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**Balancing Between and Succeeding Within  
Ecosystems – Case studies of Complementor  
Strategies in Platform Ecosystems**

Master's Thesis

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AALTO UNIVERSITY SCHOOL OF SCIENCE PL 11000, 00076 Aalto http://www.aalto.fi	ABSTRACT OF THE MASTER'S THESIS	
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TITLE OF THESIS: Balancing Between and Succeeding Within Ecosystems – Case studies of Complementor Strategies in Platform Ecosystems		
MASTER'S PROGRAMME: Industrial Engineering and Management		
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<p>The <i>ecosystem</i> concept enables and demands expanding the focus of strategy making from individual companies to value systems in a novel way. Ecosystems are characterized by nongeneric complementarity and a lack of full hierarchical control. The construct has attracted growing interest in both academics and practitioners, but the focus of interest has mainly been directed to companies in leading positions of the ecosystems with the ability and responsibility to orchestrate the ecosystems. This thesis is an effort to not only present the most important characteristics of ecosystems, but to provide insight about the players that represent a majority in ecosystems, but have not been thoroughly understood previously, i.e. the complementors.</p> <p>The thesis builds on literature in strategy, but also on information systems literature to provide a summary of the most important themes for complementors. Specialization and multihoming enable companies to succeed in ecosystems, but they also come with some costs. Furthermore, there seems to be a tradeoff between them, which has not been widely explored or explicitly studied in prior literature, although early indications exist.</p> <p>The empirical case study of this thesis is inductive and exploratory in nature. Based on interviews from eight case companies that provide services to business customers in the software industry, and comprehensive analysis of the interview data, insights on complementor strategies regarding ecosystems are provided.</p> <p>The main theoretical contribution of this thesis is the identification of a divergence in the approach the complementors take to participating in ecosystems or platforms. The case companies either focus on a single platform or remain independent of platforms while participating in multiple platforms. The decision regarding platform participation is strategic in nature as platform-focused complementors and platform independent complementors differ in their key success drivers and the way their offerings relate to platforms. The organizations have aligned themselves to succeed with their platform participation decision. Furthermore, the way they are responding to changes in the operating environment, mainly driven by technology development and customer needs, differ. All in all, it seems that the way the case companies approach platform participation seems to be fundamentally interrelated with many characteristics of the companies.</p> <p>In addition to theoretical contributions, the thesis provides practical implications as advice to complementors. As the findings are context-specific to some degree, some limitations in applicability to other contexts are discussed. However, complementors in other industries where platforms are emerging and complementarity is nongeneric in a manner that requires continuous development of specialized capabilities that relate to platforms, may also find the advice useful.</p>		
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<p>Ekosysteemin käsite mahdollistaa ja vaatii strategian tarkastelun painopisteen siirtymistä yksittäisistä yrityk-  sistä arvoa tuottaviin systeemeihin. Käsitteen tärkeimpiä ominaispiirteitä ovat epägeneerinen komplementaa-  risuus sekä täyden hierarkkisen kontrollin puute. Ekosysteemit ovat herättäneet kiinnostusta niin tutkijoissa  kuin ammatinharjoittajissakin, mutta kiinnostus on kohdistunut lähinnä ekosysteemejä hallitseviin yrityksiin.  Sen sijaan komplementtien tuottajia, jotka edustavat suurinta osaa ekosysteemien yrityksistä, ei ole aikaisem-  missä tutkimuksissa perusteellisesti tarkasteltu. Tämän diplomityön pyrkimyksenä onkin esitellä ekosysteem-  mien tärkeimpiä ominaispiirteitä sekä luoda syvempää ymmärrystä komplementtien tuottajista.</p> <p>Tämä työ rakentuu niin strategisen kuin tietojärjestelmätieteiden kirjallisuuden varaan, ja tarjoaa yhteenve-  don komplementtituottajien kannalta tärkeimmistä teemoista. Erikoistuminen ja useampaan alustaan kuulumi-  nen mahdollistavat komplementtituottajien menestymisen ekosysteemeissä, mutta näihin liittyy myös kustan-  nuksia. Lisäksi, näillä vaikuttaa olevan vaihtoehtoinen suhde, jota ei ole aiemmassa kirjallisuudessa käsitelty  syvällisesti, mutta josta on jo aikaisia merkkejä viimeaikaisissa artikkeleissa.</p> <p>Työn empiirinen tapaus tutkimus on luonteeltaan induktiivinen ja eksploratiivinen. Löydökset perustuvat haas-  tatteludataan, joka on kerätty kahdeksasta yrityksestä, jotka tuottavat palveluita yritysasiakkaille ohjelmisto-  alalla. Haastatteludatan perusteellisen analyysin perusteella tässä työssä esitetään löydöksiä komplementti-  tuottajien strategioista ekosysteemeissä.</p> <p>Työn tärkein ja tieteellisesti arvokkain havainto on se, komplementtituottajat lähestyvät osallistumista ekosys-  teemeihin tai alustoihin kahdella erilaisella tavalla. Tapausyritykset joko keskittyvät yhteen alustaan tai pysyt-  televät riippumattomina alustoista osallistuen useampaan alustaan samanaikaisesti. Päätös alustoihin osallis-  tumisesta on luonteeltaan strateginen, sillä alustakeskittyneet ja alustariippumattomat komplementtituottajat  eroavat toisistaan tärkeimmässä menestystekijöissään sekä tavassa, jolla niiden tarjonta suhtautuu alustoihin.  Organisaatioiden sopeutuminen osallistumispäätökseen mahdollistaa niiden menestyksen. Lisäksi nämä eri-  tyyppiset yritykset eroavat kyvyssään vastata muutoksiin toimintaympäristössä, jonka kehitystä ajaa teknolo-  gian kehitys ja muutokset asiakkaiden tarpeissa. Kaiken kaikkiaan vaikuttaakin siltä, että tapausyritysten tapa  lähestyä alustoihin osallistumista on perustavalla tavalla yhteydessä niiden ominaispiirteisiin.</p> <p>Tieteellisen arvon lisäksi diplomityön johtopäätökset tarjoavat käytännön ohjeita komplementtituottajille.  Löydökset ovat kuitenkin kontekstisidonnaisia, minkä vuoksi työssä käsitellään rajoituksia löydösten sovelta-  misesta muihin konteksteihin. Rajoitukset huomioon ottaen myös muiden alojen komplementtituottajat voivat  hyödyntää työn löydöksiä ja ohjeita. Ohjeet ovat erityisesti hyödyllisiä aloilla, joissa alustat kasvattavat mer-  kitystään, ja joissa komplementit ovat epägeneerisiä niin, että komplementtituottajien on jatkuvasti kehitettävä  alustoihin erikoistunutta osaamistaan.</p>		
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The best thesis is one that is finished – perhaps the most common advice I have heard during the process of writing this thesis. Following the advice is not, however, as easy as giving it. When is a thesis finished? One can always find ways to improve it, as the understanding on the topic increases. If I would start rewriting now on the same topic, and if I would reconduct the empirical research, the outcome would surely be much better. However, even though building on their experience gained in writing prior articles, academics, too, at some point, have to submit an article and move on, instead of rewriting the article continuously. Especially in the case of a thesis, perhaps the most important thing is for one to go through the process, and not only learn how to conduct academic research, but also display one's ability to conduct it. These objectives, I believe, have been reached.

Even though the journey has not always been enjoyable, I have learned a lot about academic research, and perhaps more importantly, about the software industry and about firms that are very successful and exciting. I am very thankful to the people that have made it possible for me to write my thesis on such an interesting theme.

I would first like to thank all of the informants from the case companies for taking the time to answer my questions. Your participation has not only been crucial for the thesis, but the discussions were also very enjoyable and inspiring to me personally.

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Santeri Vilos

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## Abbreviations

CC	Case Company
CEO	Chief Executive Officer
CIO	Chief Information Officer
ERP	Enterprise Resource Planning
IP	Intellectual Property
IPO	Initial Public Offering
IPR	Intellectual Property Rights
SaaS	Software as a Service

# 1. Introduction

This chapter introduces the thesis by providing background and motivation for the topic, explicating the objective and research questions for the empirical research, and outlining the scope and structure of the thesis.

## 1.1 Background and motivation

The ecosystem-centric approach stems from the insight that traditional industry or company focused strategies are not enough as whole systems may be dissolved or descend into intense competition (Moore, 1996). Companies thinking competition in terms of offers and markets face problems if they ignore their context, i.e. ecosystem and its success, demonstrated by threats to e.g. first-rate suppliers to collapsing retail chains (Moore, 1996). In rapidly changing environments, coevolution is the common denominator of some of the most successful companies in the world (Moore, 1996). They not only employ competition and cooperation to lead competitors and industries, but also “hasten the coming together of disparate business elements into new economic wholes from which new businesses, new rules of competition and cooperation, and new industries can emerge.” (Moore, 1996, p. 12). These new economic wholes are called ecosystems, and they demand a different approach to strategy making as summarized in Table 1 (Moore, 1996). The approach is not alternative to traditional concepts of strategy such as corporate and competitive strategy, but one that can add value by shedding light on questions that prior concepts may not cover as well (Adner, 2017).

Table 1. Premises of the Ecosystem strategy (Moore, 1996, p. 56)

<b>From Company &amp; Industry</b>	<b>to Ecosystem</b>
Business boundaries – such as industry or nation – as given	Business boundaries as an issue and to some extent a matter of choice
Industry or the company is the primary unit of strategy-making	The business ecosystem, or community of co-evolving, innovating participants, is the primary unit of strategy-making
Economic performance is a function of how well the company is managed internally – and how profitable, on average, is its industry	Economic performance is very much a function of how the company manages its alliances and relationships within the network that constitutes its business ecosystem
Individual company growth is the central concern	Development of the economic network as a whole is the central concern, as well as the position of the company within the network
Cooperation among players is largely limited to direct suppliers and customers to improve traditional customer/supplier relationships and/or maintain existing industry or national boundaries	Cooperation is expanded to include all players relevant to the search for ideas and unmet needs that can be innovatively combined into new communities of coevolving participants
Competition seen as primarily between product and product or company and company	Competition is also understood to be among business ecosystems – as well as for leadership and centrality within particular ecosystems



Not only is the ecosystem concept well motivated, practitioners are also adopting it. The prospectus of Alibaba in 2014 for the world's largest IPO until 2018 lists 160 mentions of the word *ecosystem* (Jacobides, Cennamo, & Gawer, 2018). Even though ecosystems have generally been understood to be important in digital domains, the relationship of complementarity that underpins the concept can be found in more traditional industries, such as the insurance industry, airline industry, commercial banking industry, and even the metal stamping and powder metal industries (C.-H. Lee, Venkatraman, Tanriverdi, & Iyer, 2010).

Even though the ecosystem concept was initially proposed by Moore in 1993 (Gomes, Facin, Salerno, & Ikenami, 2016), it has since then gained broadening interest of multiple other academics. There are many different characterizations and boundary conditions for ecosystems proposed by scholars (Adner, 2017; Gomes et al., 2016). However, the essence of the ecosystem construct can be distilled to characteristics of nongeneric complementarity and lack of hierarchical governance (Jacobides et al., 2018). Furthermore, ecosystems, especially in the digital domain, have platforms at their center and consist of platform innovator(s) and complementors (Teece, 2018). These roles are important in order to understand how firms act in an ecosystem, and they have various names in prior literature.

The extant literature has focused mainly on the dominant firm or the ecosystem leader (Kapoor & Agarwal, 2017; Nambisan & Baron, 2013; Rickmann, Wenzel, & Fischbach, 2014) and there have been calls for further research on the complementor point of view and strategies of complementors (Jacobides, Cennamo, & Gawer, 2015). Even though some academics have shifted their focus to complementors (Ceccagnoli, Forman, Huang, & Wu, 2012; Kapoor & Agarwal, 2017; Rickmann et al., 2014), the studies have mainly focused on performance, not the intentions of or strategies employed by the complementors with few notable exceptions, mainly in software ecosystems (e.g. Kude, Dibbern, & Heinzl, 2012; Rickmann et al., 2014). Therefore, the need to study complementors is evident (Jacobides et al., 2018; McIntyre & Srinivasan, 2017).

There is much room for research in the area of ecosystems, and this thesis focuses especially on how complementors can find competitive advantage within ecosystems and across different ecosystems and platforms. After all, complementors represent a majority of firms in ecosystems and are critical contributors to value creation (Kapoor & Agarwal, 2017).

Literature has mainly focused on complementors' decisions that are deemed tactical (Jacobides et al., 2018), and covered product complementors, such as developers for mobile apps (Bresnahan, Orsini, & Yin, 2015) or the video game industry (Cennamo, Ozalp, & Kretschmer, 2018). The focus of this thesis is on complementor strategies of service complementors in the software industry that serve business customers.

## 1.2 Research objective and research questions

In order to understand the strategies of complementors, the ecosystem construct was studied extensively, and thus one of the aims of this thesis is to provide an introduction to the main drivers of ecosystems and what differentiates ecosystems from other concepts.

The focus of the thesis being on the complementors, the theoretical part of the thesis presents the main concepts important from the complementor point of view. The empirical focus is entirely on complementors, and the research questions are related to their strategic decisions regarding ecosystems. The general aim is to understand how complementors act in ecosystems and why, and how they may be able to succeed in the future.

As a premise for understanding complementors' actions in ecosystems, there is a need to understand what decisions they make regarding participation in ecosystems. Do complementors participate in mainly one ecosystem, or do they participate in many? Furthermore, if they employ different ways to approach platform participation, what drives their decisions? Therefore, the first research question for this thesis is:

*Research question 1: What decisions regarding ecosystem participation do complementors make, and what drives those decisions?*

Even though the first research question is interesting and helps understand the behavior of complementors, it is even more interesting in a strategic sense to understand how complementors can, and do, succeed in ecosystems. In order to understand the drivers of success of complementors, the second research question for the thesis is:

*Research question 2: What drives complementor success?*

Moving even further to the practical domain, while probing for answers on the behavior and key success drivers for complementors, the thesis also aims to provide some insight into how the complementors' industry may develop, and how they may be able to respond successfully to changes in the operating environment. In order to shed some light on possible future development, the third research question is:

*Research question 3: What drivers affect the future of ecosystems and complementors and how will the complementors respond to changes?*

Altogether, the research questions aim to provide a comprehensive picture ranging from the past to the future. The research questions are somewhat interrelated, and the findings present a dynamic picture starting from initial participation decision, advancing to how complementors' organizations and processes are aligned with the participation decision and what the complementors consider their key success drivers to be now, and finally describing how complementors anticipate the environment to change, and how they have started, and increasingly will, adapt to changes in order to succeed in the future.

### **1.3 Scope of the thesis**

The scope of the thesis is guided by the research objective and chosen methodology, and restricted by practical limitations in resources. The research objective guides the scoping in a sense that the focus is specifically aimed at understanding the actions of complementors, and the drivers behind those actions. As an inductive methodology is employed in order to explore how complementors act and why they act in such ways, deep understanding needs to be gained. In order to gain such a deep understanding on the complementors, multiple in-depth interviews with multiple knowledgeable informants and a comprehensive analysis of the interview data are conducted.

In order to put the limited resources to best use, all informants and case companies come from the same industry. This enables to capture as much variation within a similar set of boundary conditions stemming from a common ground. Furthermore, the case companies all mainly operate in the same geographical region, namely Finland, which helps in limiting other possible explanations to the actions of the firms.

The case companies can all be described as complementors. A possibility to include interviews with platform leaders or customers was considered, but as the objective is to understand the actions of complementors, the focus was limited to them. Allocating resources to studying multiple different roles in the same ecosystem may have provided more diverse insights, but may also have limited the variety of insights, if less complementors would have been interviewed.

The industry of the interviewed complementors is the software industry. More specifically, all the case companies provide services, in contrast to products, to business customers. The sample logic is further explained in section 3.2, but in brief, the enterprise software industry has been deemed a suitable context for studying ecosystems and especially complementors (Ceccagnoli et al., 2012; Rickmann et al., 2014). Furthermore, the sampling procedure aimed to reduce unwanted variation, as the focus was narrowed down to established companies, thus scoping out new entrants.

The limited resources have been a restricting factor in the number of interviews conducted. As the analysis of the interview data required significant efforts in processing interview data as a whole and abstracting the data in a manner that takes into consideration the variation across cases, while remaining true to the data, eight interviews were conducted. Even though additional interviews may have presented more insights, a pragmatic degree of theoretical saturation was reached, as discussed in section 3.2.

## **1.4 Structure of the thesis**

The thesis is divided into 6 chapters. This first chapter provides background on the topic, and motivation for the research, describes the research objective and the research questions that aim to tackle that objective, explains the scope of the thesis, and finally, in this section, provides the structure in which the thesis progresses.

Chapter two, the literature review, is divided into two main sections. The first section, “Ecosystem as a construct”, lays the groundwork for understanding ecosystems. The section is structured in a manner that reflects the characteristics that define and distinguish ecosystems from other value systems. Building on the foundation set by the first section of the literature review, the second section, “The complementor point of view”, focuses specifically on academic literature that helps explain how complementors act in ecosystems.

The third chapter elaborates on the methodology utilized in the empirical research for this thesis. The underlying fundamentals for the decision to utilize an inductive approach are explained, and the corresponding aspects of the research strategy are discussed. The chapter ends with a discussion on the possible limitations to the approach chosen, thus assessing the quality of the research.

The fourth chapter presents the findings of the empirical research. The section is structured to correspond to the research questions, and further divided into different themes that emerged from the data during the analysis. The concluding summary synthesizes the findings related to the different research questions into a dynamic process, which connects the strategic decision first to aligning the company’s operations and finally to future opportunities enabled or restricted by the decision.

The fifth chapter, following the logic of the chosen research methodology, aims to bind the findings of the inductive empirical study to prior theories and findings from academic literature. By comparing the findings to existing knowledge, the discussion chapter relates the new insights gained to what was already known or expected by the academic community. As such, it not only enables evaluation of the findings, but also shows how the new insights add to prior theories.

The sixth chapter concludes the thesis by drawing implications to both practice and theory. The practical, or managerial, implications focus mainly on providing insight on strategizing in ecosystems to complementors. The theoretical contributions are discussed in the form of how the thesis can aid academics in understanding complementors in ecosystems.

## 2. Literature review

The literature review of this thesis presents key theories and findings of prior academic literature relevant to the topic of complementor strategies in platform ecosystems. By combining academic literature from different streams, the literature review sets the theoretical foundation needed to understand how complementors act in ecosystems and what drives their decision-making.

First, the ecosystem construct, and the main characteristics that underpin ecosystems are presented. Complementarity is the underlying relationship that explains why and how different participants align their interests. Platforms, even though not strictly required for ecosystems, are important constructs that enable complementarity and alignment. Furthermore, as the roles that firms take in ecosystems are distinct from other value systems, they, too, are discussed.

Second, the literature review focuses on complementors as important actors in ecosystems and the focal actors for this thesis. Even though prior academic literature has mainly focused on platform leaders as actors, there is a growing body of literature that discusses complementors. The main themes regarding complementor strategies are specialization and multi-homing. In addition to these themes, prior findings and theories relating to benefits of platform participation, ways for complementors to cope with the asymmetric power relation with platform leaders, and future development of especially software ecosystems are discussed.

### 2.1 Ecosystem as a construct

The main reason for ecosystems to form and exist is that they can provide complex value propositions that build on multiple components to various customers (Adner, 2017; Adner & Kapoor, 2010; Dattée, Alexy, & Autio, 2017; Hannah & Eisenhardt, 2017; Kapoor & Lee, 2013). The value proposition can be understood as the “benefit that the target of the effort is to receive, as opposed to what a firm is to deliver” (Adner, 2017, p. 43) and does not need to be viewed as a single product or service, but “a set of offerings for different user groups and uses” (Autio & Thomas, 2014, p. 208). A good example of an ecosystem value proposition is a “seamless music experience that delight[s] customers” (Hannah & Eisenhardt, 2017, p. 2).

The success of ecosystems, or of any offerings that are a part of customer-facing solutions that consist of offerings of multiple firms, is not only dependent on the ability of any one firm to develop its own innovation (Adner, 2006). Successful ecosystems “allow firms to create value that no single firm could have created alone” (Adner, 2006, p. 100) as the customer-facing solutions are combinations of individual offerings of multiple firms. The emergence of a market for the most brilliant innovation, meeting or exceeding customer needs, is “determined as much by the firm’s partners as by its own performance” (Adner, 2006, p. 100). In the case of ecosystems that are formed around platforms, “[t]he platform requires complementary innovations to be useful, and vice versa” (Gawer & Cusumano, 2008, p. 28)

Arguably, offerings of firms are rarely isolated from other firms’ offerings. Jacobides et al. (2018) classify three distinct types of value systems, namely hierarchy-based value systems, market-based value systems, and ecosystem-based value systems.

Ecosystem-based value systems are set apart from hierarchy-based value systems, such as firm-supplier relationships, mainly due to the fact that in ecosystems, “final customers can choose among the components (or elements of offering) that are supplied by each participants, and can also, in some cases, choose how they are combined” (Jacobides et al., 2018, p. 6). In contrast, in hierarchy-based value systems the offering is provided “as is”, combined and offered to the customers by a single firm (Jacobides et al., 2018).

Limiting the choice of customers and setting ecosystems apart from market-based value systems, there is need for significant coordination and “end customers choose from a set of producers or complementors who are bound together through some interdependencies” (Jacobides et al., 2018, p. 7) instead of buying the offerings separately from the market and combining them freely.

The characteristics that make ecosystem distinct from the other types of value systems capture the essence of the ecosystem construct, and set the foundation to the definition of ecosystems. Ecosystem-based value systems are distinct precisely due to the interdependent, yet unhierarchical, nature of the relationships between the products, services, and therefore producers (Jacobides et al., 2018). Therefore, the definition employed in this thesis is:

*“An ecosystem is a set of actors with varying degrees of multilateral, non-generic complementarities that are not fully hierarchically controlled” (Jacobides et al., 2018, p. 10).*

The notion that in ecosystems there are “multilateral, nongeneric complementarities” refers to the characteristic of the boundedness of components to each other via interdependence, or complementarity (Jacobides et al., 2018). The complementarity in ecosystems is specifically nongeneric, which means that the complementarities entail some degree of customization, and therefore require “the creation of a specific structure of relationships and alignment to create value” (Jacobides et al., 2018, p. 9). Complementarity is further discussed in section 2.1.1.

The notion that ecosystems are not “fully hierarchically controlled” refers to the characteristic that sets ecosystems apart from hierarchy-based value systems, i.e. that “[n]o one party can unilaterally set terms for, as examples, prices and quantities” (Jacobides et al., 2018, p. 12). Even though in supply chains there is negotiation for prices between the firm and its suppliers, the firm still decides “what it will procure, from whom, and at what cost” (Jacobides et al., 2018, p. 13). In ecosystems, the final customers can choose amongst different complements, and thus, the decision-making processes are distributed between the producers to some extent (Jacobides et al., 2018). On the other hand, in many ecosystems there is a hub that is responsible for setting the standards and rules for the ecosystem and wields significant power in comparison to complementors (Jacobides et al., 2018). The different roles in ecosystems, and how the different firms can affect the power they exercise in the distributed decision making that follows from a lack of full hierarchical control are discussed in section 2.1.2.

### **2.1.1 Complementarity**

Complementarity in its essence, attributed to Edgeworth, can be economically noted as “the marginal value of a variable increases with another variable” (Teece, 2018, p. 1373). Even

though simple at the core, complementarity is a concept for which closure or agreement in academic literature has not been reached (Jacobides et al., 2018; Teece, 2018).

Both Teece (2018) and Jacobides et al. (2018) clarify different types of complementarity, but neither claim to produce an exhaustive list. Both articles note that complementarity raises coordination issues (Jacobides et al., 2018; Teece, 2018), but Jacobides et al. (2018) further highlight that not all complementarity raises such coordination issues, referring to generic complementarity. According to them, specifically nongeneric complementarity underpins the ecosystem construct (Jacobides et al., 2018). Nongeneric complementarity is discussed further in section 2.1.1.i.

According to Teece (2018, p. 1375), “[c]omplementarity is the essence of platforms, and platforms help enable ecosystems”. Even though academic literature altogether is still undecided on whether platforms should be included as defining element of ecosystems, they are important in most of the ecosystems studied, especially in the digital domain (Teece, 2018). The main function of platforms in ecosystems is to enable complementary offerings to be built on them (Gawer & Cusumano, 2008; Teece, 2018). These complementary offerings that are strictly not the platform, and add value jointly with the platform are called complements (Gawer & Cusumano, 2008). A summary of platforms and complements in the context of ecosystems is presented in section 2.1.1.ii.

