologies. This will be further explored in this study. To ensure that the startups' perspective is understood, the data collection is composed by interviews with both automotive OEMs and startups, as well as experts that have an unbiased view and long experience from working in Silicon Valley.

1.2. Purpose

The purpose of this study is to investigate the challenges and key factors for automotive OEMs to consider in order to identify and engage with startups successfully. The data for the study is collected through 24 interviews with startups, automotive OEMs, and experts in Silicon Valley. The findings contribute to pinpoint the challenges and key factors for such engagements, as well as suggest a process for how automotive OEMs can identify and engage with startups in a successful way.

1.3. Research questions

As stated in the background, there are many challenges that must be addressed by automotive OEMs to successfully engage with startups. Moreover, there is a gap in previous research regarding the startups' perspective on such engagements (Usman & Vanhaverbeke, 2017). To achieve the purpose of pinpointing these challenges and how to overcome them, by taking both the automotive OEMs' and startups' perspective into consideration, the research questions below have been developed.

RQ1) What challenges and common pitfalls are related to engagements between automotive OEMs and startups?

RQ2) What are the key factors for successful engagements between automotive OEMs and startups?

1.4. Delimitations

Although the outcome of the study, which is a suggested process for identifying and engaging with startups, aims to be globally applicable, the data collection is delimited to Silicon Valley. Based on the collected data from the interviews, as well as previous research, the study ends up in a suggested process for the critical activities that automotive OEMs need to complete in order to successfully identify and engage with startups. The main activities covered in the process are the key factors to have in place before starting, how to identify and evaluate the startups, the internal decision process, what to consider when designing the setup of the engagement, and the contract. Thus, this study does not address the actual period in which the engagements has begun.

The startups included in the study was delimited to early stages, latest series A, with a maximum of $20M in funding and 50 employees. Moreover, only external, business-to-business startups were targeted, as the outcome of the study aims to be applicable for automotive OEMs. Moreover, there were only three automotive OEMs included in the study, with the purpose of gaining understanding of how some of the companies that are present in Silicon Valley are working with startups. Thus, the results should not be seen as facts nor be generalised, but rather as complementary input to the other data.

1.5. Disposition of the report

The disposition of the remaining chapters of this report is presented in Table 1. The report starts by presenting the methodology of the study, followed by the theoretical framework. Thereafter, the empirical findings from the case study, a recommended process for how to engage with startups, discussion, and conclusions are presented.

Table 1. The disposition of the remaining chapters of the report.

Chapter		Content
2	Methodology	Description of the methodology used to answer the research questions in the study.
3	Theoretical framework	A review of previous research on engagements between corporations and startups, as well as an overview of the Silicon Valley ecosystem.
4	Empirical findings	The findings from the interviews with startups, automotive OEMs, and experts in the study, categorised into five areas: Reasons to engage, challenges and common pitfalls, key factors for successful engagements, channels, and ways to engage.
5	Analysis	An analysis and comparison of the empirical findings and previous research.
6	Discussion	A discussion around the research questions.
7	A recommended process for identifying and engaging with startups	A recommendation of a process for how to identify and engage with startups is presented.
8	Conclusion	Concluding chapter answering the research questions in the study.

2. Methodology

This chapter describes the research strategy, research design, and research methods that have been used in the study. Moreover, the data analysis and research quality is described.

2.1. Research strategy

A research strategy is a general orientation to conduct business research (Bryman & Bell, 2015; Remenyi, Williams, Money & Swartz, 1998). When considering the strategy of a research, two different approaches can be taken: qualitative or quantitative. While a quantitative approach emphasises quantification in the data collection and analysis, qualitative research has a focus on words rather than numbers (Holme & Solvang, 1997).

The purpose of this master's thesis is to investigate how automotive OEMs can identify and engage with startups, both from the startups' and the automotive OEMs' point of view. This is done by interviewing startups, automotive OEMs, and experts, who have experience of working in the industry with both startups and automotive OEMs, as well as incubators and accelerators who are used to work as a third party between startups and automotive OEMs. Since the study aims to understand and analyse the context to come up with recommendations that are suitable for the specific situation, a qualitative approach was suitable (Bryman & Bell, 2015).

Moreover, Bryman and Bell (2015) distinguish between deductive and inductive approaches regarding the relation between theory and research. An inductive approach is commonly used in qualitative studies, and implies that theory emerges from empirical observations. Deduction on the other hand, which is commonly used in quantitative research, begins with a hypothesis based on theory, to be followed by empirical testing of the hypothesis (Bryman & Bell, 2015).

The distinction between inductive and deductive research is however not always so clear (Bryman & Bell, 2015), and the two approaches respectively has been criticised for not being able to support the development of anything that is not already known (Kirkeby, 1994). Instead, several researchers suggest an abductive approach (Kirkeby, 1994; Dubios & Gadde, 2002), which is a back-and-forth process between the empirical world and the theory (Bryman & Bell, 2015).

The process of this master's thesis has followed what Dubois and Gadde (2002) have presented as systematic combining, which originates from an abductive approach. The authors define systematic combining as "*a process where theoretical framework, empirical fieldwork, and a case analysis evolve simultaneously, and it is particularly useful for development of new theories*" (Dubois & Gadde, 2002, p. 554). During the process of this study, the theory and empirical data collection has been developed simultaneously. The process started with general studies of the literature to get guidance on what data to collect. As more data was collected and deeper understanding of the situation was gained, additional suitable theory was reviewed and included continuously.

2.2. Research design

A research design outlines the overall framework for collecting and analysing data (Bryman & Bell, 2015). Since the purpose of this study is to both examine the way in which automotive OEMs are engaging with startups, the startups' perspective on engaging with automotive OEMs, as well as develop a recommendation for how automotive OEMs can identify and engage with startups, the research design was chosen to fit these issues.

As the research questions are concerned with the specific context of engagements between startups and automotive OEMs, a case study design was appropriate (Bryman & Bell, 2015). A case study is an intensive examination of a situation, and is suitable when the research is concerned with the complexity of the situation in question (Bryman & Bell, 2015), which is the case in this study.

2.3. Research methods

This section describes the different methods that were used to collect data. First, the chapter describes the execution of the conducted literature review. Second, it describes the sampling, design, and execution of the interviews, which was the main source of information in the study.

2.3.1. Literature review

As previously mentioned, the research in this study followed a systematic combining approach. The choices on which literature to add were thus made throughout the whole research process, depending on the empirical findings. Moreover, the literature review consisted predominantly of books and scientific articles found on Chalmers library's webpage and Google scholar.

In order to gain understanding of the area from the beginning, and get guidance on what kind of empirical data to look for initially, literature on different types of engagements between corporations and startups, as well as literature on the Silicon Valley ecosystem, were studied to begin with. The theoretical framework was thereafter developed throughout the entire research process, and the search for literature was eventually focused around five areas related to engagements between corporations and startups: Reasons to engage, challenges and common pitfalls, key factors for successful engagements, channels, and ways to engage. The literature review about Silicon Valley was also focused to the different players in the ecosystem. Moreover, open innovation (OI) was chosen to be a basis for engagements between automotive OEMs and startups, since a large part of the previous research on the area has taken that approach.

2.3.2. Interviews

The main source of information in the data collection in this study was interviews, which is suitable as the research aims to understand a complex situation and gain insight into business realities (Easterby-Smith, Thorpe & Jackson, 2012). This section describes the sampling, design, and execution of the interviews.

Sampling

When choosing people to target for the interviews, the researchers started with reading articles and discussing with experts within the field, to get an overview and understanding of the topic. Moreover, a rough draft of the process for identifying engaging with startups was made, in order to get inspiration and understanding of what people that could have valuable input, depending on the main activities. The main steps in the first draft of the process are the following:

- Critical factors to have in place before starting
- Screening of the startup scene
- The first pitch meeting with the startup
- The internal evaluation meeting
- Deciding on a win-win situation
- The final contract

By reading articles and talking to people working with corporate venture capital (CVC), experts within different fields related to the six steps presented above were identified (see Table 2). In addition to the experts, startups and automotive OEMs were targeted in order to get multiple perspectives. Based on the targeted groups of interviewees, a purposive sampling was made, which means that the people were chosen based on their potential to contribute with valuable input related to the research questions (Bryman & Bell, 2015). Based on recommendations from people within the researchers' network, both within and outside of Volvo Cars, people who could have valuable input to the research questions were contacted. Thereafter, the contacted people recommended additional people that could be useful to talk to. This type of purposive sampling is known as snowball sampling (Bryman & Bell, 2015).

During the interviews, experts within the automotive field recommended the researchers to contact the incubator Plug and Play and the accelerator 500 startups. Accelerator and incubator programs within the automotive field where also mentioned several times during the interviews with experts and automotive OEMs as a potential way of screening the startup scene. Therefore, interviews with 500 startups and Plug and Play became an important role of the data collection to get insight into the screening part of the process for identifying and engaging with startups, as well as finding startups to interview. By going to events at, as well as looking into the portfolio of, three of the most popular programs in Silicon Valley (Plug and Play, Y combinator, and 500 startups), a majority of the 12 startups were found. The first seven startups to interview were found in the portfolio of the event Winter Summit at Plug and Play, an event focusing on startups within the automotive sector. After interviewing the first seven startups, the interview data was analysed and a few minor changes of the interview questions were made, based on discussions with the stakeholders at Volvo Cars, before interviewing the five additional ones.

When conducting the sampling of the automotive OEMs, the first criterion was to look at the automotive OEMs active in the bay area, that are in the forefront when it comes to autonomous vehicles. Secondly, factors such as potential availability and willingness to participate were considered. These issues were critical in the sampling since the study was conducted on request by Volvo Cars, and the other participating firms are competitors. The first step in the selection was to study articles about how the largest automotive OEMs engage with startups. As the possibilities to interview people in automotive OEMs were limited, there were only three automotive OEMs interviewed in this study, and only one person from each one. Thus, an extensive investigation of the information available online played a significant role in the data collection, to complement the interviews. The information was found in news articles, annual reports, homepages, seminars, scientific articles, and the web page Crunchbase.com. The collected information was then discussed during the interviews.

Table 2. Overview of all the interviewees in this master thesis.

Startups		OEMs	Experts	
			Independent experts	Accelerators, incubators, VCs
Spirit AI	Drive.ai	Ford	Consultant	GSV Labs
Clarity	Bestmile	BMW	Siemens TTB	500 Startups
Polysync	Relimetrics	Toyota	Tech Trend Researcher	Plug and Play
Splitsecnd	Mojio		Silicon Vikings	Alliance Ventures
Compound Eye	Hansoft		Legal expert	
Caruma	Speedment			

Design

There are many things to consider when designing interviews. For example, the questions should be open enough to give the respondent room to provide their opinion, without leading them into an answer. Therefore, the questions should not be of a yes or no character, and not be too narrow nor too wide, in order to minimise the risk of getting irrelevant answers (Holme & Solvang, 1997).

A suitable interview type for this study is semi-structured interviews, since they cover both specific key questions and allows for follow-up questions and discussions (Bryman & Bell, 2015). Therefore, only open questions were asked in the interviews in this study, and no answer alternatives were given, which means that the respondents only answered what they thought was most important. It is thus important to have in mind that the respondent might would have given different answers or included additional information in their answer if alternatives would have been given.

All the respondents were, depending on their profession, divided into three groups: startups, automotive OEMs, and experts. The experts were thereafter categorised into two subgroups: independent experts and accelerators, incubators, and VCs. The different interviewee groups were asked different questions during the interviews, since they are involved in different parts of the process for how automotive OEMs can identify and engage with startups, and therefore have different input to provide to the study. The interview questions can be found in Appendix 1-3.

When designing the interview questions to the startups, a person with experience of talking to startups at Volvo Cars was consulted. After interviewing seven startups, the answers were

revised together with the stakeholder at Volvo Cars and some minor changes were made before interviewing additional five startups. The interview questions were designed mainly based on the information found in articles and books, as well as discussions with people with experience from Silicon Valley.

When interviewing automotive OEMs and experts, a part of the interview, besides asking interview questions, was to show a paper with a timeline. In order not to lead the interviewee to any specific answers, a paper with only a line of the process was shown. This was done with the purpose of gaining an understanding of all the critical steps to include in a process for identifying and engaging with startups. The respondents were asked to draw and explain the steps from before starting to a signed contract, where they could point out the critical steps from their point of view. An example of one of these drafts can be found in Figure 1.

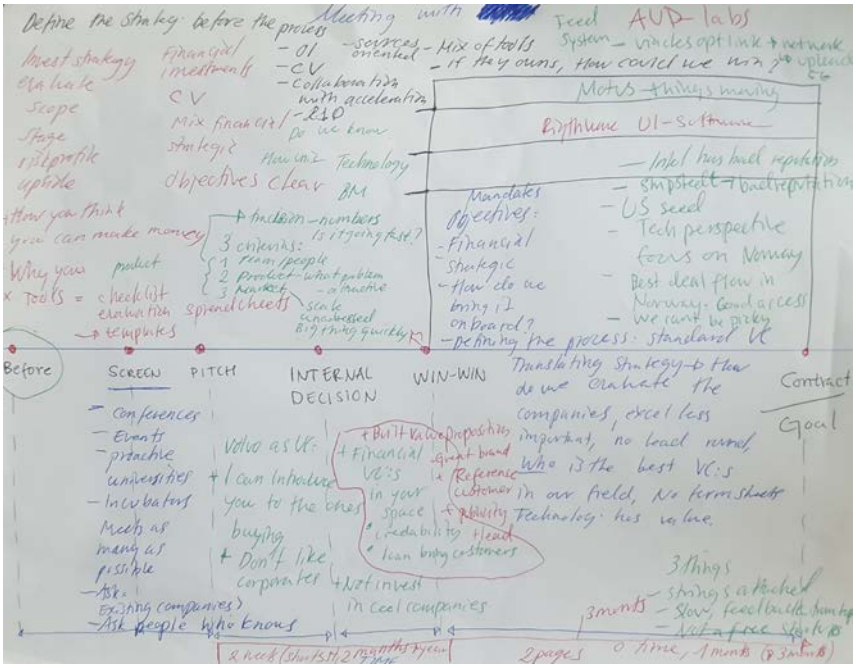

Figure 1. Draft of a process for how to identify and engage with startups, according to one of the interviewed experts.

Execution

Most of the interviews were conducted in face to face, although a minority of the interviews were conducted over a video conference call because of practical reasons. Since there were two interviewers, one of the researchers interviewed all startups, and the other researcher interviewed all the experts and automotive OEMs, to reduce potential errors due to the interviewers' variability (Bryman & Bell, 2015). The person who did not interview at the time took notes during the interview. The notes were then analysed by both the researchers within a day after the interview, to make sure the notes did not miss out of any important information.

The duration of the interviews varied between 30-60 minutes. When emailing with the respondents before the interview, information regarding the topic of the questions, that the study was sponsored by Volvo Cars, the preliminary title and description of the master's thesis project, the expected time of the interview, and why they were selected as respondents. All the interviews took place during March, April, and May 2017, and the interviews with the three interviewee groups were held simultaneously.

The interviews were initiated with a description of the background and purpose of the study, as well as information about that the study will be published and that the interviewee was to feel

free to not answer any question. Moreover, the researchers explained that the information would not be used in any way that could harm the participants, and that anonymity was guaranteed. The interviewees were also asked if it the researchers could take notes during the interview and use the information on the report.

2.4. Data analysis

This section describes the coding of the data collected from the interviews, as well as the development of the recommended process for identifying and engaging with startups.

2.4.1. Coding

The 24 semi-structured interviews conducted in this study generated a large amount of qualitative data, which had to be structured and analysed in an effective way. First, the interview questions and thus the collected data was categorised based on the three different groups of interviewees: startups, automotive OEMs, and experts. Thereafter, the data was categorised, recombined, and displayed (Miles & Huberman, 1994) in three steps. These three steps were carried out in the same way for all the three interviewee groups.

First, to simplify the final data analysis, the data from the interviews was transcribed and categorised based on the key questions in a table directly after the interviews. This was thus made continuously throughout the entire data collection process. In this step, the original transcripts were saved in separate documents, and the main findings were put into the tables. As the key questions in the interviews were designed in accordance with the theoretical framework, and the data was coded based on the key questions, the data was transcribed and matched with the theoretical framework.

Second, when all the interviews were conducted, the different answers to the key questions were labelled within each question. For example, on one question addressing the challenges related to engagements between startups and automotive OEMs, one label was “cultural differences”. This was made both based on the information in the tables and the original transcripts, in order to make sure that no information was misinterpreted nor forgotten. The labelling within the categories was made by writing the key answers on color-coded post-its and put on larger color-coded papers representing different key questions (see Figure 2).

Figure 2. Labelling and categorisation of the qualitative data collected through interviews with 24 Silicon Valley professionals.

The third step in the coding was to quantify and compare the answers from the different interviewee groups, to be able to detect patterns and draw conclusions. Another table was created in this step, where the key findings were listed in rows, and the different groups of interviewees were listed in columns (see Appendix 4). For example, the number of startups, automotive OEMs, and experts who answered a specific reason for engaging was quantified in one column respectively for each question in the table. This way, an overview of the most common answers, as well as the differences between the different interviewee groups, was provided. The answers were later visualised in graphs, which can be found in chapter 4.

2.4.2. Design of the recommended process

As previously described, the study followed a systematic combining approach, meaning that the development of the theoretical framework and the data collection was made simultaneously (Dubois & Gadde, 2002). The same principle was also followed regarding the development of the recommended process. Based on the collected data, as well as previous research, the first draft of the process was made about half way through the data collection. This draft was designed following a timeline containing the critical activities for automotive OEMs to complete when intending to identify and engage with startups, starting from before beginning until a contract is signed. Thereafter, as more information was gathered, the process was revised and updated continuously. As previously described, the process was also developed with the help of the interviewed experts and automotive OEMs, as they were asked to give input to how they would have roughly designed the process. At the end of the research process, one of the interviewed experts, who have long experience of working with this in Silicon Valley, as well as guiding other firms in the matter, was met with again to go through the process, get feedback, and discuss improvements.

2.5. Research quality

There are several issues that must be taken into consideration to assure the quality of the research. Bryman and Bell (2015) suggest four criteria for qualitative research: internal- and external validity, reliability, and objectivity. These four criteria are discussed below.

Internal validity, also referred to as credibility, of the study is concerned with ensuring that the research is acceptable to others and conducted in a good way (Bryman & Bell, 2015). To ensure this criterion, a number of measures has been taken. First, the conclusions from the interviews were presented to the participants in order for them to validate the researchers' interpretation of the answers. Also, both researchers of this report were present during the interviews, to reduce bias and the risk of misinterpretation. Finally, multiple sources of the same kind of information were used.

The second quality criterion, external validity, also referred to as transferability within qualitative research, is concerned with to which extent the study can be generalised (Bryman & Bell, 2015). Since case studies are situation specific, the findings might not be applicable to other contexts (Dubois & Gadde, 2002). Therefore, the context of the study has been analysed and described in an as detailed and exhaustive way as possible, to provide the reader with a good understanding of the specific situation. This issue must also be kept in mind regarding the information obtained from the participating automotive OEMs. This study is delimited to include only three other automotive OEMs, and only one interviewee from each company, and the findings can therefore not be considered to represent the entire industry.

Reliability, also referred to as dependability in qualitative research, is concerned with the consistency of the measures of a concept, to ensure that the measures are reliable (Bryman & Bell, 2015). To ensure this criterion, the way in which the situation at the companies involved was to be analysed was discussed with experts within the field. Furthermore, the activities in all the phases of the study were carefully documented to enable evaluation of the execution of the research afterwards.

The final quality criterion that must be assured is objectivity, which is also referred to as confirmability in qualitative research (Bryman & Bell, 2015). Being objective is not always easy, and one might not even be aware of biases. This issue has been kept in mind during the entire research process, and the data and interpretations have been discussed with a neutral party from the university throughout the entire research process. Moreover, complete records that account for the interpretations of the interviewees' answers were kept. Another concern regarding objectivity is the information obtained from the automotive OEMs, since they are competitors to Volvo Cars. There is a risk that the information provided was biased and did not represent the entire truth. The same goes for the answers regarding incubators and accelerators as channels to connect, since most of the startups were selected from the portfolio of the incubator Plug and Play and the accelerators 500 startups and Y combinator, and some of the experts were representatives from accelerators and incubators.

3. Theoretical framework

This chapter presents the theoretical framework of this study. It starts with the basics of open innovation, followed by a section about the Silicon Valley ecosystem and the different players in it. Finally, the reasons for corporations and startups to engage with one another, the challenges and common pitfalls, the key factors for successful engagements, channels to connect with potential collaborators, as well as ways in which corporations and startups can engage, found in previous research, is presented.

3.1. Open innovation

This subchapter presents open innovation (OI), which can be seen as a basis for engagements between corporations and startups (Chesbrough & Brunswicker, 2014; Spender, Corvello, Grimaldi & Rippa, 2017). It starts with an introduction and definition, followed by a description of inbound OI in corporations with startups.

3.1.1. Definition

Open innovation can involve many different types of practices and processes (Spithoven, Vanhaverbeke & Roijakkers, 2013). According to Chesbrough (2006), it can be defined as "… *the purposive use of inflows and outflows of knowledge to accelerate innovation in one's own market, and expand the use of internal knowledge in external markets, respectively*" (p. 1). In OI, the general assumption is that companies do not exist in a vacuum, and rely on external sources of information to combine with the internal ones (Gassman, Enkel & Chesbrough, 2010). Moreover, OI can be divided into inbound and outbound (Chesbrough & Crowther, 2006). The authors describe that inbound OI is about searching for external sources of information, while outbound OI is concerned with commercialising internal innovation outside the company. As this report is concerned with how automotive OEMs can identify and engage with startups, the focus will from hereon be on inbound OI.

3.1.2. Inbound open innovation with startups

As previously described, startups compose a valuable source of innovative technologies and business models, and the knowledge inside a company is not enough to generate innovations (Chesbrough, 2003). Following this reasoning, corporations have started to establish programs to interact with startups and benefit from their strengths (Kohler, 2016; Weiblen & Chesbrough, 2015). Corporations in the automotive industry are not an exception, and many of the world's largest OEMs in the industry have established presence in Silicon Valley to benefit from the startup scene there during the past two decades (Nelson, 2014). The reasons why corporations and startups seek to engage with one another, as well as the challenges, key factors, and ways to connect and work with startups, will be addressed in chapter 3.3.

3.2. The Silicon Valley ecosystem

This sub-chapter presents the Silicon Valley ecosystem and some of the main players in the area.

3.2.1. Background

The culture and innovation systems differ significantly between different places. For example, there are some key differences between Silicon Valley and Boston, the two major high technology focused regions in the United States. Steiber and Alänge (2016) describes Boston as an independent firm-based system and Silicon Valley more of a decentralized regional network-based structure. By that they mean that, in Silicon Valley, employees, money and, technologies move around between different startups and corporations much faster than in other regions. Thus, Silicon Valley is a cluster that is suitable for rapidly changing industries, such as technology based businesses (Steiber & Alänge, 2016).

There are many reasons why Silicon Valley became such a successful area for new technologies (Berger & Brem, 2016). According to the authors, it is a combination between the presence of NASA and the US military, some of the best universities, such as Stanford University, Berkeley and Singularity university, combined with the culture and willingness to change the world and the mindset that failure is a way of learning. In Silicon Valley, some of the largest companies, such as Google, Facebook, and Tesla, are based on something called hacker ethics, which is a common term used in Silicon Valley and in many other tech cities (Steiber & Alänge, 2016). The hacker ethic is based on the corner stones: the belief of always delivering high quality in order to change the world, sharing of information (e.g. open source), and a dislike of authority, and instead strive for a collaborative and flat working structure (Steiber & Alänge, 2016).

In addition to Silicon Valley, Klepper (2010) describes Detroit as one of the most remarkable clusters in the United States. During the first three decades of the automotive industry, over a hundred automotive companies entered Detroit, and the area has been associated with the automotive industry ever since (Klepper, 2010). However, as cars are becoming more technology dependent, the tech industry and automotive industry are getting more and more intertwined (Nelson, 2013). Moreover, Nelson (2013) argue that Silicon Valley is the centre for development of in-car computing, and Detroit is falling behind. Consequently, many of the automotive industry leaders have opened offices in Silicon Valley during the past two decades (Nelson, 2014).

3.2.2. Actors in the ecosystem

Weiblen and Chesbrough (2015) argue that the amount of support for startups is increasing with the growing startup scene. For example, the authors mention angel investors, VCs, and startup incubators. Moreover, the universities play a significant role in the ecosystem. For example, Kenney (2003) mean that Stanford is a key player in Silicon Valley. This section describes the role of corporations, startups, incubators, accelerators, and VCs in Silicon Valley.