#### ***2.1.1.i Nongeneric complementarity***

Nongeneric complementarity can be understood via the opposite of it, namely generic complementarity. Generic complements are such complementary goods or services that are standardized to a degree that customers can buy them from markets and combine any of them on their own, without a need of coordination of investments on the producer side (Jacobides et al., 2018). Generic complements do not require alignment or interaction between the different producers in order for the ecosystem value propositions to materialize, and therefore do not need an ecosystem to create value (Adner, 2017; Jacobides et al., 2018)

In contrast to generic complementarity, nongeneric, or unique complementarity does require coordination, alignment or customization of offerings (Jacobides et al., 2018). Unique complementarity ranges from strict, where a good or service requires a *certain* complementary good or service, to specific, where a good or service requires a complementary good or service *that is customized to it* (Jacobides et al., 2018).

Nongeneric complementarity can be one- or two-way, meaning that the customization requirement may apply to both of the complements, or only one of them (Jacobides et al., 2018). The situation of two-way unique complementarity leads to a need for cospecialization, i.e. a need to customize both of the complementary offerings to each other, and the situation of one-way unique complementarity leads to a need for specialization, i.e. the need to customize applies to only one of the offerings (Jacobides et al., 2018).

Cospecialization stems from the idea of strategic fit and can be “of one asset to another, or of strategy to structure, or of strategy of process” (Teece, 2007, p. 1337). Teece classifies cospecialized assets as a class within a larger group of complementary assets, defined as “assets where the value of an asset is a function of its use in conjunction with other particular assets” (Teece, 2007, p. 1338). Cospecialization increases the value of joint use, and leads to markets where the assets are idiosyncratic and cannot be easily be imitated by competitors

(Teece, 2007). Cospecialization, or customization, does however come at a cost. Perhaps most importantly, the cost and investments to customize to a certain complementary offering may not be fully fungible, i.e. the customized offering may not be readily compatible to other possibly complementary offerings (Jacobides et al., 2018).

### ***2.1.1.ii Platforms and complements***

Autio and Thomas (2014) include a platform or a focal firm, later discussed as a platform leader, to their definition of an ecosystem. Even though not all ecosystems necessarily have a platform at its core (Autio & Thomas, 2014), one example in prior literature being the residential solar industry (Hannah & Eisenhardt, 2017), Teece (2018) argues that ecosystems consist of platform innovator(s) and complementors. Teece notes that such a definition is preferential “for the purpose of examining issues relating to digital convergence” (Teece, 2018, p. 1375), which implies that, at least in ecosystems where digital elements are important, platforms are an important enabler of ecosystems.

The inclusion of a platform in the definition of ecosystems by some authors may also be a consequence of how ecosystems develop initially. The ecosystem construct emphasizes that the value is not created in isolation, but together with complementary offerings of players that “help fill out the full package of value for customers” (Moore, 1993, p. 76). According to Moore, during the birth stage of ecosystems, “entrepreneurs focus on defining what customers want, that is, the value of a proposed new product or service and the best form for delivering it” (Moore, 1993, p. 76).

The definition of a platform includes both a core value proposition and an ability for others to build on top of it. First, platforms perform “at least one essential function within what can be described as a “system of use” or solve an essential technological problem within an industry” (Gawer & Cusumano, 2008, p. 29). Second, they are “easy to connect to or build upon to expand the system of use as well as to allow new and even unintended end-uses” (Gawer & Cusumano, 2008, p. 29).

Thomas et al. (2014, p. 200) refine the platform construct and describe it as “a system or architecture that supports a collection of complementary assets”. They note that the platform ecosystem builds on product family logic, described as “[p]latform as the stable center of a platform family leading to derivative products”, and its “modularity, standards, and product differentiation to product or service system” (Thomas et al., 2014, p. 205). The differentiating factor to product family platforms is that the focal product or service system is “broader than an internal or supply-chain-level” (Thomas et al., 2014, p. 205). Furthermore, Thomas et al. (2014, p. 205), note the fact that the stream “explicitly recognizes the importance of the resulting industrial community and surrounding ecosystem to the platform”. As Gawer and Cusumano (2008, p. 28) put it, “[t]he platform requires complementary innovations to be useful, and vice versa”.

A platform, different from the ecosystem platforms, often referred to as a multisided platform, is described “as an intermediary between two or more market participants” (Thomas et al., 2014, p. 200). This stream is distinguishable from ecosystem platforms as the platform specifically highlights the intermediary nature facilitating interchange, i.e. exchange or trade (Thomas et al., 2014), whereas in the ecosystem literature the platform, even though acting also as a facilitator, specifically stimulates external complementary innovations (Gawer &



Cusumano, 2014). Multisided platforms are not necessarily ecosystems, if the complementarity between the complements and the platform is generic, i.e. if there is no coordination required in production (Jacobides et al., 2018).

Ecosystem platforms do, however, have commonalities with, and owe theoretical debt to, multisided market platforms. Direct, or same-side, and indirect, or cross-side, network effects, and multihoming and switching costs, present in multisided platforms, are also important in many ecosystems (Gawer & Cusumano, 2014). These effects and costs are especially crucial in ecosystem to ecosystem competition as they help explain the dynamics at play and the need to grow the ecosystem rapidly on both the supply and use side – although as discussed later, growth in pure numbers is not always favorable (Wareham, Fox, & Cano Giner, 2014).

Gawer and Cusumano (2014, p. 417) define network effects as a phenomenon where “the more users who adopt the platform, the more valuable the platform becomes to the owner and to the users because of growing access to the network of users and often to a growing set of complementary innovations”. Essentially this means that “there are increasing incentives for more firms and users to adopt a platform and join the ecosystem as more users and complementors join” (Gawer & Cusumano, 2014, p. 417). Direct network effects refers to the fact that more users attract more users, and indirect network effects refers to more users attracting more complementary innovations and vice versa (Gawer & Cusumano, 2014).

Complementary innovations can be called complements (Gawer & Cusumano, 2008). Even though any two complementary units can be complements to each other, in platform ecosystems complements are specifically services or products that, jointly with the platform, or core product, create value to customers (Jacobides et al., 2018). Therefore, platforms are not complements, when utilizing this definition of a complement.

As noted above, for the ecosystem construct complementarity alone is not enough, but there is a need for nongeneric complementarity, or customization to some extent (Jacobides et al., 2018). In ecosystems with platforms, the unique complementarity is most likely to be one-way, as the point of platforms is to offer a variety of complementors the opportunity to build on them (Gawer & Cusumano, 2014). An example by Jacobides et al. (2018) illustrates this relation:

*[...] In the example of an OS platform/app ecosystem, the app and the platform have unique complementarity in the sense that the app does not function without the OS (unique complementarity, unidirectional, as the OS operates without most apps). (Jacobides et al., 2018, p. 9)*

Specialization or customization of only the complements can be explained by platform architecture. In platform architecture, a system is divided into two distinct sets of components: those with low variety and high reusability, i.e. the platform; and those with high variety and low reusability, i.e. the complements. This combination of some fairly fixed component, i.e. platform, and components that can vary in the present and change over time, i.e. complements, makes the system evolvable and able to adapt at a lower cost. Due to the complements being allowed to vary, the whole system does not have to be invented or rebuilt completely to generate new solutions for heterogenous tastes, or to respond to changes in the external environment. (Baldwin & Woodard, 2009)

Therefore, complements are most likely to be specialized to certain platform, instead of co-specialized with them. The degree of specialization of complements is an important decision for complementors, i.e. producers of complements, have to make. In the following section, complementors and platform leaders as roles that have different characteristics, duties, and opportunities or power are discussed. After discussing the different roles in ecosystems, the focus will be concentrated on the complementors, and relevant themes for them in platform ecosystems will be discussed.

### **2.1.2 Roles, positions and power**

According to Jacobides et al. (2018, p. 4), “[i]t is broadly agreed that ecosystems require providers of complementary innovations, products, or services, who might belong to different industries and need not be bound by contractual arrangements – but have significant interdependence nonetheless”. The lack of a need for contractual arrangements, or integrated hierarchies, whilst parties having significant interdependencies is what makes ecosystems distinct from “classical firm-supplier relationships, Porter’s (1980) value system, or a firm’s strategic networks” (Jacobides et al., 2018, p. 4).

Complementarity helps explain why firms wish to align their offerings, but does not give insight on how such alignment occurs. Ecosystems do not emerge out of nowhere, but are a result of deliberate efforts from multiple parties that wittingly or unwittingly form ecosystems (Jacobides et al., 2018).

According to Adner (2017) ecosystems are defined as the alignment structures that consist of sets of partners, which are multilaterally connected in a way that cannot be reduced to dyadic relationships, who must interact for that value proposition to materialize. The sets of partners, or sets of roles, are interdependent, and importantly the interdependencies tend to be standardized within each role (Jacobides et al., 2018). Even though there are various different descriptions of different roles in ecosystems, in essence, the division can be made to leaders and followers (Adner, 2017).

In a similar manner that platforms are important enablers of ecosystems (Teece, 2018), even though there may be ecosystems without platforms, ecosystems usually, but not mandatorily, have leading firms that “take responsibility for leading the systems towards alignment” (Adner, 2017, p. 48).

The leader role has been named in multiple ways. Moore (1993) writes about central ecological contributors, Iansiti & Levien (2004) call leaders either keystones, or value or physical dominators, Gawer and Cusumano (2008) write about platform leaders, Teece (2018) about platform innovators and Jacobides et al. (2018) employ the terminology of a hub.

Successful leadership is contingent to willing followership, i.e. deference to the vision of structure and roles of the leader (Adner, 2017). The followers in ecosystems (Adner, 2017) have been named niches (Iansiti & Levien, 2004), non-focal firms (Selander, Henfridsson, & Svahn, 2013), spokes (Jacobides et al., 2018) or complementors (Cennamo et al., 2018; Jacobides et al., 2018; Teece, 2018).

In this thesis, the terminology of platform leaders and complementors is employed. Platform leader is deemed suitable, as the core offering on top of which other players build upon in most cases fits the definition of a platform, as discussed in section 2.1.1.ii. The terminology of a complementor, on the other hand, is deemed most suitable, as the relationship which

distincts the ecosystem construct, is complementarity, and in platform ecosystems, complements are distinguishable from the platform, as discussed in section 2.1.3.

In the following subsections, the two different roles in ecosystems are defined. When discussing platform leaders in the following, some of their most important tasks are presented with a brief discussion on how they both need to lead the ecosystem and how they can benefit from their leadership. The definition of a complementor is provided, too, in this section, but their actions, motives, and opportunities are more deeply elaborated in the following section, section 2.2.

### ***2.1.2.i Platform leaders***

A platform leader is a firm that develops a core offering, or platforms, and enables others to build on it (Gawer & Cusumano, 2008; Nambisan & Sawhney, 2011). The leader “sets, and often enforces, the governance rules, determines timing, and often reaps the lion’s share of gains after the ecosystem is aligned” (Adner, 2017, p. 48). The alignment process has been called orchestration in prior literature (Iansiti & Levien, 2004; Rickmann et al., 2014). As the coordination of an ecosystems is very complex with tensions in simultaneous collaboration and competition, requiring design of technology and business logics that incentivize different parties to act coherently, there is a need for “one firm or a small group of firms to act as a platform leader” (Cusumano & Gawer, 2002; Gawer & Cusumano, 2014, p. 422).

The main mechanisms for platform leaders to create successful platform ecosystems are coring and tipping (Gawer & Cusumano, 2008). Coring refers to the creation of “a new platform where none existed before” (Gawer & Cusumano, 2008, p. 32), and tipping to winning “platform wars by building momentum” (Gawer & Cusumano, 2008, p. 32). In both coring and tipping, platform leaders must consider both technological and business actions (Gawer & Cusumano, 2008).

In coring, or creating a new platform, platform leaders take technological actions to solve an essential business problem common to multiple customers. They do so by not only creating an own core solution, but also by facilitating external complements by complementors both technologically and in terms of business incentives to complementors. (Gawer & Cusumano, 2008)

In tipping, or succeeding in the platform to platform competition, they must be careful not to be enveloped by other platforms, and ensure to attract as many customers and complementors as possible. In platform envelopment, the enveloper captures market share and harnesses network effects by combining its own functionality with the target platform to a multi-platform bundle (Eisenmann, Parker, & Van Alstyne, 2011). In order to attract as many customers and complementors as possible, platform leaders need to ensure that their platform is more attractive than competing platforms to both, especially in the presence of network effects. (Gawer & Cusumano, 2008).

At the same time as platform leaders need to keep in mind the attractiveness of the platform to complementors and customers, they also need to preserve their own revenues and profit. This simultaneous collaboration and competition makes ecosystems complex. (Gawer & Cusumano, 2014)

In platform ecosystems, the power of the platform leaders has been attributed to architectural advantage (Gawer & Cusumano, 2014). Architectural advantage of a company in an ecosystem stems from competition being ferocious in segments complementary to them, and not in the value adding process they themselves participate in (Jacobides, Knudsen, & Augier, 2006). Platform leaders, as crafters of rules in ecosystems, can facilitate entry and competition in the complementary assets without participating themselves in the complementary processes, and thus end up with the lion's share of the benefits (Jacobides et al., 2006).

The architectural advantage concept is very much related to bottlenecks, as Jacobides et al. (2006, p. 1209) define bottlenecks as “segments where mobility is limited and competition softened”. Essentially, bottlenecks are segments where the entry of producers is limited and at the same time other segments are characterized by high mobility in terms of switching costs and entry potential (Jacobides et al., 2006). High mobility essentially means that in the segment, where there is high mobility, “assets can be replaced by numerous equivalents at negligible cost” (Jacobides et al., 2006, p. 1206).

Managing bottlenecks is about facilitating entry into complementary assets, thus enabling and encouraging “ferocious competition in the complementary assets rather than in their own segments” (Jacobides et al., 2006, p. 1210). The main way to increase mobility is to create standards that encourage competition in complementary activities (Jacobides et al., 2006). The critical factor to achieve such a position is to become the “guarantor of quality” (Jacobides et al., 2006, p. 1210) while standardizing other components. An illustrative example of such positioning can be seen in the development of positions of IBM on the one hand and Microsoft and Intel on the other hand as the latter became “de facto signals of quality” and the “other PC components became standardized” (Jacobides et al., 2006, p. 1210).

The entry of multiple complementors to a platform can be beneficial to all parties, but there are also some limits to increasing attractiveness from increasing participation. As discussed in section 2.2.1.iii, platform dominance, or having more participants than other platforms is generally deemed as an attractive characteristic of a platform. On the other hand, platform leaders must carefully manage the openness of the platform, i.e. mobility, as too much competition in the complements is also deemed unattractive by complementors, as discussed also in section 2.2.1.iii.

Platform leaders, as the most powerful players in the ecosystem, do not only possess architectural advantage, but may also utilize their power to capture more and more of the created value by either integrating vertically or horizontally, or draining value by e.g. aggressively negotiating deals in their favor (Iansiti & Levien, 2004).

Yoffie and Kwak (2006) specifically focus on relationships between firms that have complementary offerings, and highlight the importance of power. They note that tensions may develop between the firms even though they share many goals (Yoffie & Kwak, 2006). Such tensions relate to pricing, technology, influence over customers, and “which one [of the complementary firms] gets the bigger slice of the pie” (Yoffie & Kwak, 2006, p. 90). In order to influence the behavior of others, firms can employ tools that can be divided into hard power and soft power (Santos & Eisenhardt, 2009; Yoffie & Kwak, 2006). Whereas hard power stems from direct actions or threats of the focal firm, in soft power other firms willingly

behave in ways that are beneficial to the focal actor as acting so is in the self-interest of the non-focal firm (Santos & Eisenhardt, 2009; Yoffie & Kwak, 2006).

According to Yoffie and Kwak (2006, p. 92), hard power stems from “traditional sources of strength, such as market share, brand equity, control of distribution channels, or cash” but also from other sources, such as entry to complementor markets, i.e. producing complements, and supporting other platforms. Exercising hard power means using these sources, or threatening to use these sources, to make others do, or not to do, something (Yoffie & Kwak, 2006). A great example of utilizing hard power is how Microsoft threatened not to support Intel’s MMX (a microprocessor technology), unless they license it at no cost to other chip makers, therefore drawing on Intel’s dependence on Microsoft (Yoffie & Kwak, 2006). A counter-reaction by Intel to support Linux reducing Microsoft’s ability to exercise hard power (Yoffie & Kwak, 2006) can be seen as building hard power on the complementor side.

As soft power depends on alignment of interests, wielding it builds on signaling commitment via sharing information, articulating a vision, fostering leadership, and contributing to the cause (Yoffie & Kwak, 2006). As such, soft power resembles the efforts of platform leaders to orchestrate ecosystems (Iansiti & Levien, 2004; Rickmann et al., 2014), or a balance of power and trust, where “[m]eaning is imposed on the weaker partner by the stronger one, but the weaker partner is quite happy to let this happen because doing so will result in significant gains for the entire ecosystem” (Perrons, 2009, p. 1309).

Even though they possess significant advantage in comparison to complementors, platform leaders benefit most from improving the ecosystem as a whole by also taking into account the health of other players (Iansiti & Levien, 2004). They do not do so due to altruistic reasons, but due to the fact that they benefit from the growth and health of the ecosystem (Iansiti & Levien, 2004) and also due to platform to platform competition for complementors and customers (Teece, 2018). As Teece well puts it:

*When there is platform-to-platform competition, adoption and commercial success is likely a function of who can recruit the most (and the best) complementors. Over time, the advantage belongs to the platform leaders that set the rules in the manner most likely to benefit the system as a whole and not just their own short-term interests. (Teece, 2018, p. 1376)*

### **2.1.2.ii Complementors**

The definition of a complementor derives from customer value as “[a] player is a complementor if customers value your product more when they have that player’s product than when they have your product alone” (Nalebuff & Brandenburger, 1997, p. 31). In ecosystem literature, complementors have specific role in defining the concept, as their existence as actors that are not suppliers or distributors, and their inputs, i.e. complementary inputs, represent a major and simple distinction to supply or value chains (Gomes et al., 2016; Iansiti & Levien, 2004).

Defining the role of complementors via complementarity is not, however, enough. In a general sense, both platform leaders and complementors have offerings that are complementary to each other. Followership, or conceding to another firm’s leadership is a way to distinct the role of a complementor from a leader (Adner, 2017). Another way to distinguish the roles

is to differentiate between the platform hub and spokes that provide complementary products or services to the platform (Adner, 2017; Jacobides et al., 2018). In terms of platform ecosystem terminology, a spoke seems to be an interchangeable term for a complementor (Huber, Kude, & Dibbern, 2010; Teece, 2018). In platform ecosystems, where complements can be defined as in section 2.1.1.ii, complementors can be defined as providers of those complements (Jacobides et al., 2018). Besides spokes, complementors have also been called “non-focal actors” (Selander et al., 2013). The definition of a non-focal actor, in contrast to a focal actor, gives a different perspective that adds more depth to the definition of a complementor.

Selander et al. (2013) define ‘non-focal’ actors as “ecosystem participant[s] who [are] at the periphery of the digital ecosystem” (Selander et al., 2013, p. 184). These actors have two specific characteristics: 1) the survival of the ecosystem is not dependent on the actor and 2) the survival of the actor is not dependent on the specific ecosystem (Selander et al., 2013). A distinction between a focal and a non-focal actor can be exemplified via a single actor, Google, which is a focal firm for the Android ecosystem, but a non-focal player in the Apple iOS ecosystem as a third-party developer (e.g. Google Voice) (Selander et al., 2013). As such, the focal actor definition resembles closely the definition of a platform leader.

There is a problem with the terminology employed by Selander et al. (2013) that stems from the fact that a “focal actor” can also refer to “the actor from whose perspective the analysis is conducted” rather than determining focality “by power or traditional measures of network centrality” (Adner, 2017, p. 56). Therefore, in this thesis I refer to complementors, in contrast to non-focal actors, although the definition of a non-focal actor itself is useful.

To summarize the complementor role, it is perhaps easier to define the role via relation to the platform leader role, while keeping in mind the essence of complementarity as a defining characteristic. Complementors are the firms that do not provide a core offering in the ecosystem, but provide products or services that add value jointly with it, i.e. complements. Their individual participation in the ecosystem is not mandatory for the ecosystem to be successful, but on the other hand as a set of actors, they are crucial for the ecosystem. Even though the survival of complementors generally may not be strictly dependent on a single ecosystem, some of the complementors may become quite dependent on specific ecosystems, as discussed later on in section 2.2.2.iii.

## 2.2 The complementor point of view

Complementors, as a set of actors are crucial to the ecosystem's value creation, and, therefore, their perspective is very relevant to understanding ecosystems. The point of view of a complementor differs from platform leaders significantly, mainly due to the fact that they are not, as single firms, crucial for the survival of the ecosystem (Selander et al., 2013). Even though they have much less power than platform leaders, they are not, in theory, dependent on any single ecosystem (Selander et al., 2013).

For complementors, platform partnerships can offer significant benefits. Platform partnership, on a general level, increases sales and the likelihood of an initial public offering (IPO) of a complementor (Ceccagnoli et al., 2012). Prior literature has identified that the main reasons for complementors to partner with platforms can be categorized to benefitting from technological resources, market resources and social resources (Dellermann, Jud, & Reck, 2017; Kude et al., 2012).

In order to maximize the benefits from a specific ecosystems, especially in the case of complex platforms, complementors specialize or align themselves with the platform (Cennamo et al., 2018; Kapoor & Agarwal, 2017). The more specialized, or experienced with the platform the complementors are, the more likely they are to reach superior performance in the ecosystem (Kapoor & Agarwal, 2017). Furthermore, the benefits offered by the platform leaders to complementors are usually linked to partnership status (Wareham et al., 2014), which most likely increase with specialization.

There are, however, risks in specializing to a specific ecosystem. What makes complementors successful in a specific ecosystem makes it more costly for them to change to another ecosystem, i.e. the superior performance configurations are platform specific (Cennamo et al., 2018) and costs of specialization or customization may not be fungible (Jacobides et al., 2018). Therefore, complementors may become dependent on their ecosystem of choice. For this reason, it is important for complementors to assess the attractiveness of different ecosystems when making the initial decision to join one.

However, even though they may be able to choose a suitable ecosystem at a certain point of time, the situation may change. Complementors face the risk of being locked-in in a losing ecosystem, which they cannot control (Selander et al., 2013). Furthermore specializing into an ecosystem is asymmetric, and the dependence of complementors on a specific ecosystem increases the risk of opportunistic behavior from platform leaders. The most important way to mitigate the risks is to multihome, i.e. participate in multiple ecosystems (Cennamo et al., 2018). Multihoming has also other benefits than reduction of dependence, most importantly the access to a wider customer base (Bresnahan et al., 2015). However, multihoming may be too costly for some complementors (Venkataraman, Ceccagnoli, & Forman, 2018).

In the following sections, I discuss the choices complementors have to make in terms of platform participation, or in other words, specialization and multihoming that are somewhat contradictory behaviors, as themes. First, I discuss the benefits that complementors aim to attain from partnerships and the factors that affect platform attractiveness. Second, I discuss the benefits and logic of specialization and the risks that it entails. Third, I discuss multihoming and its benefits and costs, and other ways for complementors to cope with the asym-

metric relationship they have with platform leaders. Fourth, and finally, I finish the complementor point of view by discussing the main drivers of change in the information systems industry, and how prior literature anticipates that the complementors react to the changes.

### **2.2.1 Benefits of platform participation**

The participation of complementors in ecosystems essentially manifests as them producing complements, i.e. products or services that add jointly value with the platform to customers (Jacobides et al., 2018). Complementarity posits that the offering of the complementors is more valuable with the platform than without the platform (Jacobides et al., 2018), therefore already implying that there is generally a benefit from complements in customer value creation.

From the point of view of the complementors, participation to ecosystems grants also direct benefits to them. Ceccagnoli et al. (2012) take the perspective of complementors, more specifically of independent software vendors that act in an environment where joining a platform is not required. They find that in the enterprise software industry, participation in platform ecosystems can provide significant benefits for complementors that join the platform ecosystem, manifested as improved sales and a higher likelihood of an IPO (Ceccagnoli et al., 2012).

The benefits the complementors can receive from platform participation can be divided into technological, commercial and social capital. These different forms of capital help explain how exactly platform participation benefits complementors, and are discussed in the following.

#### ***2.2.1.i Technological capital***

By participating in ecosystems, and partnering with platform leaders, complementors gain access to various technological capital provided by the platforms. The technological capital includes the hub's, or platform leader's, capability to provide integrated systems, and its capability to innovate system architectures (Kude et al., 2012). This technological capital provided by platform leaders is a necessary condition for platform loyalty, or willingness for complementors to invest in an ecosystem (Dellermann et al., 2017)

The platform leader's capability to provide integrated systems is important for complementors, as the complementor's solutions are limited in ability to cover customer demand (Kude et al., 2012). As the solutions of complementors only cover a fraction of the comprehensive need of the customers, they are of little value without the platform that provides the underlying architecture and the ecosystem of components and modules surrounding it (Kude et al., 2012). Furthermore, complementors rely on the platform leaders' technology-related know-how regarding the platforms, and platform partnership provides access to that know-how (Kude et al., 2012). More specifically, platforms may provide resources such as knowledge, training and tools that help to develop offerings using platform technologies and integrate the offerings with platforms (Rickmann et al., 2014). These resources enable complementors to integrate their offering more reliably and with less costs to the platform (Ceccagnoli et al., 2012).

Whereas the ability to provide integrated systems enables complementors to "exploit the potential of their own solutions to contribute to the hub's system" (Kude et al., 2012, p. 253) the platform leader's capability to innovate systems architectures is important as systemic



innovation is required for the ecosystem as a whole to remain competitive (Kude et al., 2012). Such a capability is actually an important driver for complementor decisions regarding which platforms to participate in as developers are likely to be drawn to innovative platforms that have a dominant position (Venkatraman & Lee, 2004).

### ***2.2.1.ii Commercial and social capital***

If technological capital is an important prerequisite, or a necessary condition for platform participation, it alone is not a sufficient (Dellermann et al., 2017). Commercial and social capital provided by the platform leader are two other categoric benefits that induce platform loyalty (Dellermann et al., 2017). Commercial and social capital are deemed substitutable as benefits, which means that the effect on platform loyalty may only require either one of them to be present, not both (Dellermann et al., 2017). This may be a consequence of how they both achieve a similar effect in enabling improved access to customers.

Commercial capital refers to the marketing capabilities, as well as service and distribution networks possessed by the platform leader (Dellermann et al., 2017). More generally, commercial capital helps firms to commercialize new technologies and obtain rents from them (Ahuja, 2000). As complementors are generally smaller than the platform leader, they benefit from the marketing and distribution capabilities of platform leaders that are usually global players (Kude et al., 2012). More specifically, the marketing support from platform leaders may range from acknowledging the partnership with the complementor publicly to recommending the complementor's solutions to customers (Kude et al., 2012).

Social capital refers to the information and status benefits that stem from a firm's prior relationships with other firms (Ahuja, 2000). The benefits of social capital are related to increases in legitimacy, quality and trustworthiness in the eyes of customers (Dellermann et al., 2017; Kude et al., 2012). As small and recently founded firms "often face the challenge that they are unknown in the market and that potential customers are doubtful about the quality and reliability of their products and services" (Kude et al., 2012, p. 253) they may overcome these challenges by partnering with platform leaders (Bengtsson & Johansson, 2014; Kude et al., 2012). More specifically, "positioning the brand name of a hub organization within its own marketing efforts [...] helps spoke organizations signal their trustworthiness to potential customers" (Kude et al., 2012, p. 254).

Both commercial and social capital can actually be distilled under the general benefit of customer access as they both increase the awareness of customers of the complementor solution and the credibility of the solution, both increasing customer trust in the quality of the complementor offerings (Rickmann et al., 2014). Furthermore, customer access is related to the technological capital provided by platforms, as the demand is for the comprehensive solution instead of the standalone offering of the complementors, and therefore integration of the complementor offerings to the platform is a means of customer access (Rickmann et al., 2014, p. 8).

In addition to goals, and enablers and instruments to achieve those goals, Rickmann et al. (2014) identify effects and influencers that affect the complementors intention to partner and continue the partnership. The perceived usefulness of the partnership is essentially assessed by "how well [the complementors] achieve their goals with the offered enablers and instruments" (Rickmann et al., 2014, p. 9). This perceived usefulness determines how satisfied the complementors are with the partnership, and together with trust to platform success and the

possible existence of previous connections to the ecosystem, the satisfaction will influence whether the complementor will end the partnership or expand their business within the ecosystem (Rickmann et al., 2014).

Kude et al. (2012) conducted a multiple-case study to explore the relevance and interaction between the input-oriented perspective, which posits that actors enter inter-firm arrangements to access external resources and capabilities, and the output-oriented perspective, which posits that complementariness influences benefits obtained from such arrangements. They specifically study spoke organizations and find that the hub's "reputation and its capability to provide integrated systems are generally important reasons for partnering" and that there is an interaction between the input- and output-oriented perspectives as the level of product complementarity affects how the hub's innovativeness and commercial capital motivates spokes to participate (Kude et al., 2012, p. 250). More specifically, the resources and capabilities of the hub that motivate spokes to partner up with it are: 1) ability to provide integrated systems, 2) ability to innovate systems, 3) commercial capital, 4) reputation (Kude et al., 2012). Out of these four, two are apply generally: namely 1 and 4 (Kude et al., 2012).

The effects of the other two abilities are moderated by the level of complementarity, i.e. how much the platform leaders' solutions overlap with the core business of the partner, where a high overlap leads to lower complementarity (Kude et al., 2012). When overlap is high (complementarity is low), the platform leader's commercial capital may be highly beneficial for the complementor, but at the same time there is a higher threat for the platform leader to innovate in a way that renders the complementor's solutions obsolete (Kude et al., 2012). In essence, therefore, some but not all platform leaders' capabilities and resources are beneficial for all complementors and therefore understanding complementarity and alignment is important for both platform leaders and complementors, especially in the enterprise application software industry (Kude et al., 2012)

### ***2.2.1.iii Platform attractiveness***

As noted above, ecosystem participation offers benefits to complementors. However, as there are oftentimes multiple competing ecosystems, complementors not only choose between participation and non-participation, but also in which ecosystem to participate in (e.g. Moore, 1993). The main drivers of attractiveness are platform related factors, and competition within the ecosystems (Venkatraman & Lee, 2004).

The platform related factors that affect ecosystem attractiveness are platform dominance, and platform newness (Venkatraman & Lee, 2004). Platform dominance is important as dominant platforms offer complementors a bigger market to offer their products and services to (Venkatraman & Lee, 2004). Platform newness, on the other hand is important as new platforms are likely to offer improvements of basic functionalities due to being able to take advantage of newer technologies (Venkatraman & Lee, 2004).

The most important driver for platform dominance are positive feedback effects in networks (Venkatraman & Lee, 2004). Network effects not only lead to a larger market of buyers, but also minimize uncertainty of the future viability of the platform, as network effects are prone to positive feedback effects (Katz & Shapiro, 1994), therefore increasing the probability of the sustainability of the platform in the future, i.e. dominant platforms are likely to continue to be dominant. This is important as complementors need to be convinced that platform investments will yield adequate long-term returns (Wareham et al., 2014).

Platform newness is a characteristic that offers some counterbalance to platform dominance (Venkatraman & Lee, 2004). As platforms get older, complementors are less likely to participate in them (Venkatraman & Lee, 2004). This is due to the fact that newer platforms are likely to take advantage of improvements in technology, therefore offering significant improvements in the core platform (Venkatraman & Lee, 2004). Dominant platforms may have difficulty to incorporate new features due to a phenomenon called “innovators dilemma” (Gawer & Cusumano, 2014). The same dominance that grants platform leaders advantage may tie it to the models it is successful in leading to the innovator’s dilemma (Gawer & Cusumano, 2014) therefore being at risk to be displaced by superior new platforms (Eisenmann et al., 2011) that make better use of improvements in technology (Venkatraman & Lee, 2004).

Platform dominance is not only somewhat contradictory with platform newness, but also with the attractiveness of ecosystems that stems from a lower level of competition within the ecosystem. As network effects, and therefore an increasing number of not only buyers but also complementors drive platform dominance, dominance is most likely correlated with higher levels of competition between the complementors. In other words, growth in the number of complementors is not always beneficial as “excess supply of variable quality and overcrowding in complementor markets[,] negatively impact[s] partner profits” (Wareham et al., 2014, p. 1210). Whereas generativity, or increase in complements is helpful as it increases platform value, excessive supply of competing complements, or plurality is problematic, as it may lead to downward price pressure reducing profitability or even leading to losses to complementors (Wareham et al., 2014). Therefore, “a sustainable value proposition is not only relevant for customers but also for complementors who self-select into business niches based on potential returns” (Wareham et al., 2014, p. 1210).

As the different drivers of attractiveness are somewhat contradictory, it is important to assess the importance of the different drivers. According to Venkatraman and Lee (2004, p. 885) “the impact of platform dominance on developers’ platform choice was much stronger than the impact of competition within a platform”. Unfortunately, Venkatraman and Lee (2004) do not explicate the relative importance of newness to dominance. They do, however, that “developers are drawn to newer platforms, all other things being equal” (Venkatraman & Lee, 2004, p. 888) which may imply that it is somewhat a secondary attribute to dominance. On the other hand, the attractiveness of newness is an important counterbalance to dominance, and explains that even dominant platforms may lose their attractiveness as “their functionality declines relative to that of newer platforms” (Venkatraman & Lee, 2004, p. 879).

To conclude, ecosystem attractiveness to complementors is fundamentally driven by platform dominance and newness, but also by the competitive environment within the ecosystem, i.e. crowding of complements. As dominance is somewhat contradictory with the other drivers of attractiveness, and dominance seems to be the most important driver, it seems that complementors are less worried about the within ecosystem competition than the ecosystem-to-ecosystem competition, at least when considering which ecosystems to participate in. It is however noteworthy, that participating in a dominant platform implies tougher competition, and that dominance is not permanent.

### **2.2.2 Specialization**

As the benefits of platform participation and drivers for platform attractiveness have been discussed, I now turn to how complementors contribute to and succeed within the different ecosystems. The basic idea of complementarity has already been discussed earlier, and the very concept of a complementor relies on the fact that the offering of a complementor is more valuable due to the existence of the platform, and that the platform is more valuable due to the offerings of complementors (Nalebuff & Brandenburger, 1997). However, the complementarity alone is not enough, as it is the alignment of complements that underpins the concept ecosystems (Adner, 2017; Jacobides et al., 2018). In order for the ecosystem value proposition to materialize, the complementary offerings must be aligned (Adner, 2017). Therefore, from the perspective of complementors, in order to create value in ecosystems, they must ensure that their offerings are aligned with the platform (Kude et al., 2012).

The concept of specialization in contrast to cospecialization, as discussed in section 2.1.1.ii, explains that in contrast to both the platform being customized to complements and vice versa, complementors mostly, if not only, are responsible of the customization. Specialization is important as it enables complementors to succeed in the competition amongst the different complementors (Kapoor & Agarwal, 2017), but it is also required in order to reap maximum benefits from platform participation (Wareham et al., 2014).

Specialization does however come at a cost. More specifically that cost is increasing lock-in to a specific ecosystem. This is due to the fact that investments to specialization are not fully fungible or redeployable to other ecosystems (Jacobides et al., 2018). Successful alignment to platforms is platform specific, as is platform experience, both of which constitute to complementor performance (Kapoor & Agarwal, 2017). Furthermore, the achievements that translate to benefits relate to the specific ecosystem, as they are measured via e.g. platform certifications and sales brought to the platform (Wareham et al., 2014).

In the following sections, I first introduce the concept of specialization and how it applies to complementors. Second, I discuss why specialization is both required from the complementors, and why it is useful for them. Third, and finally, I discuss how specialization may lead to unfavorable dependency, and what risks follow from that dependency.

#### ***2.2.2.i Specialization***

Cennamo et al. (2018, p. 3) note that “the more a complement design is tailored to the specific workings of a platform technology and its interfaces, the more the complement becomes specialized to that platform” and define the degree of such specialization complement cospecialization. They note that complementors need to tailor their offerings “to a platform’s core technological functions and interface specifications to take full advantage of its performance” (Cennamo et al., 2018, p. 1).

In order to generate value for the customers, it is more or less necessary for the complementors to ensure that their offering is aligned with the platform (Kude et al., 2012). Two different drivers increase the need to specialize. First, each complementor must deal with competition amongst complementors (Teece, 2018), which is amplified in dominant platforms, i.e. attractive platforms, as they may be crowded with complementors, as noted earlier. If complementors align themselves successfully with respect to the ecosystem, they may reach superior performance configurations (Kapoor & Agarwal, 2017). Second, in order to grant complementors access to the benefits of the platform partnership, as discussed earlier, platform

leaders require ecosystem specific investments and achievements from the complementor (Kude et al., 2012). These investments and achievements induce both alignment with and lock-in to the ecosystem.

### ***2.2.2.ii Benefits of specialization***

Kapoor & Agarwal (2017) study the performance of app developers in the two dominant smartphone ecosystems, Apple iOS and Google Android (Kapoor & Agarwal, 2017). Their idea of superior performance configuration is very much related to specialization. Superior performance configuration stems and consists of “choices that complementors may make regarding their products, tasks, or organization with respect to the ecosystem” (Kapoor & Agarwal, 2017, p. 533).

They specifically explore “how ecosystem-level interdependencies affect the extent to which complementors can sustain their value creation in an ecosystem” (Kapoor & Agarwal, 2017, p. 547). According to them, the interdependencies are rooted in both structural and evolutionary features of the ecosystem (Kapoor & Agarwal, 2017). Structural features are related to technological interdependencies between complementor products and other ecosystem components, and in their study they incorporate these features as the complexity faced by the complementor (Kapoor & Agarwal, 2017). They take into account the evolutionary features via platform technology transitions and experience that accumulates to complementors in ecosystem over time. They specifically note that the experience-based advantages that they refer to are for a specific platform-based ecosystem (Kapoor & Agarwal, 2017, p. 549)

Their findings indicate that both complexity and ecosystem experience help firms sustain their superior performance, and that the positive impact of complexity is greater for firms with more ecosystem-specific experience (Kapoor & Agarwal, 2017). This essentially, as complexity represents level of interdependence, and as experience is platform-specific, indicates, that within platforms firms that are deeply aligned and experienced with the specific platform are expected to be better off in the intra-platform complementor competition also in the future (Kapoor & Agarwal, 2017). As they measure superior performance by whether the apps are in the top 500 apps by revenue in either of the ecosystems (Kapoor & Agarwal, 2017) the superior performance is related mainly to the competition between complementors.

The benefits of platform partnership have already been discussed in 2.2.1, but it is important to note that even though the categories of benefits may exist on some level for also lower levels of partnership status, they increase in the effect as partnership status increases (Wareham et al., 2014). That status may be measured via achievements within the ecosystem and certifications, but fundamentally higher status partners also create more value to the platform (Wareham et al., 2014). This value created is not only in revenues to the platform, but also in ways such as expanding the core offering or specialist competencies of the complementors (Wareham et al., 2014).

As partner status increases, the benefits increase. When it comes to technological capital afforded to the complementors, it may be limited to community technological support, or general development tools, but on the higher levels it may include priority real-time technical support (Wareham et al., 2014). The commercial or social capital at a minimum may be limited to general marketing and sales tools or access to the network, whereas, on the highest

levels of partnership status, it may manifest in higher levels of cobranding and dedicated account managers from the platform leader side (Wareham et al., 2014).

All in all, specialization is required to some degree, as complementors must customize their offering to be compatible with the platform. However, a higher degree of specialization or alignment with the ecosystem can also increase the benefits that complementors reap from the ecosystem. Those benefits can relate to direct benefits afforded by the platform leader, but they also relate to the ability of the complementor to be successful in the within-ecosystem competition against other complementors. If complementors align themselves successfully, they can reach superior performance configurations that are sustainable due to experience benefits.

### ***2.2.2.iii Costs of specialization***

Superior performance configurations, or alignment “may play a significant role in the complementors’ ability to appropriate value over time” (Kapoor & Agarwal, 2017, p. 547) but such superior performance is in comparison to other similar complementors within the same ecosystem, which represent only one competitive dimension in ecosystems (Teece, 2018). The other two dimensions, namely competition across ecosystems, and competition within the ecosystem between the platform leader and the complementor (Teece, 2018) may actually become more problematic due to specialization. The problems stem from lock-in, which is a consequence of specialization (Teece, 2007), and dependency, which stems from both lock-in, and the asymmetric nature of specialization (Jacobides et al., 2018).

Lock-in stems from fungibility of investments in assets and relationships that firms need to make in order to operate in ecosystems (Jacobides et al., 2018). The fungibility of those assets and relationships is a measure of how easy it is to re-tool or re-customize, i.e. the cost to redeploy them in other settings (Jacobides et al., 2018). The more complementors invest into alignment to one ecosystem, the more they have to lose if they wish to switch to another (Kude et al., 2012).

Jacobides et al. (2018) list different origins for costs for such redeployment: cost from product/offering adjustments that require new investments, adjustments to the transaction rules of the ecosystem and membership, and coordination costs with other ecosystem participants. In essence what makes complementors successful in a specific ecosystem, i.e. superior performance configuration, also locks it in the specific ecosystem (Jacobides et al., 2018).

Lock-in is problematic, as the main driver of ecosystem attractiveness, i.e. dominance is not permanent, as noted earlier. Therefore a complementor that is deeply specialized into one ecosystem “risks becoming a witness of how an ecosystem, which it cannot control, loses its momentum” (Selander et al., 2013, p. 194). In addition to new platforms gaining ground, as they may leverage new technologies better, as discussed earlier, dominant platforms may also lose their position in the form of platform envelopment, where an adjacent, or even a somewhat unrelated platform manages to leverage its existing user base to attack another platform’s market (Eisenmann et al., 2011).

Furthermore, as the specialization in the case of platforms and complementors, is mainly one-way, i.e. it is actually most often specialization of complementors to the ecosystems of platform leaders and the relationship is asymmetric in a way where each complementor is

dependent on the platform leader, but not vice versa. This dependence is risky for complementors, as platform leaders may leverage their position opportunistically, and the value distribution may be tilted in the favor of the platform leaders at the expense of complementors (Jacobides et al., 2018).

As the fungibility, or dependence, is a powerful way to affect the behavior of actors, platform leaders have an incentive to increase the dependence of complementors. Therefore, “powerful firms (especially hubs, or hub contenders) craft rules and shape the process of ecosystem to tie in complements and make complementors abide to them” (Jacobides et al., 2018, p. 9) with an aim to “lock them in with non-fungible investments” (Jacobides et al., 2018, p. 9).

More specifically, platform leaders encourage higher levels of dependence by relating the benefits from the partnership to a certain set of requirements from the complementors (Wareham et al., 2014). The requirements may manifest in a need for complementors to demonstrate various achievements related to the ecosystem, or the need to submit “greater levels of control over their processes and outputs” (Wareham et al., 2014, p. 1204). For the lowest levels of partnership status, there may be no other requirements than some sort of registration (Wareham et al., 2014). For the highest levels of partnership status, complementors need to show verified, i.e. controlled, achievements in e.g. certifications of personnel, documented industry-level implementations of solutions, customer satisfaction, or volume of sales generated for the platform leader (Wareham et al., 2014). In terms of fungibility of these achievements, it is obvious that the achievements are ecosystem specific, and therefore not fungible to other ecosystems. Therefore, as benefits from a certain ecosystem increase with achievements within that ecosystem, they also tie complementors to the platform.

In addition to the risk of being locked-in in a losing ecosystem, complementors also face the risk of platform leaders acting opportunistically and capitalizing on its power that stems from complementor dependence (Kude et al., 2012). Even though platform leaders’ motivations may not be merely opportunistic, as increasing dependence via less fungibility can promote the alignment of interest of complementors in seeing the common ecosystem succeed (Jacobides et al., 2018), the threat of opportunistic behavior of platform leaders increases if complementors are more tightly tied to the ecosystem (Kude et al., 2012). If the complementors are locked in, platform leaders do not have to worry as much about recruitment of complementors. Recruitment of most and best complementors is otherwise a controlling element of opportunism due to platform to platform competition (Teece, 2018), as discussed in section 2.1.2.i.

One of the most fatal manifestations of opportunistic behavior of platform leaders from the complementor point of view is if the platform leader utilizes its dominant position to absorb critical knowledge from the complementor, and imitate the functionality of the complementor, thus jeopardizing the survival of the complementor (Kude et al., 2012). Furthermore, as the power imbalance increases, the platform leader may share less and less resources with the complementor, thus decreasing the benefits of the participation to the complementor (Kude et al., 2012), or demand a price for granting access to the platform (Huang, Ceccagnoli, Forman, & Wu, 2013).

All in all, fungibility of investments into specialization is a major driver for lock-in that may be risky for complementors in ecosystems. In essence “[t]he degree to which a participant’s effort is tied to one ecosystem, and cannot be recouped in any other setting, determines the

economic basis of their attachment to that ecosystem” (Jacobides et al., 2018, p. 11). The risks stem from the difficulty to utilize experience from and investments made into an ecosystem to other ecosystems should the ecosystem lose its momentum, and from the threat of opportunistic behavior from the platform leader.

### **2.2.3 Coping with asymmetric power**

In this section, I discuss tactics and factors that reduce complementor dependence on individual ecosystems on one hand and help them to mitigate the threat of opportunistic behavior of platform leaders on the other hand. Multihoming is the most important tactic or strategy discussed in prior literature, and it has also a benefit of broadening the addressable market of complementors apart from reducing dependence on specific platforms.

#### ***2.2.3.i Multihoming of complementors***

As platform attractiveness seems to be non-permanent, and as experience in an ecosystem is deemed beneficial in competition within ecosystems, complementors may benefit from participating in multiple ecosystems simultaneously. Such behavior is called multihoming, which is deemed generally beneficial for complementors (Cennamo et al., 2018; Selander et al., 2013). Multihoming is beneficial for complementors as it enables complementors to tackle a larger market (Cennamo et al., 2018). Furthermore, complementors may multihome in order to mitigate risks related to specific ecosystems in terms of the success of the ecosystem (Hagel, Brown, Davison, & Bartlett, 2008; Selander et al., 2013) and the risks of opportunistic behavior of the platform leader (Dellermann et al., 2017). Even though many studies of multihoming have assumed multihoming costs to be negligible, the need to specialize to each ecosystem makes multihoming quite costly, especially if the platforms are complex (Cennamo et al., 2018).

The most widely discussed benefit of multihoming, according to Cennamo et al. (2018), is the benefit of increased market size. The logic is simple: if the costs to multihome are small enough compared to the expected demand for the complement on more than one platform, a complementor is expected to multihome in order to reach as many customers as possible (Bresnahan et al., 2015; Cennamo et al., 2018).

Another major benefit of multihoming is that it allows for the complementor to spread its risks across several ecosystems (Hagel et al., 2008). This sort of pluralistic or balancing approach allows the complementor to avoid a situation where the ecosystem the complementor participates in loses momentum, which is important as individual complementors may have little influence on the success of the ecosystem (Selander et al., 2013). The risk balancing approach enabled by multihoming may be especially useful if a dominant platform has not yet emerged (Hagel et al., 2008), and since dominance of a platform is not permanent, as noted earlier, it may be helpful to consider multihoming even if the ecosystem in which the complementor participates is dominant at present.

Multihoming can also be caused by the threat of opportunistic behavior of platform leaders (Dellermann et al., 2017). According to Dellermann et al. (2017), the uncertainty of platform leader behavior may even be more crucial for the decision to multihome than uncertainty related to market conditions or technology. Their finding implicates that the need to spread the risk across ecosystems due to the possible loss of momentum of a single ecosystem is lower than the need to spread risks due to the threat of opportunistic behavior (Dellermann



et al., 2017). On the other hand, they find that the risks related to ecosystems can be overcome with a suitable level of benefits provided, as discussed earlier, by the platform leader, and therefore, their findings “support a notion of [complementor] loyalty to be driven by opportunity-seeking rather than risk-avoiding motives” (Dellermann et al., 2017, p. 525). This would imply that with a suitable set of rules regarding benefits, platform leaders should be able to prevent multihoming.

Multihoming costs refer to the costs of developers to associate with more than one platform (Armstrong & Wright, 2007; Tiwana, Konsynski, & Bush, 2010). According to Tiwana et al. (2010, p. 681) “homing costs represent the aggregate of adoption, operating, and opportunity costs incurred by a developer to maintain affiliation with a platform”. The costs are not limited to each platform individually, but include also a coordination cost (Venkataraman et al., 2018). The coordination cost stems from the fact that focusing on one platform enables a clear strategic focus (Hagel et al., 2008), and requires less diversity in terms of human capital, and therefore comes with lower coordination costs (Venkataraman et al., 2018).