Corporations

Corporations compose an important part of the Silicon Valley ecosystem. One example of a corporation, whose framework for engaging with startups has been exemplified in previous research (Weiblen & Chesbrough, 2015), is Siemens Technology to Business (TTB). Siemens TTB has a long history in Silicon Valley that goes back to over 20 years ago, and have had a close collaboration with Berkeley since 1999 (Weiblen & Chesbrough, 2015). Every year,

Siemens screens over 1200 start-ups, which are then boiled down to 80 startups that are evaluated more closely. Ultimately, the company initiates engagements with an average of 16 startups a year (Weiblen & Chesbrough, 2015). Siemens most dominant and successful model of engaging with startups is a non-equity partnership with startups, coming from the collaboration with the large universities in the area (Weiblen & Chesbrough, 2015). The value proposition for the startup, besides the small amount of payment they get from Siemens, is to get associated with Siemens as a go-to-market partner or pilot-customer (Weiblen & Chesbrough, 2015).

Another large company with a history of investing in startups in Silicon Valley is Axel springer, one of the largest media companies in Europe (Berger & Brem, 2016). The company, who opened a small innovation hub in Silicon Valley in 2013, has a different approach than most corporations, since they see top management awareness and commitment as one of the top priorities (Berger & Brem, 2016). Therefore, they are actively involved in a few incubator programs, such as Rocket Space, to whose they have sent members of the top management for 6-12 months during the past few years. The top managers are working on solving complex problems and are at the same time getting integrated into the network and gaining understanding of the ecosystem in order to get inspired and bring knowledge back home (Berger & Brem, 2016). Moreover, the famous incubator Plug and Play is helping Alex Springer with the startup selection process, which is one of the biggest challenges related to investing in startups in Silicon Valley (Weiblen & Chesbrough, 2015).

To go back to the automotive industry in Silicon Valley, both BMW and Volkswagen opened innovation labs in Silicon Valley already in 1998 (Berger & Brem, 2016). The authors explain that the purpose of doing so was to get close to competent people within high technology fields, such as Artificial Intelligence (AI), as well as test new prototypes, so called Minimal Viral Products (MVP), with customers. Other reasons for opening outposts in Silicon Valley were to change the mind-set of top management back in the headquarters in Europe, and detect and report about future technology trends to the organisation back home (Berger & Brem, 2016).

Berger and Brem (2016) further explain that BMW's outpost has direct connections to the Chief Technology Officer (CTO), to be able to hire the right people. Hiring local entrepreneurs coming directly from top universities, such as Stanford and Berkeley, was also seen as a good way of integrating the company with the Silicon Valley ecosystem. BMW had two goals with opening their innovation lab. The first one was to integrate it into the Silicon Valley ecosystem, and the second one to create a soft-landing place for people from the headquarters moving to the Valley (Berger & Brem, 2016).

Being actively involved in the informal network of Silicon Valley is an efficient way of detecting the latest trends in the rapidly changing technology environment (Ferrary, 2003). According to Ferrary (2003), corporations can enter the Silicon Valley network in three ways. The first is to physically move a part of the company to the area, e.g. by creating a CVC arm. Doing so allows for frequent contact, both formally and informally, between the employees and the network. The success of a CVC arm depends on how well it is integrated into the network. Therefore, a success factor when investigating which startups to invest in is the level of integration of the startup, since investing in a well-integrated startup could be a good way for the corporation to enter the network. Secondly, the corporation must make sure to bring something to the table, such as funding or technical knowledge and support, and contribute to the network. The third key factor, is to create an overlap between the people in the company and the network. This can be accomplished by integrating the employees in the company with the network, but also by employing local Silicon Valley professionals that are already a part of the Silicon Valley network and ecosystem, which is called cross-fertilization (Ferrary, 2003).

Startups

Having your own, or working in a startup in Silicon Valley, is very common, and many of the most famous companies in the Bay area, such as Google, Facebook, and Tesla, started as startups. There are many ways of defining a startup. Neil Blumenthal, the co-founder and CEO for Warpy Parker, has defined a startup as "... *a company working to solve a problem where the solution is not obvious and success is not guaranteed*" (Robehmed, 2015). Another famous definition, by Steve blank (2010), is that a startup is an organization that is seeking a scalable and repeatable business model. This is also the definition used in this report.

Understanding the different stages of development in a startup is crucial since the focus, resources, and needs in the startup varies significantly depending on the stage (Churchill & Lewis, 1983). The different investment stages is a way of determining the level of maturity, which could be used when analysing and trying to understand what the startups need (Delventhal, 2015). The investment stages are usually categorised into the following investment rounds: Seed/angel, series A, series B, and series C (Delventhal, 2015). The author explains that the investment needed in the seed stage is to fund the initial market research and business development, the focus in series A is on building the business model, series B is focused on building the value in the company, and series C is usually about scaling the business. However, Delventhal (2015) further explains that the stages and valuation depends on the maturity of the startup, the type of investors involved, why the company is raising capital, and sometimes the geographical location.

Incubators

Bergek and Norrman (2008) describe incubators as tools for promoting the development of technology-based growth firms. Startups are usually a part of an incubator program for a few years. The incubators accept startups continuously, and usually do not take equity in the startups. Instead the startups usually pay rent (Cohen & Kador, 2013). Moreover, it is common that the incubator is non-profit or governmental owned. The benefits from being a part of an incubator are usually to get connections to legal advice, accounting consultants, technology transfers, and sometimes taking advantage of the incubator's network (Cohen & Kador, 2013). Since the incubator programs usually does not take equity, and their main income is the rent from the startups, they usually want the companies to grow slow and stay as long as possible (Cohen & Kador, 2013). The main drawback with an incubator is that the conditions inside an incubator may not be the same as in the real world.

Accelerators

An accelerator program can be described as a boot camp for startups (Hochberg & Fehder, 2015). In contrast to an incubator program, an accelerator program is an intense program that takes place during a short period of time, usually three months, has cyclic batches and takes equity from the startups. The batches that startups are accepted in are also called cohorts, and the startups in each batch are called portfolio companies (Cohen & Kador, 2013). The participants usually become very close to each other during these three months, motivating and helping each other out. Most of the accelerator programs take equity of the startups for participating, while the startups gets a small amount of money to use during the program (Cohen & Kador, 2013). The three program ends with a demo day, which is an event where startups gets the opportunity to pitch their business ideas for investors (Hochberg & Fehder, 2015). Since the accelerator programs takes equity in the startups, the goal is to make the startup growth as much and as fast as possible in order to make a positive exit (Cohen & Kador, 2013; Hochberg & Fehder, 2015). The top accelerator programs are very popular and accepts around one percent of the applicants (Cohen & Kador, 2013). The main reason for startups to participate in an accelerator program is the learnings, such as educational seminars in a range

of topics needed to build and grow a business, mentorships, guidance, and the network (Cohen & Kador, 2013). Table 3 summarises the key differences between incubators and accelerators.

Table 3. Key differences between incubators and accelerators (Cohen and Kador, 2013).

	Incubators	Accelerators
Duration	1-5 years	3 months
Cohorts	No	Yes
Business model	Rent Non-profit	Investment Can be non-profit
Selection	Non-competitive	Competitive, cyclic
Venture stage	Early to late	Early
Education	Ad hoc, human resources, legal etc.	Seminars
Mentorship	Minimal, Tactical	Intense, by self and others
Venture location	On site	On site

Venture Capitalists

Venture Capital (VC) plays an important role in the startup ecosystem, as it is a source of funding for startups (Gompers & Lerner, 2001; Wonglimpiyarat, 2016). VC can be defined as "*a high risk, potentially high return investment to support business creation and growth*" (Wonglimpiyarat, 2016, p. 82). Wonglimpiyarat (2016) further describes that VC firms raise capital from various sources, and invest in return for equity, and enables entrepreneurs to develop and commercialize their ideas. Venture Capitalist firms are hereinafter referred to as VCs.

3.3. Engagements between automotive OEMs and startups

This sub-chapter presents previous research on engagements between corporations and startups, divided into five areas: Reasons to engage, challenges and common pitfalls, key factors for successful engagements, channels, and ways to engage.

3.3.1. Reasons to engage

The increasing complexity of knowledge today makes it difficult for one organisation alone to obtain all relevant knowledge internally. Consequently, the ability to interact with other companies have become a competitive advantage (Perez, Whitelock & Florin, 2013). The fact that startups and corporations are very different, and the first one generally possesses the capabilities that the other one lacks, makes the two parties seem like good complements to one another (Chesbrough, 2006; Kohler, 2016). Some of the main reasons why corporations and

startups respectively seek to engage with one another are presented below. A summary of the reasons can be found in Table 4.

Table 4. Summary of the reasons why corporations and startups engage with one another, according to previous research.

Corporations	Startups
Financial return	Brand association
Technological know-how	Knowledge and experience
First mover advantage	Resources
Gain influence	Scale
Access to capabilities such as: - Creativity - Problem solving skills - Agility - Speed	

Reasons for corporations to engage with startups

According to Kohler (2016), the reasons for corporations to engage with startups can be divided into financial, strategic, and innovative. One of these does however not necessarily exclude any other, but firms might engage with startups for multiple reasons simultaneously (Weiblen & Chesbrough, 2015). The following section presents examples of reasons within these categories.

Financial returns

One purpose for corporations to engage with startups, through corporate venture capital, is to get financial returns (Weiblen & Chesbrough, 2015).

Technological know-how

Startups compose a significant source of ground breaking innovations (Hunt, 2013; Gruber, MacMillan & Thompson, 2008; Kohler, 2016), and have specialised expertise since the entire company is often built around a technological innovation (Hogenhuis et al., 2016). Technological know-how can be very valuable when doing for example proof of concept (POC) or addressing small scale technological challenges in corporations (Hogenhuis et al., 2016). Moreover, the purpose can be to access new technology (Weiblen & Chesbrough, 2015). To pursue new technologies has also been described as a reason for automotive OEMs to engage with startups, as can be exemplified by BMW (Boutellier & Gassman, 2008; Gassman & Gaso, 2004).

First mover advantage

Moreover, Weiblen and Chesbrough (2015) argue that one of the main reasons for corporations to work with external startups, without involving any equity, is to get first mover advantage. The authors describe that startups could accelerate the corporation's ability to move faster to respond to new opportunities on the market. Also, by working with startups and being exposed

to emerging technologies, corporations can increase the chance of seizing new business opportunities (Kohler, 2016).

Gain influence

Weiblen and Chesbrough (2015) further examine the reason why corporations engage with external startups through corporate venturing, and get equity in the startup. The authors state that the primary reason in such cases is to gain insight and influence, as investments usually takes place when the startup fits into the long-term strategy of the corporation. By having equity in the startup, the corporation can steer the direction in a way that benefits the long-term strategy of the corporation (Weiblen & Chesbrough, 2015).

Access capabilities

The capabilities that corporations are usually lacking in their innovation process, and therefore can benefit from by engaging with startups, are usually the ones needed in the beginning in the innovation process, such as creativity and technological know-how (Hogenhuis et al., 2016). Startups' opportunity-driven spirit and creativity can be of vast benefit in the very beginning of the innovation process. Because of this mentality, startups are often excellent problem solvers (Hogenhuis et al., 2016). Moreover, large firms can benefit from the startups' organisational agility and speed, since those are capabilities that are becoming more and more important to keep pace with the fast and large changes on the market (Weiblen & Chesbrough, 2015).

Reasons for startups to engage with corporations

While startups are superior to corporations in some capabilities, they are lacking in many others (Hogenhuis et al., 2016). Some of the reasons for startups to engage with corporations, according to previous research, are presented below.

Brand association

Being associated with a big brand, by for instance doing a pilot project or partner up to go to market together, is one considerable reason for startups to engage with corporations (Weiblen & Chesbrough, 2015). Furthermore, Kohler (2016) describes that startups want to be associated with an established corporation to increase their credibility and visibility, because it will make it easier to get other customers later.

Knowledge and experience

Corporations have a lot of experience and expertise about many areas, such as the industry and customers, that can be very useful for a startup (Hogenhuis et al., 2016; Weiblen & Chesbrough, 2015). Moreover, corporations have experience in executing projects, which is valuable for a startup (Kohler, 2016).

Resources

Corporations have a lot more resources than startups, that compose an important incentive for startups to engage with corporations (Kohler, 2016; Weiblen & Chesbrough, 2015). Examples of such resources are equipment and production capabilities (Weiblen & Chesbrough, 2015), although Kohler (2016) mean that the desired assets depends on the business and what is necessary to scale the specific startup in question.

Scale

Another reason for startups to engage with corporations is to scale (Kohler, 2016). Corporation's resources, established customer base, and experience of commercialisation make them

desirable for a startup to work with when it comes to scaling and getting to market effectively (Hogenhuis et al., 2016; Weiblen & Chesbrough, 2015).

3.3.2. Challenges and pitfalls

Although the benefits from working together seem to be obvious or both corporations and startups, efforts to set up such engagements usually fails (Weiblen & Chesbrough, 2015). There are many challenges to cope with, and one of the most common pitfall is that corporations usually neglect the challenges that engagements entail (Hogenhuis et al., 2016). This section provides an overview of some of the challenges and common pitfalls that can be found in the literature on the area. The challenges and pitfalls are summarised in Table 5.

Table 5. Challenges and common pitfalls according to previous research

Challenges and common pitfalls
Cultural differences
Bureaucracy
Manage Intellectual Property
Unbalanced power relationship
Get buy in from the rest of the organisation
Timing

Cultural differences

One main challenge and reason why engagements are so difficult is the cultural differences between startups and corporations (Weiblen & Chesbrough, 2015). While startups are opportunity driven, corporations are strategy driven and strive towards minimising risk. The different mind-sets and ways of working often causes misunderstandings that can be a large barrier towards successful engagements (Weiblen & Chesbrough, 2015).

Bureaucracy

Another factor that affects engagements negatively is the bureaucracy in corporations, which entails slow processes and decision making (Weiblen & Chesbrough, 2015). Compared to the agile and very fast way of working in startups, this becomes a big barrier towards aligning the two types of organisations.

One issue related to bureaucracy is that startups are often required to follow corporations' rigorous policies regarding requirements and certifications (Weiblen & Chesbrough, 2015), which takes lot of time from the startup's core business. This is a huge problem for startups since their resources are usually very limited.

Manage Intellectual Property

The issue of managing intellectual property (IP) is central when corporations and startups engage (Weiblen & Chesbrough, 2015). The IP is often the key asset in a startup, and it might be tempting for a corporation who is engaging with a startup to be inspired by the technology

and create an own version of it (Weiblen & Chesbrough, 2015). There are examples of large firms who have handled this poorly and thus incurred a bad reputation among startups.

A startup's technology is likely required to be adapted to the architecture of the corporation in engagements, or changes might be developed jointly. It is thus important to take precautions to be able to handle these situations (Weiblen & Chesbrough, 2015), as the question of who owns what will occur. Weiblen and Chesbrough (2015) describes that corporations have managed this by signing non-disclosure agreements or have legal advisors available. Moreover, Andries and Faems (2013) point out that patents and licensing deals may become important mechanisms to handle IP.

Unbalanced power relationship

Corporations have an advantage over startups as they have much more power, and must thus be careful not to misuse it (Slowinski & Sagal, 2010; Weiblen & Chesbrough, 2015). Being too dependent on a corporation firm in an engagement is something that many startups fear (Weiblen & Chesbrough, 2015). According to Alvarez and Barney (2001), the survival of the startup can be put at risk in worst case. Moreover, Kohler (2016) mean that startup's ability to pivot can be very limited if it is tied to a corporation. Also, Slowinski and Sagal (2010) emphasise this problem and argue that it is important that the deal is fair for both parties in the engagement.

Get buy in from the rest of the organisation

Even if an engagement, for instance a POC or pilot project, would succeed, the challenge of getting buy in from the rest of the organisation remains (Weiblen & Chesbrough, 2015). The unit within the corporation that is working with startups must thus act as a bridge to the organisation and connect the project with the startup to the corporation to make it useful (Weiblen & Chesbrough, 2015).

Timing

There is a challenging dilemma related to timing surrounding engagements between corporations and startups (Hogenhuis et al., 2016). The different capabilities that the two parties possess are typically needed in different stages of the innovation process, where corporations need startups in the front end of the process, while startups benefit from collaboration in the later stages. In the beginning of the innovation process, corporations can benefit from startups as there is a large need for creativity, technological know-how, and problem-solving skills. On the other hand, startups have limited assets, capacity, and experience that is needed later in the process, when e.g. scaling for commercialisation is needed. Thus, corporations must carefully consider the stage in which the project is in, what capabilities that are needed, and whether a startups may be able to contribute with those capabilities, before entering an engagement (Hogenhuis et al., 2016).

3.3.3. Key factors for successful engagements

This section presents some of the key factors for successful engagements that can be found in previous research. The key factors are summarised in table 6, followed by a description of each one.

Table 6. Key factors for successful engagements, according to previous research.

Key factors for successful engagements
Have a clear purpose
Have a clear value proposition
Have procedures in place
Have a separate unit to engage with startups
Build trust and credibility
Involve the right people
Evaluate the appropriateness of the engagement

Have a clear purpose

In order to engage successfully with startups, corporations must define what they want to achieve with the engagement (Kohler, 2016; Weiblen & Chesbrough, 2015). When the strategic goal is clear, the way in which to engage with startups should be determined accordingly (Hogenhuis et al., 2016). For example, the purpose will affect the kind of startup that is targeted, as well as how the engagements are designed (Weiblen & Chesbrough, 2015).

Have a clear value proposition

There is already a lot of support for startups in the ecosystem, constituted by for instance VCs and incubators, and corporations need to find their place in the system (Weiblen & Chesbrough, 2015). Corporations must be very clear about their value proposition towards the startups and figure out what makes them unique, to attract the best startups. Consequently, Weiblen and Chesbrough (2015) mean that it is just as important for the corporation to pitch their offer to the startup as the other way around. Moreover, Kohler (2016) argue that designing the offer is crucial when starting a startup program, as it defines the relationship with the startup, including how to set up the engagement, what people to include, and the location of the engagement. Also, Kohler (2016) stresses the importance of making sure that the engagement is valuable for both parties.

Have procedures in place

Hogenhuis et al. (2016) argue that one reason why corporations usually fail to engage with startups is that they engage without having a clear action plan. Similarly, Weiblen and Chesbrough (2015) mean that having a pre-defined program for how to engage with startups simplifies the engagement process significantly. Weiblen and Chesbrough (2015) continue by writing that every engagement need specific resources, but having a rather standardised way of working with startups will help to overcome many of the issues related to for example bureaucracy. In line with Weiblen and Chesbrough's (2015) reasoning, Kohler (2016) describes that startup programs must be designed to cope with the bureaucracy and slow processes in corporations and lower the barrier between the corporation and the startup. Thus, the author means that the procedures should be designed in a way that is similar to a startups'. For example, he argues that the procedures must be simplified, decision making should have a

clear timeline and be decentralised to the startup program, and the contracts must be simple and startup-friendly.

Have a separate unit to engage with startups

As the startup ecosystem is growing, the amount of startups that corporations need to screen, identify, work with, and monitor is growing bigger (Weiblen & Chesbrough, 2015). This entails that there are more potential engagements on the table, and an urgent need for faster decision making in corporations. The bureaucracy in corporations compose a considerable barrier towards fast decision making and fast processes, and need to be managed effectively in order to work successfully with startups. According to Weiblen and Chesbrough (2015), corporations need to have a separate unit outside the organisation that is able to act more like a startup, to act as a buffer towards the bureaucracy. Similar arguments can be found from other researcher as well, as exemplified by Kohler's (2015) argument that startup programs need to act as a shield towards the complexity in the corporations.

Build trust and credibility

Previous research shows that there is a widespread fear among startups to engage with corporations (Weiblen & Chesbrough, 2015). The reasons for this are mainly the corporate inertia and slow decision making, as well as concerns about becoming too dependent and influenced of one partner, which can entail serious consequences for the startup after the engagement. Moreover, Hancké (1998) emphasise the importance of building trust between the two parties. In line with this reasoning, corporations must make sure to deliver according to their promises, in order not to get a bad reputation (Weiblen & Chesbrough, 2015).

Involve the right people

Weiblen and Chesbrough (2015) write about successful examples where the majority of the people working with startups in corporations have knowledge and understanding of the startup world themselves. The same thing is valid the other way around, as Usman and Vanhaverbeke (2017) describes that startups who have previously worked in corporations have an advantage when it comes to negotiate effectively, as they understand how processes and practices in corporations work. This could be a way to overcome the cultural barriers and make it easier for startups to approach corporations.

Moreover, corporations need to identify champions to act as a bridge between the startups and the corporation, as well as connecting the startups to the right people in the organisation (Kohler, 2016). Kohler further argues that the people who should work with startups in corporations need to be skilled in both working with startups and corporations, and be able to demonstrate their willingness to help the startup succeed.

Finally, Ferrary (2003) argues that key to succeed with CVC is to have decision makers in charge for the unit, to make sure they are ready to act when a great investment possibility appears. This has also been emphasised by Kohler (2016), who argues that the decision-making in startup programs must be decentralised.

Evaluate the appropriateness of the engagement

According to Hogenhuis et al. (2016), corporations must carefully consider both whether and when it is suitable to enter an engagement. To ensure that the engagement is suitable, corporations need to assess their own capabilities, examine possible partnerships, and define the capabilities they need from outside the company (Chesbrough & Schwarz, 2007).

There is a number of tools that can help in the process of determining the suitability of an engagement. Hogenhuis et al. (2016) suggest a framework by Slowinski (2005) when matching the capabilities desired with a startup for a potential engagement. The framework is structured around the factors Want, Find, Get, and Manage, where the large firm goes through the questions what they need, where to find it, how to get it, and finally how to manage it (Slowinski, 2005).

3.3.4. Channels

As described above, the growing startup community makes is difficult for a corporation alone to screen and evaluate all startups for potential engagements (Weiblen & Chesbrough, 2015). Thus, Weiblen and Chesbrough (2015) argue that corporations should find a way to interact with other players in the startup support system. For instance, independent VCs, accelerator programs and incubator programs may be a very valuable mean to find startups for potential engagements, as they can be help the corporation with both the screening and reaching out to startups (Weiblen & Chesbrough, 2015). Involving a third party can also be beneficial as they can act as intermediaries between the corporation and the startup (Minshall, Mortara, Valli & Probert, 2010; Weiblen & Chesbrough, 2015).

Moreover, networking is one effective way of screening the startup scene (Ferrary, 2003; Weiblen & Chesbrough, 2015). The networking does however not have to be formal. For example, Ferrary (2003) argue that social relations and informal networks are usually more useful than formal network.

Table 7. Channels to connect according to previous research.

Channels
Engage with third party
Networking

3.3.5. Ways to engage

Weiblen and Chesbrough (2015) have identified four main models for how corporations engage with startups in the tech industry, and have established a framework for what kind of engagement that fits for different purposes (see Table 8). Among the four models, the two that involves equity are described by the authors to be more traditional, while the ones that does not involve equity have emerged rather recently. As this report is concerned with engagements with external startups, the inside-out models will not be further described.

Table 8. Four ways in which tech corporations are engaging with startups, inspired by Weiblen and Chesbrough (2015).

		Direction of innovation flow	
		Outside-in	*Inside-out*
Equity involvement	*Yes*	**Corporate Venturing**	**Corporate Incubation**
	No	**Startup program (outside-in)**	**Startup program (platform)**

By outside-in startup programs, Weiblen and Chesbrough (2015) refer to programs that allows for lightweight engagements with several startups in a more standardised way, that enables the corporation to work faster with startups. The model further focuses on making new technology accessible and useful for the large firm. This is typically made by setting up a unit outside the corporation, that is able to act more like a startup and have faster decision making, to act like a buffer between the two very different parties (Weiblen & Chesbrough, 2015). The programs might look different from case to case, but one dominant way of working is to have non-equity partnerships with startups, that can be seen at Siemens TTB for instance (Weiblen & Chesbrough, 2015). For such engagements, a joint development agreement is signed between the parties, which contains activities, milestones, IP handling, financials etc. A defined stage-gate process ensures alignment throughout the process. This agreement is made as specific as possible, including an explanation of how the future joint project will look like and the future exploitation of the project.

Having a pre-defined program for engaging with startups simplifies the engagement process, not least for the startup (Weiblen & Chesbrough, 2015). These programs are designed to work with startups, and help to overcome issues with vendor qualification processes and requirements on certifications that are usually common in engagements. Also, a project-based model like this helps to limit the risk that the startup gets too dependent and influenced by one corporation, compared to CVC. Not involving equity has further benefits, such as it allows the project to proceed faster and scale faster. Also, less due diligence is required from the corporation, and it is not always desirable to have corporate investors from a startup perspective. Moreover, startups does not need to be screened as thoroughly and slowly as if they were to be invested in (Weiblen & Chesbrough, 2015). It also allows corporations to work with a larger number of startups at the same time.

4. Empirical findings

This chapter presents the empirical findings, categorised into the five main areas investigated: Reasons to engage, challenges and pitfalls, key factors for successful engagements, channels, and ways to engage. Each of the sub-chapters are further divided into the findings from the three interviewee groups. The startups' answers represent the startups' point of view, while the automotive OEMs' answers represent the automotive OEMs' point of view. The experts' answers do however represent both the startups' and the automotive OEMs' perspectives, as they are independent and have experience from both sides.

In all the figures throughout the chapter, the answers are presented on the x-axis, while the number of responses per answer are presented on the y-axis. When referred to in the text, the number of responses to a reason is presented in brackets after the sentence. For instance, if eight out of 12 startups said that they would want to engage with an automotive OEM, it could be presented in the following way: One of the most common responses was that startups would want to engage with an automotive OEM (8/12).

4.1. Reasons to engage

Based on the interviews, the reasons for startups and automotive OEMs to engage are presented below, categorised into the three interviewee groups; Startups, Automotive OEMs, and Experts.

4.1.1. Startups

The 12 interviewed startups' answers to why they would want to engage with an automotive OEM are summarised in Figure 3. All the answers are thereafter described and elaborated on further.

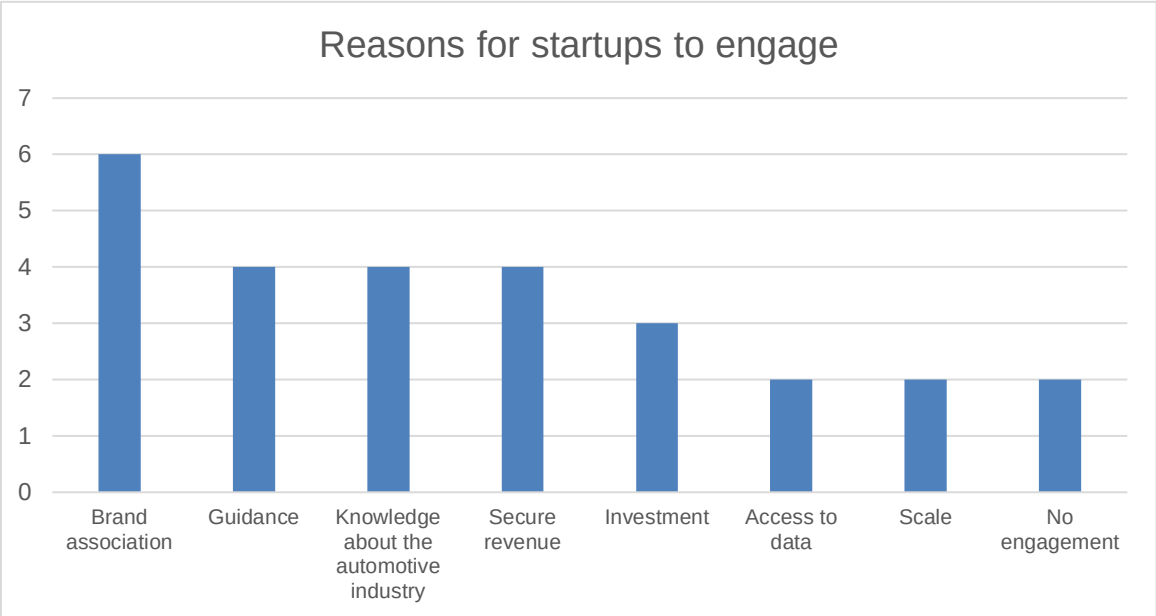

Figure 3. Summary of the startups' responses to why they would want to engage with an automotive OEM.

Brand association

On the question regarding why the interviewed startups would want to engage with an automotive OEM, the most common answer was to get brand association or a reference customer (6/12). Not only was this the most common answer, but also emphasised by many as the most important reason. Several of the interviewees described that getting brand association or having the automotive OEM as a reference customer is the biggest value that an automotive OEM can offer to a startup, since many of the other things that startups need can be accessed from other parts of the support system to a lower risk.

Several startups described that they were not interested in receiving investment from an automotive OEM, mainly because of two reasons: The fear of getting too dependent and influenced by one corporation, and the risk of losing other potential customers or partners in the future. However, the startups argued that if they would be able to say that they work with a well-known company, they would easily get funding from elsewhere. Moreover, multiple startups said that having an automotive OEM as a reference customer would also entail publicity and make it easier to find more customers later on.

Guidance

The second most common answer was to get guidance (4/12). The answers varied and included mainly two things. First, the startups described that it would be valuable to get guidance when it comes to defining the features of their product or service, and understanding and developing their value proposition with the automotive OEM's help. Also, some startups meant that guidance in understanding what they need to do in order to become a potential partner, and prioritise the actions needed to get there, is valuable. One startup exemplified this with a case where they were evaluated as a larger supplier by an automotive OEM, and had to fulfil a number of requirements. All the certifications required would however entail large investments and take time for the startup to accomplish. In this case, the startup said that it would have been valuable for them if an agreement would have been come to with the automotive OEM, where they agreed to fulfil these requirements with some guidance regarding how to prioritise and what to focus on.

Knowledge about the automotive industry

Related to receiving guidance, the next reason that was emphasised was to gain knowledge about the automotive industry and what automotive OEMs need (4/12). For example, a couple of the startups said that this kind of information is lacking in the rest of the support system, such as in the accelerator- and incubator programs, and is thus the main reason why they would want to engage with an automotive OEM. The information wanted is related to what is normal in the industry, including e.g. pricing and the dynamics in the supply chain.

Secure revenue

The next reason why four of the interviewed startups stated that they would want to engage with an automotive OEM was to secure a future revenue stream. Mainly, this was related to receiving orders of their product or service from an automotive OEM, and thus have a customer and supplier engagement. However, receiving orders is not the only way to secure revenue, according to the startups. Future revenue could also be secured by getting brand association with the automotive OEM, as described previously, and thereby getting other customers.

Investment

In contrast to the majority of the startups, as described in the beginning of this chapter, three startups said that they were interested in receiving investment from an automotive OEM. All these three startups were some of the earliest stage startups that were interviewed in this study, and were about to close another investment round in a near future to the interview date.

Access to data

A couple of the interviewed startups described that they would want to engage with an automotive OEM in order to get access to data. The startups were both in the area of autonomous driving, and described that the amount of data that many automotive OEMs are collecting when testing the autonomous vehicles would be extremely valuable for them to use. The startups need that kind of data to be able to test their own product or service, and be able to proceed in their development.

Scale

A couple of the startups stated that they would want to engage with an automotive OEM in order to scale. They described that the resources and access to production that automotive OEMs possess would be of great value for them to take advantage of at the stage they were in at the moment. The focus in both startups was to scale and get to market, as they described that they already had developed a clear business model and product.

No engagements

Two startups argued strongly that they would not want to engage with an automotive OEM at all. The first one had previously had a bad experience with an automotive OEM, where they were evaluated as a supplier and had to fulfil rigorous requirements and perfect deliveries even though the startup only had a prototype at the moment. The startup was forced to spend a lot of time on activities that were not related to their core business, and the bad experience made them decide not to engage with automotive OEMs anymore.

The other startup, in which the interviewee had long experience of starting several startup companies before, described that it usually takes too much time and effort for a startup to engage with an automotive OEM, to a significant risk. The interviewee elaborated on this saying that the slow and bureaucratic processes makes it too difficult for a startup to engage, and is thus not worth the risk, since this kind of engagements usually fail anyway.

4.1.2. Automotive OEMs

As visualised in Figure 4, the reasons why the interviewed automotive OEMs would want to engage with startups are divided into strategic and financial reasons. One of the automotive OEMs stated that the only reasons why they engage with startups are strategic, while the other two engage with startups for both strategic and financial reasons. The reasons why the automotive OEMs engage with startups have a big impact on how they engage, and affect the entire process of how to identify and engage with startups. The reasons are further described below.

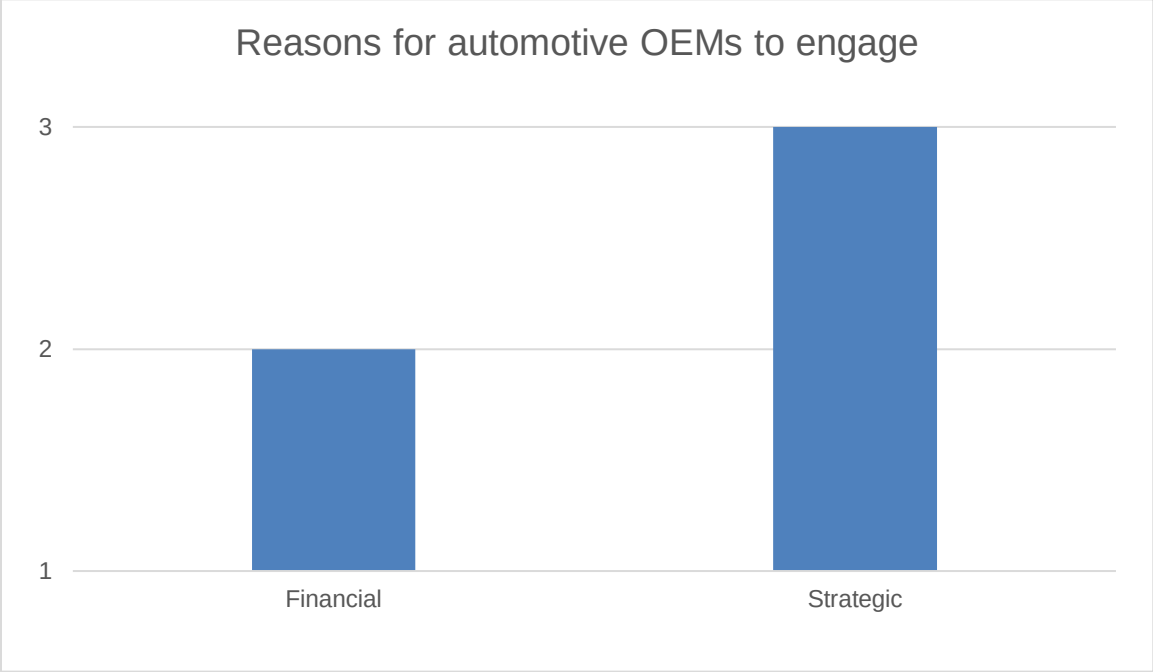

Figure 4. The interviewed automotive OEMs' reasons to engage with startups.

Strategic reasons

The strategic reasons for engaging with startups were all related to technology (see Figure 5). All the three of the interviewed automotive OEMs described that accessing new technology was the main reason to engage with startups. Moreover, they all described that they seek to get first access to technologies, to be able to be the first player to offer a specific technology and get a competitive advantage.

Furthermore, one of the automotive OEMs mentioned that one strategic reason to engage with startups is to lock up technology to prevent competitors to take advantage of it. On the other hand, another interviewee described that it can be beneficial to collaborate with other automotive OEMs and not require exclusivity from the startups, since it makes the startup grow and that competition is a good thing that will eventually lower the price on the product or service they deliver. The same automotive OEM has a strategy of buying the startups if they feel that exclusivity is necessary.

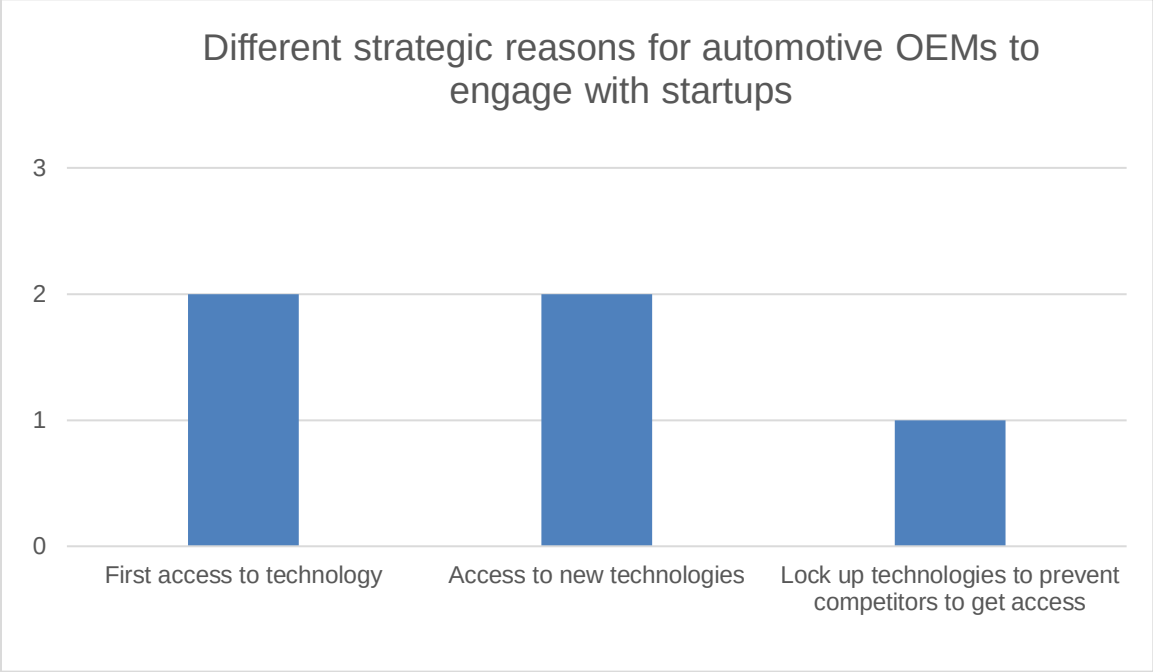

Figure 5. The interviewed automotive OEMs' different kind of strategic reasons to engage with startups.

Financial reasons

Two of the automotive OEMs described that they invest in startups both of strategic and financial reasons. Investing in startups of financial reasons is when the automotive OEM aims to get financial return on their investment. However, they both described that the primary reasons for engaging with startups are strategic, and the financial reasons are secondary.

4.1.3. Experts

Figure 6 summarises what the interviewed experts perceived as the main reasons for automotive OEMs and startups to engage with one another.

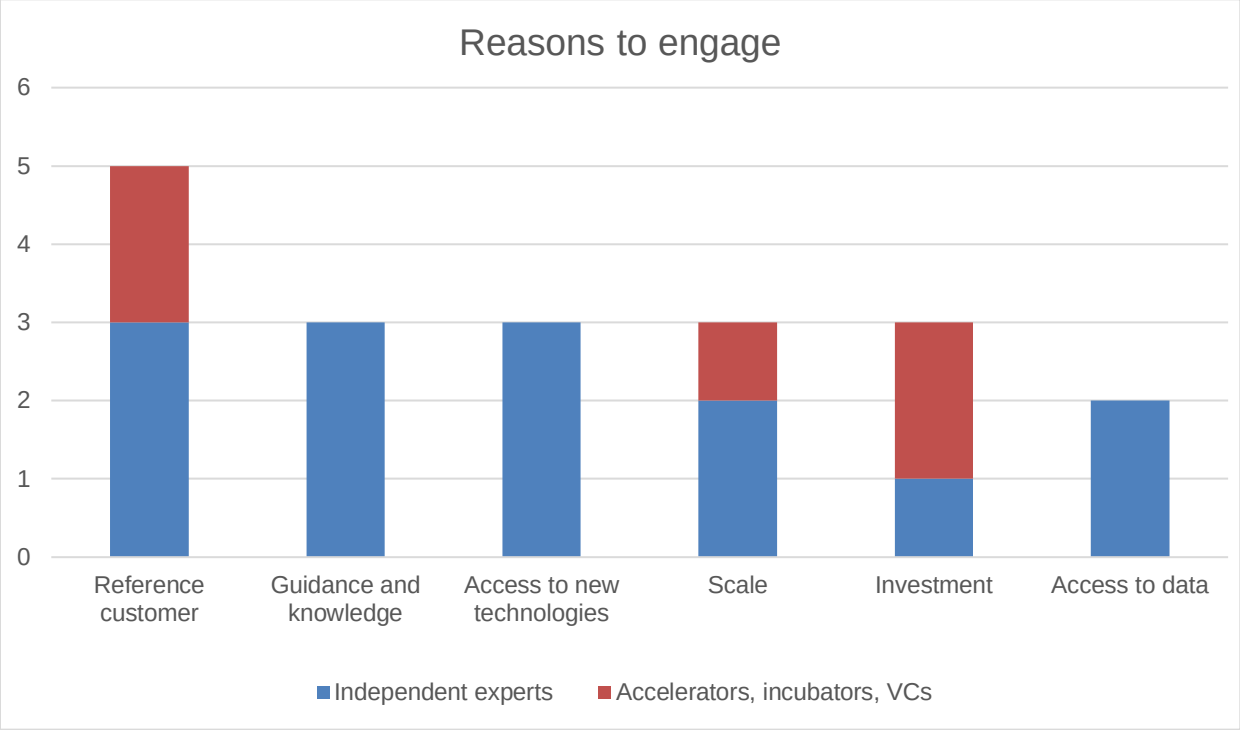

Figure 6. The reasons for automotive OEMs and startups to engage, according to the interviewed experts.

Reference customer

According to both the groups of experts, the biggest value that an automotive OEM can contribute with is for the startup to use the automotive OEM as a reference customer. The majority of the answers included the same argument as described by the startups earlier in this chapter, i.e. to be associated with the brand of the automotive OEM, since there is already a lot of support to get from other players in the ecosystem. This includes for example financial support and business development.

Guidance and knowledge

For the startup to get guidance from an automotive OEM, regarding how to make the startups technology fit the automotive OEM's requirements, was mentioned by several experts. Therefore, automotive OEMs should consider their knowledge and expertise as an important part of their value proposition when designing an offer to the startups. One of the experts also emphasised the importance of understanding the startups' different needs in different stages, since the need for guidance differ a lot depending on the stage. For example, startups in an early product development phase, that are still building their product and value proposition, might see guidance as the most attractive value an automotive OEM can offer. On the other hand, startups in later phases, focusing on building a customer base or validating the product, might think that a very close engagement with a lot of guidance from the automotive OEM takes too much time from their core business, and would rather use the automotive OEM for brand association or validation of the product. To include guidance in the offer to a startup in the growth or validation phase could therefore have a negative impact.

Access to new technologies

Most of the experts, with experience from working with both startups and automotive OEMs, mentioned that access to new technologies is one of the reasons for automotive OEMs to

engage with startups. Accessing new technologies by engaging with startups is both a way for the engineers in the automotive OEM to learn and get inspired, as well as a strategy for the automotive OEM to get the best technology in order to get a competitive advantage.

Scale

For a startup to get help from an automotive OEM to scale the product and the brand was mentioned several times as a reason to engage by both groups of experts. Depending on the startups' technology and targeted customers, the automotive OEM can be useful in different ways. If a startup has a business-to-business product within the automotive industry, the automotive OEM can recommend the startup to their suppliers, which can be an important revenue stream for the startup and make it scale much faster. If the startup is targeting consumers, an automotive OEM can be useful as a go-to-market partner. This was mostly mentioned for mobile applications for services related to cars, where the automotive OEM can increase the startups customer base.

Investment

About a third of the interviewed experts, from both groups, mentioned the automotive OEMs as investors in the startups as a possible way to engage. The experts described that automotive OEMs can be valuable as a strategic investor together with VCs and incubators, because of their specific knowledge and experience that could bring value to the incubator's or VC's portfolio startups. Some drawbacks mentioned regarding automotive OEMs as investors was that startups could be locked up in a corner, since competitors might not be willing to work with the startup if it would be partially owned by an OEM.

Access to data

Another reason for startups to engage with automotive OEMs, described by a couple of experts, is to access data. Startups based on technologies such as AI, deep learning, and machine learning need a massive amount of data from autonomous cars to test their technologies. The experts explained that data from autonomous cars is hard to get from elsewhere, and is therefore of critical value for startups. It is especially attractive if the data is collected under weather conditions that are common in specific regions, and thus hard to access in e.g. California. An example of this is the need for data from testing in snow, rain and wind, that is common in the Scandinavia.

4.2. Challenges and pitfalls

The following sub-chapter describes the challenges and common pitfalls related to engagements between automotive OEMs and startups, according to the interviewees.

4.2.1. Startups

The main challenges that the interviewed startups emphasised are summarised in Figure 7.

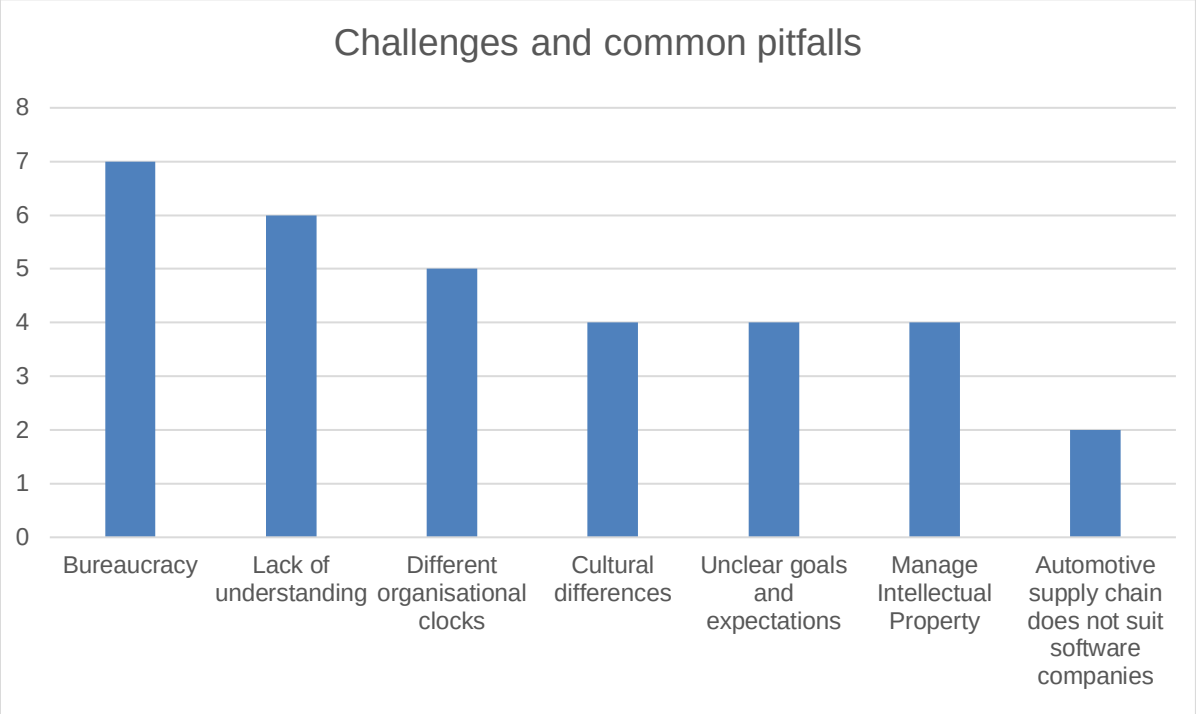

Figure 7. Challenges related to engagements between automotive OEMs and startups, according to the interviewed startups.

Bureaucracy

The most common answer regarding the main challenges related to engagements with automotive OEMs, according to the startups, was the bureaucracy in the automotive OEMs (7/12). Several startups exemplified that they had fell victim for the rigorous processes in automotive OEMs when being evaluated for a potential engagement. One big problem was that the startups were evaluated as suppliers, and were required to fulfil a lot of requirements that took too much time from their core businesses. One startup captured the magnitude of this problem by saying that "*the best way to get rid of a competitor is to recommend a large firm for them to work with*", meaning that it takes too much time and effort for a startup to work with an automotive OEM.

Lack of understanding

Another pitfall mentioned by half of the startups is lack understanding of the other party in an engagement. Most of the automotive OEMs have no experience of the startup world and vice versa. Consequently, is it hard to understand what is reasonable to expect from the other party, and how much time and resources an engagement will require from the other party. One example of misaligned expectations was when an automotive OEM wanted a startup to deliver 100 products, to test in their vehicles, but the startup barley had a finishing prototype and had a hard time delivering. Therefore, the startup explained how important it is for them that the automotive OEM understand their limitations and capacity, and make the engagement fit their need in current stage.

Different organisational clocks

The third most mentioned challenge is the different organisational clocks in startups and automotive OEMs (5/12). One startup exemplified this with a case where they had a drawn-out discussion with an automotive OEM, and doubled their valuation during the same period.

Another startup exemplified the differences in speed by saying that "*startups are living dog years, while corporations are living human years*". Moreover, some startups explained the essence of having the right timing. Being first on the market with a new technology could be crucial for the success of a startup. Therefore, spending a lot of time on an engagement with an automotive OEM that would not generate any revenue in many years, could jeopardise the survival of the startup.

Cultural differences

Another major challenge that the startups emphasised is the cultural differences between startups and corporations, which makes it hard to work together. One challenge related to this is how failure is perceived. While startups see failure as learning, large firms usually strive towards minimising risk. Another issue related to the cultural difference, mentioned by two of the startups, is that automotive OEMs are in fact afraid of change and does not truly want autonomous cars to become a reality too soon. In contrast to this, startups are built around technologies that will make autonomous driving a reality sooner.