The costs of multihoming relate to each platform individually, as complementors need to specialize to each platform to some degree, as noted earlier. The degree of specialization required, in addition to factors discussed above, depends also on the complexity of the platform (Cennamo et al., 2018). Cennamo et al. (2018, p. 4) define platform complexity “as the number of interdependent components of the platform’s core technology interacting with the platform’s complements through specialized interfaces”. They note that *ceteris paribus*, multihoming will be easier on less complex platforms, and that complex platforms require more investments and customization to improve the fit to the platform (Cennamo et al., 2018). Complexity of a platform requires greater cospecialization, and simpler platform architectures “increase fungibility of the complements across competing platforms” (Cennamo et al., 2018, p. 14).

Furthermore, in the case of complex platforms, an expectation of benefiting from being able to distribute development costs across platforms does not hold (Cennamo et al., 2018). On the contrary, adoption costs to new platforms remain high and the quality a multihoming complement is actually lower than one that is specialized to a specific platform (Cennamo et al., 2018). The findings of Cennamo et al. (2018) are, therefore, consistent with the idea of superior performance configurations and experience benefits, and their platform-specific nature and limited fungibility (Kapoor & Agarwal, 2017).

The ability to multihome is not only related to platform characteristics, such as complexity and platform specific experience required, but also to the capabilities and task structure of complementors (Venkataraman et al., 2018). The capabilities required to multihome relate to human capital, and come with higher coordination costs (Venkataraman et al., 2018).

Venkataraman et al. (2018) argue that multihoming requires a diversity of human capital as specialized firms “lack the abilities to grasp all elements of the new platform, namely technology, functionality and industry context and embed these elements in their organizational routine required to multihome” (Venkataraman et al., 2018, p. 31). They conclude that “there is a tradeoff between specializing in one form of human capital, thereby keeping coordination costs low, and strategically investing in multiple forms of human capital to enable multihoming” (Venkataraman et al., 2018, p. 31).

According to them, this gives a rise to a division of firms to generalist and specialist complementors, where generalists are more fit to multihome (Venkataraman et al., 2018). They define specialists as firms “being above the 75<sup>th</sup> percentile on any one form of human capital” (Venkataraman et al., 2018, p. 25), namely technological, functional and industry, i.e. firms that are more focused on one form of human capital than others.

Importantly, whereas they find that having high skills in any one form of human capital leads to less likelihood of multihoming, they also find that the interaction of the human capitals leads to a positive effect on multihoming (Venkataraman et al., 2018), therefore implying that having a skilled pool of employees with heterogeneous capabilities may enable and increase the likelihood of multihoming.

The tradeoff between the benefit of low coordination costs of specializing and investments required to multihome, according to Venkataraman et al. (2018), leads to different mixes of human capital, which forces complementors to choose early on whether they want to specialize or not. As firms adapt to the environment it chooses, there are path dependencies that stem from the fact that the “very decisions that helped a complementor to adapt to its initial environment makes it harder for it to respond to changes in the environment” (Venkataraman et al., 2018, p. 14). Venkataraman et al. (2018, p. 1), notably, define multihoming as “a strategy in which a complementor firm chooses to join multiple platforms rather than one”, explicating that the decision is strategic instead of tactical.

### ***2.2.3.ii Additional factors and tactics that mitigate asymmetric dependence***

Even though multihoming has been related to avoiding the threat of opportunism by platform leader (Dellermann et al., 2017), the exact mechanism how it mitigates opportunism has not been identified. There are, however, some other tactics and factors that may help complementors mitigate the risks of opportunistic platform leader behavior. The issue is not only important for complementors, but for platform leaders too, as the risk of opportunistic behavior affects platform loyalty, which on the aggregate level of complementors is vital to platform success (Dellermann et al., 2017)

In order to mitigate the risks of opportunistic behavior from platform leaders, complementors can benefit from intellectual property rights (IPR) and downstream capabilities (Huang et al., 2013). Complementors with a greater stock of IPR and with stronger downstream capabilities are more likely to join a platform as they can secure returns from their innovations (Huang et al., 2013). Even though Huang et al. (2013) do not explicate how exactly do downstream capabilities aid complementors in appropriation, except for noting the difficulty for platform leader to imitate them, they give examples of downstream capabilities, namely trademarks and consulting services (Huang et al., 2013).

IPRs and/or downstream marketing or service capabilities in independent software vendors facilitate their value appropriation and thus indirectly increase value creation and the success of the platform as a whole (Ceccagnoli et al., 2012). The success stems from the virtuous circle that may be realized as the returns of innovative partners will draw in more partners, who will draw in more customers, etc. (Ceccagnoli et al., 2012)

Even though not focused on complementors, Edelman’s (2014) advise to suppliers in ways they can reduce dependence on platforms and the proposed 4 main solutions may be helpful to complementors. 1) “Exploit the need for completeness” (Edelman, 2014, p. 89) refers to

the fact that platforms need suppliers, and either by directly becoming important, and therefore gaining negotiation leverage, or indirectly via the fact that suppliers are needed for completeness of service, the negotiating power of platforms can be reduced (Edelman, 2014). 2) “Discredit discrimination” (Edelman, 2014, p. 89) refers to identifying possible cases of discrimination by platform leaders and getting customers on board to induce public outcry and regulatory complaints that can provide protection from “intermediaries’ favoring their own services” (Edelman, 2014, p. 90). 3) “Create an alternative” (Edelman, 2014, p. 89) refers to the fact that competition among platforms improves suppliers’ position in relation to platform leaders and suggests that suppliers may collaborate and try to create alternatives to the platform (Edelman, 2014). The interesting point here is that the idea of increased competition in platforms connects well to the idea of increased mobility, but unfortunately Edelman (2014) does not probe further into the theme and discuss the effect of switching to or multihoming at other platforms. 4) “Deal more directly” (Edelman, 2014, p. 89) refers to suppliers selling directly to the customers, without using the platform (Edelman, 2014), which for the case of complementors does not unfortunately apply, as the whole point is that the offering is more valuable when both the complement and platform are used together as a system.

All in all, the fact that suppliers and complementors have different characteristics make Edelman’s (2014) advice less transferable to complementor strategies. Still the solutions may give some insight to complementors. Especially the 3<sup>rd</sup> solution modified to increasing platform-to-platform competition actually provides a mechanism through which multihoming may enable complementors to – at least indirectly – counteract the platform leaders efforts to reduce mobility in their own segment, i.e. their efforts to increase the bottleneck nature of the platform.

Complementors can also engage in Open Source activities, i.e. offer Open Source based products and services. Many of the motivations for firms to engage in Open Source activities are a direct counter-reaction to the problems that are the result of the power of large software companies, i.e. platform leaders (Bonaccorsi & Rossi, 2006). These motivations include “being independent of the price and license policies of the large software companies” (Bonaccorsi & Rossi, 2006, p. 48) and “thinking that software should not be a proprietary good (in order to reduce market power of the large software companies)” (Bonaccorsi & Rossi, 2006, p. 48). Some other motivations, such as being able to hire good IT specialists, not only stem from a threat of powerful platform leaders but also relate to benefits of independence (Bonaccorsi & Rossi, 2006). As talented developers are critical to many software firms, attracting them is very important (Baskerville, Levine, Pries-Heje, & Slaughter, 2001).

Developers not only attach importance to being free from the power of large software companies, but also to learning, and on social factors, such as “living to code” or the fun to program that can be attained via Open Source projects (Bonaccorsi & Rossi, 2006). In motivational theory embedded research, also extrinsic, in contrast to only intrinsic, motivational factors for developers include learning, reputation and career advancement (Battistella & Nonino, 2012), which are attached to Open Source activities, but can also be interpreted as more general motivations of developers.

## **2.2.4 Change, the future and implications for complementors**

In this section, some aspects that may affect the future of complementors are discussed. First, the way prior alignment or specialization affects reacting to change is discussed. Second, aspects relevant for complementors in the software, or information systems industry are presented, focusing on how the complementors need to adapt to the development in the industry.

### ***2.2.4.i Effects of specialization to adapting to change***

In addition to introducing the concept of superior performance configurations, Kapoor & Agarwal (2017) discuss the complementors ability to react to change. The change they include in their empirical models is platform technology transition, which according to them may “render[] strategic configurations of the high performing complementors from the previous platform generation less effective” (Kapoor & Agarwal, 2017, p. 535). According to Kapoor & Agarwal (2017) these platform transitions are a way for platform leaders to compete and create value by improving functionalities and adding new ones. They find that platform transitions increase the likelihood of a previously superiorly performing complementor exiting that stratum by as much as 44% (Kapoor & Agarwal, 2017). Furthermore, they find that platform complexity increases the difficulty to maintain superior performance (Kapoor & Agarwal, 2017). They hypothesize that this is due to higher complexity of platform leading to transitions to require a greater degree of change (Kapoor & Agarwal, 2017). They also note that in lower complexity platforms, those complementors with superior performance configurations before the transition are more likely to preserve their superior performance after the transition as they “find it relatively easier to identify and to move to a high performance configuration in the new platform generation” (Kapoor & Agarwal, 2017, p. 536).

The meaning of platform transition is interesting, as it is more radical than mere continuous technological development, even if rapid. However obvious, it is still good to note that “[i]n environments of rapid change, there is a need for continuous or at least semi-continuous realignment” (Teece, 2007, p. 1337). Perhaps such continuous realignment can be compared to transitions in low complexity, as the degree of change in low complexity transitions is lower in contrast to the “long jump” required in platform transitions of complex ecosystems (Kapoor & Agarwal, 2017). In low complexity transitions, those firms that are already well aligned, or specialized to the platforms, have an advantage (Kapoor & Agarwal, 2017) in the intra-platform competition between the complementors.

Schmidt & Brown (2015, p. 499) study “the world’s largest enterprise vendor SAP and its strategic network” to fulfill a gap in empirical research of studying “long-term rigidities of cospecialization processes in interorganizational arrangements” (Schmidt & Braun, 2015, p. 490). They find that cospecialization has long-term effects for the participating organizations as specific cospecialized assets dominate and shape the competence and rationality of the organization (Schmidt & Braun, 2015, p. 507). This is due to the positive feedback of asset complementarity that leads to increasing cospecialization, and, therefore, interorganizational path dependence and rigidity (Schmidt & Braun, 2015).

Levinthal (1997) provides a notion for understanding how complementors can explore and exploit new opportunities. According to him: “Tightly coupled organizations can not engage in exploration without foregoing the benefits of exploitation. For a tightly coupled organiza-

tion, efforts at search and experimentation tend to negate the advantages and wisdom associated with established policies and thereby place the organization at risk of failure. In contrast, more loosely coupled organizations can exploit the fruits of the past wisdom while exploiting alternative bases of future viability” (Levinthal, 1997, p. 949).

#### *2.2.4.ii Change in the software industry*

Schütz et al. (2013) study on the SaaS (Software as a Service) revolution and its impacts on existing on-premise vendors sheds light on the effects of a transitional, or radical, change in the software industry. Based on their empirical analysis, they provide insight on impacts on partner profiles, relationships, and ecosystems (Schütz et al., 2013). First, they find that due to shift towards SaaS, the partner models, formerly dominated by value added resellers (VARs), i.e. firms that extend direct sales channels of platforms, will shift to new players (Schütz et al., 2013). Namely, successful players in the SaaS model will be: independent software vendors (ISVs) that sell complementary products, original equipment manufacturers (OEMs) that embed keystone, or platform leader, products, and business process outsourcers (BPOs) that are service providers that take responsibility of business processes such as payroll (Schütz et al., 2013). This is due to the fact that mere reselling is not enough, and partners need to create value and fill in segments that platforms do not wish to address themselves (Schütz et al., 2013). Furthermore, they suggest that “the most important assets are market access and expertise in the specific domain – other than cloud” as “customers do not buy cloud solutions, but a solution addressing a certain area – e.g. sales” (Schütz et al., 2013, p. 136).

Regarding relationships, Schütz et al. (2013) suggest that system integrator business as project-based business may no longer meet the needs of customers. Instead, customers increasingly look for continued relationships and not having to carry the risks of implementation themselves (Schütz et al., 2013). When it comes to changes in the ecosystems, Schütz et al. (2013) suggest that competition between complementors is not expected to be fierce within ecosystems in short term due to the newness of the models and yet unoccupied niches, as firms have not yet adapted to the new model. In the long term, they expect differentiation to increase due to increased competition (Schütz et al., 2013). More importantly, they expect that differentiation will occur on the service level and in company branding instead of product features, i.e. firms that gain experience and develop add-ons and industry-specific customizations will prosper and be protected from competition due to differentiation (Schütz et al., 2013). Furthermore, they suggest that generalist strategies within ecosystems will struggle as they fail to differentiate (Schütz et al., 2013).

When it comes to platform leader to complementor competition, Schütz et al. (2013) find it likely that the power imbalance will increase as more responsibilities will be taken over by platform leaders regarding software e.g. in hosting and maintenance. However, they do not believe this to be a threat to complementors, especially those that focus on certain niches, as platform leaders will probably not be interested in competing with them (Schütz et al., 2013). As they quote one of their informants: “[i]f a partner creates a niche solution, we are receiving 30% for no effort. If we do it ourselves, we are receiving 70% for 100% effort. This is a simple business calculation.” (Schütz et al., 2013, p. 137).

Not only are platform leaders unlikely to enter the competition with complementors in some niches, they are also unlikely to be able to cover all customer needs with their platforms. According to Schmidt & Braun (2015) SAP aimed to create a web-based software for SME

customers that would be purchased and implemented by the customers themselves, but was unsuccessful, as “in contrast to the plan of simple customer self-service, the software is delivered in processes that still demand consulting and customizing services by consultants” (Schmidt & Braun, 2015, p. 499).

The position in serving customers in consulting activities or other downstream services is fairly sheltered, as not only is it economically attractive for platform leaders to let complementors take care of them, as noted above, but it may also be difficult for platform leaders to take over. This difficulty stems from the knowledge needed being embedded in business practices, and therefore it is difficult to codify (Ceccagnoli et al., 2012).

From a more general perspective, the capabilities required from information systems professionals and critical information system activities are changing (D. Lee, Trauth, & Farwell, 1995). Lee et al. (1995) identify changing technologies, changing business environment, and changing role of information systems as three key drivers for changes in the role of information systems. In their study, they find that the portfolio of critical information system activities are changing in 3 main ways: 1) the importance of information system activities in organizations is growing, 2) the priority of application development and support is decreasing, and 3) the priorities to align information systems with business problems and integration are increasing (D. Lee et al., 1995). More specifically, first, they suggest that the increasing importance of information system activities will lead to increase of attention paid and emphasis given by organizations to information systems (D. Lee et al., 1995). Second, they note that supporting existing applications and developing new applications in-house are becoming less important (D. Lee et al., 1995). They note that this is related to technological development that leads to packaged software for an increasing variety of business applications becoming available, and reduces the need for development of such centralized business systems and operational support for those systems from information systems staff within companies (D. Lee et al., 1995). Finally, third, the most important priority, according to information system managers and consultants, will be aligning information systems with business goals (D. Lee et al., 1995). Therefore, the most important activity of information systems in the future will be analyzing business problems and information systems solutions (D. Lee et al., 1995). This means that not only do information systems professionals play an important role due to their technological skills, but also due to the customer firms’ needs to link different business applications together (D. Lee et al., 1995).

In their study, Lee et al. (1995) also find that the critical knowledge and skills of information systems professionals are changing. According to them, the most important skills will be in “selected areas of emerging technologies, together with a much broader set of knowledge/skill requirements” (D. Lee et al., 1995, p. 329). This broader set of skills and knowledge includes business functional knowledge, interpersonal/management skills, and knowledge of technology management (D. Lee et al., 1995).

Interestingly, when comparing the skills and knowledge to the changes in critical activities, they notice two different patterns of knowledge and skill requirements (D. Lee et al., 1995). On one hand, the activities centering around effective application of information systems to meet business needs requires “in-depth knowledge of business as well as excellent interpersonal skills” (D. Lee et al., 1995, p. 331). On the other hand, for the activities centering around “the integration of the organization’s technological infrastructure” they find that

“technical competence is an absolute necessity” (D. Lee et al., 1995, p. 331), therefore implying that technical competence is more important for these activities than for applying information systems to business needs. Ultimately, they note that both activities require “good technology management knowledge to effectively link technology with business and user needs” (D. Lee et al., 1995, p. 332), therefore highlighting the importance of business and user understanding to technology management. Even though Lee et al. (1995) relate these different patterns of applying information systems to business needs and integration of the technological infrastructure to different career tracks, it may be that the patterns are applicable to service providers on a firm level, as directions of specialization of the firms.

More generally the importance of combining business understanding to understanding in the software domain responds to the rethinking of IT strategy from one that is subordinate to business strategy “to one that reflects a fusion between IT strategy and business strategy” (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013, p. 471). There is also empirical support for the importance of business understanding in the software industry, namely as the results of Venkataraman et al. (2018, p. 27) “emphasize the importance of business processes and the industry to ERP systems in addition to technical knowledge”.

### 3. Methodology

In this chapter, the methodology employed for the empirical research of this thesis is presented. First, motivation and reasoning for the research design is provided together with a description of the research process. Then sampling, data collection, and analysis are elaborated on. Finally, the quality of the research is discussed by elaborating on possible problems of the approach and how those problems are tackled in the research.

#### 3.1 Research design and process

Even though proliferate, the ecosystem research field is still nascent in theory, meaning that there is limited theory and evidence (Hannah & Eisenhardt, 2017) especially about firms that are not platform leaders (Kapoor & Agarwal, 2017; Nambisan & Baron, 2013; Rickmann et al., 2014). Therefore, there is still much work to do in theory building. Furthermore, even though some notable articles discuss the capabilities that affect complementor abilities to succeed in ecosystems (Ceccagnoli et al., 2012; Huang et al., 2013), and hypothesize entrepreneurial capabilities that affect the decision-making process of the complementors (Nambisan & Baron, 2013) very few have explored how complementors act in ecosystems and why do they act so. The notable exception of Rickmann et al. (2014) merely focus on the decision on expanding on a platform, and as a singular exploratory paper, it has not been tested.

In order to build theory, an inductive approach has been chosen. Eisenhardt et al. (2016, p. 1113) define inductive methods as “those approaches through which researchers attempt to generate theory from data”. In contrast to deductive methods, where the research begins with hypotheses and tests those hypotheses with data, inductive research emphasizes the emergence of theory from the data itself (Eisenhardt, Kathleen; Graebner, Melissa; Sonenshein, 2016).

Another option for this research would have been to set out to test the propositions of Rickmann et al. (2014). Should such an approach have been chosen, the logical way would have been to modify the propositions into hypotheses and test them with a suitable set of data – an approach for which they call for in their article (Rickmann et al., 2014). Such an approach would have been deductive, which is a mirror to inductive research (Eisenhardt & Graebner, 2007). However, as their research is pioneering and ultimately influenced by the subjective view of the researchers – a fact noted by themselves (Rickmann et al., 2014), there is still room for alternative theories and propositions. Furthermore, there is no empirical support for their theory, therefore justifying further theory building (Eisenhardt & Graebner, 2007).

In addition to the need to build theory in the topic, the topic is also a very contemporary, and embedded in a real life non-controllable context, therefore promoting employment of case-study research (Yin, 2006). According to Yin (2006, p. 3) “case stud[ies] allow[] an investigation to retain the holistic and meaningful characteristics of real-life events”. Yin defines a case study as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (Yin, 2006, p. 13). As the topic of this thesis is evidently contemporary, and as the aim to understand complementor actions is inherently contextual, incorporating logics of case studies is certainly warranted.



The approach, as motivated above, of this thesis is therefore to build theory with the use of cases. Such an approach has been identified as one of the most prominent approaches to inductive research (Eisenhardt, Kathleen; Graebner, Melissa; Sonenshein, 2016). It can be described as an approach that “blends case study and grounded theory logics” (Eisenhardt, Kathleen; Graebner, Melissa; Sonenshein, 2016, p. 1114).

The grounded theory logic essentially means that the method relies on a “grounded theory-building process” (Eisenhardt, Kathleen; Graebner, Melissa; Sonenshein, 2016, p. 1114). The fundamental characteristics of the process are: 1) gathering raw data iteratively, 2) coding raw data into first-order concepts, 3) raising those concepts to higher levels of abstraction, such as second-order themes, 3) creating creative insights by constantly comparing data and the emergent theory, and 4) comparing prior literature to sharpen the themes and the relationships between them (Eisenhardt, Kathleen; Graebner, Melissa; Sonenshein, 2016).

As inductive research has attracted critique especially in rigorness and systematicness (Gioia, Corley, & Hamilton, 2013), I followed a systematic approach to build theory from the data. The approach combines advice from methodological articles of Gioia et al. (2013), Eisenhardt (1989), Yin (2006), Eisenhardt and Graebner (2007) and Eisenhardt et al. (2016).

The systematic process is described in Figure 1 and can be divided into 4 major stages. First, in the research preparation stage, I consulted literature in the domain of ecosystems to develop the initial research problem and questions, and decided on the suitable research design. Second, in the data collection stage I chose suitable cases via theoretical sampling, collected data by interviewing informants, coded transcribed interviews, began the analysis with initial 1<sup>st</sup> order concepts and 2<sup>nd</sup> order themes and comparison of the cases to each other, therefore enabling refinement of my theoretical sampling logic. Third, in the data analysis and theory articulation stage, I refined the data structure by distilling 2<sup>nd</sup> order themes analytically while comparing the emergent theory to raw interview data and aimed to identify more abstract dimensions, and also aimed to find relationships between the different emerging concepts to refine the data structure and emerging theory in an iterative manner. Finally, as the data structure and theory, both grounded in the data, were finished, I compared the emergent theoretical insights to prior literature, covering a broad set of literature from different domains, to evaluate the findings and to draw parallels to prior theories and findings.

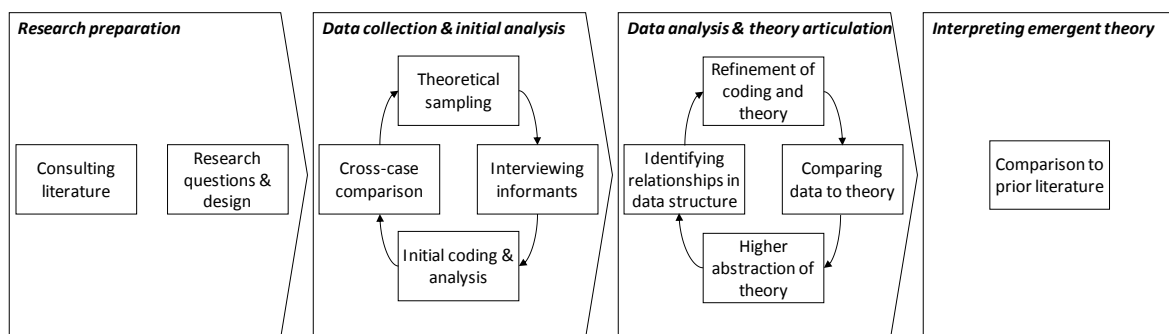


Figure 1. Research process

The process has been iterative in the different stages. Data collection could not have followed the logic of theoretical sampling without initial analysis of the data. Furthermore, articulating the theory required an iterative approach where the different level codes, themes and dimen-

sions were modified as the theory emerged via making sense of the data and the relationships. However, adhering to the inductive nature of the research, comparing the findings to other literature is not confused with the building the theory that was grounded in the data.

The decision of not incorporating prior theories to the theory that is grounded in the data was based on the inductive logic nature of the research. Even though the initial consultation of literature, and my prior studies in relevant fields meant that I was most certainly not completely uninformed or ignorant of the topic, there was a conscious effort to sustain from fitting the data into prior frameworks, such as the one by Rickmann et al. (2014). The findings chapter, therefore, aims to represent the theory without connections to prior work, as such articulation of the theory would have increased the confirmation bias or hypothesis bias, as noted by Gioia et al. (2013).

In the following sections, I will discuss the most important steps of the research in more detail. First, I will discuss the sampling logic of the research, while highlighting the importance of theoretical sampling. Second, I will describe the collection of data, where interviews are the primary source of data. Third, I will discuss the analysis in more detail and elaborate on the process of coding and articulation of theory via a data structure. Fourth and finally, I will discuss the quality of the research by tackling some reasonable concerns that are related to the way I chose to analyze the data, and by discussing the credibility of the research.

### **3.2 Sampling**

The basic logic for sampling for the research builds on the core ideas of theoretical sampling. Initially, the sampling or decision on what kind of firms to interview was based on the understanding that the software industry specifically is a great example of a platform ecosystem and provides a great setting to study complementor strategies.

The software industry, or enterprise software industry to be more precise, is characterized by the rise of platforms, where enterprise software vendors have introduced platform business models (Rickmann et al., 2014). According to Kittlaus and Clough (2009, p. 26), “[f]or software more than for other products, a well-oiled network machine of diverse partners is a significant prerequisite for long-term success in addition to the traditional direct sales channels” referring to ecosystem thinking. They identify various different roles complementors can take, but highlight their importance of value added resellers and consulting and service companies (Kittlaus & Clough, 2009). Value added resellers aid software vendors (note: or platform leaders) in reaching customers faster than with a direct sales force (Kittlaus & Clough, 2009). Even more importantly, the complexity and interdependence of software products, and customer interest not being in particular software products but solutions to their business problems and integration to their business processes, leads to customization and implementation needs by consulting and service companies (Kittlaus & Clough, 2009).

Furthermore, as noted by Ceccagnoli et al. (2012) in the software industry, these complementors have an option not to join the ecosystem. According to them the industry is different from settings where complementors are required to join one platform or another, such as video game platforms (Ceccagnoli et al., 2012). This is an interesting feature for the research setting, as the option of not to join allows for a more deep understanding of complementor strategies in ecosystem, as the question is more broad than the question of which platform to complement, but also whether and how to participate in those platforms.

Regarding the unit of the sample, it seemed fit that one unit is one firm. For most firms in the final sample this turned out to be a very suitable choice, as the informants discussed firms as units that act in coherent and individual ways. However, one firm was somewhat problematic, as it consisted of three different businesses, only one of which was comparable to the other firms in the sample. The informant identified this dilemma, and asked from which angle to discuss the phenomenon. They were not requested to limit their discussion to any business unit, which turned out to be good, as later on during the interview, the differences became clear, and the business units turned out to be quite separate thus strengthening the scoping of the study. The business unit of interest in this case was focused on services, and the business units scoped out of the study were focused on two different products.

The focus on service firms was not initially targeted, but emerged as multiple informants identified a stark separation of the logics of services and products in the software industry. According to the informants, the two businesses have different logics, and do not mix easily. A further consideration of such balance and the relationship between those businesses is out of scope of this research. However, it is important to note that the findings of this thesis stem from service complementors.

The initial sample of possible informants was identified by looking for software companies in Finland with the help of the Orbis database. Firms were filtered based on their NAICS code, which was “5415 – Computer Systems Design and Related Services”. Furthermore, the filter was set to independent companies – in contrast to subsidiaries that may not have independent strategies, to year of incorporation being before 2013 – in order to find companies that would have been newly established, and to firms that had revenues of over USD 5 million in the previous reporting year. In addition to the initial sample, two of the case companies were added to the sample based on their characteristics. Even though their NAICS codes are different, they both provide services to business customers in the software industry, have revenues over 5 million USD, are independent, and were incorporated before the year 2013.

The year of incorporation and size of the company in terms of revenues were set at arbitrary threshold levels to limit the sample into companies that were fairly established, in contrast to new and less established. This decision was made as new and small companies would most likely have very different logics in their decisions, and their strategies would most likely be less mature – indicating that assessing the strategies and decision logics would be more difficult. Furthermore, a scope of more established companies allowed to rule out one variable, namely the ability to participate in different ecosystems. The logic for this is that newer and smaller firms may not be as experienced and skilled and perhaps less credible as participants, and thus may experience limitations in access to partnerships.

Finally, the guiding principle was to choose firms that, based on their offering presented on their websites, do not identify themselves as platform leaders. Instead, they offer services to business customers in the software sector.

After the initial sampling decisions, the contacting of the firms started. Not all firms agreed to interviews due to either time constraints or the firm representatives’ assessment of the topic not being applicable to them. The sampling did not, however, follow a purely convenience sampling logic, although accessibility was naturally a factor (Morse, 2011).

Already during the first interview the possibility of two distinct categories of firms emerged, which was in contrast to the ex ante working hypothesis of a multitude of different approaches to balancing between ecosystems. The informant in the first interview partitioned firms in their operating environment into these two categories, namely those that are independent, and those that partner up with a single platform leader. After this insight, the sampling logic emerged, which was sampling firms that seemed independent based on not highlighting platform alliances on their websites and the researchers understanding of their business from public information sources such as annual reports, and firms that seemed to be more closely allied with platform leaders, based on e.g. showing platform leader logos dominantly on their websites. However, an open mind was kept all the way until the final interview, which was expected to be different in a way that it would have a different logic than the two prior categories. Namely, it was expected that the firm interviewed last would have deeper alliances with multiple platform leaders. Should this have been the case, and the strategy have differed from the firms with one deeper platform partnership, it would have been difficult to build compelling and unifying theory based on the data, and further sampling would have been required. However, it turned out that the firm was factually in a deeper partnership with only one platform leader, and had only secondary, less important other partners. This was also consistent with firms that were expected to be single-partnering, due to labels proposed by other informants or clear focus on their website to one platform. Namely, some of them also turned out to have some secondary partnerships. This insight, in addition to consistencies found within categories and differences across categories, led to comfort in stopping further gathering of data. Of course, continuing sampling may have showed that other strategies to platform partnership also exist, but in terms of not ballooning the resources needed to conduct the research, theoretical saturation was assessed to have been reached.

The assessment of theoretical saturation is in line with the proposed signals of theoretical saturation in methodological literature, as described by Suddaby (2006, p. 639) “[t]he signals of theoretical saturation, which include repetition of information and confirmation of existing conceptual categories, are inherently pragmatic and depend upon both the empirical context and the researcher’s experience and expertise”. Even though the researcher in this case may not be that experienced, repetition of information and confirmation of conceptual categories certainly occurred, and the decision to discontinue sampling was based on the balance of reasonable confirmation and pragmatism.

In this thesis, while gathering data, i.e. interviewing the informants, an interesting phenomenon occurred, as some of the interviewees spoke of other companies, even other companies in the sample. By referring to the other interviewees, they highlighted the difference between the two polarized strategies employed in the context. Even though this information is second hand, the data, named shadowed data has been deemed beneficial in sampling.

*1. Exploring the use of the generalized self and the generalized other makes the domain and the various components of the phenomenon understandable more quickly so that analysis goes faster. Ethnographers use this technique all the time when interviewing their key informant(s). When researchers use grounded theory and other methods, it provides important information that may direct theoretical sampling and facilitate the organization of other types of sampling frames. One final adage, also from ethnography, is: When seeking shadowed data, use expert informants rather*

*then those who are new to the scene. Expert informants are able to provide the necessary generalizations on which to base subsequent work.*

*2. The perceptions from outside a certain group (i.e., the generalized other) may not coincide with how the people from within the group see themselves. Nevertheless, outsider's perspectives may provide interesting alternative data. These data make the data set richer and more interesting.*

*3. These perceptions of others may easily be verified, both from within and outside the group concerned. Thus, not only may the researcher reach an understanding of the phenomenon more quickly, but saturation may also be achieved and the analysis validated more quickly and efficiently.*  
(Morse, 2001b, pp. 291–292)

The shadowed data turned out to be very beneficial in this thesis, as three of the informants pointed out that in the other firms, the firms essentially must choose one platform in order to be successful. Such insight could have been discovered by analyzing the interviews with the firms themselves, as their commentary supported strongly this insight, but the shadowed data led to a quicker realization of this phenomenon, and thus aided in sampling.

When it comes to the specific informants from each firm in the sample, they were all knowledgeable agents (Gioia et al., 2013). According to Morse (2011, p. 4) “[p]articipants must therefore be experts in the experience or the phenomena under investigation; they must be willing to participate, and have the time to share the necessary information; and they must be reflective, willing, and able to speak articulately about the experience”. Such interviewees were targeted by contacting the CEOs of the companies chosen for the sample of the research, and by asking to interview either them, or someone in the company who:

- knows about the firms operations and strategic development for a time period of several years
- has a good understanding on the reasoning why the firm’s offering has developed to be how it is currently
- can describe the firm as an entity, and can assess the development of the firms offering comprehensively

The interviewees mainly corresponded to the criteria, as all of the interviewees were either CEOs, or people very high up in the organization. Namely, six of the interviewees were CEOs, one interviewee was the CTO of the company, with responsibility of the firm’s offering, and 1 interviewee was a senior partner in the company, with very long experience with the company. Generally, the people interviewed had a long history in being employed in the company, except for one interviewee, a CEO, who had not been active in the company for several years in between, but was one of the founders of the company. A second informant, who the CEO deemed suitable to support him in the interview, also attended and acted as an informant in that specific interview.

### **3.3 Data collection**

The primary data source for the research are semi-structured interviews conducted with the informants that allow for “both retrospective and real-time accounts by those people experiencing the phenomenon of theoretical interest” (Gioia et al., 2013, p. 19). However, as deemed helpful for qualitative research (Gioia et al., 2013), also multiple other data sources were employed to get familiar with the topic. Those sources include market research reports from Gartner, identified by one of the informants as an important information source for both the firm and their customers. The approximately 20 reports from Gartner that were read allowed getting an understanding on the most current trends in the industry, including understanding how the service complementors are developing from an outside point of view and on a more general level. Furthermore, the websites and annual reports, when available, from the firms in the sample were consulted, which allowed for the interviewer to ask more specific questions, and even challenge some of the answers to interview questions by the informants during the interviews.

Despite utilizing other data sources, the analysis is based on the data gathered in the interviews. Interviews with 8 Finnish companies that corresponded to the sampling criteria were conducted. In terms of revenues in 2016, five of the case companies had revenues between USD 5 million and USD 30 million (CC-2, CC-3, CC-5, CC-6 and CC-8), and three of the case companies had revenues between USD 30 million and USD 100 million (CC-1, CC-4 and CC-7). The median revenue of the case companies was USD 18 million. Three of the case companies (CC-1, CC3 and CC-7) corresponded to the characteristics of platform-independent complementors, and five case companies (CC-2, CC-4, CC-5, CC-6 and CC-8) corresponded to the characteristics of platform-focused complementors.

After the eight interviews with the eight case companies, that lasted on average 1 hour, ranging from 25 minutes to 1 hour 19 minutes, the interviews were transcribed. The one outlier, the 25-minute interview, was conducted via telephone, instead of in person as the other interviews, and was not transcribed, but the interview notes were sent to the informant, who confirmed that they were accurate.

The interview structure is shown in Appendix I. In general, the three main areas of interest for the interviews were 1) the firm’s platform strategy, 2) the firm’s offering(s) related to different ecosystems, 3) development of the industry and ecosystems. Even though there are multiple, more specific questions, they were not followed in detail, but instead questions were adjusted during the interviews to probe for insights related to the research questions. Utilizing a basic structure common for the interviews, but allowing for flexibility in exact questions asked, allowed to “follow wherever the informants lead [the researcher] in the investigation of [the] guiding research question[s]” (Gioia et al., 2013, p. 20). In the interviews the advice to give voice to the knowledgeable agents and not imposing any prior constructs or theories on them was kept in mind and applied (Gioia et al., 2013)

### **3.4 Analysis**

It should be noted that the analysis commenced before the final interview was conducted, and therefore the analysis and data gathering were conducted as parallel processes – a prerequisite for being able to adhere to the logic of theoretical sampling and to identify theoretical saturation as noted in section 3.2. The analysis was conducted in a similar manner as

described by Gioia et al. (2013). Namely, first a large amount and variety of informant centric 1<sup>st</sup>-order concepts were distilled from the interview transcripts. The amount of these 1<sup>st</sup>-order concepts amounted to some 800 unique codes that were almost direct quotations from the data, although abbreviated and anonymized. Second, those informant centric terms, or concepts were analyzed, and grouped to more abstract level 2<sup>nd</sup>-order themes. At this point, the goal was to understand what is actually going on at a more theoretical level (Gioia et al., 2013). During the first iteration, the 2<sup>nd</sup>-order themes amounted to approximately 70 different emerging themes, to which most of the 1<sup>st</sup>-order concepts were grouped to. Not all original first order themes received even an initial 2<sup>nd</sup>-order theme, as some of the themes discussed by informants were not relevant to the research questions.

After the initial 2<sup>nd</sup>-order theoretical themes had been assigned to the 1<sup>st</sup>-order concepts, the analysis turned even more theoretical, and the aim was to explain the phenomena that was being observed. The 2<sup>nd</sup>-order categories were iterated together with interview data in order to distill final 2<sup>nd</sup>-order themes and also to group them into aggregate dimensions. Finally, with the 1<sup>st</sup>-order concepts, 2<sup>nd</sup>-order themes and aggregate dimensions identified, the data structure started to emerge. The data structure forced me to “thinking about the data theoretically, not just methodologically” (Gioia et al., 2013, pp. 20–21) and showing it provides “a graphic representation of how [I] progressed from raw data to terms and themes in conducting the analyses” (Gioia et al., 2013, p. 20). The final data structure consists of 22 2<sup>nd</sup>-order categories and seven 3<sup>rd</sup>-order dimensions, as shown in Figure 2 in Section 4,

With the data structure in place, the analysis continued with an aim to “show[] the dynamic relationship among the emergent concepts that describe or explain the phenomenon of interest and one that makes clear all relevant data-to-theory connections” (Gioia et al., 2013, p. 22). Therefore, the focus turned to understanding the dynamic interrelationships between the different concepts, themes, and dimensions (Gioia et al., 2013, p. 22). To do this, diagrams describing the causal-loops for each case firm were drawn, and the different firms were compared to each other, adhering to the logic of constant comparison and accounting for different patterns and variations (Corbin & Strauss, 1990). The emerging model, shown in Figure 9 in section 4.4, was built not only upon the data structure, but also upon the data itself, as I continuously kept the original data in mind and kept checking that the model was true to the original narratives. Even though there is a need for some conceptual leap, for which there is room in the methodology (Gioia et al., 2013), a multitude of original quotations is showcased for each finding that support the emergent model that aims to account for the dynamic relationships.

### **3.5 Quality of the research**

As the analysis, and main body of the findings chapter is structured with the help of a data structure described by Gioia et al. (2013), and there has been some critique on the applicability of such a structure (Eisenhardt, Kathleen; Graebner, Melissa; Sonenshein, 2016), those challenges not only validate, but call for a short response. As the problems of the approach have been tackled as well as possible, the research is able to leverage the benefits of the approach, constituting to the validity of the theory generated.

According to Eisenhardt et al. (2016) the usefulness of data structure figures, as advised by Gioia et al. (2013) is modest as “a data structure displays names such as for categories or concepts and themes or constructs, but often lacks actual data” (Eisenhardt, Kathleen;

Graebner, Melissa; Sonenshein, 2016, p. 1119). In this thesis, this problem is tackled with both a comprehensive display of multiple first order themes, that are very informant centric and open, and with a rich display of direct quotes from informants.

Furthermore, Eisenhardt et al. (2016, p. 1119) note that “such an approach [using data structure] makes it harder for researchers to observe patterns of interdependent actions”. In this thesis, it seems that the contrary actually occurred. Due to the efforts to incorporate the differences in the cases – that certainly were present as two quite opposing strategies for firms emerged – the data structure actually forced the researcher to look past those differences and see what it all means on a more abstract level.

The two emerging categories not only helped in understanding the logic for theoretical sampling, but also provided a means to aim for more comprehensive theory that, via the unifying data structure, must accommodate variation. As the two categories were quite consistent within them and quite different across, the theory development incorporated both those views. This is very much in line with the main sources of validity, strength and powerfulness of the grounded theory approach.

*While remaining focused on the concept, the grounded theorist’s deliberate listing of all data characteristics, comparing and contrasting, coding and verifying, and the purposeful seeking and saturation of negative case sampling ensures rich, dense, comprehensive results. If conducted well, grounded theory is valid, strong and powerful.*

*Paradoxically, variation in the sample ensures that bias, while used as a sampling technique, is removed from the final product. The completed theory is presented as a balanced and well-rounded explanatory description of the topic. Note that the active seeking of variation and incorporating it into a model ensures validity. This is one of the major and most important strengths of the method. (Morse, 2001a, p. 11)*

Therefore, in fact, the use of data structure, supported by open coding in the first place, and a rich incorporation of illustrative quotations resulted in strong theory, that rests on the three fundamental criteria proposed by Eisenhardt et al. (2016). These three criteria are: 1) internal coherence and parsimony resulting in strong theory, 2) constructs or themes convincingly grounded in compelling data, and 3) providing rich and unexpected insights (Eisenhardt, Kathleen; Graebner, Melissa; Sonenshein, 2016).

First, internal coherence according to Eisenhardt et al. (2016, p. 1120) stems from “well-defined concepts, relationships between constructs, and underlying logical arguments that support these relationships”. This problem is tackled with not only a process diagram that ties all findings together, but logical arguments that tie them together, summarized in section 4.4. The strength also stems from discussing boundary conditions to which the emergent theory applies to (Eisenhardt, Kathleen; Graebner, Melissa; Sonenshein, 2016), which is essentially tackled by acknowledging and noticing that the theory may not apply to industries with different dynamics, especially contrasting to product complements. The parsimony means that “the emergent theory should be as parsimonious (simple) as possible yet still remain true to the core insights” (Eisenhardt, Kathleen; Graebner, Melissa; Sonenshein, 2016, p. 1120). The findings of the thesis were iterated multiple times, with the aim for as much simplicity as possible while still, very importantly, remaining true to the insights that



emerged in the data collection. Of course, more simplicity may have been obtained if the research was conducted by some other, perhaps more experienced researcher – but as an underlying goal for this research was for the researcher to practice their research skills, outsourcing the fundamental and core process would have diminished that goal. Furthermore, further simplification would most likely have required further exclusion of insights from interviews. Perhaps not all the insights that have been included in the theory are core, but at least the analysis remains true to data.

Remaining true to data is also related to the second fundamental criteria presented by Eisenhardt et al. (2016), namely the groundedness of constructs and themes in compelling data via showing the chain of evidence and reporting informants' interpretations faithfully. As noted above, the data is shown not only in a broad collection of informant-centric and open codes, but the chain of evidence is further supported by illustrative quotations that are not limited to single sentences, but include the interpretations of informants to a great degree.

Finally, the third criteria calls for providing rich and unexpected insights by contributing to a specific research conversation by providing fresh insights (Eisenhardt, Kathleen; Graebner, Melissa; Sonenshein, 2016). This call is answered by focusing in on the complementor view in ecosystems, and relating the findings to that domain using prior related literature. Due to the dispersion and newness of the research in the domain, this thesis is an important step to unify the literature, drawing connections between somewhat distinct streams within the emerging domain. Furthermore, the practical implications of section 6.1 should not only be of interest to the case companies and their peers, both established and new, but to firms operating in other environments where platform dynamics are emerging.

All in all, the approach chosen for this research may have its limitations, but as those have been tackled, the theory can instead leverage the benefits of the approach.

## 4. Findings

The findings of the inductive case research are presented in this chapter. The structure of the findings follows the data structure that emerged during the collection and analysis of the data. The 2<sup>nd</sup>-order categories structure the topics covered, which are grouped into subsections that are structured to match the 3<sup>rd</sup>-order dimensions. The highest-level sections of this chapter reflect the research questions of the research, and the subsections of 3<sup>rd</sup> order dimensions that cover the research questions are grouped accordingly under each section. The complete data structure is presented in Figure 2.

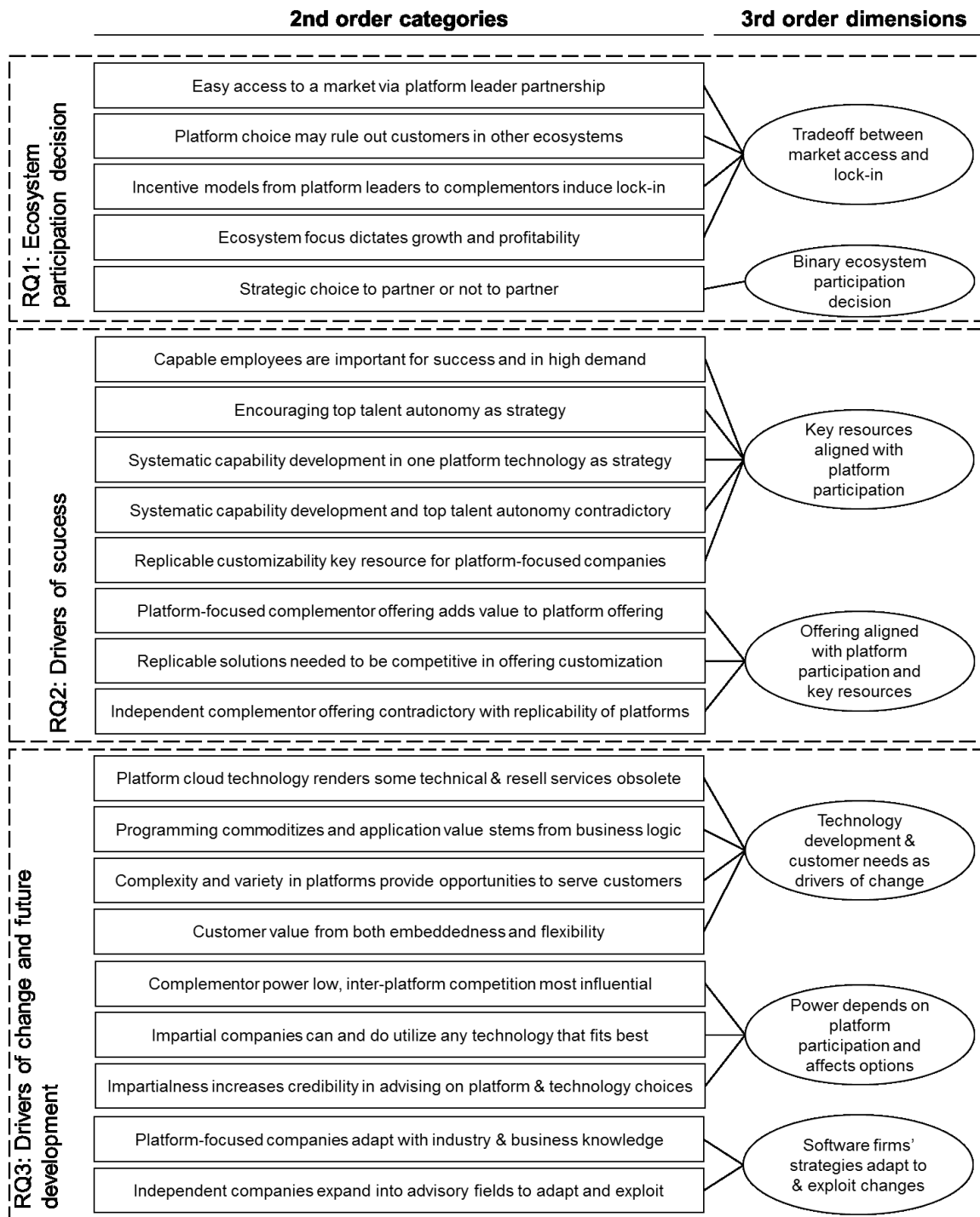


Figure 2. Data structure of the findings

In order to show the logic of how the different categories emerged, and how the data structure was formed, each subsection includes examples of the informant-centric first order concepts that contribute to the second-order category. The first-order concepts presented provide a non-exhaustive list of the interview data that contributed to the emergent category, and collectively they provide compelling evidence that can easily be assessed by the reader. The first order concepts that the 2<sup>nd</sup>-order categories stem from are presented under relevant 3<sup>rd</sup>-order subsections. Furthermore, in addition to the first-order concepts, in order to describe the underlying data that the findings are grounded on, extensive illustrative quotations are presented. These illustrative quotations for part show that the first-order concepts are indeed informant-centric, and help to illustrate how the different concepts relate to each other. Of course, I as a researcher play a part in interpreting the data, especially when raising the findings to more abstract levels, and therefore the findings represent my interpretations of what was being said by the informants collectively.

The findings are structured as follows. First, the decision to participate in different ecosystems is presented as a fundamental and binary decision for complementors. Due to a tradeoff between market access, i.e. benefits from platform participation, and lock-in, i.e. only being able to receive those benefits by focusing in one platform, the decision seems to be binary, and all firms in the sample can be categorized as platform-focused or platform independent.

Second, the findings related to drivers of success for the complementors are presented. The fundamental driver for success seems to be alignment to the chosen participation decision regarding ecosystem. This means that the key resources of firms differ depending on whether they are platform-focused or platform independent. Furthermore, the firms' offerings differ, too, and each firm's offering is interrelated to the platform participation decision and key resources, as the firms are fit and able to tackle a certain kind of customer need due to the partnership decision and key resources they focus on. All in all, the complementors' key resources and offering would mismatch the other platform participation decision, i.e. platform-focused firms would not likely succeed well if they were platform independent and vice versa.