Unclear goals and expectations

Another pitfall that can make an engagement fail, according to the interviewed startups, is unclear goals and expectations with the engagement (4/12). The startups described that engagements had been initiated without defining the desired output and aligning the expectations between the parties, and failed. Moreover, one of the startups mentioned that a previous effort to engage with automotive OEM failed because the automotive OEM was unclear about their offer, which caused misaligned expectations. In this case, the automotive OEM did not deliver on time, which caused serious problems for the startup.

Manage Intellectual Property

Another challenge that many of the startups mentioned is how to handle IP, and four of the startups emphasised the need for the startup to keep the IP. For startups, the IP is often the core value, and should therefore not be given to any automotive OEM as long as the startup is not acquired.

The automotive supply chain does not fit software companies

Two of the startups described the difficulties of working with automotive OEMs as a software company, and meant that the automotive supply chain is designed to fit hardware companies. One of the startups described that they adapted their software very quickly to fit the specifications of an automotive OEM, which caused concerns for the OEM as they meant that the product could not be reliable if it was that easy to adapt, since it is hard to ensure the quality of it.

4.2.2. Automotive OEMs

The challenges and common pitfalls related to engagements with startups, according to the interviewed automotive OEMs, are summarised in Figure 8 and described below.

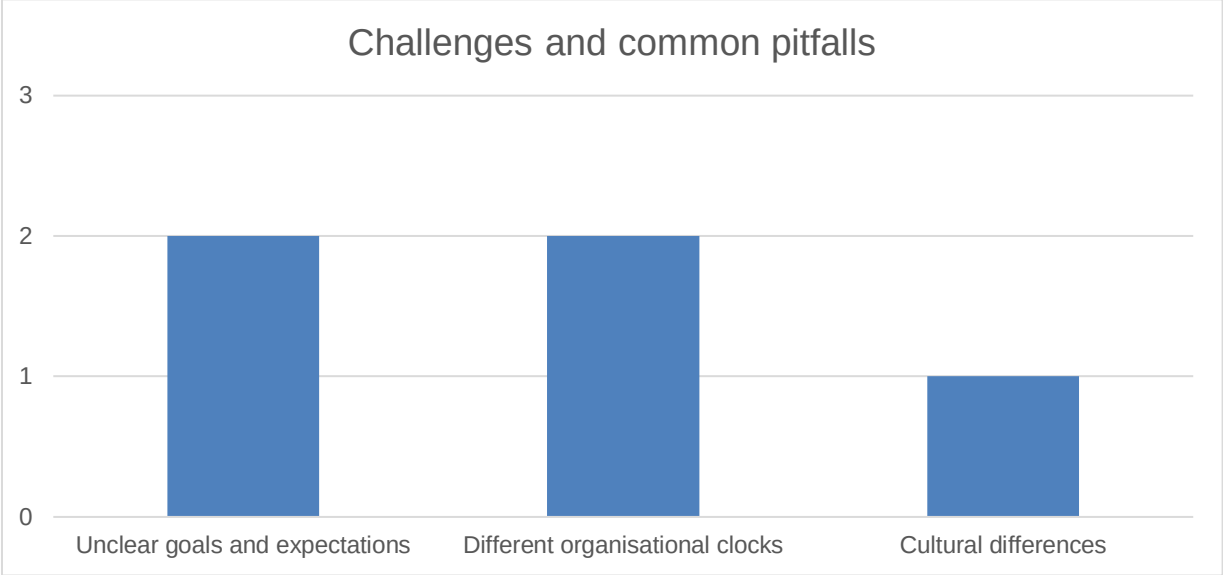

Figure 8. The challenges and common pitfalls, according to the interviewed automotive OEMs.

Unclear goals and expectations

A couple of the interviewees explained the challenges related to unclear expectations. For example, if the startup is forced to spend 50 % of its capacity on fulfilling requirements from the automotive OEM, the startup might lose their competitive advantage, which can make the engagement useless. Therefore, according to one of the automotive firms, it is critical for the automotive OEM to understand the consequences of not being clear with what the startup can expect from them and not promise too much.

Different organisational clocks

One big difference between automotive OEMs and startups is the organisational speed, which was emphasised as a main challenge by two of the interviewed automotive OEMs. Startups are very fast in their way of working, and time is very critical for them, since a few months for a startup could be a difference between succeeding or failing. One of the interviewed automotive OEM described that VCs in Silicon Valley can invest in a startup within a few weeks after meeting them for the first time, which makes some startups expect the same from automotive OEMs. One of the automotive OEMs, with a long experience working with startups in Silicon Valley, explained the importance of always getting back with an answer whether they are interested in engaging or not to the startup within a week after the pitch meeting.

Cultural differences

Finally, one of the interviewees stressed upon the cultural differences between automotive OEMs and startups as the main challenge. The interviewee explained that the different ways of working makes it difficult to engage. The interviewee further explained the value of hiring people with experience of startups in the automotive OEM, to cope with this challenge. To act and dress like a startup was explained as another way of overcoming the cultural barrier and making the startup more comfortable. Another way mentioned is to make the environment in the automotive OEM more startup friendly, for example by having 3D printers and other new technology for startups to use, making the office look like an incubator.

4.2.3. Experts

This sub-chapter presents what the interviewed experts perceived as the main challenges and common pitfalls for automotive OEMs to address when engaging with startups (see Figure 9).

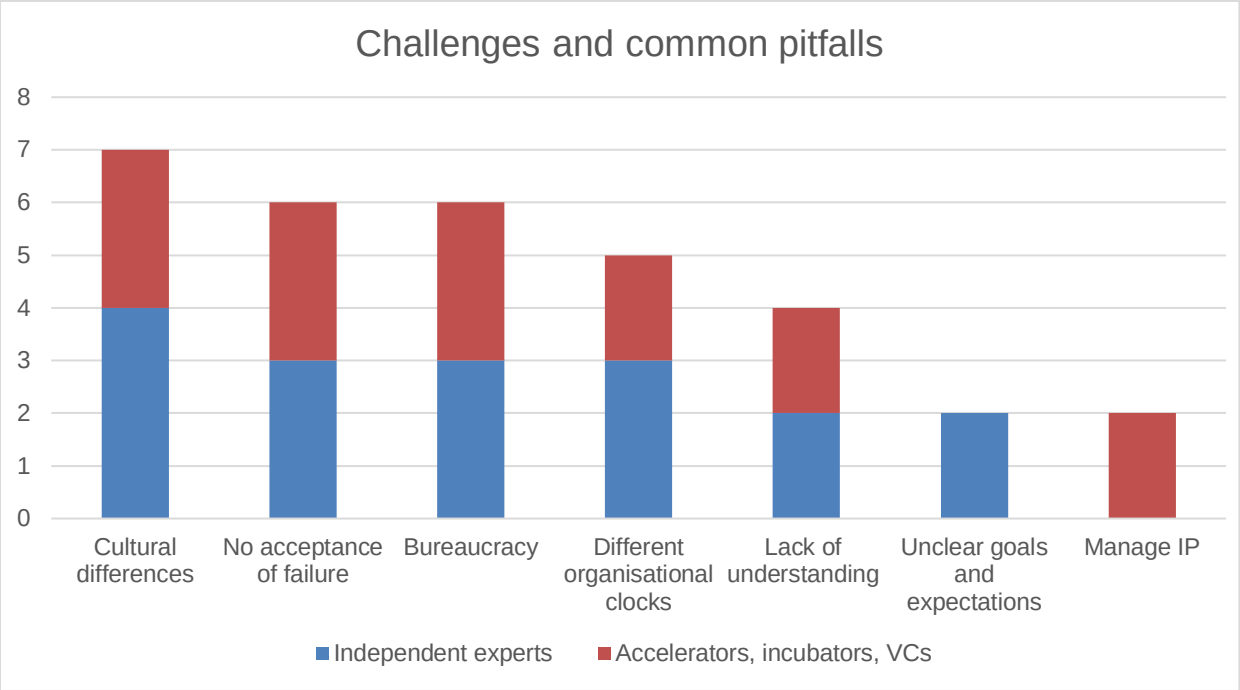

Figure 9. Challenges and common pitfalls related to engagements between automotive OEMs and startups, according to the interviewed experts.

Cultural differences

The interviewed experts strongly emphasised the cultural differences between startups and automotive OEMs as the main challenge to address. While automotive OEMs have been active for many years and have complex supply chains and processes, startups are inexperienced and known for being flexible and are often changing both their product and their business model. Moreover, many of the startups in Silicon Valley are software based, where the product development looks totally different from traditional hardware products that automotive OEMs are used to. The cultural difference can be hard to overcome, which is why some of the experts described that different types of third parties are useful to involve as intermediaries between the two parties. For example, consultants, independent organisations organising events and hackathons, accelerators, and incubators can act as a bridge between automotive OEMs and startups, and increase the chance of an engagement to become successful.

No acceptance of failure in automotive OEMs

Related to the culture, startups' and automotive OEMs' views on failure differ significantly. According to the experts, automotive OEMs typically strive towards reducing risk, while startups see risk as necessary to grow and succeed and failure as learning. The fact that automotive OEMs is striving towards minimising risk is a challenge, since startups are always associated with risk. Moreover, a couple of experts argue that automotive OEMs are not comfortable with engaging with startups, even if they say that they want to invest and involve with startup early, before they grow and become wide known. The experts argued that automotive OEMs are afraid of innovation and taking big risks in a market they do not have any experience from. On the other hand, the risk entailed with an engagement between a startup and an automotive

OEM is very unbalanced for the two parties. Experts described that a failed engagement would not affect the automotive OEM very much, whereas it can make a startup go under.

Bureaucracy

Many of the experts described that there is a big risk for a startup to engage with an automotive OEM, because of the time it requires of them to spend on the engagement instead of their core business. The experts described examples of how automotive OEMs only engaged with startups to make their engineers learn, and not to make the startup growth or succeed. Moreover, the automotive OEMs requirements are usually not adapted to suit engagements with startups. Instead, automotive OEMs' processes and requirements are typically made for suppliers of hardware products, that have been on the market for a long time. For example, experts described that automotive OEMs often require the startups to fulfil standard requirements, such as ISO certifications. However, such requirements would be very expensive and sometimes impossible to fulfil for a young startup.

Different organisational clocks

In accordance with the startups and automotive OEMs answers, the experts mentioned the different organisational clocks as a main challenge. They explained that being able to move fast and be flexible is necessary for a startup to succeed, while automotive OEMs usually have time consuming processes and slow decision making, often because of the hierarchy. Thus, the experts emphasised the importance of being clear and transparent about what the startups can expect from them, to reduce the risk for misunderstandings.

Lack of understanding

Another challenge emphasised by the experts is lack of understanding of the other party. The most common pitfall, according to one expert, is that startups often expect that an engagement with an automotive OEM will make them successful right away. However, some startups do not understand the time and resources that an engagement can require, that could be spent on other activities that would increase their competitiveness. On the other hand, automotive OEMs often fail to understand how critical time and flexibility is for a startup, as well as what the startups need from them to develop in the right direction. Moreover, the experts described that both the automotive OEMs and startups often fail to understand the way the other party works and what is reasonable to expect.

Unclear goals and expectations

One of the most common pitfalls, according to the experts, is that automotive OEMs engage with startups without defining the purpose of engaging. One expert said that "*if you have undefined goal, you will get undefined results",* meaning that it is difficult to succeed if the goal is unclear. Moreover, unclear goals and expectations in the automotive OEM causes problems both for startups and for experts acting as a third party between the automotive OEM and the startups, since it makes it difficult to understand what is expected of them to deliver to make the automotive OEM satisfied.

Manage Intellectual Property

Another big challenge is how to manage the IP. If an automotive OEM and a startup develop something together, the question of who own the IP will arise. This issue was mentioned as the biggest challenges by some of the experts. Thus, going through all possible scenarios in the contract before starting the engagement is important to make the engagement successful and

reduce the risk of conflict and misunderstandings. Most of the experts described that the best way is to make sure that the startups keep owning their IP, but co-developments could be owned by the party who pays for the development.

4.3. Key factors for successful engagements

The following chapter describes the key factors for successful engagements between automotive OEMs and startups. The chapter is divided into three sub-chapters, based on the interviews with startups, automotive OEMs, and experts.

4.3.1. Startups

On the question regarding the key factors for successful engagements, the different answers from the startups are summarised in Figure 10.

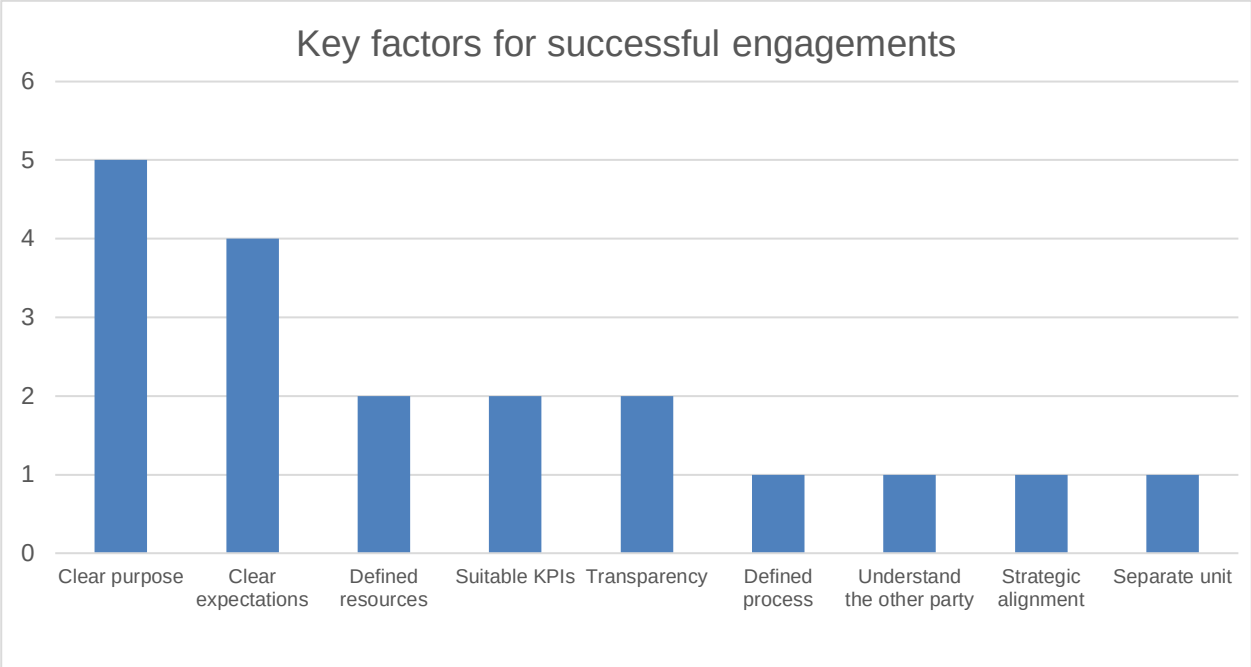

Figure 10. Key factors for successful engagements, according to the startups.

Clear purpose

The most important key factor for successful engagements, described by the startups, is that automotive OEMs must clearly define their intent of engaging with startups before starting (5/12). The startups emphasised the importance of being clear with the reason to engage in each specific engagement, to be able to know what to strive towards.

Clear expectations

The second most common answer was that the expectations on the engagement must be defined and aligned between the two parties (4/12). The interviewees elaborated on the importance of the automotive OEMs defining what they expect to get out of the engagement, their expectations on the startup's performance, as well as aligning the OEM's expectations with the startup's expectations.

Defined resources

A couple of the startups strongly argued that automotive OEMs must define the resources that can be put into the engagement, in terms clearly knowing what they can offer to the startup. This includes for example if the automotive OEM can offer a team of engineers, equipment, money, and location. Defining the offer and resources that can be put on the engagement is related to the automotive OEM's value proposition towards the startups, that need to be designed in a way that is attracting to the startups.

Suitable KPIs

Another key factor that a couple of startups mentioned is that automotive OEMs need to establish suitable KPIs for engaging with startups, that are aligned with the purpose. The startups elaborated on the problems related to that automotive OEMs usually measure and evaluate engagements based on KPIs that contradict the purpose, and thus hinder successful engagements.

Transparency

Two startups emphasised the importance of being transparent in engagements. For example, automotive OEMs must be open about their problems and needs in order for the startups to know what is needed from them. If the automotive OEM would have any problems with for example delivering on time, keeping their promises, or have too little knowledge, it is much better to be transparent and share that information with the startup, to create understanding and trust and decrease the risk of misunderstandings.

Other key factors

In addition to the factors descried above, one startup emphasised that automotive OEMs need to have a defined process with a clear timeline and milestones, and that the KPIs should be connected to these milestones. There were also answers regarding the importance of understanding the other party, ensuring strategic alignment between the startup and the automotive OEM, and that the automotive OEM need to have a separate unit outside the core organisation that is able to act more like a startup.

4.3.2. Automotive OEMs

Figure 11 provides an overview of the key factors for successful engagements, emphasised by the interviewed automotive OEMs. The factors are further described below.

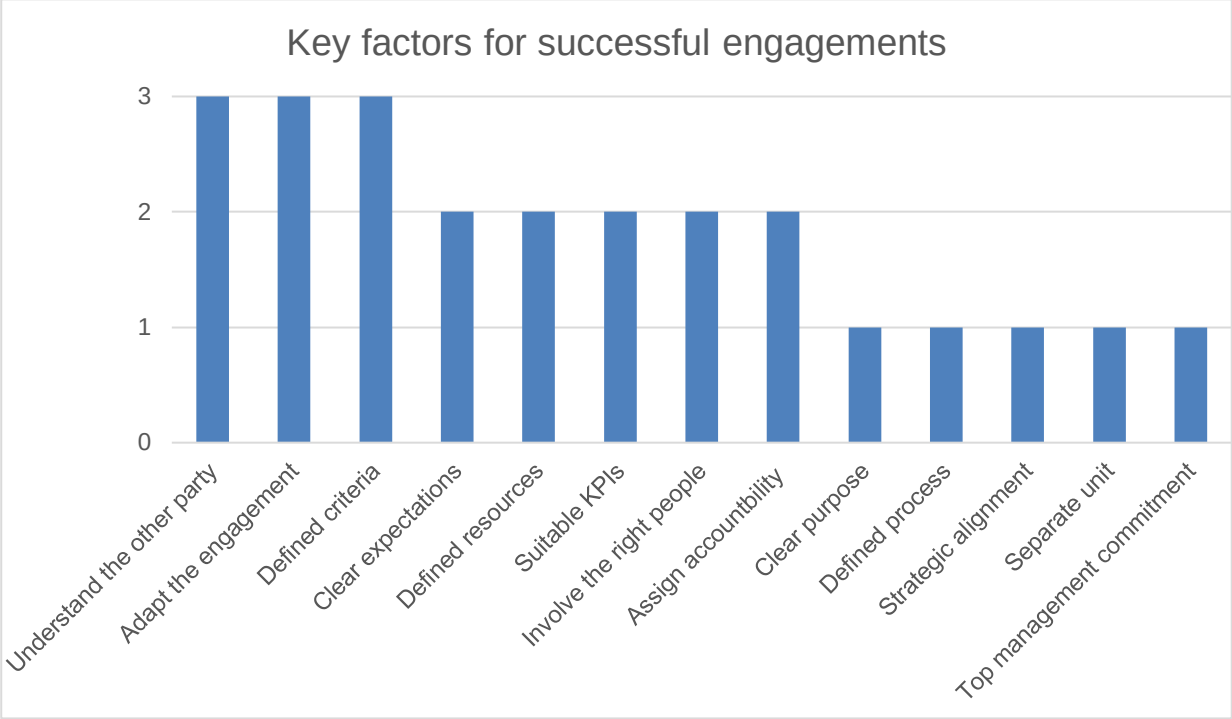

Figure 11. Key factors to address when engaging with startups, according to the interviewed automotive OEMs.

Understand the other party

All three of the interviewees stressed that it is extremely important to understand the other party. Different startups need different things, and the specific circumstances for each startups must be clearly understood. One interviewee described that understanding of the other party is a prerequisite for overcoming many of the challenges that are related to engagements.

Adapt the engagement

The next key factor, emphasised by all the interviewed automotive OEMs, is to adapt the engagement to each specific case. The interviewees described that the kind of engagement that is suitable depends entirely on the specific case, since startups need different things in different stages, and the automotive OEMs might need different things depending on the technical field.

Defined criteria

Having a defined set of criteria to evaluate whether the startup is a good fit or not was also described as a key factor for successful engagements by all the automotive OEMs. The most important criteria, emphasised by one of the automotive OEMs, is that the startup is aligned with the strategy of the automotive OEM. Other criteria that the automotive OEMs are using are the people in the startup, the product, and the potential. Moreover, they described that there are additional criteria within each of these categories. Finally, the interviewees emphasised that it is important to have the stage of the startup in mind when evaluating the criteria. The risk is higher the younger the startup is, but the amount of money required to invest is usually lower.

Clear expectations

Two of the interviewees from the automotive OMEs also mentioned the importance of being honest with what the startup can expect from them, both because it could damage the

reputation of the automotive OEM if promises would not be fulfilled, but also since time is much more critical in a startup than for an automotive OEM. For example, three months for a startup could mean a doubled valuation, while automotive OEMs usually do not change very much during that period of time. Moreover, since Silicon Valley is built on relationships, the reputation is very important. One of the automotive OEMs therefore pointed out the importance of getting back to the startup relatively fast with an answer whether they are interested in proceeding to the next step or not. The interviewee exemplified that they make sure to get back to the startup within one week if the engagement is small. The interviewee also mentioned that if the automotive OEM does not have a well-defined purpose or is well prepared, they should not reach out to startups at all, because of the risk of failure and to get a reputation of not being a serious player.

Defined resources

In Silicon Valley, startups can get money from VCs, as well as knowledge and advice from incubators and accelerators. Thus, one critical aspect to consider before engaging is the automotive OEM's value proposition to the startups. As mentioned by one of the interviewees, the best startups usually gets many offers. Thus, it is crucial to design an offer that is attracting and makes the best startups want to engage. The interviewee exemplified that the offer can include an attractive working space, with access to for example cars and 3D printers. However, simple things such as making the startup comfortable by showing that the automotive OEM understands its needs could be just as important, as well as the knowledge of what automotive OEMs see as attractive, or access to user data from autonomous cars. An important key factor is thus that the automotive OEMs must pitch their offer to the startup as well, and not only the other way around.

Suitable KPIs

Another key factor is to establish suitable KPIs to be able to measure the success of the engagements before reaching out to startups. Also, the KPIs should be adapted to the purpose of engaging with startups. Related to this, it is important for the automotive OEM to define what is meant by success, since it can differ a lot depending on the purpose of the engagement. For example, one of the automotive firms engage for strategic reasons only, while the other two engage for both financial and strategic reasons.

Involve the right people

Another important factor, to lower the cultural barriers and overcome the pitfall of lack of understanding, is to hire local people that have experience from the startup world. To have people that have been working in or with startups before, and truly know the startups' mindsets and struggles, makes it less scary for startups to engage, according to two interviewees. It is also a way of accessing the network in Silicon Valley, since employees who have been active in the area for a long time, and have a lot of contacts in the startup world, could be a way of finding the right startups to engage with. Involving the right people also concerns the people needed internally in the process for engaging with startups. For example, a decision maker, as well as people with technical and legal expertise is important to identify before starting to engage, to enable fast decision making when a startup is found.

Assign accountability

Having someone responsible for making the decision regarding if the automotive OEM should enter an engagement with a specific startup or not is important to enable fast decision making, and be able to get back to the startups with an answer fast. As described above, slow

processes and absence of answer could seriously damage the automotive OEM's reputation among startups. Moreover, having a reputation of being a serious player is important to get recommendations from other players in the ecosystem. Also, the unit working with startups within the automotive OEM should have the mandate to make decisions about specific engagements, to reduce time.

Clear purpose

Two of the interviewed OEM described that one of the most important key factors for successful engagements is to have a clear purpose with the engagement. One of the interviewees exemplified that he always asks himself: "*Which strategy is this engagement supporting?*" before initiating any engagement. Moreover, the interviewees described that the purpose is closely linked to the kind of startups that are targeted. While two of the interviewees described that it is very important to be focused regarding the technical field, the third interviewee meant that being too focused can be a bad thing, since it might make you miss out on opportunities.

Other key factors

In addition to the key factors described above, the interviewed automotive OEMs also described that it is important to ensure strategic alignment between the automotive OEM and the startup, have a separate unit to work with startups outside the organisation, and ensure top management commitment. One interviewee also pointed out that time is extremely critical when talking to startups. Thus, it is crucial to be well prepared and have a defined process for engaging to be able to act fast when an opportunity appears.

4.3.3. Experts

Figure 12 provides a summary of the key factors for automotive OEMs to have in place before engaging with startups, according to the interviewed experts.