Third, the findings related to power, and the directions to which the two different types of complementors are developing are presented. Power essentially refers to the relationship between the complementors and the platform leaders in ecosystems. The power in relation to platform leaders complementors have is affected by their platform participation decision. The flexibility they have and the degree of their dependence from specific platforms affects how complementors can respond to technological development and development of customer needs. Therefore, even though sharing some characteristics in development, platform-focused and platform independent complementors seem to differ in which way they are currently developing their strategies.

Fourth, and finally, all of the findings are brought together to describe the interrelated nature of complementor strategies in ecosystems. The summary concludes the main findings of the research and relates them to each other.

#### **4.1 Binary ecosystem participation decision due to tradeoff between market access and lock-in**

The first research question for this thesis aimed to understand platform participation from the perspective of complementors. This section addresses the research question, formulated as below.

*What decisions regarding ecosystem participation do complementors have, and what drives those decisions?*

As complementors, in contrast to platform leaders, do not own a platform, they can and must choose whether to join platforms. Even though some of them become tied to a single platform, they are fundamentally free to choose which platform that is, and whether to participate in the first place. The platform participation decision is primarily driven by a tradeoff between market access and lock-in. Due to this tradeoff between market access and lock-in, firms have either chosen to remain independent from alliances or chosen to partner up with some specific platform leader. It seems that firms do not effectively participate in more than one main platform, or ecosystem, if they wish to receive the benefits from platform focus, and therefore the decision is binary. Furthermore, independence suffers if complementors identify as partners to any, even if multiple, platforms, and therefore, independent firms are better off without signaling any dependence.

The decision's binarity is generally supported by the interviewees, where especially platform independent complementors assess that platform partnership is accompanied with a choice of one single platform. The way platform leaders assess complementors and award benefits to them makes it difficult for platform-focused firms to receive benefits from more than one platform, and require them to focus their efforts to only one. The benefits, together with knowledge and experience accumulated in the ecosystem dynamics lock complementors in their platform of choice. As platform-focused complementors are locked in their platform of choice, their growth and profitability prospects are affected by the platform success and competition within the ecosystem amongst complementors. However, on one hand, quickly growing and popular ecosystems can accommodate many profitable complementors, and on the other hand less popular ecosystems can be profitable for successful complementors as no more complementors enter and some exit the ecosystem.

The more detailed findings are presented in the following sections. First, the tradeoff between market access and lock-in is discussed by elaborating on the findings related to the four second-order categories that support it. These findings altogether support the binarity of the platform decision, which is discussed thereafter. Some of the most important 1<sup>st</sup>-order concepts that led to the 2<sup>nd</sup>-order categories are presented in Figure 3 below.

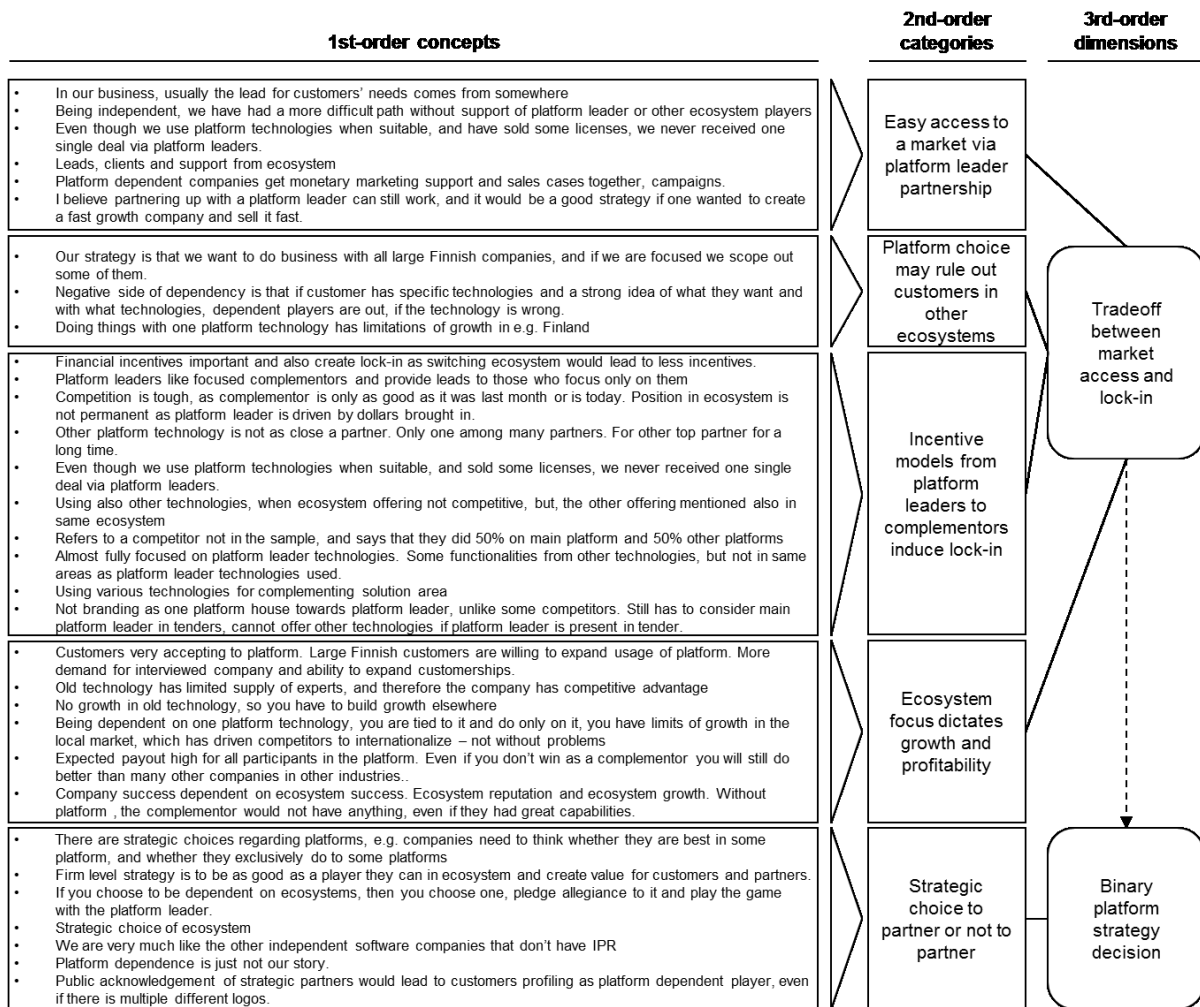


Figure 3. Data structure supporting the binarity of the ecosystem participation decision

#### 4.1.1 Tradeoff between market access and lock-in

The main benefit from partnerships with platform leaders to complementors is the possibility to gain business with the help of platform leaders. The market access that platform leaders provide to the complementors comes in forms of leads and even joint sales cases. In order to get the benefits, a certain level of commitment to the platform leader is required, and firms have to give up independence if they wish to get the market access. However, the market access is limited, as it does not cover customers in other ecosystems.

For platform independent complementors, the ability to serve all clients is an important driver for not focusing on one platform. For those firms that give up their independence, the decision may lock them in the ecosystem of choice. Platform leader's incentive models to complementors are an important driver of lock in. As the firms become locked in, their growth and profitability are increasingly tied to the platform. On the level of all complementors in the ecosystem, this may not be that bad as platforms that grow rapidly can accommodate many profitable complementors, and those platforms that fade in demand may sustain a number of profitable complementors, given that the supply decreases.

The most important reason for firms to enter a partnership with one platform leader seems to stem from the will to easily access the market. Furthermore, the reason to stay independent stems from the desire to keep the customer base as wide as possible. However, other issues

play also an important role in explaining why firms choose independence or focus to a specific platform and remain on that path. These factors, namely key resources and offering being tied to and aligned with the platform participation decision cannot, however, be identified as actual antecedents for the decision. Instead, the key resources and offering of the firms are interrelated with the platform participation decision via a more evolutionary process of strengthening alignment of the firm with its participation decision. The evolutionary and interdependent alignment of platform participation to other important strategic decisions is discussed in more depth in section 4.2.

#### **4.1.1.i Easy access to market via platform leader partnership**

The main benefit from partnering seems to be easier access to the market of the platform ecosystem. Market access means that the partnering firms get support in obtaining customers in the ecosystem via leads and joint sales cases.

*[...] And we saw that by focusing in one, we could get support from the ecosystem, which in practice means new leads, customer cases and support. (CC-4)*

Partnering up with a platform leader can be especially beneficial for getting the company started and getting customers in the first years.

*[...] I always said to them: “why do you want to create a new platform and compete with [platform leaders], when you could complement the platform and get the audience immediately from there”. (CC-5)*

The customer access from platforms continues throughout the partnership. Those firms that chose to remain independent, too, note the attraction of partnering with platform leaders mainly due to the access to customers.

*One concrete disadvantage [from not partnering] is that when we conduct business, there is always a lead that a customer would need something. It seems like that the platform leaders like ecosystem complementors, who are only focused on them. They usually give customer leads to those who only use their technology. (CC-1)*

The access to customers is also the main difference between secondary platforms, or supportive platforms that may be utilized on the side by platform partnering firms, and their primary platform partnerships. This, as further elaborated in section 4.1.1.iii, is what leads to the acceptance of being able to partner mainly with one partner.

*We do not get leads from [the firm’s secondary platform]. With [the main platform] we have joined sales cases, we get leads, and look together how we can win cases. (CC-8)*

#### **4.1.1.ii Platform choice may rule out customers in other ecosystems**

Even though partnering up with a platform leader certainly helps to get access to customers in a specific ecosystem, it also somewhat limits the clientele to that specific ecosystem. This limitation was the primary cause for firms that chose a platform independent strategy.

*Our strategy is that we want to serve all large corporations in Finland, and if we focus in only one platform, we limit our business opportunities too much. (CC-1)*

Those firms that have chosen a one-platform focus also note this issue.

*[...]If we are limited to one actor [platform leader], do we limit our possibilities to serve customers? If customers then say that they do not want have only one platform, and the provider must be capable also in others, then we limit our possibilities to gain business with our focus. (CC-4)*

As customers already have systems in place, not all technologies fit those environments equally well. This reflects into available clientele as firms with a platform focus are generally ruled out from cases where their technology is not fitting. Allying with one platform leader can also prohibit firms from winning cases where the customer has settled into a different ecosystem.

*The bad thing [about platform focus] is that when there are cases, where the client has already – they already have a certain environment with things X and Y and they have a strong opinion that this and that technology should be used in order to fit their environment. Well, then you are out of that case, if you are entering with a wrong technology. (CC-7)*

*The first question regarding platform strategy is, that one needs to assess whether focusing on one platform leader limits the clientele too much. If customers say that they do not only want one technology but you have to have capabilities in many, then our focus limits our opportunity to get enough business in. (CC-4)*

Companies that have selected a platform independent strategy note that limiting out some customers is problematic especially in a smaller market such as Finland.

*If you look at houses that are dependent on a single platform [...] they never do things with other technologies than [platform leader] technology, and that has a certain limitation of growth in e.g. Finland. (CC-3)*

#### **4.1.1.iii Incentive models from platform leaders to complementors induce lock-in**

The most important external driver for focusing only on one platform and not switching that focus is the way the platform leaders structure their incentives to complementors. As discussed earlier these benefits are mainly customer leads, or access to customers on a more abstract level. Such benefits seem to be directed only at those firms that bring in significant business for the platform leader.

*It comes from the fact that platform leaders measure success via license sales. If you sell platform leader licenses for only one platform, the license sum is much larger for that platform, and you are perceived as a better partner. If you look at the partner correspondents or such [in platform leader firms], they are primarily incentivized by partner license sales. And if the license sales are distributed to three places, then it amounts to a third on average. (CC-8)*

This incentive structure not only forces complementors to focus their efforts into one ecosystem, but it also locks them in the chosen ecosystem, as they have a lot of incentives to lose if they were to aim to switch to another ecosystem.

*And as we are a large [partner] there, we are hooked. In contrast, if we think about taking some business to another platform, we would then receive smaller incentives. (CC-4)*

As will be discussed later, the lock in is also a result from firms needing to align to their chosen platform strategies, and for firms with one focus platform it means accumulating capabilities that match the platform of focus. In addition to the alignment of offering and capabilities and resources to the platform of focus, which are discussed in more depth later, platform focused firms also accumulate relational resources within the ecosystem. These relational resources not only mean personal relationships with platform leader staff, but also other knowledge specific to the platform. One informant describes this well:

*It is a long road to grow into a new ecosystem. Building the capabilities, building the ecosystem relationships – in the ecosystem you know the platform leader, but you also know the competition and their behavior. In a tender, you know who is probably attending, and even which employees they may offer for certain things, and therefore you know your position in the competition, and how to price and what to offer. (CC-8)*

#### **4.1.1.iv Ecosystem focus dictates growth and profitability**

For those companies that have chosen to focus on one ecosystem, growth and profitability is affected by the growth of the ecosystem, and by the competition within it. Even though platform leaders most probably would welcome all qualified and skilled software firms, the thorough alignment required to succeed as a platform-focused player sets up barriers of entry and switching costs, in addition to the lost incentives from switching, as without focus, partners are unlikely to succeed in the within ecosystem complementor competition.

Platform decisions may have a direct effect on profitability, as platform focused complementor competitive dynamics are dictated by ecosystem characteristics. According to the interviews, growth of platform on one hand and softness of competition on the other hand can be beneficial for complementors.

Platforms that are growing rapidly may accommodate a multitude of complementors. Even though some complementors may not be top complementors in an ecosystem, they can still do very well when compared with companies in other industries. For ecosystems that have lately been more popular in terms of demand and media coverage, the competition is tougher, but as one interviewee pointed out, it may very well be that an ecosystem is so successful that all complementors do well in it – even if competition within the ecosystem is tough.

*[...] Within platforms, firms that do similar things must compete with each other a lot. But still, the expected payoffs for everyone are so incredibly high that even though you are very successful compared to an average firm from another industry, you are not necessarily a winner [within the platform competition] (CC-5)*



On the other hand, complementors in ecosystems that are strong in older technologies may benefit from the softened competition. As less complementors or no complementors at all, wish to enter the ecosystem, their position can be very favorable.

*The market in [platform leader technology] is in a certain way closed, there is a certain number of players in it. [...] There are no more entrants (CC-8)*

No informants highlight the importance of softer competition in the decision to join an ecosystem. Therefore, the lack of competition is mostly a benefit for those that already are in ecosystems that decrease in popularity, thus offsetting a negative effect of gradually decreasing demand. The effect of intense competition may be more relevant in the case of a platform, where supply is high and demand starts to fade. In such a case, a complementor may find itself in a difficult situation, as they may not be able to transfer easily to another ecosystem. None of the interviewed firms assessed their own firm to be in such a situation, but one informant from a platform independent firm noted the possible threat to platform focused firms.

*It is difficult to say which is better [platform focus or independence]. But you have to be careful not to be in an area where [one platform] is currently. An area where they have a “pig cycle”, where there is many new players and plenty of capacity, and suddenly demand starts to fade. (CC-1)*

Furthermore, even for successful platforms, there are still some limitations to growth as the clientele is limited to firms that are already in the ecosystem of the platform leader, or willing to use the platform technology. It may very well be the reason for some of the platform-focused firms to have chosen to expand geographically. An interviewee in a platform independent firm sees it as a direct consequence, with its own problems:

*[As the platform focused strategy] has growth limits in Finland, it has led to them having to have a stronger internationalization strategy, which in [the case of a firm] has driven them into problems. (CC-3)*

#### **4.1.2 Binary platform participation decision**

Driven by the tradeoff between gaining the benefits of market access and avoiding lock in, the decision to become a platform-focused complementor or a platform independent complementor seems binary. The decision to partner with a platform leader essentially means that the complementor focuses its efforts into one ecosystem, therefore becoming platform-focused. Partnering firms have either been founded on top of the chosen platform, based on founder experience, or chosen the ecosystem they join based on competitiveness of the ecosystem in their target market. Conversely, firms that have chosen to remain platform independent have also very knowingly made that decision, with emphasis on independence, instead of having a multiple platform focus strategy. They may utilize different platforms, but identify themselves as independent, and do not market their affiliation with the platforms.

The tradeoff between market access and limitations to potential clientele being a driver for the decision, firms must assess whether they benefit more from the easy access to a certain market, or being unbound and able to offer their services to all customers. As, due to the incentive models of the platform leaders, as discussed above, firms manage to only get the

market benefits from one primary ecosystem, they must also choose which ecosystem to join.

Three of the interviewed companies were founded on the idea of belonging to a selected ecosystem. Some of the founders of the companies had previous experience in the platform technology of the chosen ecosystem and founded a company specializing in that ecosystem. For at least one of the companies, the role as a complementor, i.e. benefiting from the platform success and adding value to it, was also clear from the beginning. When it comes to the choice of which platform to partner up with, three of the four platform-focused firms did not really consider or compare the different ecosystems, but the decision was mainly driven by founder experiences.

*We had already chosen – I personally used to work for [the platform leader] – that [platform leader] is our platform, with which we do things. And on top of which we develop our company. (CC-5)*

*We have for a long time done business in the [platform], I personally have a background in working in the [platform], and we have many employees from [the platform], so capabilities in [the platform] have been very strong, and that was where we started from. (CC-8)*

One of the interviewed firms noted that the decision was guided by platform strength in the customer segment the firm was already operating in.

*It was a strategic choice that, as we saw that in the market we operate in, i.e. B-to-B market, which are the strong players in there, and where we can get support from (CC-4)*

In a similar vein, the decision to remain independent has been strategic. All the firms that describe themselves as independent highlight some form of fundamental decision of remaining independent in contrast to partnering with some platform leader.

*The second principle for the company [the first being the decision to be a purely service company], was to be first and foremost technology independent. [...] The third thing, which is related to the previous one, is that we principally do not exclusively ally with anyone and go into license sales. (CC-1)*

*When we started, we took an exceptional strategy for the time by starting off as platform agnostic. [...] Other companies at that time threw themselves into for example the Microsoft camp. [...] But that is not our story; it is a different story (CC-3)*

*[...] For us – I cannot of course speak for others, it was a very intentional choice not to do so [partner up with a platform leader] (CC-7)*

On the other hand, those firms that have chosen to be independent still utilize platform technologies and are partners with many platform leaders. As such, they are not separated or isolated from platforms. The main distinction is that they do not exclusively partner with any of the platform leaders, and they do not market partnerships with platform leaders.

*I do not know what to call it, but yes we do have all kinds of cooperation agreements with different actors [...] In practice we do not handle all the world's technologies [...]. (CC-7)*

*We could conduct an analysis of what technologies we use and publish it on our website [...] but it would not be beneficial to us, but do more harm, as we would be seen as a firm who only does on those [technologies]. (CC-7)*

Platform independent complementors also identify themselves as belonging to (multiple) ecosystems (CC-1), even though not as deeply as platform focused complementors (CC-3), and “have all kinds of partnerships” with many different platform leaders (CC-7).

The interview data also supports the binarity of the decision directly as interviewees from platform independent firms describe the trade-off that leads to having to make a choice between a partnership with one platform and platform independence.

*If you take the technology dependent path, then you should choose one, as then you actually receive the benefits from the partner. If you have five, you do not actually get any benefits. (CC-7)*

*[For companies that chose to ally with a platform leader] the sales channels and everything were united with those platforms – you were either in the IBM camp or Oracle camp, but never in both. (CC-3)*

Such a binary decision between choosing one specific platform leader is not highlighted by some of the platform-focused firms. According to them, they may also use different platforms, but when asked to describe ways other platforms are utilized, they seemed always secondary or complementary and connected to the same ecosystem. As noted above, platform leaders' incentive models seem to be structured in a way that discourages focus into multiple platforms, as the benefits come only with significant sales in the ecosystem.

Besides firms that commit to one platform, and those that do not commit to any platforms, there may be also firms that balance between these two approaches and commit to more than one, or those that switch their platform of choice. The notion that the interviewed firms all fit into two different categories of platform independent firms and firms that have one main platform partner, and some of the informants point out a binarity of choices, does not mean that these are the two only alternative ecosystem strategies. There is, however, evidence implying that these two alternative strategies are exhaustive to some degree for the specific context of mid-sized software service firms. First, no firms with divergent from these two categories were present in the sample, and as discussed in regards of sampling, such firms were sought for. Second, in addition to the sample, an out-of-sample firm was referred to by an interviewee as “one with 50% revenues from one ecosystem, and the rest from others” (CC-5), indicating that some firms may have a slightly more balanced approach. Still, having 50% of sales from one platform ecosystem indicates that there is a main platform and the others are somewhat secondary.

All in all, the choice of partnering up with a platform leader or remaining independent is binary in a sense that you cannot have both platform independence and the main benefits platform leaders offer as incentives from platform partnership. In the following sections, we

will see that not only is the decision of platform participation binary, it has effects on what drives success for the firms, and therefore the two different decision are reinforced as firms align themselves to the decision. The decision is strategic, as for one, especially for the platform-focused firms the competitive environment is set by the decision, and for second, the drivers of competitive advantage are different depending on the decision, as discussed further in the following sections.

#### **4.2 Drivers of success dependent on platform participation decision**

The second research question for this thesis aimed to understand how complementors can succeed in ecosystems, or what the informants identify as most important drivers of success in their business. This section addresses the research question, formulated as below:

*What drives complementor success?*

Even though the case firms all operate in a very similar segment, i.e. provide business-to-business services in the software industry, the drivers of success seem to differ depending on the platform participation decision. Platform independent complementors attribute their success almost solely to top talent employees. Platform-focused firms, on the other hand, do not, consistently throughout the different case companies, talk about top talent, at least as a key to their success. Instead, they mention replicability, or intellectual property (IP) as a key competitive driver, as these assets not only allows them to win cases, but also allow them to conduct projects profitably. These capabilities are homogenic in the sense of employee technological capabilities being focused on a single platform and IP being platform specific. The alignment of capabilities with the platform allows platform-focused complementors to benefit from systematic capability development and platform training materials, but the resources are tied mostly to a specific platform.

The key drivers of success can be labeled as key resources to the companies. In order to understand fully why the key resources, or drivers of success, differ in the two different types of complementors, it is helpful to discuss the offerings of the firms. The offerings of the firms, even though both related to platforms, differ fundamentally, and therefore help explain why the key drivers of success are different. The offerings are related not only to the key drivers of success, but ultimately they relate to how the firms have chosen to partner with the platforms, making the three (platform participation type, key resources and offering) interdependent.

As platform focused complementors have chosen to partner up with platform leaders, they do not have to attract top talent as they can train their employees with materials provided by platform leaders. They do, however, have to align their offering with the platform leader and add value in the specific way the platform leader does not want to or cannot easily provide. The competition between similar complementors in the ecosystem leads to them having to be able to provide the solutions to customers efficiently, requiring them to develop replicable solutions to business problems. Furthermore, they are aided by customer references, from applying those solutions, in their sales. As their accumulated replicable solutions and resources that provide the basis of their offering are related to the specific platform in order to be competitive, their strategic configurations become more specialized, and as they become more successful in their ecosystems, they also become locked in them.

On the other hand, platform independent companies do not benefit from an easy access to ecosystem customers. However, they have been able to attract top talent from a pool of professionals that are very much competed for. In order to be attractive to these employees they must offer interesting technologies and projects, and autonomy. Interesting technologies and projects are in line with their offering, as creating differentiating solutions means creating something new that does not exist elsewhere. Creating new and differentiating solutions is interdependent with the freedom to use any technology autonomously, as it is not only appreciated by self-driven top talent, but also required to create best possible solutions. As the solutions rely on most suitable technologies for the specific solution, the firms are better off not being tied to a single platform technology.

#### **4.2.1 Key resources aligned with platform participation**

The key resources that the firms view to contribute most to their success differ depending on their approach to platform partnerships. The interviewees in platform independent firms highlight top talent employees as almost their sole source of competitive advantage. Informants in firms that have a single-platform focus do not mention top talent as a key driver for their success. Instead, they highlight the importance of replication and IP as drivers of success in winning customer cases and executing them profitably.

For platform independent complementors, top talent is the most important driver of success, according to the informants. Being able to recruit and keep top talent is the basis of their sustained performance. Therefore, the companies are aligned to be attractive employers. This alignment is a dynamic equation, as providing autonomy, and enabling the use and learning of most attractive technologies both makes the firm attractive as an employer and enables it to benefit from the top talent as autonomous experts develop themselves in a variety of technologies thus enabling a broad capability base and innovation.

For platform-focused complementors, top talent is not a key resource. A platform-focused strategy, namely partnering with a platform, can also be a way to work around problems in recruiting by enabling hiring people that are not already top talent – or employees that may even be less likely to ever achieve such status. The firms manage to circumvent the problem of limited supply of capable software professionals by systematic capability development. Therefore, the ability to develop capabilities in a systematic way is a benefit to and strategy employed by the platform-focused firms. They do not have to compete for top talent, as they are able, with the help of training materials from platform leaders, to train people with little to no prior experience to become capable professionals. As there is no significant bottleneck in employees for them, the key resource for competitive advantage is intellectual property (IP), or replicable solutions. These replicable solutions enable platform-focused complementors to win customer cases, and to execute projects profitably. Both systematic capability development and IP are, however, platform specific. This may make it difficult to transfer capabilities and assets to other platforms.

The more detailed findings, and supportive illustrative quotations related to the alignment of key resources to the platform participation decision are presented in the following subsections. The data structure supporting the findings is presented in Figure 4.

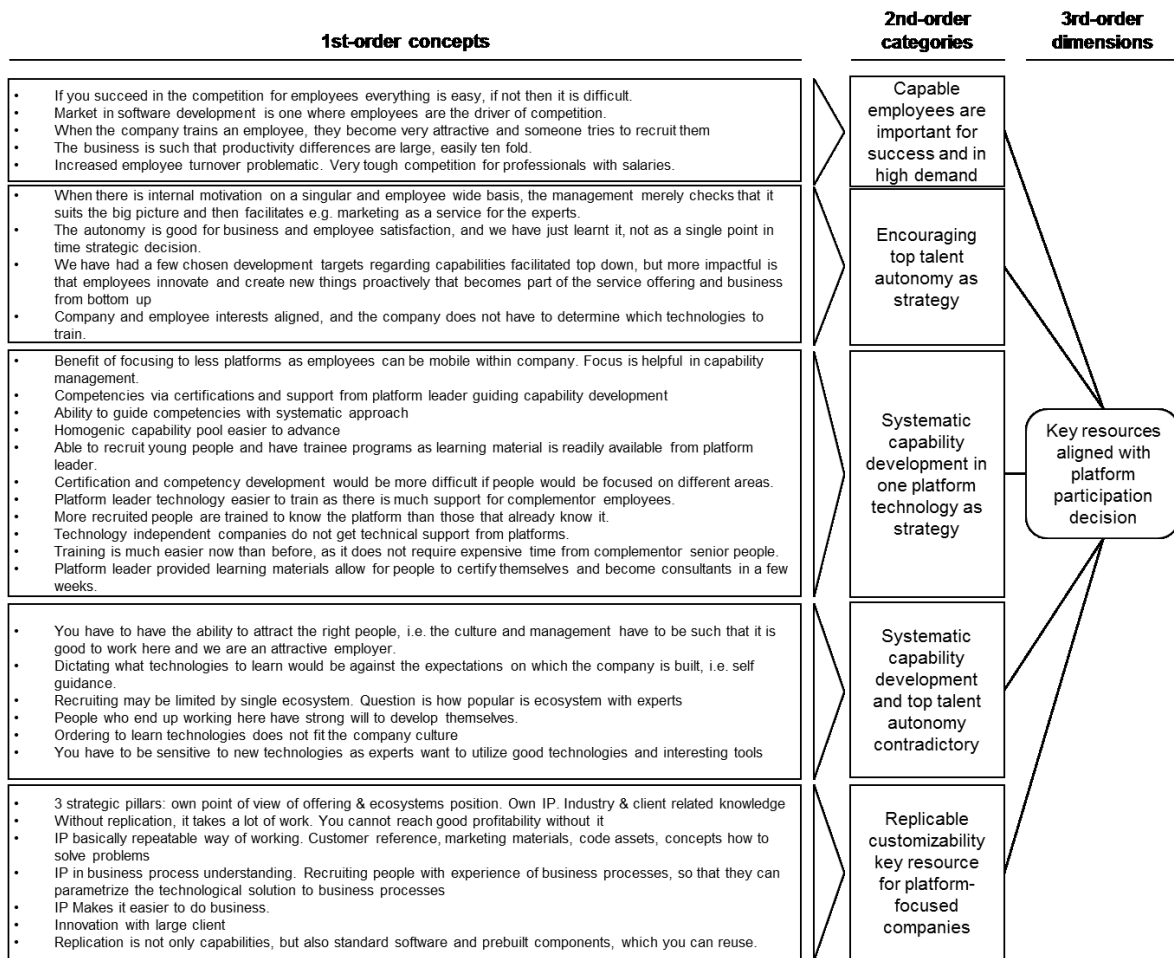


Figure 4. Data structure supporting alignment of key resources with platform participation decision

#### 4.2.1.i Capable employees are important for success and in high demand

According to the data, a very important issue for software companies, especially the platform independent complementors, is having capable employees. Top talent was highlighted in the interviews as almost the sole driver of success and competitive advantage for the platform independent companies.

*The business is competency-driven. Without belittling sales or customer-ships, if you are in the hottest capability areas, then the one who has the doers has the business. You do not need to sell much if you have the right people on board. (CC-1)*

*We have invested a lot into being a good place to work at, in order to get [the top talent]. This work what we do is brainwork, and productivity differences are insane, easily tenfold. [...] The whole thing starts from trying to lure in the top talent, and if we manage that, then everything is much easier from thereon. And if you do not succeed in that, then it is fairly difficult [...] even if everything else was as [good as possible] (CC-7)*

Platform-focused complementors also note that recruiting is not easy in the industry.

*The problem is that there is an increase in employee turnover. It is a very tough competition that capable employees are headhunted with very high salary offers. (CC-6)*

However, it seems that for them, top talent, or recruiting capable employees is not such a top priority or key resource. For them employee turnover may be problematic, and they need to consider recruitment and be somewhat attractive employers, but there is a significant difference to platform independent complementors in how valuable top talent is. Whereas platform independent complementors highlight employees as a key resource, platform focused firms do not. The insight is partially based on what was not being said, and is supported more by how the firms focus on systematic capability development, as elaborated later on in section 4.2.1.iii.

#### **4.2.1.ii Encouraging top talent autonomy as strategy**

Due to top talent being extremely important for platform independent complementors, and as they identify it as a key resource, their corporate culture supports the attraction and retention of top talent. The culture is highlighted by autonomy, which not only enables the companies to be attractive employers but also enables them to manage the diversity of different technologies that is required to be independent. Autonomy of top talent is, therefore, directly interdependent with the decision to remain independent from platforms.

*Nowadays we do not aim to affect [technology choices] of our employees, but to recruit as capable people as possible and facilitate their enthusiasm. It has not been a single point in time when it occurred. The world has changed; it has become more complex and diverse in terms of technologies and ecosystems. And we have the people, as we have continuously aimed to recruit top talent, who have been very strong in their own points of views, and we have just let them do. It would be nice to be able to say one point in time when we made such a strategic choice, but it is difficult to point out. We have just learned it, and it is good for business and employee satisfaction to operate in this way. (CC-3)*

Platform independent companies actually embrace the diversity of different technologies, and have a culture of autonomy, where individual experts and project teams are allowed and encouraged to make their own technology choices. Granting autonomy to employees does not mean that employees can use any obscure technology of his or her choice. Even though firms do not dictate what technologies to use, or employ hierarchical decision-making, they are interested in conducting a profitable business. At least one of the platform independent firms note that their by incentive models for employees act as a simple guidance. As incentives are tied to billing, people are encouraged to learn and utilize technologies for which there is demand and use cases.

*[...] In the end it is simple. Our compensation model is tied to billing, and if you happen to know such technologies, for which there is no demand, it will start to show in your salary. (CC-7)*

The encouragement of autonomy is a fundamental driver of capability development, as individual employees, i.e. top talent, make their decisions regarding technologies inde-

pendently. This means that multiple, highly knowledgeable people develop the firm's capabilities in a distributed manner. Furthermore, some may also proactively drive new offerings that may become a part of the firm's core offering.

*[When new technologies come] it requires an entrepreneurial minded person, who says that this is good – I will use it and it will work – it is a big bet for them to invest their time. And then it either flies and they are a Guru, or it doesn't and they wasted their time. (CC-1)*

*[...] We had a few employees who thought that [the general point of view that a technology cannot be applied in a certain way] was false, and convinced a few clients that it is possible. And the outcome is that it [the solution] is one of our major service areas. (CC-3)*

#### **4.2.1.iii Systematic capability development in one platform technology as strategy**

Instead of having to recruit already proficient top talent, platform-focused firms employ systematic capability development strategies enabled by having a one-platform focus. Those firms that choose to commit to one platform benefit from the focus, as it is easier to coordinate a less diverse capability pool. The ability to manage the capability pool is not only an added benefit from the partnership, but in some cases a reason to commit to a single platform.

*[...] In that stage of growth of the company we saw the benefit of being able focus in one area, and as a consequence have a more homogenic capability pool to advance. (CC-4)*

*With our size, [over 200] employees, it is already difficult to know and do everything, if we would have [two other platform leaders] also, it would not work out. We would have internal silos with different capabilities fighting with each other, and different priorities. (CC-8)*

Platform leaders facilitate capability management and development of platform-focused firms. Namely, they provide training materials and the possibility for people to gain certifications in their technologies, which give significant benefits for two reasons: 1) capability training can be very expensive, if conducted by senior experts in the company 2) recruiting is easier, as the firm can hire people with little to no experience and train them with the available materials.

*As a rough estimate, we do have more people coming in that do not know [the platform technology], than those that already know it. (CC-5)*

*Yes, [capability management has changed] as we can and do hire young people as the training material is available. [...] In especially application training we do not need that many senior experts involvement – the people who earn most in the company. (CC-6)*

On the other hand, a homogenic capability implies that the capabilities are homogenic also in the negative sense, i.e. in only one platform technology. As employees are trained with platform leader materials, these materials are likely to increase the capabilities in specifically that platform technology, therefore making these skills less transferable to other platforms.



#### **4.2.1.iv Systematic capability development and top talent autonomy contradictory**

As the firms with different platform participation strategies differ in their ways of tackling the business critical employee issue, it is noteworthy that these choices seem to be contradictory. One cannot have autonomy and a systematic capability development strategy at the same time. Furthermore, top talent may prefer platform independent companies specifically because they give them autonomy, and freedom of choice in technologies. Freedom of choice enables employees to use technologies that excite them and ensures that all employees feel like they are using and learning things that they want to develop themselves in. Informants in both types of the companies deemed these factors important.

*It is important for employees to feel like home somewhere. When it comes to corporate strategy, it means that the person deeply identifies with it. Is the company supporting a technology that I know and want to know? It is very important for employees and reflects to customers. If a person feels that they can develop themselves in where he is capable in, it of course reflects to the customer side. That you are a happy expert who truly lives and breathe the technology. (CC-6)*

*[What drives our technology choices] is demand and the interestingness of the technology. Even if there was a huge demand, if no-one is interested or excited, it sets off quite difficultly. However, these two things usually go hand in hand. (CC-1)*

As platform-focused companies are tied to one technology, such alignment of employees with the technologies they use may not exist with the most attractive talent, or supply of labor. As the comment below illustrates, the platform-focused firms acknowledge the possible difficulty in recruiting, and note the importance of platform technological attractiveness to experts, even though they do not see it as a limiting factor.

*A good question is then, as the market has a good pull, and you probably acknowledge that recruiting is not always that easy, is that would it be easier to attract people if we had a wider array of technologies – a question of how attractive [platform leader] technology is. It is a good question, but these platforms are not that different, and it is not a limiting factor. (CC-4)*

From the perspective of platform independent firms, they may get some of the benefits available to platform-focused firms. Namely, they can also utilize training materials provided by platform leaders. The actual rules and pricing for training materials from platform leaders was not explored in depth in the interviews, but platform independent firms, too, can and do use them.

*For example, for [cloud platform], when we started expanding services related to it, we had big internal trainings, to which everyone was welcome to attend to. Some 30 people attended and about half of them received a certification. (CC-3)*

There is certainly some level of systematic capability development also by platform independent firms, but the approach is different, as it is more facilitative and enabling, and optional for employees. The difference is illustrated well by the quote below, as platform complementors view themselves more of enablers for top talent to autonomously fulfill “their own mission”.

*When there is an internal will and individual people drive the excitement, management merely checks that it fits our big picture, and facilitates it by offering e.g. marketing for the top talent as a service. They get to fulfill their own mission with the support of the firms marketing and sales, and the firm gets business. (CC-3)*

Therefore, even though both of the capability development styles are systematic in their own sense, the platform-focused firms’ way of hiring people and training them in platform leader technologies is definitely more structured and standardized. The way platform independent complementors approach capability development is nonstandardized and enabling, and grants the right to make decisions to the employees in a more bottom-up manner. Instead of training employees to a specific platform technology with available materials, the platform independent complementors rely on autonomous efforts and motivation of the top talent.

Even though platform independent firms are not specialized in their employees’ capabilities to any single platform, it is fair to claim them to be specialized in their own way. As they rely on their ability to attract top talent and retain it, they, too, have limited options. More specifically, in the context of their platform participation decision, they are locked in their decision to remain independent. The option to choose one single platform and configure capabilities to that ecosystem is not attractive for platform independent complementors, as they would most likely lose at least some of their top talent. As their ability to attract top talent relies, at least partly, on the autonomy of their employees in technology choices and ability to develop capabilities to the direction employees themselves choose, taking away that autonomy may be very harmful.

#### ***4.2.1.v Replicable customizability key resource for platform-focused companies***

Instead of highlighting employees as the most valuable resource for the firm, platform-focused firms value most their accumulated experience in customer projects. This accumulated experience can be referred to as intellectual property (IP), or assets that allow replicating processes and solutions that have been learned in earlier projects to other customers. All the experience or IP that the firm has accumulated amounts to the unique resources of the platform-focused firms, which at least some of the interviewees see as core to the firm.

*IP, in these conversations is usually reflected in what the unique capabilities of the player are, or the asset on which they base their operations and value creation in the ecosystem. What the core is. (CC-4)*

IP can be seen as many things, but essentially it helps firms to replicate their processes and solutions, ranging from offerings to project management.

*Examples of IP [in the context of ecosystems] include having a concept how you do things, customer references, marketing materials, code assets, and concepts how you go through projects – a replicable implementation model. All these, can be referred to as IP, and any asset, capability, or*

*feature that helps you in a replicable way of doing things can be seen as IP. (CC-4)*

As noted, the experience accumulates from prior projects. The value of the experience stems also from the customer reference, i.e. that the next customer can see that the solution has worked before and that the service provider has successfully conducted a similar project before.

*One can think that we have a product portfolio, for which we have a trademark or a software asset – that is quite clear IP. We can have a concept that we have done with a customer and which we can utilize in a similar manner, when we go and talk to another customer. The other customer sees that we have done it to someone else, who is satisfied, and we as a service provider know how to solve the problem. We have a framework, which allows for quicker time to market, we have less risk – and that is why customers should work with us. In that case, we see that we have a certain asset that helps us in conducting business. (CC-4)*

The IP is not only valuable in terms of winning projects, but it enables the platform-focused firms to provide solutions more quickly, efficiently, and with lower risk and higher quality.

*In the future, if we have an efficient concept and way of delivering, that IP is valuable for us as we can produce that service or solution efficiently to customers. Also, the quality is probably higher, and the risk is lower, it [IP] helps in that, too. (CC-4)*

The replicability and experience, therefore, not only has an effect on the ability to sell projects, but also conduct them more profitably.

*[...] You start focusing on certain firms [as customers], as you have prior experience, and it is easier to sell when you do the same thing again. It is always the aim and important to get to replicate things, as if you cannot replicate, it takes always as much work. If you have to start from the beginning and you have to study the customer as much as the first time, you cannot reach improved profitability. (CC-6)*

*It is not only you having the capability that you replicate, but also on the software side, the way you set things up, the way you set the parameters for the standard software. Plus if you have a specialized component, which you have done before – i.e. you have customized already the standard software, you can reuse it. Otherwise it is always a couple of dozens days more work to each customer, and then you cannot reach better profitability in this industry. (CC-6)*

It seems logical that the replicable solutions go hand in hand with the systematic capability development strategy of the platform-focused firms. Both replicable solutions and having a structured training for new employees via training materials favor standardization and doing things in a replicable and cost-efficient manner. On the other hand, the IP that the platform-focused complementors accumulate is tied to the platform of choice. The scalable and replicable solutions or frameworks are likely to be platform-specific.

## 4.2.2 Offering aligned with platform participation and key resources

The offering of the complementor firms is thoroughly aligned with the firms' platform participation decision and key resources. Even though platform-focused complementors' offerings fundamentally differ from the offerings of platform independent firms, both still take platforms into consideration. The offering of platform-focused firms is essentially aligned with the offering of the platform leader, and is focused on ways to efficiently add value to that offering. For platform independent complementors, the offering is specifically different from the platform offering, as they focus on offering something that those platforms cannot offer, i.e. differentiation.

The offerings are fundamentally aligned with the firms' key resources, as platform-focused complementors leverage the replicable solutions in order for their offering to be competitive, as tailoring solutions from scratch to each individual firms needs would not be efficient and would not allow for profitable business. Platform independent firms would likely not fare well in competition against the platform-focused complementors, and their offerings do not aim to compete against neither platforms nor platform-focused complementors. Furthermore, it is likely that the top talent, employed by the platform independent complementors, appreciates being able to work on projects that aim to differentiation instead of replication.

The data structure supporting the alignment of offerings with the platform participation decision and the key resources of the complementors is presented in Figure 5.

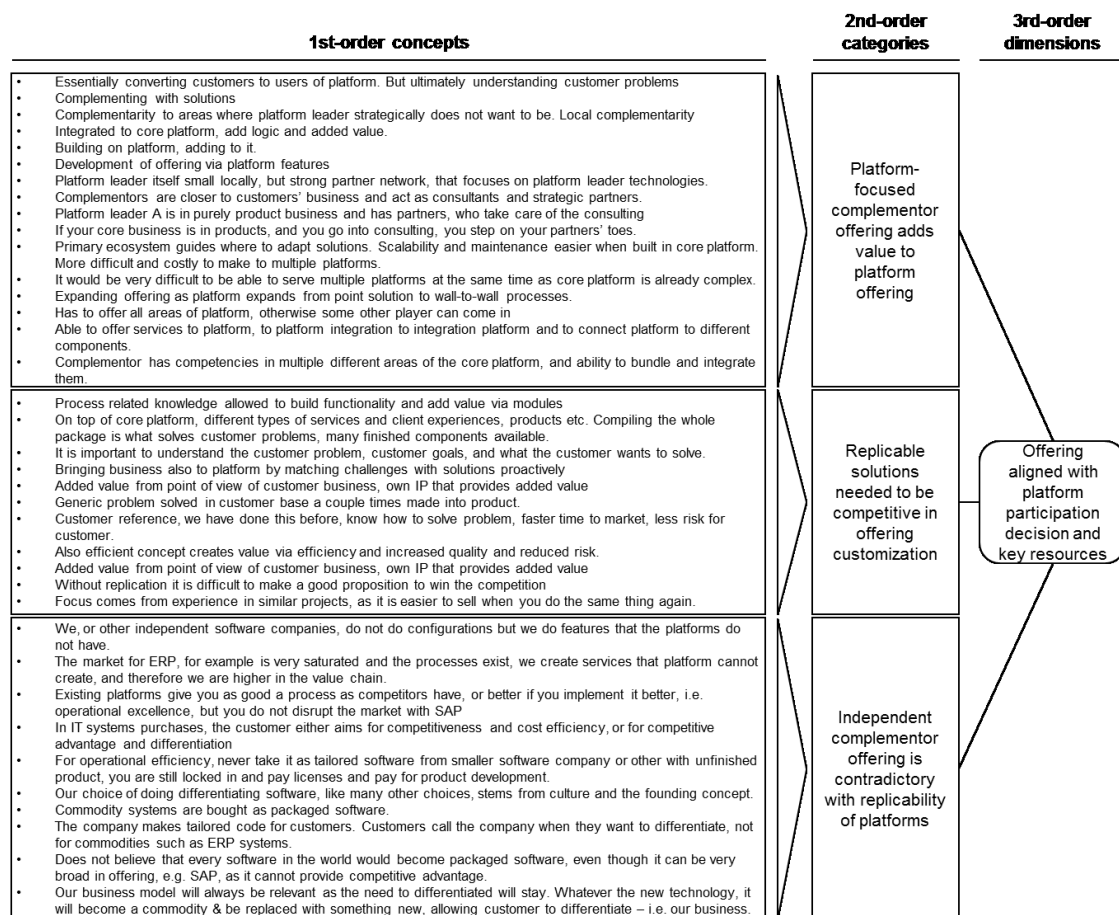


Figure 5. Data structure supporting the alignment of offerings of the complementors to the platform participation decision and the key resources

#### **4.2.2.i Platform-focused complementor offering adds value to platform offering**

As the offering of platform-focused complementors is built around the idea of adding value to the platform, there are two predicaments for the offering. First, the areas in which they provide services and solutions need to cover a significant part of the platform's offering. Second, the services and solutions must be such that the platform does not cover those needs on their own. Therefore, the offering development of platform-focused firms is aligned to their ecosystem of choice.

The first predicament stems from not only the fact that customers value firms that can serve them comprehensively, but also the will of complementors to protect those customerships. According to the informants, the firms are not only able to expand their offering as the platform increases in functions, but they also have to do so, in order to protect their position as the customers' service provider. The need to protect the position stems from the fact that if some other complementor would take over one of the functions of the platform, they may threaten also the other businesses or functions related to the platform formerly served by the focal complementor. As one of the interviewees puts it:

*I do want that we protect our position in the customership. If someone else came in and took one corner, then they suddenly take another corner and maybe a third and expand their position in the customer. That is why we need to offer comprehensive solutions [within the platform] and know all of them [platform functionalities] (CC-5)*

The need to provide comprehensive services in regards to platform technologies is also related to the fact that the benefits of the platform stem from a comprehensive coverage of functionalities. The platforms are becoming wall-to-wall comprehensive systems and that affects also the platform-focused firms interviewed.

*The platform is becoming a system that encompasses the whole [customer] firm, where you can handle processes wall-to-wall, and that is one thing that has driven what we do. (CC-5)*

The second predicament, the value added, most importantly, stems from providing services that the platform leader cannot or does not want to offer. It originates from the difference of product and service businesses, and from the fact that a scalable product cannot be customized to each customer's needs. The platforms provided by platform leaders are not customized to each customer's needs, and instead of providing such customization as a service themselves, the platform leaders rely on a network of partners, or complementors to do that. Instead of having to have large organizations in each geographical region, the platform leaders can rely on the large complementor networks for customization.

*[The platform leader] does not sell anything on their own, or maybe they have some large clients in which they are involved for a while. But it is always the partner network. And the partner network has [more than 100 times] the employees compared to the platform leader here in Finland – [more than 100 times more] people employed by partner firms that are only focused on [platform leader]. (CC-6)*

What the partners, or complementors, provide is specifically customer specific solutions. They get to know the customer and their processes, and assist them in configuring the platform solutions to their business.

*It always needs that experience in order to get the software configured to the clients industry in a way that the business processes run as the customer wants [...] you can actually configure those business processes quite much, as the functionalities are deep – and that is why you need the consultant and the experience. (CC-6)*

*The key thing to our offering is that it starts from the customer. (CC-4)*

#### **4.2.2.ii Replicable solutions needed to be competitive in offering customization**

As noted in the section 4.2.1.v, platform-focused complementors identify IP and replicability as perhaps their most important drivers of success. This is directly interrelated to their offering, as even though they customize platform technologies to specific customer needs, they have to do it cost-efficiently, quickly and with low risk. This relates to both winning projects in the first place, and reaching profitability in those projects.

In order to win cases and projects, platform-focused firms compete against other complementors. Without replicability, the costs of having to start from scratch may prohibit a competitive offer. Therefore, replicability is not only key to profitability, but also to winning projects in the first place.

*There is always an aim for replicability, and it is very important to be able to replicate things. If you cannot replicate things, it is always as labor-intensive. And you can never reach better profitability, because you always have to start from scratch, and study the client as much as the first client. [...] You cannot actually even do a proper proposition to win the case with [without replicability]. (CC-6)*

IP, as noted, builds up from prior customer projects, and stems from a broad clientele that faces similar problems. In terms of offering, IP is not necessarily a product, but more of a solution that is replicable to multiple customers.

*[...] And this is our primary way of working, as now when we look at the world, it has gone to a direction where multiple basic capabilities available. Say we look at analytics, machine learning, AI or IOT, in order for them to get traction, there has to be a clear context and problem to solve. [When solving a problem with a customer] we have e.g. IOT-frameworks and technologies to use for the problem type, and then we can also find a solution that we can replicate to others. (CC-4)*

Therefore, by solving customer problems, the platform-focused firms actually accumulate replicable solutions, which become part of their offering in following cases. They benefit not only in being able to win cases via credibility due to customer references, and ability to propose a lower price, but they can also conduct those projects efficiently and earn a profit – even though they are providing a customizing service, which solves a customer specific problem, in contrast to stand-alone platform products. These accumulated replicable solutions, as noted earlier, are a key resource for the platform-focused firms.