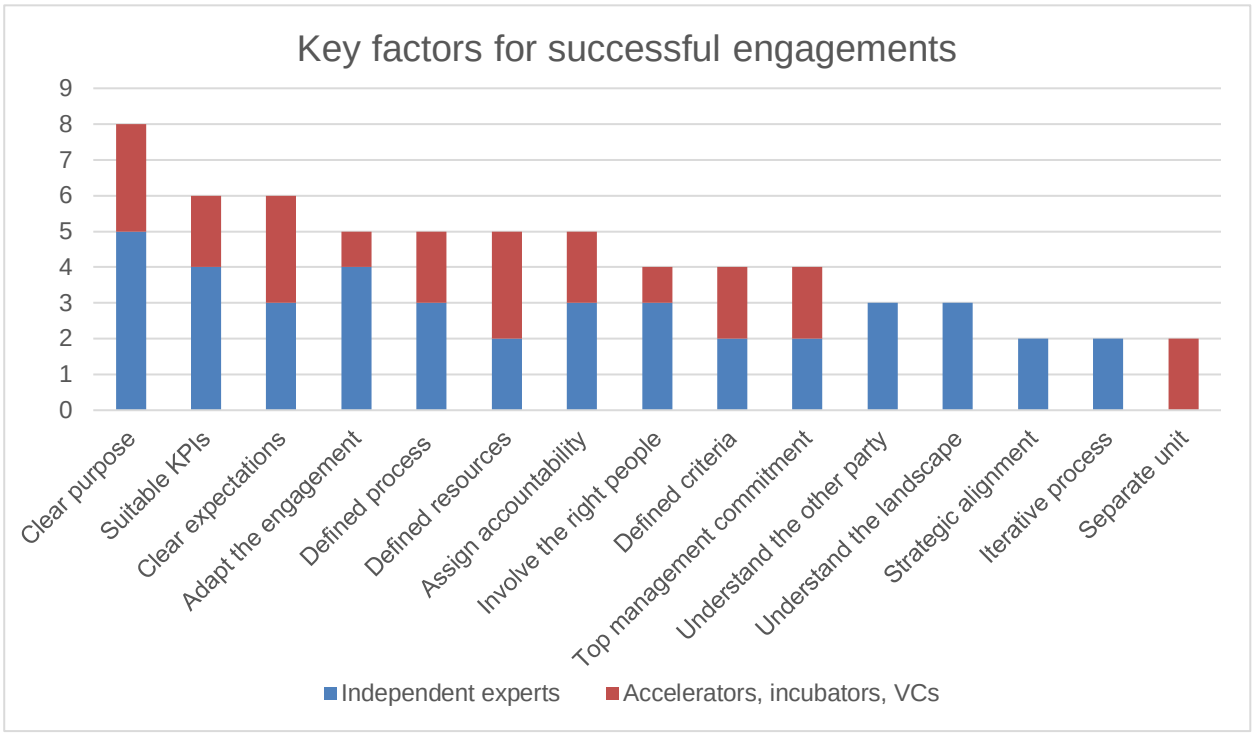

Figure 12. Key factors for successful engagements, according to the interviewed experts.

Clear purpose

Having a well-defined definition and goals of what a successful engagement means for an automotive OEM, before starting to engage with startups, is the most important key factor, according to the interviewed experts. A clear purpose was the most common answer to the question regarding key factors for successful engagements, as well as described as the most important one by many of the interviewees.

Suitable KPIs

The second most common answer regarding key factors was to have suitable KPIs for the engagement. The KPIs should be adapted to the purpose of the engagement. Several experts stressed on the importance of measuring success, and define what success means for the organisation.

Clear expectations

To define and be open with the expectations on the engagement, both for the startups and the automotive OEMs, was another important key factor mentioned by the interviewed experts. Being clear with the intent of engaging, as well as the resources and effort that will be spend from each party must be clearly communicated, and the expectations from both sides must be aligned for the engagement to succeed.

Adapt the engagement

Another key factor, according to the experts, is to make sure that the engagement fit the specific situation. The startups' needs might differ significantly depending on the type of technology and the stage of development, and the automotive OEM might need different things for different projects. Thus, the experts argued that there is no single way in which all engagements can be set up. For example, startups in early stages, that only have a prototype, might need knowledge and guidance, while startups in later stages might need more space and help to scale.

Defined process

Several experts meant that one of the most important key factors is to be well prepared before starting to engage with startups. This means to have procedures in place to be able to act fast when a suitable startup is found, and some of the experts described how a process for identifying and engaging with startups could look like. One expert, with long experience from engagements between startups and corporations in Silicon Valley, explained how being well prepared, knowing all the critical steps in the process by heart, and adapting it to each startup increases the chances of an engagement to succeed significantly.

Defined resources

Before an engagement is initiated, several experts argued that the automotive OEM must know how much resources that can be spent on the engagement. Resources can include budget, what type of equipment they can offer, if engineers can be spared, or if a working space can be offered. Defining this beforehand is crucial both when defining and pitching the value proposition to startups, as well as decreasing the time to decide whether an engagement can be initiated. Also, several experts explained that the automotive OEMs need to have a competitive offer to pitch to the startups in order to attract the best startups.

Assign accountability

Several experts described that it is important to have someone responsible for the process of engaging with startups. The interviewees described that the purpose of having a separate unit to work with startups is partly to enable fast decision-making. Thus, there must be someone with mandate to make a decision whether or not to engage with the startup involved in the process.

Involve the right people

Closely related to the previous paragraph, experts described the importance of involving the right people in the process of engaging with startups. In addition to involve a decision-maker, the people who should be in contact with the startups must be carefully selected. According to the experts, one key factor to make the best startups want to engage is to create trust and make the startups comfortable. A key factor is therefore to employ people within the specific technical field of interest, as well as people with experience of working with startups, to lower the cultural barriers.

Defined criteria

Having pre-defined criteria for evaluating startups is a key factor for ensuring that the engagement is suitable, according to the experts. The criteria should be used both during the pitch meeting, to know what to pay attention to and ask for, but also for evaluating the startup's suitability for an engagement before making a decision whether to engage or not. The criteria are recommended to be scored and preferably visualised in a diagram (see Appendix 5). One expert argued that it is preferable to use the scoring 1-4, because it is too easy to put medium score on everything. Instead, by having a score between one and four, it is easy to see whether the startup is performing on the lower or upper part on the scale. The scoring can thereafter be a basis for areas of development and goals for the startup, either during the engagement or as scores to fulfil before an engagement can be initiated. Other experts described that a scale from one through five is used. Common criteria to evaluate are potential, people, product, traction, scalability, business model, strategic hypothesis, core technology, competition, market, capital need, ownership and valuation, exit opportunities, strategic fit, and risk (see Appendix 5). However, an interviewed VC argued that the criteria should be adapted to the purpose of the engagement.

Top management commitment

Multiple experts described the importance of having top management commitment in the automotive OEM. The interviewees argued that top management must not necessarily be involved in the operative process of engaging, but should support the strategy of engaging and make sure to get buy in from the rest of the organisation.

Understand the other party

To be able to offer the startup an attractive deal, and make sure that the engagement is beneficial for both parties, the automotive OEM need to understand the startup's perspective on the engagement. For an automotive OEM to truly understand the startups, the experts described that they must meet and work with startups, make sure to learn from mistakes, and be open and curious when it comes to exploring new ways of working and thinking.

Understand the landscape

To understand the landscape was described as the next key factor by the experts. Knowing the landscape includes for example the competition, the technical field, and where to find the startups within that specific field. Silicon Valley is network driven, and the landscape differ from most other places in the world. Thus, depending on the geographical area, whether it is in Silicon Valley or somewhere else, it is important to understand the landscape in order to identify and engage with startups successfully.

Strategic alignment

Two of the interviewed experts explained that the startup and the automotive OEM must be strategically aligned in order for the engagement to succeed, if the automotive OEM intend to invest or engage for strategic reasons. For example, if the automotive OEM engage to get access to the startup's technology, which is the most common reason according to the experts, the startup's technology must fit the long-term strategy of the automotive OEM. Moreover, if the startup's strategy is not aligned with the automotive OEM's strategy, the time spent on the engagement will probably not contribute to develop the startup's core business.

The process must be iterative

For automotive OEMs to be successful with startup engagements, a couple of the experts strongly argued that the process for identifying and engaging with startups must be iterative. To make sure to learn from each engagement, continuously improve the process, and constantly adapt the way of working to new circumstances and situations is necessary for the automotive OEM to be successful in the long term.

Have a separate unit to engage with startups

According to the experts, having a separate unit outside the mother organisation to work with startups is a key factor for successful engagements. The experts described that it takes too long if the decisions regarding every specific engagement must be made high up in the hierarchy, and the slow and bureaucratic processes in corporations are too time consuming and complex for startup engagements to be successful. Thus, the unit that should engage with startups should act more like a startup and be a buffer towards organisational complexity.

4.4. Channels

This sub-chapter presents the channels that can be used by automotive OEMs and startups to connect with each other, based on the interviews with startups, automotive OEMs, and experts.

4.4.1. Startups

This section presents the channels that the interviewed startups have used to connect with potential engagement partners. An overview of the answers can be found in Figure 13.

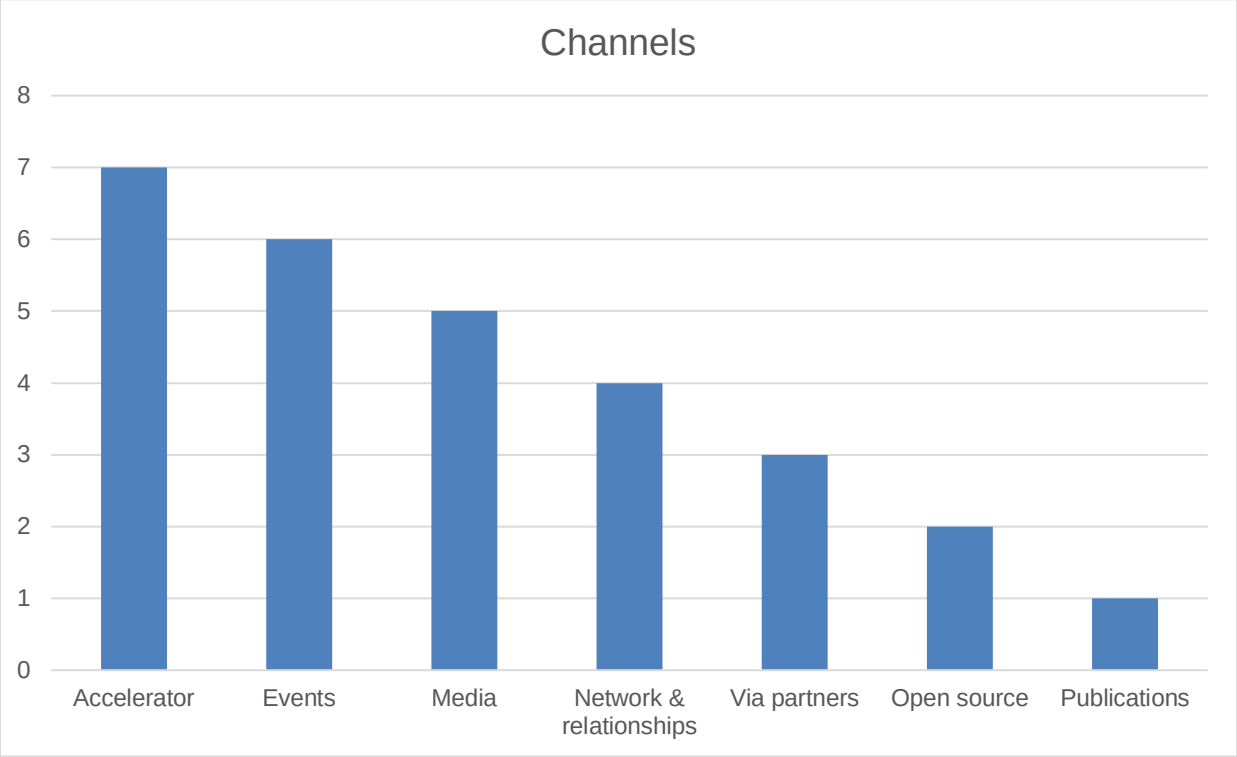

Figure 13. The channels used by the startups to get in touch with potential engagement partners.

Accelerators

The most common way to connect with engagement partners was through an accelerator (7/12). However, it must be kept in mind that a majority of the interviewed startups were selected from the portfolio of one of the biggest accelerators in Silicon Valley. The startups described benefits such as getting access to a large network, events, and the social platform that the accelerators compose, which provides a good way to connect with other players in the ecosystem.

Events

The second most common channel was through events, such as pitch events, meetups, and seminars. The advantages of participating at events with the topic of a specific technical area of expertise was mentioned as a good way to connect, since people with the same specific interest and knowledge are usually there.

Media

Some startups described that they had used different kind of media to connect with others (5/12), such as social media, blogs, and. This was also the only channels that three of the startups had been using prior to the interviews.

Network and relationships

One way to get in contact with other parties was through personal network and relationships. This was described by four of the startups, who also mentioned other channels that they had used, but emphasised the personal network as the by far most important and successful way to connect with engagement partners.

Other channels

In addition to the channels described above, a minority of the startups described that contact can be initiated through introduction from existing partners, open source, and technical publications.

4.4.2. Automotive OEMs

The channels used by the interviewed automotive OEMs to connect with startups are presented in Figure 14.

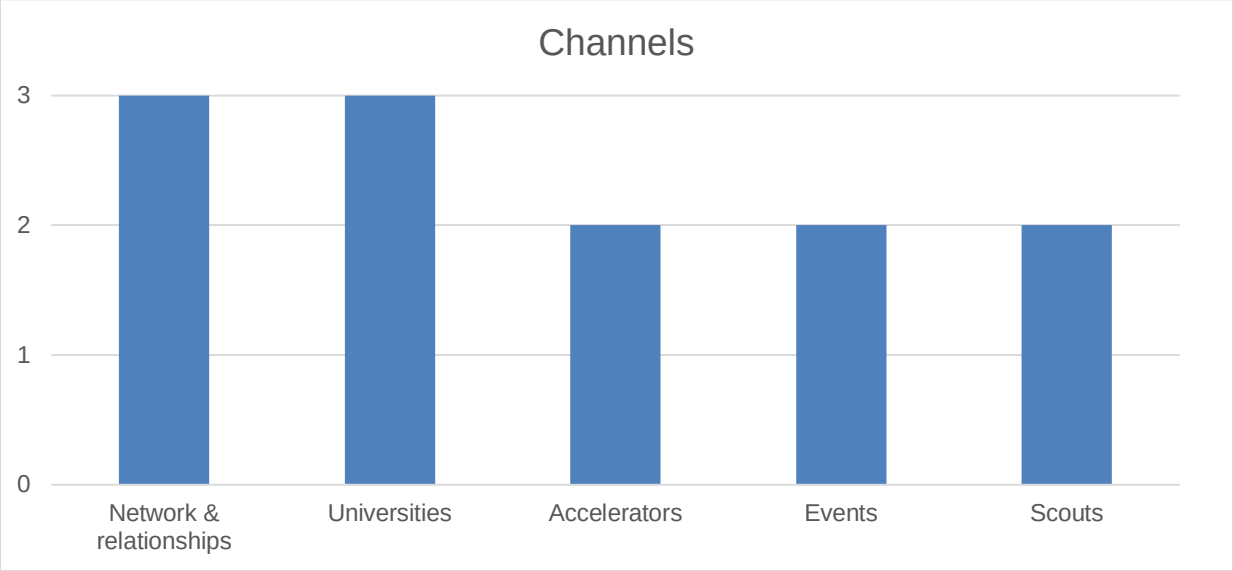

Figure 14. Channels used by the automotive OEMs to connect with startups.

Network and relationships

According to all the interviewed automotive OEMs, networking and relationships, both professional and social, is the most effective way to connect with startups in Silicon Valley. By building a personal network to serve as a screening filter, the automotive OEMs can get high quality startups within the targeted technical field and stage of development recommended.

Universities

To have a close collaboration with some of the top universities in the world, that are located in Silicon Valley (Stanford, Berkeley, and California University), was also mentioned several times as one of the most successful ways of finding new technology and startups. Also, the interviewees described that having relationships with universities is a good way to get first access to new technology, which is one of the goals of engaging with startups for all of the automotive OEMs involved in this study.

Accelerators

Another channel described is to become a partner with an accelerator. However, one interviewees described that automotive OEMs does not necessarily have to become a partner and pay the accelerator to get startups recommended, but can build relationships with several accelerators instead.

Events

Two of the interviewees described that going to events was an important part of networking and finding startups. One of the interviewees said that, if he would have done something differently, he would have attended even more events. The interviewee further described that being visible and attending events is one of the most valuable way to connect and build a network, that could lead to a successful engagement in the future.

Scouts

Finally, two of the interviewed automotive OEMs described that having own scouts to screen the startup scene, attend events, and scout for trends is a successful way to connect.

4.4.3. Experts

A summary of the channels that automotive OEMs and startups can use to connect, according to the interviewed experts is visualised in Figure 15. Most of the interviewed experts recommended the automotive OEMs to use multiple channels to find startups.

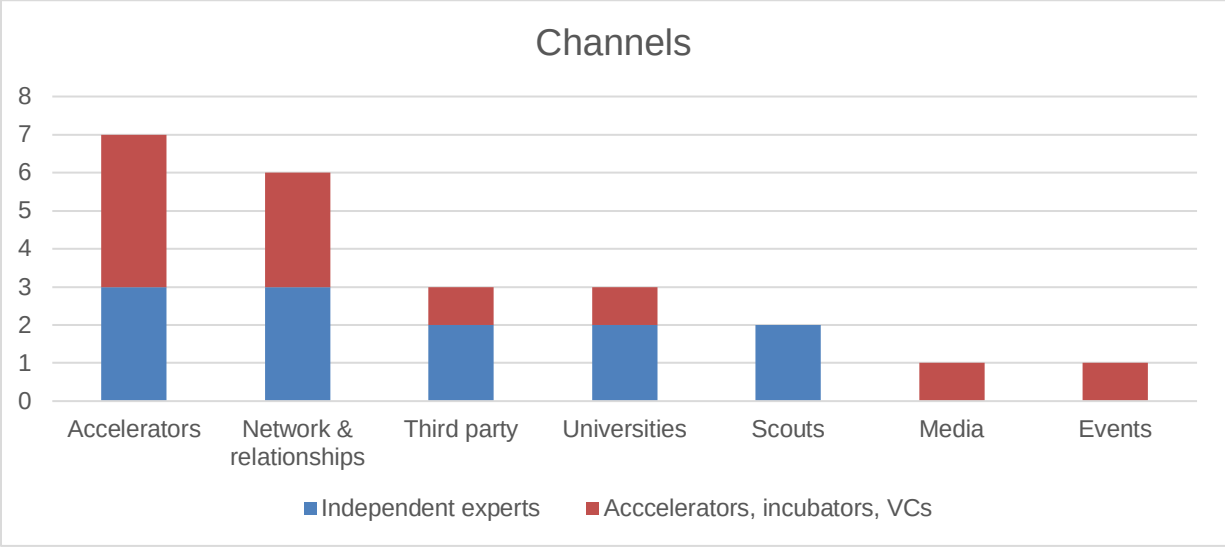

Figure 15. Channels to get in touch with potential collaborators, according to experts

Accelerators

The majority of the experts mentioned accelerators as a good way to connect, as they provide a platform to meet and host events, as well as help to introduce potential engagement partners. However, some experts that did not have any connection to any accelerator mean that putting money into and partner with accelerators does not have to be the best way, but rather to build relationships with several accelerators. It must also be kept in mind that the answers can be biased, as some of the interviewees are representatives from accelerators and incubators.

Network and relationships

The second most mentioned channel is to build a strategic network and relationships. As one of the expert said, "*Silicon Valley is relationship driven rather than technology driven*", and meant that the good relationships is the key to success. Moreover, several interviewees said that the network should be built strategically. A strategic relationship is, according to two of the experts,

an effective way to get introductions and recommendations to startups within specific fields. For example, if an automotive OEM is targeting startups within a specific field, it is valuable to build relationships with other players in the ecosystem within the same field.

Engage with a third party

Another way of connecting, which is related to building a network and collaborate with accelerators, is that automotive OEMs should build relationships with third parties to get help with the screening. The third party can be for example a high-profile VC that is active within the same area as the automotive OEM is looking for startups within. To create a win-win situation, where both the automotive OEM and the VC recommend the best startups in their specific targeted field of technology and stage of development to each other, is a way of helping each other out to screen the startup scene, and thus increasing the chance of finding a good match. Moreover, one expert described that they helped an automotive OEM to host a hackathon event. The expert managed the day to day communication with the startups, and prepared the entire engagement together with the automotive OEM.

Universities

Thee experts emphasised that having a close connection to the top universities is a good way to find early stage startups, sometimes even before a great team graduate. Collaborating with university incubators, having events, being out talking to schools, or sponsoring universities were mentioned as ways of finding startups through the universities. It was also mentioned that one of the reasons why Silicon Valley has been so successful when it comes to bringing world class technologies to the market, is because of all the competence coming from the world class universities in the area, as well as from NASA.

Scouts

The experts mentioned that automotive OEMs can have own scouts working with building relationships and reporting about future technology trends. The scouts can screen the startup scene, and recommend the best startups to look deeper into. Scouts also have an important role of establishing the brand of the automotive OEM and spread a good reputation within the ecosystem, to make the startups consider the automotive OEM as an option when considering automotive OEMs for engagements.

Media

One expert mentioned different media channels as good ways for automotive OEMs to find startups to engage with. It could be through the automotive OEM’s webpage, social media, or other internet sources. It is also common that startups uses social media to create a hype around their brand. Scientific articles and webpages, such as crunchbase.com, are widely used to find startups.

Events

Building relationships by going to events was also mentioned as one successful way of finding startups. Attending events is a good way of building a network of people interested in the same field, or to find new startups before competitors. Choosing the events carefully is however important, according to one of the experts, since there is so many events in Silicon Valley and there is a significant risk that it is a waste of time if the events are just randomly chosen.

4.5. Ways to engage

The following sub-chapter describes the preferred ways to engage, according to startups, automotive OEMs, and experts interviewed in this study.

4.5.1. Startups

On the question regarding how startups would prefer to engage with an automotive OEM, there were many alternatives among the replies, were the most common ones are shown in Figure 16.

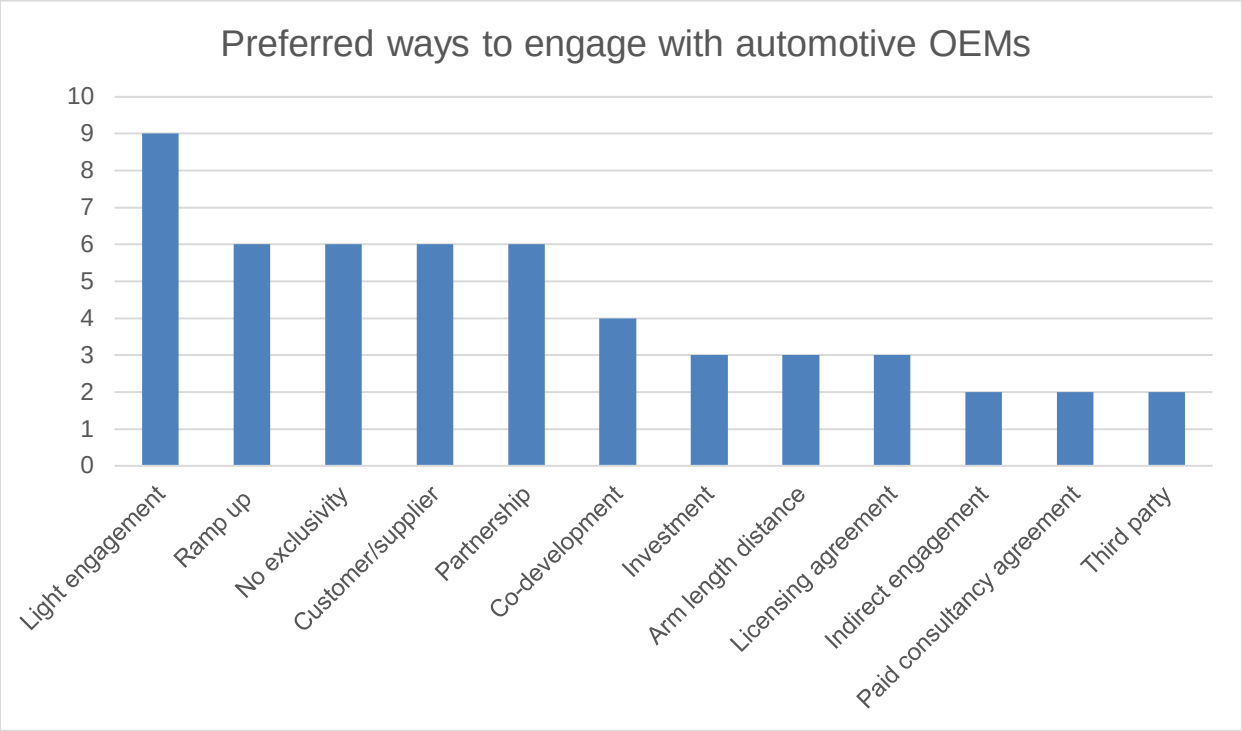

Figure 16. The startups' preferred ways of engaging with automotive OEMs.

Light engagement

The by far most common answer to how the startups would prefer to engage with an automotive OEM was to start with minor engagement, such as a pilot project or a POC (9/12). These kinds of engagements were desired to get validation or testing of the startup's technology. Moreover, it could also be a way to validate the suitability of a potential engagement between an startup and an automotive OEM. Furthermore, five of the startups stressed that it is important that the automotive OEM have a defined budget to spend on these engagements, that does not require a long decision-making process to get access to.

Ramp up

The second most common answer was to first have a ramp-up period, before entering a full-scale engagement. The reasoning behind many of the answers was to overcome the challenges related to the OEMs' requirements on the startups. By engaging step by step, and develop all the necessary requirements during the ramp up period, several startups argued that the engagement would be much more likely to succeed. The ramp up period could preferably be constituted by a light engagement described above. Moreover, the ramp up period can also be a

way for the startup to develop certain skills and capabilities related to the criteria described above, by the automotive OEMs help, that are required for a full-scale engagement to succeed.

No exclusivity

Furthermore, half of the interviewed startups brought up that they would not want to engage with an automotive OEM if it would require exclusivity. For instance, one startup said that, because of the extremely competitive market and the risk that it entails for a startups to be exclusive with one OEM, it makes no sense to be exclusive.

Customer/supplier relationship

After having a ramp up period, the startups described that one desirable way of engaging was to have an automotive OEM as a customer. The reasons for this were both to receive orders from the automotive OEM and secure revenue, but also to get a reference customer that would make it easier to get more customers later on.

Partnership

Half of the startups further stated that they would prefer a partnership with an automotive OEM. A partnership could be of many kinds, such as having the startup's product in the car, or using its service for creating value for the automotive OEM's customers. Being a partner with an automotive OEM would strengthen the startup's brand, make it more attractive for investors, and make it easier to get other well-known brands as partners and customers.

Co-development

Four of the startups said that they would want to have a close co-development engagement with an automotive OEM, where engineers from both companies would work jointly towards a common solution. The startups' described that learning from the automotive OEM would give them a competitive advantage, since startups often lack knowledge about the automotive industry. Having a co-development would increase the chance of making a product attractive for customers in the automotive industry.

Investment

Another way to engage, mentioned by three startups, was to have an automotive OEM as an investor. Only one of the interviewed startups had an automotive OEM as an investor prior to the interviews, and the ones who described that they would consider an automotive OEM as an investor were all about to raise another round of funding in a near future.

Arm length distance engagement

A few of the startups described that they would prefer an arm length distance engagement, where the startup is able to work by themselves without too much influence or disturbance from the automotive OEM. The startups who preferred this kind of engagement were relatively mature, and described that they had no need for guidance at the stage they were in. Many of the startups mentioned that their needs change significantly over time. In early stages, the startups are typically in need of knowledge from an automotive OEM, to make sure they are building a product that fit the market needs. In later stages, when the product and business model is defined and they need to scale, they prefer having the automotive OEM as a reference customer or brand association.

Licensing agreement

A few startups described that they would prefer to license their product to the automotive OEM, as a way to secure a future revenue stream. Moreover, a licensing agreement in which the startup would be able to refer to the automotive OEM to other potential customers would create credibility of the product.

Indirect engagement

A couple of the interviewed startups described that they would not want to engage directly with the automotive OEM, because of the difficulties and risks associated with such engagements. Instead, they described that they would want to engage indirectly, through another company in the supply chain. One startup exemplified this with the case of Cruise, that was acquired by General Motors. According to the startup, automotive OEMs are just not equipped to work with startups in a good way, and it would thus be easier to collaborate with a company like Cruise, who is able to act and think like a startup, and both the startup and General Motors would benefit from the engagement anyway.

Third party engagement

Another preferred way to engage with automotive OEMs, mentioned by two startups, is to have a third-party solution. For example, this could mean that a startup and an automotive OEM would engage with a service provider in a project. According to the interviewed startups, this would make the power balance more even. Moreover, the startups described that having an accelerator as a third party, who has equity in the startup, would make the startup feel safer, since the accelerator have their best interest in mind and can act as a shield towards the automotive OEM's bureaucracy.

Paid consultancy agreement

The last way to engage, preferred by two startups, is to offer paid consultancy to an automotive OEM. By doing so, the automotive OEM could pay the startup to regularly consult in specific technical matters. This way, both parties would benefit and learn from one another, without being bothered by complex and time-consuming contracts and requirements.

4.5.2. Automotive OEMs

In Figure 17, the ways in which the interviewed automotive OEMs are engaging with startups are presented.

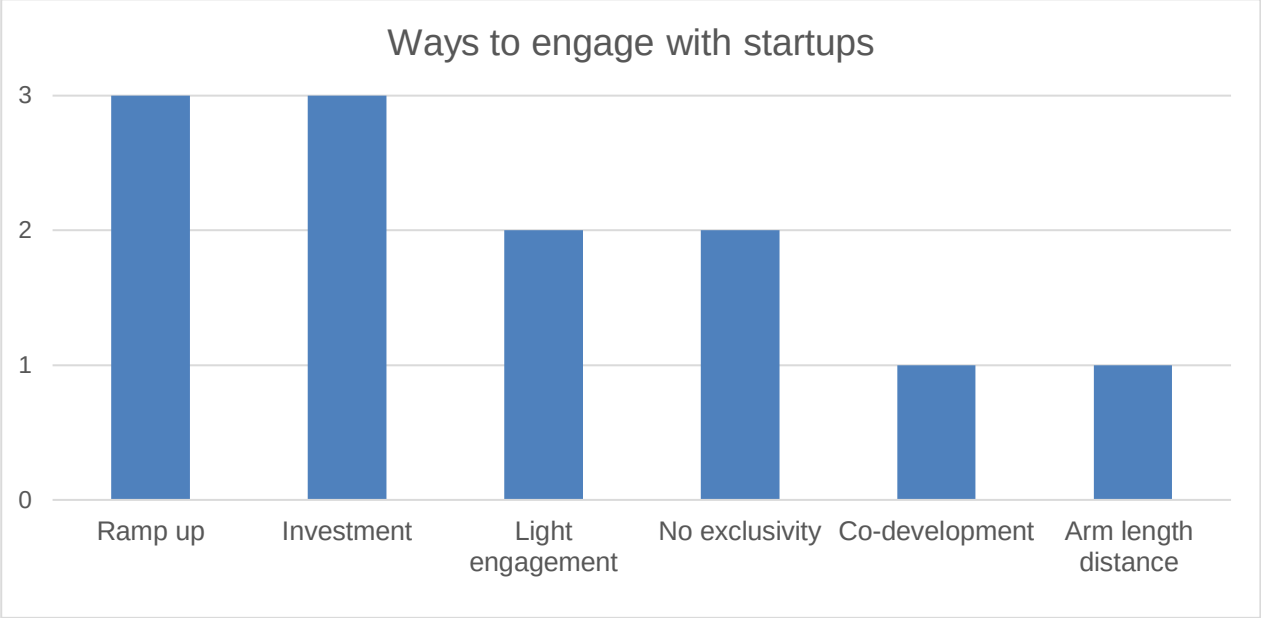

Figure 17. The ways in which the interviewed automotive OEMs are engaging with startups.

Ramp up

When engaging with startups, especially if they come directly from school and have no previous experience of running a company, a ramp up period was a preferred way of engaging, according to all the interviewees. The interviewees described that the automotive OEM and the startup can enter a light engagement, where they get to know each other, during a limited period of time. If the ramp up period turns out well, and the startup is suitable for a larger engagement, the automotive OEM can decide whether they are ready to invest in the startup or if they want to initiate a partnership, depending on the automotive OEM's purpose of engaging with startups.

Investment

All the automotive OEMs interviewed in the study are investing in startups. One of the interviewees said that they are engaging with startups in two ways that involve equity: Either they acquire them or they invest in them. The interviewee further described that the processes of these two options differ, both in how the startup is evaluated and the way they engage afterwards.

Light engagement

The different types of engagements that can compose a light engagement were similar in all of the automotive OEMs. Examples of light engagements are pilot testing, validation of the technology, POC, or experiments. For these kind of projects, two of the automotive OEMs argued that it is important to have a budget, and that the money can be easily accessed if an engagement is initiated. Spending money on light engagements does not mean that the automotive OEM is investing in the startup, but are funding the specific project. For example, a pre-set amount of $50,000 could be budgeted for each light engagement, to be spent on a project or development of the startup if the intention is to enter a larger engagement afterwards.

No exclusivity engagement

Two of the interviewed automotive OEMs described that they usually do not require exclusivity from the startup. For example, one interviewee argued that competition is good, both for the development of the startup and for the price of the startup's product or service to eventually decrease. Moreover, one of the interviewees said that exclusivity in a partnership does not make sense, since it could make the startup too dependent on one partner, and described that they buy the startup if they feel the need to be exclusive.

Co-development

Another important factor, mentioned by one of the automotive OEMs, is the value of learning in an engagement. A co-development project, where engineers from both organisations work together, is one way to learn and integrate the knowledge from both parties. However, an issue with co-development how to manage IP. If a startup and an automotive OEM build a product together, it must be decided which party that will own the IP. One of the automotive OEMs argued that the organisation that pays for the co-development should own the IP. How this will be managed in an engagement is crucial to clarify before an engagement is initiated.

Arm length distance engagement

One of the interviewees explained that the engagements looks different depending on the stage of development of the startups. For example, if the startups if very young and comes directly from a university, they might need a lot of guidance and get assistance to establish goals and milestones to fulfil before they are ready to enter an engagement. However, the interviewee described that some startups that are more mature rather need space to focus on their core business, and only need to have occasional follow-up meetings and support from the automotive OEM.

4.5.3. Experts

Figure 18 summarises the ways in which automotive OEMs can engage with startups, according to the interviewed experts.

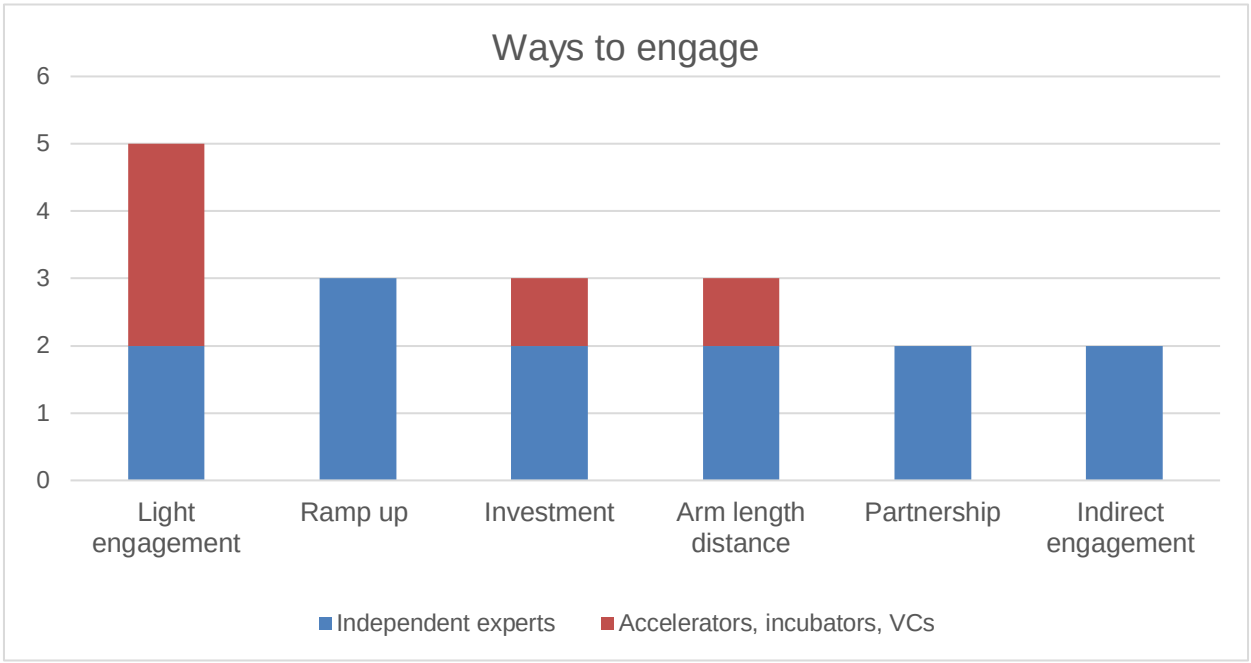

Figure 18. Ways in which automotive OEMs and startups can engage, according to the interviewed experts.

Light engagement

A majority of the interviewed experts described that a light engagement is a good option for both startups and automotive OEMs to engage. The experts described that a light engagement is a good way for the startup to get brand association with an automotive OEM, and for the automotive OEM to learn from the startup, without entering a risky full-scale engagement that might make the startup go under in worst case.

Ramp up

In accordance with the startups' and automotive OEMs' answers, the experts argued that a ramp up period is preferable to facilitate a successful engagement later. The interviewees further described that the automotive OEM should have a budget for financing the engagement, to be able to support the startup to develop and fulfil the necessary requirements for a full—scale engagement.

Investment

One way of engaging, mentioned by the experts, is for the automotive OEM to be an investor in the startup. Having an automotive OEM as a strategic investor is beneficial for the startups, since it gives the startup access to the knowledge and experience in an automotive OEM. However, it can also be risky since it might hinder the startup to get other automotive OEMs as customers or investors. Moreover, one expert described that the amount of funding to get is usually much bigger from VCs than from automotive OEMs.

Arm length distance engagement

Another factor, mentioned by experts. is the importance of adapting the engagement to the situation. As described by both startups and automotive OEMs, startups in later stages, focusing primarily on growth and scale, might prefer an arm length distance engagement. Otherwise, the engagement could suffocate the startup, if it requires the startup to spend a lot of time and energy on the engagement instead of the core business.

Partnership

A couple of the experts described that some kind of partnership is a good way to engage for both startups and automotive OEMs, preferably after a ramp up period. However, the interviewees described that the partnership can be designed in many different ways, and depends entirely on the needs of both the startup and the automotive OEM.

Indirect engagement

A couple of experts argued that the differences between automotive OEMs and startups are too big to make an engagement successful. Instead, they argued that it is better to engage indirectly, through a smaller company in the automotive supply chain. This way, the cultural differences and different ways of working would not be as significant, and the engagement would be more likely to be successful, according to one expert. Another way could be to involve a consultant, accelerator or incubator, with experience from engagements between startups and corporations, to act as an intermediary, to make sure that the communication works and the engagement is fair.

5. Analysis

This chapter presents an analysis of the empirical findings from the three interviewee groups, as well as a comparison with previous research within the field. The chapter is divided into five areas: Reasons to engage, challenges and pitfalls, key factors for successful engagements, channels, and ways to engage.

5.1. Reasons to engage

As can be seen in Figure 19, there are different reasons for startups and automotive OEMs to engage with one another. The reasons to engage that were described by the interviewees correlated to what was found in previous research. The empirical findings suggest that the main reason for automotive OEMs to engage with startups was to benefit from the startups' technological know-how, which is also emphasised by several researchers (Hogenhuis et al., 2016; Weiblen & Chesbrough, 2015). Related to this, all the automotive OEMs described the value of getting first access and to find new technology. Moreover, the representative from one of the automotive OEMs mentioned that one reason to engage with a startup could be to lock up technology to prevent competitors from getting access. On the other hand, the interviewee from another of the automotive OEMs emphasised the importance and benefits of sound competition, and therefore meant that exclusivity is not good in the long term. Besides strategic reasons, the interviewees from two of the automotive OEMs described that the companies also invest in startups for financial reasons, although that was not the primary purpose.

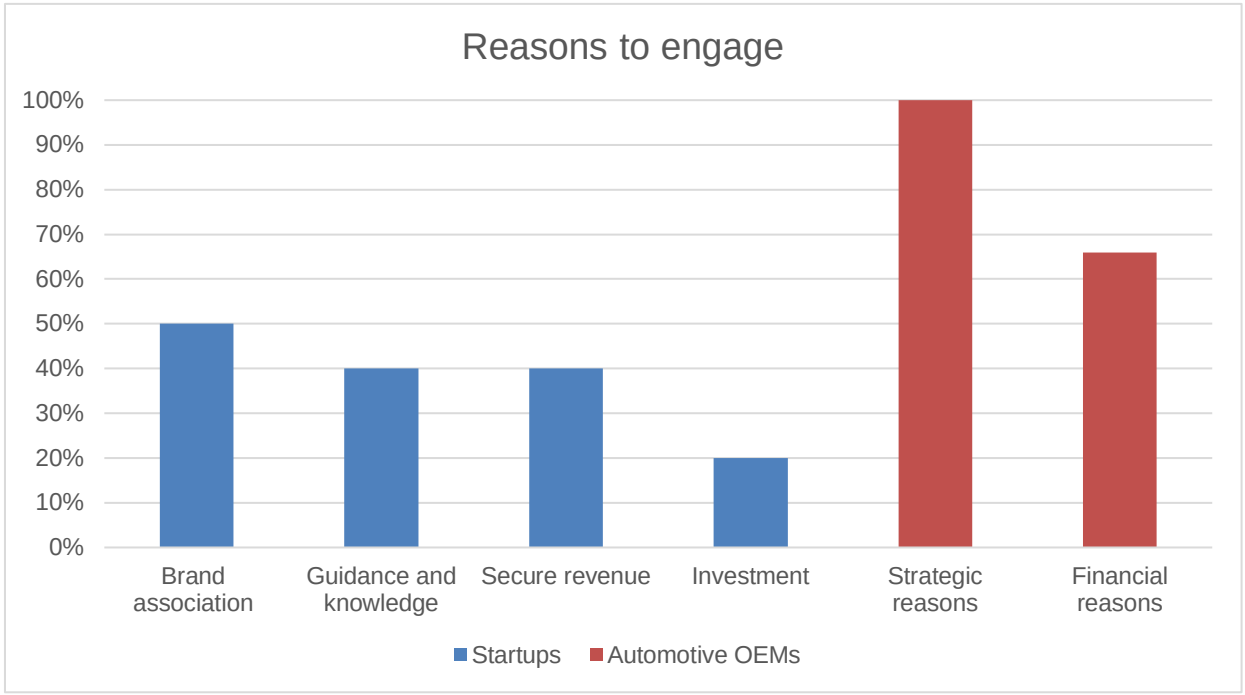

Figure 19. Reasons for startups and automotive OEMs to engage

Moreover, previous research suggests that startups would benefit from engagements with automotive OEMs because of their need for resources, brand association, knowledge, access to new markets, and scale. This also correlates considerably to the empirical findings, as the main reasons emphasised by the interviewed startups was to get brand association, guidance, and knowledge. The startups typically desired things that would contribute to their growth and development. For example, getting brand association would make other investors and

companies more interested, and guidance and knowledge about the industry would help the startups to define their strategic direction of development.

The interviewed experts typically focused on what the startups need from automotive OEMs, rather than why automotive OEMs would want to engage with startups, and thus what the automotive OEMs could focus on as the value proposition towards startups. The responses were clearly aligned with what the startups said themselves, focusing on brand association as the main value proposition, followed by guidance and knowledge.

The empirical findings support the argument by Hogenhuis et al. (2016), saying that the automotive OEMs would generally benefit from engaging with startups early in the innovation process, when capabilities such as technological know-how and creativity is needed. On the other hand, the authors argue that startups usually need capabilities related to the later stages of the innovation process, such as scale and resources. This was also evident in the empirical findings. However, a dominant reason to engage, described by the startups, is to receive guidance and knowledge about the automotive industry. This was typically emphasised by startups that were in a relatively early stage of development, and was partly related to defining the startups' value proposition towards the automotive industry. However, there were also startups who described that they would benefit from receiving guidance about actions and prioritisations regarding the growth of the company, which was associated with later stages of development.

5.2. Challenges and common pitfalls

When it comes to the challenges and common pitfalls associated with engagements between automotive OEMs and startups, the different interviewee groups emphasised somewhat different things (see Figure 20).

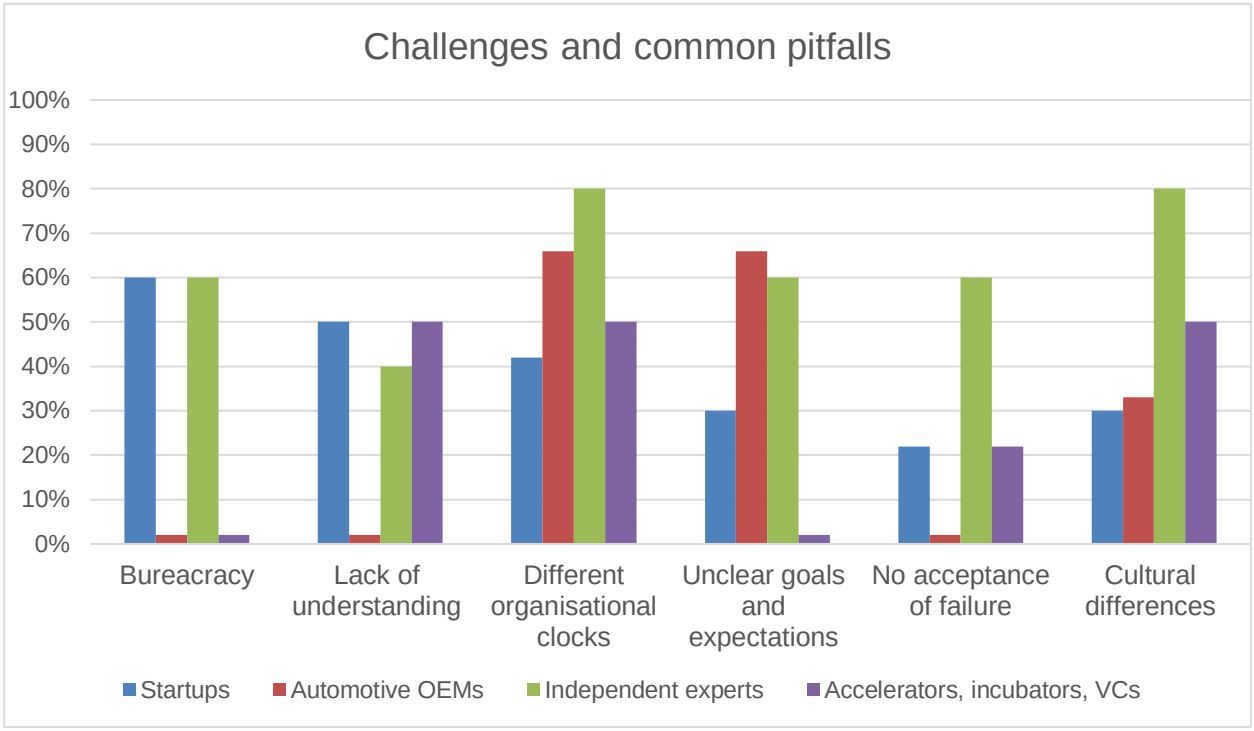

Figure 20. The main challenges and common pitfalls related to engagements between automotive OEMs and startups.

A majority of both the startups and the experts emphasised the bureaucracy in automotive OEMs as a main barrier towards successful engagements with startups. Several interviewees described that common pitfalls related to the bureaucracy was that startups are obligated to fulfil a lot of requirements, such as getting certifications and policies in place, to even be considered for a potential engagement. This is also supported by previous research, as Weiblen and Chesbrough (2015) argue that the requirements on startups takes too much time from the startups' core business and the slow decision making in corporations is a big contrast to the startups fast and agile way of working. Closely related to bureaucracy, the automotive OEMs' and startups' different organisational clocks were also emphasised by many of the startups and experts, as well as by one automotive OEM, as one of the main challenges. This has also been recognised as a main challenge in previous research (Weiblen & Chesbrough, 2015).

The next major challenge that was recognised by all the interview groups, as well as in previous research (Weiblen & Chesbrough, 2015), is the cultural differences between startups and automotive OEMs. The findings suggest that the different mind-sets and ways of working in the two different types of organisations makes it difficult to align the ways of working, and thus to make an engagement work successfully. One part of the cultural differences is the different views on failure in automotive OEMs and startups. Many of the interviewed startups and experts suggested that startups see failure as learning, while large firms are usually afraid of failure and seek to minimise risks. The interviewees meant that this is a large barrier, since it always entails a certain risk to engage with a startup. It was however not mentioned by any of the automotive OEMs that failure was not accepted. It must however be kept in mind that no answer alternatives were given during the interviews.

According to many of the experts and startups, one of the most common and severe pitfalls is lack of understanding of the other party. As the differences between automotive OEMs and startups are so large, the interviewees meant that the engagement is sentenced to failure if the two organisations do not try to truly understand one another. Several interviewees argued that there are usually very different kinds of people that are working in automotive OEMs and startups, which makes it even harder. Absence of understanding was however not mentioned as a pitfall by any of the interviewed automotive OEMs. Again, this could be explained by the open questions that were asked during the interviews.

Another common pitfall that was described by all three interviewee groups was that the purpose of engaging is sometimes not defined, and the expectations are not defined nor aligned before initiating engagements. Several interviewees argued that if the purpose and the desired outcome are not well defined, it is impossible to design an engagement that will benefit the parties involved. One expert, who has been consulting corporations and startups regarding engagements for a long time, said that "*if you have undefined goals, you will get undefined results"*, and described that as long as the purpose is unclear, automotive OEMs are not going to be successful with engagements with startups. In contrast to this, one of the automotive OEMs argued that it can be beneficial not to have a too well-defined purpose, when it comes to the targeted startups, as it allows you to come across unexpected opportunities that you would disregard otherwise.

In similarity to the reasoning about having a clear purpose, many of the startups and experts meant that another common pitfall is that the expectations on the engagement are sometimes undefined. According to the interviewees, unclear expectations that are not communicated to the other party often causes misalignments in what the different parties expect from the engagement. Consequently, the automotive OEMs and startups may put different amount of effort into an engagement that might only end up in misunderstandings and unusable output.

Another challenge that was emphasised by both startups and experts is the issue of managing IP. This was a major concern for the interviewed startups, especially since most of them are

software based. This issue has also been highlighted in previous research, where it has been described as one of the most crucial challenges (Weiblen & Chesbrough, 2015).

In addition to the above-mentioned challenges and pitfalls, there were a few issues that were emphasised by a minority of the interviewees. One of these is the issue of the unbalanced power relationship between startups and automotive OEMs, which was discussed during an expert interview. In engagements of this asymmetric nature, large firms usually have much less to lose than startups, as startups are usually required to put a majority of their scarce resources into making the engagement work. This entails a much bigger risk for the startup, and can easily make it go under if there would be a change of focus in the large firm for example. This is also supported by previous research, where similar fears among startups have been presented (Weiblen & Chesbrough, 2015).

5.3. Key factors for successful engagements

Regarding the key factors for successful engagements, the three interviewee groups gave rather united answers (see Figure 21). The most common answer among all the interviewee groups but the automotive OEMs, as well as the factor that was emphasised as most important, is to have a clear purpose with the engagement before starting. This was stressed especially much by the interviewed experts, which could be described by their long experience in related areas and objective perspective. Among the automotive OEMs, the importance of having a clear purpose was only mentioned by two of the interviewees, while the third one described that it can be beneficial not to be too focused sometimes. The importance of having a clearly defined purpose has also been stressed in previous research as extremely important (Weiblen & Chesbrough, 2015).

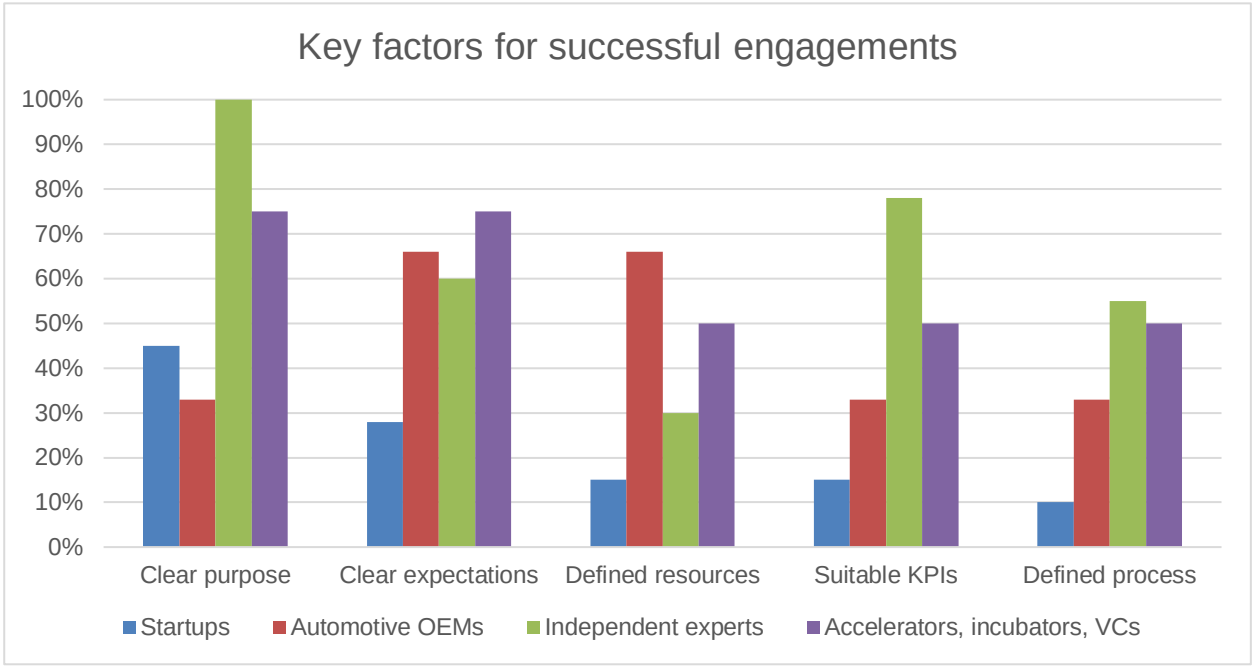

Figure 21. Key factors for successful engagements between automotive OEMs and startups.

Moreover, all the interviewee groups emphasised the importance of establishing clear expectations on the engagement. Elaborations on this included both the importance of defining the expectations internally, as well as communicating and aligning them with the other party's expectations.

The next key factor, also emphasised by all three interview groups, was that the automotive OEM must define the resources that can be put into engagements with startups. The interviewees described that this can include for instance man hours, money, or equipment. This has also been considered a key factor in previous research (Weiblen & Chesbrough, 2015). Also, closely related to defining the resources, multiple interviewees from all three groups stressed that automotive OEM need to define their value proposition towards startups, since the competition for the best startups is fierce. Thus, also brought up by experts, automotive OEMs, and previous research (Weiblen & Chesbrough, 2015), it is just as important for the automotive OEM to pitch to the startup as the other way around.

Furthermore, interviewees from all the three groups brought up the importance of defining suitable KPIs for the engagement. Multiple interviewees argued that automotive OEMs must measure the success of the initiative in a way that is in accordance with the purpose of the engagement to succeed.

Another key factor that came up multiple times, from all the interviewee groups, was the importance of understanding the other party. The reasoning behind this was very similar to the ones discussed in the previous chapter, as the lack of understanding was also seen a one of the most common pitfalls. Some startups mentioned that the automotive OEM must be transparent with their problems in order for the engagement to succeed. To overcome this, several automotive OEMs and startups emphasised the necessity for the OEMs to employ people who understand and have experience from the startup world. One important aspect when it comes to the OEM's understanding of the startup, according to all three interviewee groups, is recognising what the startup need depending on their stage of development. Startups need different things in different stages, which must be understood by the automotive OEM and the engagement must be adapted accordingly.

Furthermore, as suggested by all three interview groups and previous research (Weiblen & Chesbrough, 2015), a key factor for OEMs to successfully engage with startups is to have a separate unit outside of the core organisation. Startups argued that it is very difficult to work with automotive OEMs because of their slow and bureaucratic processes, as well as the cultural differences that composes a barrier towards understanding of one another. Therefore, many interviewees described that it would be much easier to work with a unit that is able to act more like a startup. The OEMs also saw this as important, as it enables them to work faster.

Finally, three of the experts described that it is crucial for the automotive OEM to understand the landscape thoroughly before starting to engage. By this, the interviewees described that when the kind of startup to target is decided on, the automotive OEM need to understand the situation on the market for that specific technical field. This includes for example understanding the technical field, the competition on the market, where to find the startups within that field, and which other players, such as VCs, accelerators, and incubators, that are active within that field.

5.4. Channels

The most successful way to connect with potential partners for engagements, according to all the interviewee groups, is through network and relationships (see Figure 22). As one of the experts said, "*Silicon Valley is relationship driven rather than tech driven*", meaning that the factor that makes Silicon Valley the way it is today is mostly the way people connect to each other. By building a network strategically, automotive OEMs can get recommendations about suitable startups, and save a lot of time and resources on the screening. This has also been described as the most effective way to connect in previous research (Ferrary, 2003; Weiblen & Chesbrough, 2015).

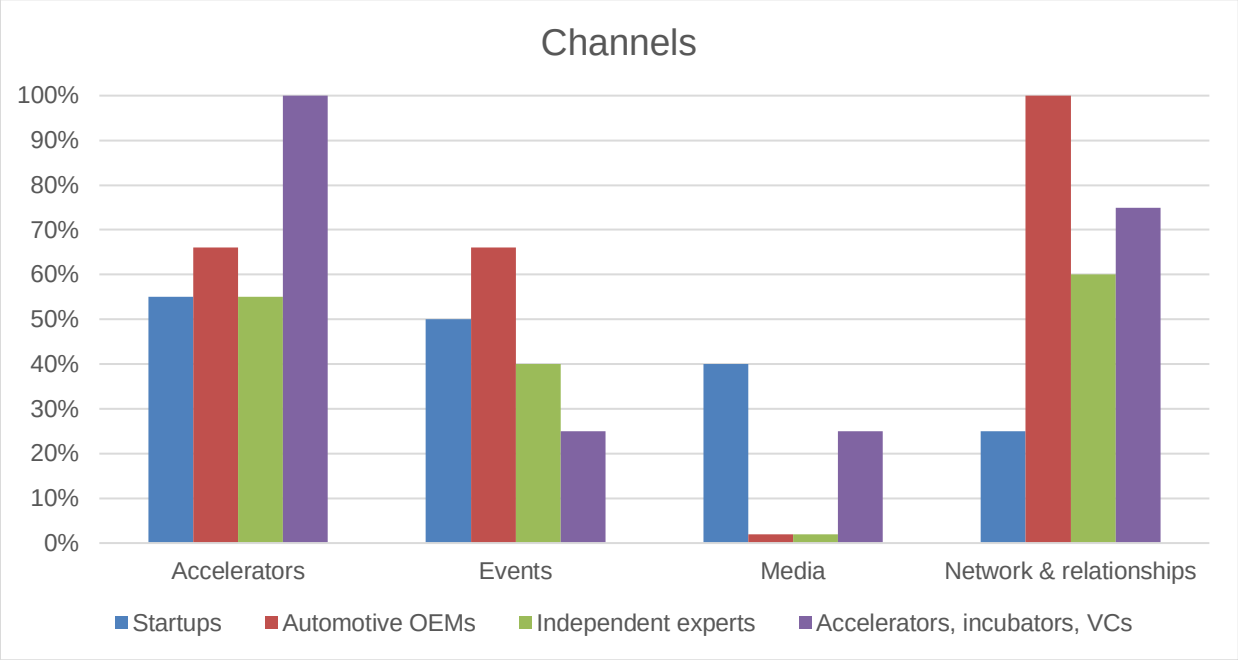

Figure 22. Channels used to connect to potential engagement partners.

Closely related to networking and relationship building, many of the interviewees argued that automotive OEMs should engage with strategically chosen third parties, such as high-profile VCs or accelerator programs that are targeting startups within the same field as the automotive OEM. This has also been emphasised as a successful way to connect in previous research, which argue that a third party can act as a filter and reduce the screening efforts required to find the right startups considerably (Weiblen & Chesbrough, 2015). The most common way to connect, described by the interviewees, is to engage with an accelerator. However, as previously described, the answers to this question might be biased since around half of the experts and startups were representatives from or picked from a portfolio of an accelerator program.

Another channel that was often mentioned is events. This can also somehow be placed under the category of networking, as that would be the primary purpose of going to these events in this case. Both automotive OEMs and several of the experts also emphasised university relationships as an important way to find the best startups, as a large amount of high quality startups comes from the schools in the bay area. Moreover, multiple interviewees suggested that using different kind of media can be a valuable way to reach out, as well as for the automotive OEM to have a scout with the purpose of finding startups.

5.5. Ways to engage

When it comes to the ways in which automotive OEMs can engage with startups, all the automotive OEMs, as well as the majority of the startups and experts, emphasised that the setup of the engagement must be adapted to the situation. This has also been stressed by Hogenhuis et al. (2016), who mean that the kind of engagement that is suitable depends on the stage of the startups as well as the capabilities that are needed in the corporation. Nevertheless, a majority of the interviewees described that a ramp up period would be a good way of initiating an engagement (see Figure 23). Several interviewees described that a ramp up period is a good way of getting to know and understand the other party, and lower the barriers related to the cultural differences and different ways of working.

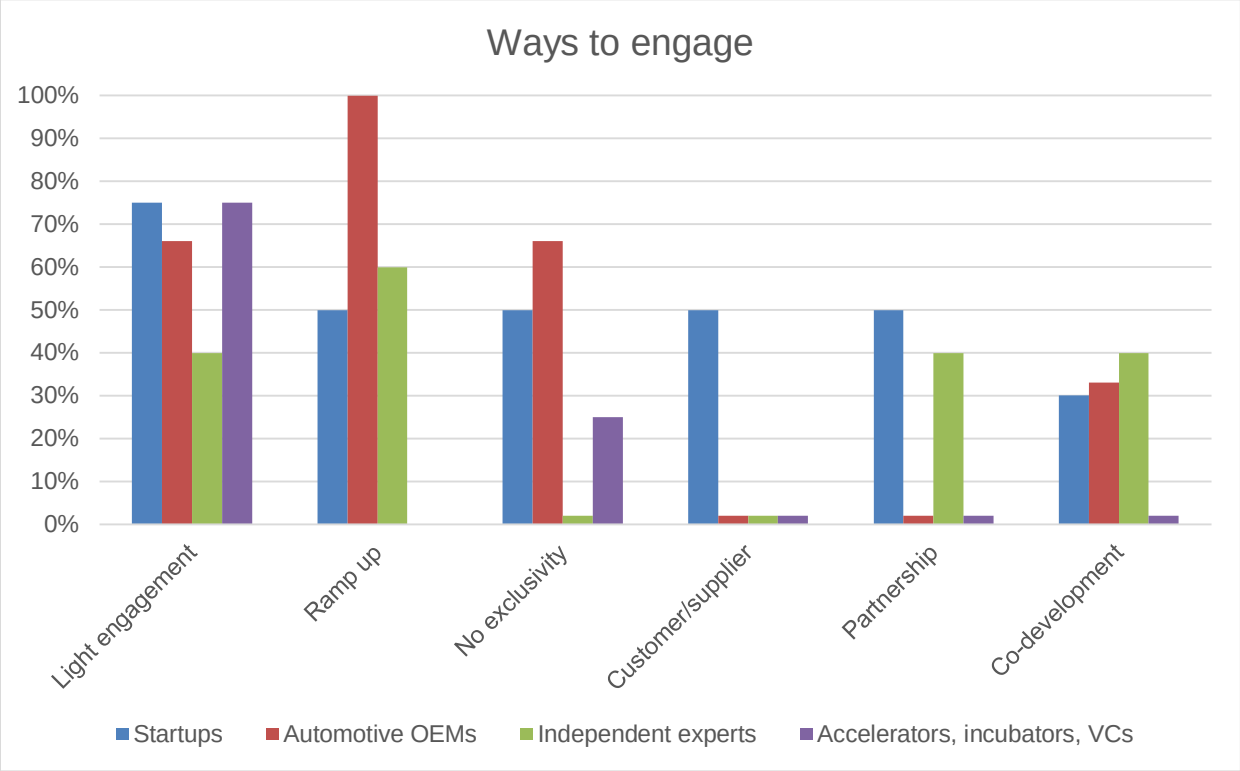

Figure 23. Ways in which automotive OEMs and startups can engage, according to all the interviewees

Furthermore, the most common answer was to have a light engagement, such as a POC, pilot project, or validation project. Many of the interviewees stressed that this light engagement can compose the ramp up period. Also, in contrast to having the light engagement as a starting point to a larger engagement, it can be beneficial for both parties to only engage for a few months. The win-win in such engagements could be for the startup to get brand association and for the automotive OEM to benefit from the startup's technical expertise and get help to solve a specific problem. Moreover, several of the experts, automotive OEMs, and startups meant that it is important for the automotive OEM to have resources, such as cash that is easy to access, in place for these kinds of engagements.

The above-mentioned way of engaging can be compared to Weiblen and Chesbrough's (2015) description of project based engagements, referred to as outside-in startup program, where corporations and startups engage in relatively small projects that allows the parties to overcome the barriers described earlier. Two of the automotive OEMs described that both a ramp up period and light engagements are very important in their ways of working with startups. Thus, although Weiblen and Chesbrough's (2015) study was conducted with tech companies, it seems like their findings are somewhat applicable to automotive OEMs as well. In addition to this, since the automotive industry is becoming more tech oriented (Nelson, 2014; Schulze et al., 2015), and the same kind of startups that are interesting for tech companies are also relevant for automotive companies, it is reasonable that automotive OEMs would work in similar ways as the tech companies.

When automotive OEMs intend to engage with a startup, many of the interviewees from all three groups described that it preferable not to require exclusivity from the startups. For example, one of the automotive OEMs said that exclusivity would be unfavourable for early stage startups since their focus must be on developing their core business rather than serving one large company. There is also examples in previous research that explains that it can be very unfavourable for a startup to be too dependent on, and affected by, one corporation.

Furthermore, one of the ways in which all three of the interviewed automotive OEMs engage with startups is through investment, which aligns with Weiblen and Chesbrough's (2015) study of tech companies in Silicon Valley, where one of the two ways in which the large firms engaged with external startups was through corporate venture capital. However, only two of the interviewees described that they invest with the purpose of getting financial returns, and that this is only a secondary purpose.

Several startups also mentioned that one desirable way to engage with an automotive OEM would be to have them as a customer, and in that way secure revenue, as mentioned in the section regarding the reasons to engage. They also described that they would like to have a co-development agreement or partnership, which was also suggested by the automotive OEMs and the experts. Also, one startup said that the most important thing for them was to have an arm length distance relationship, where the automotive OEM do not require them to spend too much time on the engagement, but rather spend time on their core business. This was also exemplified by one of the automotive OEMs.

6. Discussion

This chapter is focused on discussing and answering the research questions in this study, based on the analysis of the empirical findings and previous research. The discussion below is thus structured around the research questions.

The findings in this study are presented from an automotive OEMs perspective, and addresses what automotive OEMs need to do in order to engage successfully with startups. However, it is important that both parties in a collaboration understand each other's perspective in order to engage successfully, and there is a gap in previous literature regarding the startups' perspective (Usman & Vanhaverbeke, 2017). Therefore, this study also includes the startups' perspective on what automotive OEMs need to do to engage with startups successfully, and the startups thus compose the largest part of the collected data. Although the recommendations in this study are addressed to automotive OEMs, only three automotive OEMs were interviewed in the study. However, the automotive OEMs' perspective was also addressed by the interviewed experts, who are independent and have experience from both perspectives. Moreover, it must be kept in mind that the interview questions were open, and no answer alternatives were given to any interviewee, which mean that the answers only represent what the interviewees perceived as most important. However, if answer alternatives would have been given, the results could have been different. Also, the tables in this report are sorted based on the number of answers, and not based on importance of the answers. However, the factors that were stressed as most important by the interviewees are also described in text.

6.1. RQ1) What challenges and common pitfalls are related to engagements between automotive OEMs and startups?

The challenges and pitfalls that were emphasised by the interviewees were somewhat consistent among the three interview groups. While some challenges were stressed on by people from all three categories, other ones were more commonly mentioned by some. The most common ones, that were also emphasised as the most critical ones by several of the interviewees, are the bureaucracy in corporations, the different organisational clocks, lack of understanding of the other party, cultural differences, and unclear goals and expectations of the engagement (see Table 9). All these factors have also been stressed in previous research about engagements between corporations and external startups, which supports the suggestion that these factors would be the most important ones. It must however be noticed that most of the previous research found was focused on engagements between startups and corporations in general, not specifically automotive OEMs. Nevertheless, the empirical findings correlated strongly to the previous research, which suggest that the challenges that automotive OEMs are facing are similar to corporations in general.

Table 9. Challenges and common pitfalls related to engagements between automotive OEMs and startups.

Challenges and common pitfalls
Cultural differences
Bureaucracy
Different organisational clocks
Unclear goals and expectations
Lack of understanding
Unbalanced power relationship

One pitfall that was describes as the most common one, by startups and experts, is the lack of understanding of the other party. Many of the interviewees described that this is the most crucial part, since many of the other challenges would have been much easier to overcome if the automotive OEM and the startup truly understood one another. Lack of understanding has also been stressed upon by Weiblen and Chesbrough (2015). Other challenges that have been stressed upon in previous research, that are consistent with the empirical findings, are cultural differences, the different views of failure, the bureaucracy in corporations, and different organisational clocks (Weiblen & Chesbrough, 2015). Moreover, the unbalanced power relationship has been emphasised considerably in previous research (Kohler, 2016; Slowinski & Sagal, 2010; Weiblen & Chesbrough, 2015). This was not addressed directly by the interviewees. However, several of the startups and experts described that there is a considerable risk for startup to be too dependent on an automotive OEM, and that an engagement could make the startup go under in worst case, which can be related to the unbalanced power relationship since the risk is not as big for the automotive OEM.

The challenges related to engaging with startups were mostly stressed upon by the startups and the experts, while the automotive OEMs focused more on key factors and ways of working. The only challenges that were described by the interviewed automotive OEMs were the cultural differences, different organisational clocks, and unclear goals with the engagement. As described in the methodology chapter, this could be because the interviewed firms are competitors to Volvo Cars, that is sponsoring this study. It can also be due to the fact that there were only three interviews with automotive OEMs, compared to 12 respectively 9 with startups and experts, and the answers were thus not as many as for the other interviewee groups. Also, the representative from one of the automotive OEMs described that the company is still inexperienced in the area, and would thus not give any concrete examples. However, based on the many different sources that confirmed the same kind of information, the researchers of this study are confident that the challenges presented in Table 9 closely represent the reality.

Moreover, the fact that no alternatives were given to the questions during the interview, but the respondents answered solely what they thought were the most important things themselves, and it still correlated strongly to the other interviewees and the theory, also supports the validity of the findings. Also, the fact that the experts confirmed the same things as the startups and automotive OEMs stressed upon also supports the validity of the answers. The experts were carefully selected and compose an objective view, as well as have long experience and vast knowledge about the Silicon Valley ecosystem and have seen both failures and success from both perspectives.

6.2. RQ2) What are the key factors for successful engagements between automotive OEMs and startups?

As in the case with the previous research question, the answers from the interviewees within all the three interview groups were very similar. The key factors for successful engagements are summarised in Table 10. When it comes to identifying the best startups, a majority of the respondents within all of the interview groups emphasised having a network as the most successful way. This has also been brought up as the most critical way to connect in previous research (Ferrary, 2003; Steiber & Alänge 2016; Weiblen & Chesbrough, 2015), which supports the validity of the findings. Even more interviewees mentioned having relationships with accelerators to connect. However, this information is probably biased since more than half of the participants had close connections to accelerators. Also, those respondents mentioned accelerators as a good way to connect, but not necessarily the best one.

In order to overcome the challenges related to the bureaucracy in corporations, several startups and experts mentioned that corporations need to have a separate unit that is able to operate outside the rigorous processes in the organisation. This was not emphasised by the automotive OEMs directly, but all the interviewed organisations have an outpost in Silicon Valley with this purpose. This key factor is also argued for in previous research (Weiblen & Chesbrough, 2015). Also, in order to overcome the cultural barriers, and make sure to understand the startups, one key factor is for automotive OEMs to involve people who understand and have experience from the startup world to work in these outposts. Another major key factor is to be well prepared, and define the purpose, expectations, value proposition, resources, and way of working before initiating any engagement, to be able to act fast when an opportunity arises. All these factors have also been described as crucial in previous research (see for example Weiblen and Chesbrough (2015) and Hogenhuis et al. (2016)). Finally, it is crucial that the engagement is beneficial for both the startup and the automotive OEM. All the key factors mentioned above were stressed upon by multiple interviewees from different background, as well as brought up in previous research. This suggests that the findings can be relied on as valid and provide a good basis for automotive OEMs when intending to start working with startups.

Table 10. Key factors for successful engagements between automotive OEMs and startups

Key factors for successful engagements
Find the best startups by building a strategic network and relationships
Establish a clear purpose and expectations
Define the value proposition towards startups
Involve people who understand and have experience from startups
Be well prepared before starting to be able to act fast when an opportunity arises
Make sure that the engagement is a win-win

7. A recommended process for identifying and engaging with startups

This chapter presents a recommended process for identifying and engaging with startups. The process is based on the information from the key questions from the interviews and previous literature, but also discussions with some experts and automotive OEMs, where the process was addressed specifically. In these cases, the interviewees were asked to point out the main steps in the process of engaging with startups. The process is structured on a timeline, starting from what is needed before engaging until a contract is signed (see Figure 24). The crucial steps that must be addressed in any engagement are pointed out. However, it is important to realise that the design of the actual engagement, starting after the signed contract, must be adapted to the specific context.

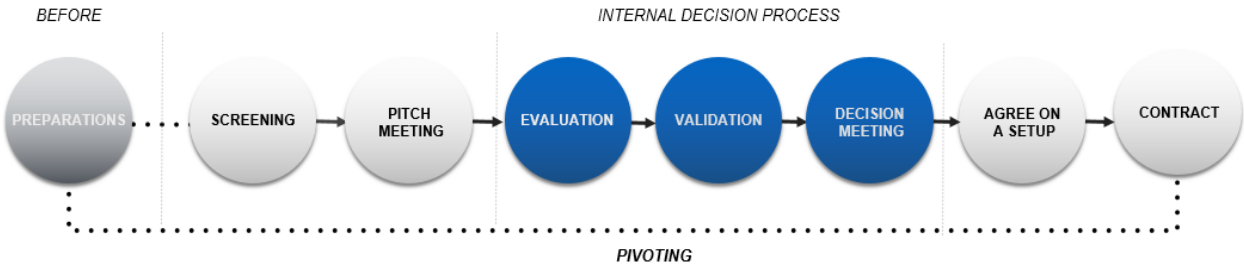

Figure 24. A recommended process for how automotive OEMs can identify and engage with startups.

7.1. Preparations

This sub-chapter presents the factors that automotive OEMs are recommended to have in place before initiating any engagement.

7.1.1. Define the purpose of engaging with startups

Before starting to identify startups to engage with, automotive OEMs need to define why they want to engage with startups, with clear and well-defined goals, as well as an engagement strategy. For example, if the reason for engaging is strategic, the company should define how an engagement with a startup could contribute to the automotive OEM's competitiveness. If it is of financial reasons, i.e. to get return on the investment, the automotive OEM must evaluate the startup accordingly. The engagement, including for example the evaluation criteria and way of measuring the success, should thereafter be adapted depending on the purpose. Therefore, having a clear purpose and a well-defined investment strategy is the most critical factor in the process of identifying and engaging with startups. Moreover, it is important that the top management is supporting the engagement strategy. The top management does not need to be involved in every decision regarding every single case, but must support the strategy of engaging with startups.

7.1.2. Establish suitable KPIs

Based on the purpose of engaging with startups and the engagement strategy, suitable KPIs should be established. In the pivoting part of the process, visualised in Figure 24, the automotive OEM should evaluate every case by using the suitable KPIs to make sure the engagement strategy is well aligned with the overall strategy. Moreover, the KPIs are useful to continuously improve and change the process to ensure that engagements fit both the

automotive OEM, since the organisation and the goals and the overall strategy might change over time, as well as the landscape that the automotive OEM is operating in.

7.1.3. Define the value proposition and offer to the startups

Before initiating any efforts to engage, automotive OEMs should to define their value proposition, meaning their offer to a startup, that should be attractive and motivate the startup to choose an engagement with the automotive OEM over any competitors. The offer should preferable include things that the rest of the support system, for example VCs, accelerators, and incubators, is lacking, such as knowledge and experience from the automotive industry, data to test and validate the product, or brand association. The most attractive attribute, according to the startups interviewed in this study, is brand association, since that would make it easier for the startups to get investment from VCs and find other key partners to engage with. The second most attractive incentive for the startup to engage is knowledge about the automotive industry. The offer to the startup should be adapted to the needs of every startup, based on for example the stage that the startup is in.

7.1.4. Define the resources that can be put on engagements

Closely linked to defining the offer to the startups, automotive OEMs should define the resources that can be put on engagements. This can include how many people and man hours that can be spend by the automotive OEM's engineers, how much money that can be spend, if a working space can be offered, and what kind of equipment, such as cars or 3D printers, that can be provided.

7.1.5. Design a process and have procedures in place

In order to decrease the time between the first meeting with a startup to the final decision of engaging, it is crucial to have procedures in place, since there is a significant risk of losing the startup to competitors because of the complex and time-consuming processes in automotive OEMs. This is especially important if the automotive OEM is targeting early stage startups, since their valuation might increase very fast. Therefore, the preparations should be made carefully, and the time between and to complete the activities in the process should be reduced as much as possible.

7.1.6. Assign accountability

To be able to act fast, the decision-making should be decentralised to the unit that is working with startups, and there should be someone that is responsible for making the go/no-go decision involved in the process. Moreover, there should be people with specific skills, such as legal, technical, and financial, involved in the process, who evaluate the startups and present a recommendation for the decision maker.

7.1.7. Define the targeted startups

Before starting to look for startups for potential engagements, the targeted type of startups, regarding for example technical field and stage of development, should be defined. There are thousands of startups in Silicon Valley, which means that it is difficult to find the best ones if the screening is too unfocused. Moreover, it is important to define the targeted startups since the entire process of identifying and engaging, as well as the offer to the startup, will differ depending on the kind and stage of the startups.

7.1.8. Understand the landscape

In addition to the factors described above, the landscape must be well known before starting to engage with startups. This includes for example to make sure to understand the technical field thoroughly, identify the actors that are active within the field, and where to find the startups that are active within that field.

7.2. Screening

The screening is the phase where startups for potential engagements are identified. Silicon Valley is network driven, and people are in general generous and willing to help each other out by for example recommending startups to potential partners that might be a good match, with the spirit of "*what goes around comes around*". One way to build a network and relationships is for the automotive OEMs to have own scouts. Preferably, the scouts should come from the area and have previous experience from working with startups and being a part of the network. Also, automotive OEMs can host events or hackathons in order to get startups interested.

Moreover, a strategic network can include engagements with third parties, such as accelerators or incubators, in the area. It is however not necessarily the best way to partner up or sponsor the programs. In fact, some interviewees meant that it could be negative, since it can put pressure on the programs to introduce potential collaborators even if they are not a good fit, which will only be time consuming in the end. To build relationships, meet over at events or over a coffee once a month could be enough. In addition to accelerators and incubators, one way is to build relationships with people that are engaging or investing in the same category of startups, for example 10 of the top VCs. This way, the automotive OEM can benefit from the third party's network and screening procedures, and be recommended high quality startups that could be a good fit with less effort. The top accelerators interviewed in this study screen around 5-10 thousand startups a year. Thus, a close collaboration with a third party that screen the startup scene is a good way of complementing the automotive OEM's own efforts, such as going to events and scouting. Since the VCs, accelerators, and incubators have an interest of bringing as high value as possible to their portfolio companies, that an automotive OEM could potentially contribute with, it could be a win-win situation. In Figure 25, an overview of ways and players that automotive OEMs can use to screen the startup scene is presented.

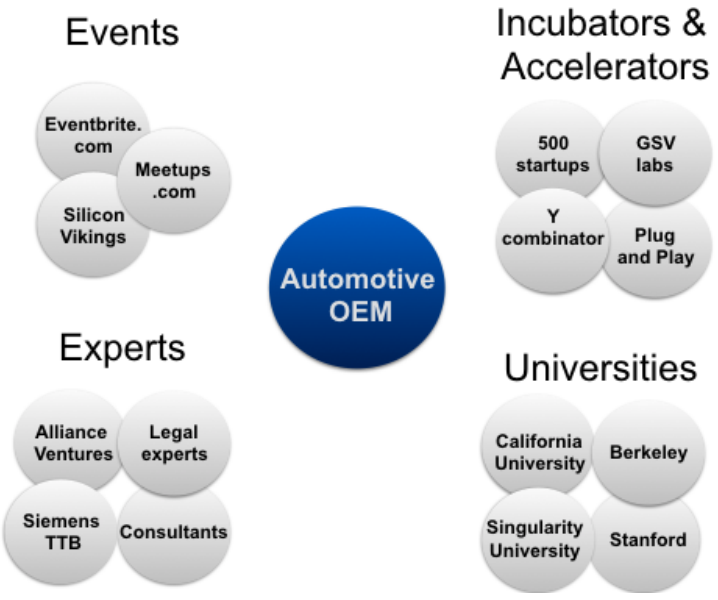

Figure 25. An example of a strategic network.

7.3. Pitch meeting

The pitch meeting refers to the first meeting between a startup and an automotive OEM, where the startup explains their business, usually by showing a pitch deck. A pitch deck is a short presentation of the product, business model, market potential, and the team behind it. During the pitch, the automotive OEM has the opportunity to evaluate the startup, by using a set of criteria. The recommended criteria to pay attention to, and ask questions about, are presented in chapter 7.4.1.

However, it is just as important that the automotive OEM pitch their offer to the startups as well. As described before, the best startups will probably have many different alternative engagements, which is why the OEM need to design an attractive value proposition that could make the startup choose them over a competitor. The pitch should include the value proposition to the startup, which could differ depending on the stage of development and type of technology that the startup's core business is built on. Therefore, the offer should be well prepared and customised to fit the needs of the startup.

7.4. Internal decision process

When the startup and the automotive OEM have met and pitched their offers to each other, the automotive OEM must decide whether an engagement should be entered. The internal decision process includes three main steps: Evaluation, validation, and a decision meeting. The steps are described below.

7.4.1. Evaluation

Shortly after the pitch meeting, the automotive OEM must evaluate the startup thoroughly in accordance with the established criteria. The criteria should be chosen based on the purpose of engaging, and can preferably include the eight dimensions below.

1. Potential
2. Team
3. Product/core technology
4. Scalability
5. Business model
6. Competition
7. Strategic fit
8. Risk

The criteria are recommended to be rated from 1-5, where one is poor and five is excellent performance, and put into a matrix to visualize and get a good overview (see Figure 26).

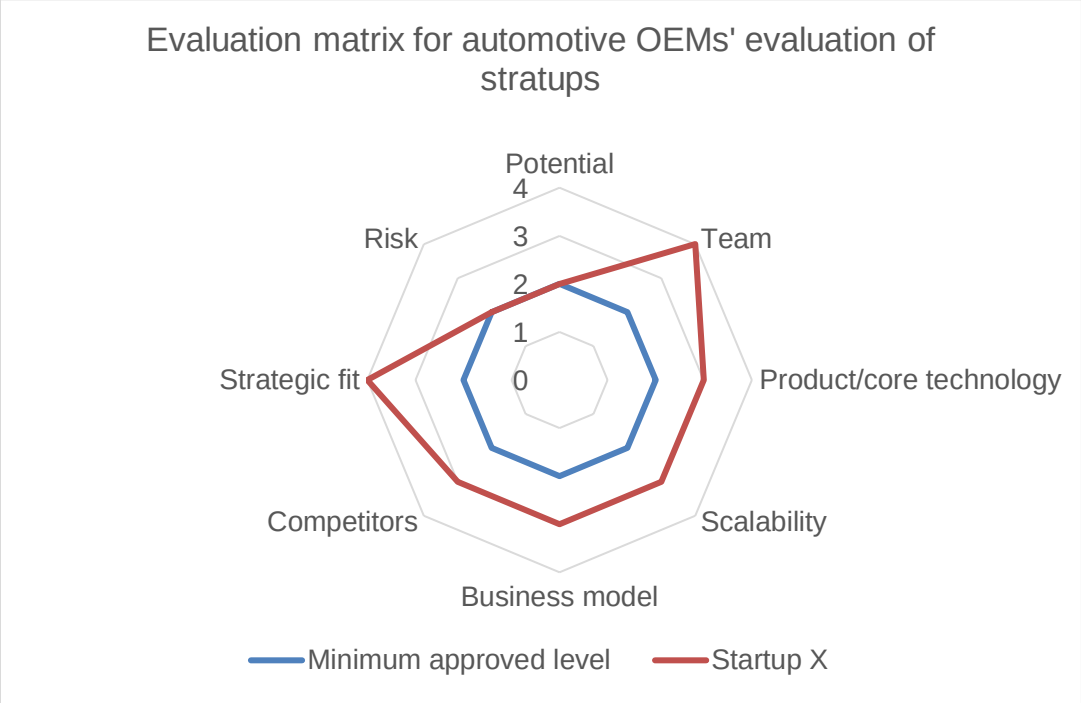

Figure 26. An example of how the eight recommended criteria can be scored and visualised in an evaluation matrix.

7.4.2. Validation

After the evaluation, the automotive OEM should validate the scores on the criteria, to make sure that the startup is trustworthy and the evaluation is correct. This can be done by asking for references, such as customers and advisors to the startup. Also, the startup's product, for example a less confidential part of the software, can be tested to make sure that it lives up to the promises.

7.4.3. Decision meeting

The internal decision meeting is where the decision whether an engagement with the startup is desirable or not should be made. A pre-defined team, with a technical expert, a legal expert, and a decision maker, is recommended to be present. The scoring from the evaluation of the startup should be presented, as a basis for the go/no-go decision. If the automotive OEM is investing or engaging for strategic reasons, it must be ensured that the engagement supports the overall strategy.

7.5. Agree on a setup

The next step is to design and agree on the setup of the engagement, together with the startup. The setup should be beneficial for both the startup and the automotive OEM. The way the engagement is designed depends on many factors, as described in several times previously in this report. However, a ramp up period is often a suitable way to initiate a larger engagement. During this period, the startup can get the chance to improve certain criteria that were not good enough, by the help of the automotive OEM, before a full-scale engagement is initiated. Moreover, to start with a light engagement during the ramp up period is a good way of getting to know the team and create trust, as well as reducing the barrier of rigorous contracts and requirements for the startup to fulfil. It is also a way for the automotive OEM to reduce the risk of making the wrong decision, and enter a large engagement that is not suitable.

7.6. Contract

Before entering any engagement, a contract must be signed. In the contract, all important aspects of the engagement should be included. The contract should be adapted depending on the kind of engagement, which makes it inconvenient to one standard contract. For example, a contract for a light engagement should not be as thorough as if the startup would be a supplier. However, a set of standard contracts, that can easily be modified based on the kind of engagement, is recommended in order to save time. It is important that the contract for light engagements is as simple as possible, but still cover the most critical things, in order not to bury the startup in paperwork. Some of the important parts to include are presented below.

Timeframe

The timeframe of the engagement should be defined to reduce the risk of misunderstandings between the automotive OEM and the startup, since clear expectations is one of the key factors for a successful engagement.

Expectations

The expectations and goals with the engagement must be defined. It must be clear what both parties can expect, and not expect, from one another, to reduce the risk for misunderstandings and disappointments. Moreover, it is important that both parties clearly describe their intentions and goals. The automotive OEM should define the expected outcomes of the engagement from the automotive OEMs point of view, in a way where it is easy for the startup to understand and follow, and vice versa. Moreover, if the contract is for a ramp up engagement, it is important to decide on what happens after the ramp up.

Resources

The resources that both parties will spend on the engagement must be defined. This include for example what type of equipment the automotive OEM will provide, or if a working space can be offered. It must also be specified what people that will be involved, both from the startups and from the automotive OEM, and how many man hours that will be spent. It is also recommended to define the exact people to be involved, since it is usually the best engineers from the startup that the automotive OEM wants to engage with, and vice versa, to learn as much as possible from the engagement. Furthermore, it is recommended to define if the automotive OEM will pay for the engagement in any way, and in that case for what and how much. It is common that the automotive OEM wants the startup to reach a specific level of quality, or do some other validation, which also is recommended to define in the contract.

Intellectual Property

The owner of the IP must be clear and well defined in the contract. This is especially important if the engagement is a co-development. According to the experts and automotive OEMs interviewed, the most common setup in a co-development is that the party that pays for the development will own it.

7.7. Pivoting

When an engagement has been designed and agreed upon, and the contract is signed, the process of identifying and engaging with startups should be pivoted. This is an opportunity to evaluate the engagement, as well as change and improve the process based on the learnings

from going through all the steps. To improve continuously is very important to make sure to that the process fit the organisation and the landscape.

7.8. The timeframe

The timeframe of the process is one of the most crucial aspects, according to the experts and automotive OEMs interviewed in this study. The recommended timeframe differs depending on the situation. If it is a light engagement, that might only go on for two weeks, the time between the pitch meeting and an answer to the startup should be a maximum of one week, according to automotive OEMs and experts. If it is a bit larger project, that goes on for several months, that require a lot of resources from the automotive OEM, it is reasonable to get back to the startups within a few weeks. If the startup is mature and considered as a supplier, the time to initiate an engagement can be six months. Regardless of the kind of engagement, it is very important to be clear and communicate how much time it will take to make a decision and initiate an engagement.

8. Conclusions

This chapter presents the conclusions of this master thesis, regarding the main challenges and how to overcome them, as well how a process for identifying and engaging with startups can look for an automotive OEM.

The empirical findings, which correlate strongly to the theoretical ones, suggest that the biggest challenges related to engagements between automotive OEMs and startups are the cultural differences, different organisational clocks, unclear goals and expectations, lack of understanding of the other party, and the bureaucracy in large firms. To manage these challenges, automotive OEMs must make sure to understand the startup's point of view, by having people in the organisation that have experience in and understand the startup world. Also, in order to cope with the bureaucratic challenges, automotive OEMs need to have a separate unit that is able to act more like a startup, as well as be well prepared and have procedures in place to be able to act fast when the opportunity arises. One part of being well prepared is to establish clear goals and align the expectations between the two parties before engaging. Also, for the engagement to be successful, it is important that both parties benefit from it. The setup of the engagement must be adapted to the specific context and needs of both the automotive OEM and the startup. However, it is most certainly always beneficial to have a ramp up period, where the two parties can get to know one another deeply.

Based on these findings, a process for how automotive OEMs can identify and engage with startups is suggested. Before starting, it is important for the automotive OEM to define the goals, expectations, and the offer to the startups. When it comes to identifying the startups, the most important channel is networking and relationships. Moreover, there must be a pitch meeting, where both the startup and the automotive OEM pitch to one another, followed by an evaluation and validation of the startup. Based in this, an internal meeting should be held, where a go/no-go decision is made, followed by a definition and design of the actual engagement, based on the specific context, before a contract can be written. Finally, this process must be iterative. Based on the learnings gained from each engagement, the process should be constantly revised and updated.

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Appendix

Below, appendix number one through five are presented.

Appendix 1

Key questions to startups

1. Can you please tell us shortly about what your company is doing?
    a. What stage of development is your company currently in?
    b. How much funding have you raised? From where?
    c. Number of employees?
2. Are your company working with any large firms or OEMs today?
    If yes:
    a. a. Can you please explain to us how that engagement look in detail?
        b. What is the win-win?
        c. How was the contact initiated?
        d. Have you experienced any difficulties?
        e. What have you learned from that collaboration?
    If no:
        f. Have you been approached by any large firm/OEM?
            1. What did they offer?
        g. Is there any specific reason why you don't?
3. What kind of engagements with OEMs would you prefer and why?
    a. What do you need from an OEM?
    b. What can you offer to the OEM?
4. What would make you choose one company to work with over another?
5. Which channels have you used to get in contact with potential collaborators or customers?
    a. Which channels have been most successful?
6. Have you been a part of any accelerator program?
    If yes:
    a. Did you find any companies to engage with through that?
    b. How did you benefit from being a part of that?
    If no:
    c. Is there any specific reason why you haven't?
7. Have you considered being a part of corporate accelerators?
    a. Why/Why not?
8. What are your thoughts about IP-related issues in potential collaborations with OEMs?
    a. How do you think these can be managed?
9. What are your thoughts on receiving funding from VC firms compared to CVC?

Appendix 2

Key questions to automotive OEMs

1. What is your company's purpose of engaging with startups?

Identification

2. How do you find startups for potential collaborations?
3. Do you target specific kind of startups?
4. Do you have any specific division, team or person who is responsible for finding startups?
5. How do you choose which startups to look deeper into?
    a. Do you have any pre-set criteria?

Internal process

6. What happens when you've found a startup for a potential collaboration?
    a. Do you have a process with pre-defined steps?
        i. What does it look like?
    b. Who are involved in this process internally?
    c. Do you have any specific criteria that the startup must fulfill?
    d. What do you require from the startup (documents, policies, contracts etc)?
7. What is the timeframe of the process?
10. How do you manage IP related matters?
11. What is your company's view on exclusivity?

Engagement setup

12. Do you have any pre-defined types of engagements that you offer to startups?
13. Do you prefer any specific type of engagement?
14. What kind of engagements do you have with startups today?
    a. What is the win-win?
    b. What is the setup of the engagement in detail?

General

15. What are challenges and most critical things to have in mind then engaging with a startup?
16. What are the kay factors to address when engaging with startups?

Appendix 3

Key questions to accelerators, incubators, and VCs

1. Can you describe the setup of your accelerator/incubator?
    a. What is the focus?
    b. What kind of startups (which technical field)?
    c. How many startups per year (applications and participants)?
    d. How many rounds per year?
    e. Size of the investment and equity?
    f. Do you have any pre-defined programs for the automotive industry?
    g. How does the coaching to startup look?
2. Can you describe the selection process for startups?
    a. Which criteria are you looking at?
3. Can you please describe your concept/offer to startups?
4. How do you select large firms to work with (if you do)?
5. Can you please describe your offer to corporations?
    a. What are the benefits for a large firm/OEM?
    b. What is required of the OEM?
        i. Levels of engagements?
6. Are you working with any automotive OEMs today?
7. Do you know any examples of collaborations between large firms/OEMs and startups that was initiated through your program?
    a. What is the setup?
8. What do you think are the main challenges related to engagement between an automotive OEM and a startup?
9. What do you think are the key factors in such engagements?

Appendix 4

Overview of the number of responses, categorised into the different interview groups.

Reasons to engage				
Reason	***Startups (12)***	***Automotive OEMs (3)***	***Experts (9)***	
			Independent experts (5)	***Accelerators, incubators, VC (4)***
Brand association	6		3	2
Guidance	4		3	
Access to data	2		2	
Knowledge about industry	4		2	
Scale	2	2	1	1
Secure revenue	4	2	1	1
Investment	3	3		2
First access to technology		2		
Access new technology		3	1	
Lock up technology		1	1	

Challenges and common pitfalls				
Challenge	***Startups (12)***	***Automotive OEMs (3)***	***Experts (9)***	
			Independent experts (5)	***Accelerators, incubators, VC (4)***
Cultural differences	4	1	4	2
Unclear goals and expectations	4	1	3	
Different organisational clocks	5	1	4	2
Lack of understanding of the other party	6		2	2
Bureaucracy in corporations	7		3	3
Automotive supply chain is not designed to suit software companies	2		1	
Unbalanced power relationship				1
The startup need to keep the IP ownership	4			2
Lack of acceptance of failure in corporations	3		3	1

Key factors for successful engagements				
Key factor	***Startups (12)***	***Automotive OEMs (3)***	***Experts (9)***	
			Independent experts (5)	***Accelerators, incubators, VC (4)***
Ensure win-win	3	2	3	1
Clear purpose	5	1	5	3
Clear expectations	4	2	3	3
Define resources	2	2	2	3
Define process	1	1	3	2
Suitable KPIs	2	1	4	2
Understand the other party	1	2	3	2
Have defined set of criteria for evaluating the startup		3	2	2
Have someone responsible for the process		1	3	3
Engagement must be adapted to the situation	2	3	4	
Strategic alignment	1	1	2	2
OEMs need a separate unit that can act faster and be more flexible	1	1		2
The process of working with startups must be iterative			2	
The pitch must be two-sided		1	2	2
Top management commitment		1	2	2

Channels				
Channel	***Startups (12)***	***Automotive OEMs (3)***	***Experts (9)***	
			Independent experts (5)	***Accelerators, incubators, VC (4)***
Network and relationships	4	3	3	3
Accelerators	7	2	3	4
Engage with third party		1	2	1
University relationships		3	2	1
Scouts		2	2	
Events	6	2	2	1
Media	5			1
Via partners	3		1	
Open source	2			

Ways to engage				
Ways to engage	***Startups (12)***	***Automotive OEMs (3)***	***Experts (9)***	
			Independent experts (5)	***Accelerators, incubators, VCs (4)***
Ramp up period	6	3	3	
Light engagement	9	2	2	3
Co-development	4	1	2	
Customer/supplier	6			
Partnership	6		2	
Investment	4	3	2	1
No exclusivity	6	1		1
Paid consultancy	2			
Arm length distance engagement	3	1	2	1
Engage through a third party in the supply chain	2		2	
Three party engagement	2			1

Appendix 5

The investment evaluation dimensions used by one of the interviewed experts.

Investment evaluation dimensions

- Opportunity size (Potential)
- Team (People)
- Product
- Traction
- Scalability
- Business model
- Strategic hypothesis
- Core technology
- Competition
- Market & tech trends
- Capital need
- Valuation & ownership
- Exit opportunities
- Fit
- Risks