The replicable solutions, as a result from prior customer projects, are most likely applicable mostly in projects that utilize similar technologies. They may not be transferable to other platforms, as platforms require not only customization to them, but understanding of the functionalities of the platform. It is unlikely that the benefits of replicability could be achieved with a multiple platform focus, as customizing the solutions to multiple platforms would be costly, and would also require having a broad capability base in all the different platforms supported. Coordination of systematic capability development across multiple platform technologies would likely increase costs – perhaps in a nonlinear manner due to increased coordination costs.

Furthermore, the experience and replicable solutions would quite evidently not be transferable to the business logic of platform independent firms, as is shown in the following section.

#### ***4.2.2.iii Independent companies' offering contradictory with replicability of platforms***

The firms that highlight their independence from platforms also seem to take platforms into consideration with their offering. It is difficult to assess the exact cause and effect relation between the two characteristics, i.e. did the offering lead to independence or independence to the offering, but there is certainly a relation. The platform independent firms namely highlight that they offer their customers with solutions that are differentiating and aimed for a different need than packaged software or platforms.

*No one of us [independent firms] do SAP configurations, what interests us are the features that SAP does not have. (CC-1)*

The platform independent complementors note that their offering is distinctively different from that what platforms can offer. The use cases of platform technologies and the use cases for which the platform independent companies offer their services are distinct from each other. There is also a clear understanding that independent companies are not fit to serve the customer need that platforms serve.

*We are called up when there is a need for differentiation, not for commodity like things such as ERP – no one buys that from us, but take it as a packaged software. (CC-7)*

*If you seek operational efficiency, but do not want differentiation, then the only right solution is to take an existing platform. [...] The worst option, chosen by many [customer firms] is to buy from a small software company that does not have a finished product. Then you pay for their product development. (CC-1)*

Furthermore, the independent firms are confident that their services cannot be taken over by platforms, as they specifically address the need to differentiate. According to the informants, even though platforms can become broader in functionalities, they can never offer differentiation or competitive advantage to the customer firms, as in the best case they offer customer firms the ability to be as good as the best of their competitors.

*[...] By implementing software products, you can at maximum reach the same level as others [...] We are those that can be near the customer developing tailored solutions with which customers seek competitive advantage. (CC-3)*

*But you cannot get any competitive advantage as everyone uses the same SAP. Our business is to make something differentiating on top of it. (CC-7)*

On the other hand, the offerings are still related to platforms, as platforms provide the basis on top of which platform independent complementors build their own offering, as also illustrated by the quote above. Even though platform independent complementors do not provide services in configuring the platform technologies, the data, essential to the solutions, is stored platform technology solutions. Therefore, platform independent complementors must know how to connect their solutions to various platforms.

*[The platform technology] is not interesting to us in a configuration sense, but it is interesting as these [platforms] are not changed every year, or even every decade. The data is there [...] and when we develop new solutions, we must be able to penetrate the platform and integrate to it. [...] We have to be able to get data in and out of the platform. (CC-1)*

Overall, the offering of independent firms varies greatly from the offering of platforms, but it can also be concluded that it differs greatly from the offering of firms that partner with platforms, i.e. platform-focused complementors.

As one of the main drivers of competition between platform-focused complementors is to be efficient in their customization, and therefore their key resources are the IP that enables replicable customization, their capabilities would certainly not transfer to projects aimed at differentiation. Replication and differentiation are polar opposites – selling best practices utilized by others does not constitute to differentiating competitive advantage, but does well answer the need for operational excellence.

On the other hand, firms that create differentiating software, i.e. platform independent complementors, would not fare well in competing against platform-focused complementors, as they certainly would not be able to win many tenders due to the high cost of starting the project without any replicable elements, or due to a lack in customer references in implementing platform configurations. Platform-focused complementors have likely accumulated much more IP relevant to their platform of choice than platform independent complementors, as they focus their efforts in one ecosystem.

Furthermore, if platform independent complementors for some reason would choose to partner with a specific platform, and even if they managed to keep an adequate proportion of their top talent that value the current differentiating projects, they would be many years behind the top platform specific complementors. Therefore, it is likely that they would not reach success in that competition for many years, if ever, as the platform-focused complementors can keep adjusting their operations with much more experience.



### 4.3 Power and future options affected by participation decision

The third research question for this thesis aimed to understand how the operating environment of the complementors is developing, while seeking to understand what drivers of change are most important. Furthermore, possible responses of the firms to their anticipated future environment were sought for. This section addresses the research question, formulated as below:

*What drivers affect the future of ecosystems and complementors and how will the complementors respond to changes?*

The most important drivers of change in the industry seem to be technological development and development of customer needs. Cloud technology is the single most important technological driver. Platforms expand in functionalities and can take on more of the technological responsibilities in projects directly. An increasing number and variety of functionalities in platforms, and concurrently the increasing number of different platforms makes understanding them more complex, and customers need advisors on platform choices. This is due to the increase of options in variety, driven by number of platforms available, and due to the increasing complexity, depth and breadth of each platform. Therefore, customers need, more than earlier, consultants that can advise on platform decisions, and that can help them in understanding what is possible within each platform ecosystem.

At the same time, programming is commoditizing, and customer value stems not from the software itself but its business applications. In addition to the vast opportunities provided by platforms, customers must think about platforms strategically, as they must balance between the tradeoff of embeddedness and flexibility that is inherent in choices they make regarding utilizing platform technologies. There are both benefits and risks for customers in embedding their processes in solutions offered by an ecosystem of a specific platform leader. Being able to utilize the benefits of ecosystems to full extent may require such embeddedness that options regarding transferring to different platforms close, and negotiation power against platform leaders diminishes.

Changes in technologies and the interrelated changes in customer needs provide business opportunities for complementors. The business opportunities relate to providing services that incorporate business logic more tightly to software than before, and advising customers in their platform strategies. The incorporation of business logic to software is not, however, only an opportunity, but it is also a necessity, as some former business opportunities are taken over by platform leaders, or become less profitable and commoditized. Commoditization is occurring especially in programming capabilities without the inclusion of business logic. Furthermore, providing software that incorporates business logic can be expanded to being actually partial in the development of business logic and strategy by taking into consideration the possibilities of software.

These changes in the industry require responses from the complementors. The responses differ between platform-focused complementors and platform independent complementors, affected by how they operate currently, and by their platform decision, and the independence or dependence that follows.

Power is discussed in this section, as it is a consequence of the platform participation decision, and importantly affects how complementors can respond to changes in their operating

environment. Power between platform leaders and complementors is asymmetric, as complementors are affected by platform leader actions, but complementors do not affect platform leader actions, at least directly. Advising customers, and therefore influencing demand, is the most important way to affect platform leaders' strategies indirectly. Platform-focused complementors, not being free to choose which platform to utilize, are affected more by the platform leader in their ecosystem, and may have pressure to utilize inferior solutions, not only to them but to their customers, although they can fight this pressure by not recommending those solutions to customers. Platform independent complementors are free to use any technology, thus enabling them to use the most suitable technology for each customer case. This, importantly, makes them credible advisors to the customers, importance of which will increase in the future.

To sum up the future directions of the different types of complementors, the platform-focused complementors can build on their experience to sustain their position in the ecosystem. They may wish to focus on some industries, but more importantly, they must address needs of the customers that the platform leader cannot efficiently serve. Even though being able to diversify their ecosystem risk would be very welcome, it does not seem very easy at this point, as they have become quite specialized in their own ecosystems, and the competition in ecosystems that may seem more attractive in terms of growth is likely to be fiercer with existing competitors that have an experience advantage. Furthermore, the platform leaders' incentive models combined with their current successful configuration will make a decision to transfer to another ecosystem very difficult.

It seems that, at least for the firms interviewed, that the prior experience of platform-focused complementors has been suitable, or at least adaptable, for the transition that is occurring. Their prior customer cases and the solutions they have created seem to be an advantage the firms build on. As such, it seems that the transition to cloud, even though radical and fatal to those companies that have focused only on license sales, has not been as negative to the case companies interviewed for this thesis.

As platform-focused complementors further adapt to new business models in the platform, it may further strengthen the degree of their lock in, but also provide them with advantage and enable them to become experts in their platform of choice. Furthermore, as the complexity increases, customers will probably still need advisors on configuring their systems, even in the new models enabled by cloud. It seems unlikely that platform leaders will be able to take over those services with scalable online materials, at least in the near future.

Platform independent complementors, on the other hand, are very much free to utilize any platform, at least with current rules of the ecosystems. They are not, however completely free as they would face problems should they wish to aim to focus on a single platform and reap the benefits in customer access. As noted earlier, their most important resources, i.e. top talent, would most likely be harder to retain in a case where they would choose such a path.

What platform independent complementors are, instead, doing is expanding to other professional services – an expansion that has started already multiple years ago in the domains of design and service design. The most recent expansion to management consulting is an addition that firms have taken onto in various degrees. The first movers already have significant

consulting power with multiple employees, as the followers are thinking about making such moves.

According to the findings, such moves towards adjacent professional services are enabled by customer demand. Customers need advisers that can respond to their strategic problems that stem from IT and business strategies becoming more intertwined, complexity increasing in the different platforms, and the need to think about platform choices more strategically. They turn to platform independent complementors to assist them in the decisions, as they are credible advisers.

Furthermore, the platform independent firms seem to be well aligned to respond to customers' needs, provided that they manage to include business knowledge in their offering, either via cooperation with business consulting firms or by integrating such skills into their own organization. The credibility that they build on stems from impartialness and a broad range of top capabilities in the software domain.

#### **4.3.1 Technology development and customer needs as drivers of change**

When looking at how the business-to-business software industry is developing, two important categoric themes that drive change can be identified from the interviews. Namely, technology development, generally and in platforms, and the development of customer needs. These themes are interdependent, as technology at the same time allows more things to be done more easily, in terms of platforms being able to take more responsibilities and the commoditization of programming, technological development also makes it more difficult for customers to understand the wide range of options and what they essentially mean to them. These both themes affect both what is expected from the complementors and what they could and do offer to customers. The changes, therefore, affect the offering of the firms, mediated by the key resources, and power relation with platforms. The quote below summarizes and illustrates the development well.

*In our case, as the core ecosystem can create more finished services directly from cloud as a service, then these [key resources] I mentioned earlier, are relevant for our ability to create added value. [...] [The key resources] with which we have been able to create added value with, and which have developed in an evolutionary manner, and which we have been aiming to strengthen continuously, as those are the areas where we see ourselves creating added value in the future with. And I would say that in an ecosystem like ours, the power relations change continuously as the market develops and the technology develops rapidly. (CC-4)*

The findings related to technology development and customer needs as drivers of change are presented below. Figure 6 presents the data structure that supports the findings, including most important 1-st order concepts that led to the emergence of the 2<sup>nd</sup>-order categories.

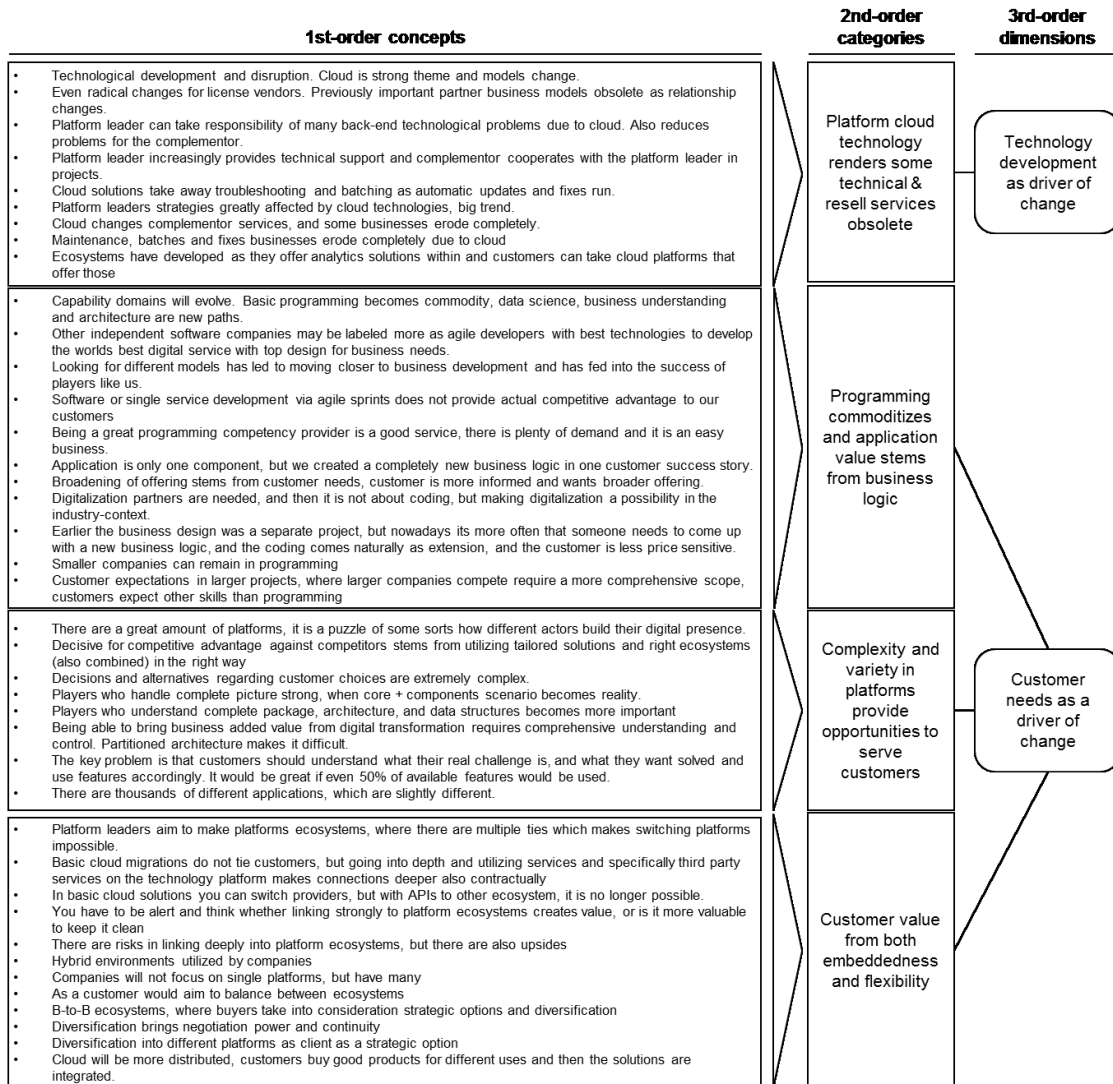


Figure 6. Data structure supporting technology development and customer needs as drivers of change in the industry

#### 4.3.1.i Platform cloud technology renders some technical & resell services obsolete

The main and most direct driver for change in the industry seems to be the development of cloud technologies. As platform leaders are driving adoption of cloud based platforms, the extent to which they can take over services grows. This change was described as radical and disruptive to especially the platform-focused complementors, indicating a big risk and need for rapid adaption.

*In this cloud model, the biggest risk is how fast it comes into effect, and whether partners can adapt as quickly as needed. For example, licensing partnerships, i.e. transforming to [platform technology] license sales to selling a cloud service model, it requires a different type of capability from the complementor. And this has been a large disruption for license retailers, a business that has been large everywhere in the world, and in the Nordics. (CC-4)*

Even though none of the firms interviewed are mere license resellers, the cloud model still has major effects on their business. Not only do cloud platforms take away opportunities in

selling licenses, they also expand the ability of platforms to take care of many technical problems of customers, previously served by complementors.

*It affects our services, as service models are very different in cloud, as some of our business practically disappears. For example, earlier we supported ERPs as on premise solution, which means that we were responsible for the system [...]. In that case we provided services in maintenance breaks, installing batches, and taking the responsibility of the updates and usability. We also took care of customer support by seeking for fixes from the platform portal. All this management and maintenance work disappears completely in cloud. (CC-8)*

The development is accelerated by the will and ability to take care of the technical side by the platform leaders, as they already not only help customers with technical issues, but also act as technical experts to platform-focused complementors. This not only takes care of some problems complementors had to deal earlier by themselves, but also takes away business opportunities from complementors and forces them to adapt and find other ways to add value – especially in the business and industry contexts, as discussed in section 4.3.3.i.

*We do not usually sell to technically challenging solutions to customers, which require a high degree of technical proficiency regarding the platform without the help of [platform leader]. We can ask, and receive automatically, such help and for free. Also, in customer problem situations, where the system is e.g. slow in some functions, we can ask for help from [the platform leader] that comes with a price tag, which the customer pays for. (CC-6)*

Platform technology development not only affects the platform-focused firms, but it is also a driver for platform independent firms' development, as platforms can provide an increasing number of new functionalities as packaged software.

*Different kinds of ecosystems are reaching a new level of maturity, if you think about what e.g. AWS offers in data analytics [...] There is an enormous diversity of possibilities [in different components], and ecosystems and platforms with their own services. (CC-3)*

#### **4.3.1.ii Programming commoditizes and application value stems from business logic**

The most important driver for change for platform independent complementors seems to be the fact that the software development without understanding the business context is commoditizing and becoming less valuable for the customers. Therefore, something else needs to be offered, such as more refined understanding in data science, business processes or software architecture.

*Basic programming, or parts of it, will commoditize and you have to go to areas like data science, business process understanding or architectural understanding. The value added moves higher in the hierarchy, so to say, and in that sense there will definitely be change (CC-7)*

The informants noted that the main driver for this is that customers' software solutions increasingly need to, and do, incorporate business logic in order for the solutions to be valuable. This relates to the opportunities provided by platforms and available technologies, but also to conventional ways of their way to offer differentiated software via tailored solutions.

*Customers have a variety of options to further develop it [their business, as there are more and more possibilities in technologies]. It is a much broader task than just developing some software or a single service in an agile manner, sprint by sprint. It [such software development] does not give actual competitive advantage to our clients. (CC-3)*

Therefore, software firms must evolve, in order to avoid becoming trapped into price competition. The willingness to pay for services of the customers stems from inventing new business logics enabled by software, and actually building that software is only a natural extension to that offering.

*The benefit for the customer does not come from whoever can program at lowest cost, but from someone inventing a new business logic for them. That is what the customer is willing to pay for, if you invent that, and then programming comes as a natural extension that you will then do for the customer. (CC-7)*

#### **4.3.1.iii Complexity and variety in platforms provide opportunities to serve customers**

The technological development not only takes away business or commoditizes prior services, but it also creates new customer needs, which the complementors can tackle. Due to the rapidly increasing diversity and complexity of available solutions in technologies and platforms, customers have a hard time understanding their options on their own.

*There is a huge amount of platforms [...]. And how different players build their digital presence will live on. It is a certain kind of puzzle. (CC-3)*

The decisions regarding different platforms and technologies are not only very complex, but also crucial for the customers. The decisions ultimately determine, whether the customers can obtain competitive advantage compared to their competitors or not.

*It is about utilizing tailored software, and making right ecosystem choices, and utilizing the services provided by that frame in a best possible manner that leads to the customer either gaining or not gaining competitive advantage in relation to their competitors. And it is an enormously complicated picture. (CC-3)*

The complexity and diversity of platform options is not only problematic in terms of choosing which platforms and technologies are used, but also in terms of how to utilize chosen platforms in the most suitable way. As the platforms continuously, due to inter-platform competition among other reasons, develop their features, customers have a hard time keeping up with what features they can and should use. Therefore, such development in customer needs also guides the offerings of the platform-focused complementors.

*It is like a beauty pageant. When one [platform] develops a feature and gets traction for it, then others too develop that feature [and vice versa]*

*[...] In a continuous manner new features are developed as the market is developed. And for the most part – one could say that it would be great if customers would utilize 50% of the features available in the solutions. The key would be for customers to understand what their real problem is, and what they want solved, and then utilize these solutions in a right way. (CC-5)*

*There are thousands of e.g. CRM solutions and they are all slightly different. And if some customer uses one CRM, it may be in a completely different manner than some other customer uses it. (CC-6)*

#### **4.3.1.iv Customer value from both embeddedness and flexibility**

In addition to having a diversity of complex platforms and technologies to choose from, customer firms must also assess their own platform choices from a strategic perspective. Namely, they have to balance between the benefits of diving deep into an ecosystem, i.e. becoming embedded in an ecosystem, and flexibility, i.e. keeping their options open for the future.

The main driver for the tradeoff between embeddedness and flexibility stems actually from the very nature of platforms as a structure to allow for complementors build and offer their products and services on. Embeddedness is a consequence of customers utilizing the increasing amount of complements available via platforms.

*Merely transferring from data warehouses to cloud does not tie up customers. But when you start resorting to those services available [in platforms] or especially to services by third parties offered to that technology, you dive deep and also get many contractual ties. This is also perhaps what they [platform leaders] aim at. Otherwise, it is most often possible to move solutions from say Azure to AWS, but when you start having APIs to the other ecosystem, then it may not be possible anymore. (CC-3)*

The embeddedness does have significant benefits for the customer, but the benefits may come at a cost. The benefits are mainly related to being able to easily utilize different services easily and scale them up or down. However, utilizing complements via the platform build up to stronger linkages with the platform. As the linkages accrue, the customer becomes more embedded, and may not be able to switch to another platform, and they lose their negotiation power towards the platform. The main benefit from not becoming too deeply linked is therefore the strategic option and ability to make own choices in the future.

*You definitely have to be alert and think if it creates customer value for them to link more strongly, or if it is value adding to keep it clean, so to say. [...] There is definitely upside in linking. The whole thematic and idea is that you can cross-utilize the services, and dynamically take into use new services and scale them up and down etc. You do not get the benefits if you keep your distance from the ecosystem. Both have their pros and cons. (CC-3)*

*In the context of B-to-B, you should think, as CIO, about where you can receive the cheapest and best service, but you also have to think about the*

*strategic angle – do you want to have all your eggs in one basket. And then you think what you want to do in the future, and what will your negotiation leverage be, and sometimes you may be willing to pay for not having all the eggs in one basket. [...] You do not want to be in a leash and you have an incentive and added value for paying for this kind of strategic option and ability. (CC-4)*

Due to the threat of lock-in, customer firms may be willing to pay more to keep their options open. This may mean utilizing multiple platforms for different things, even though it may come with a higher price tag. It also means that platform leaders need to consider the customer point of view in the way they structure their platform. As customers have different options that may be good enough, they may favor those platforms that allow for higher flexibility. This may be the main reason for platforms actually allowing at least some degree of openness in platforms.

*[...] The interfaces are becoming more open in cloud technology. Customer solutions are more distributed, and it is going into the direction where you take one good product and integrate. (CC-8)*

*Objectively, I see that [the platform leader] controlling tools – i.e. how you manage things, they practically support [other platforms] directly. [The platform leader] – even though they may not highlight it publicly, they have already accepted that customer firms will have multiple [platforms], and they want to offer their services and sustain in the world with multiple platforms. (CC-4)*

Technology development and customer preferences most certainly affect the ways complementors will conduct their business in the future. For some parts, it will mean that they will need to shift their offering, as platforms take over more responsibilities – a development which is not likely to reverse. There may, however be also some positive development due to customer needs that allow complementors to serve their customers in new ways – some of which may give the firms a more central position when it comes to platforms. However, in order for that to happen firms must develop new capabilities. Furthermore, the relationship with platform leaders and the power platform leaders have on the complementors affect the options complementors have in the future.

#### **4.3.2 Power depends on platform participation and affects options**

The power relationship between platform leaders and complementors is asymmetric, as complementors do not wield much power against platform leaders, but platform leader actions influence complementors. Platform leader actions are driven and affected mostly by competition between platform leaders, and ultimately controlled by customer demand. For platform-focused complementors, platform leader actions may be quite unfavourable, but they must accept the moves without direct negotiation. Platform-focused complementors have some indirect power via advising customers in technology choices within the platform, thus recommending, or not recommending, different new solutions offered by platform leaders.

Platform independent complementors are affected less by a power asymmetry, as they are free to use any technology and are not limited to any single ecosystem. The decisions platform independent complementors make regarding platforms are limited only by customer



preferences and the autonomous choices of employees and project teams. Such independence and flexibility also makes them impartial and credible in advising customers in their platform technology choices. Due to being able to influence customer decisions, they, too, indirectly, wield some power against platform leaders, but the more important factor is that they are free to use any technology, thus being less affected by possibly harmful strategies of individual platform leaders.

The findings related to how power depends on platform participation, and how platform participation affects options or flexibility of complementors are presented below. Figure 7 presents the data structure for the findings, including the most important 1<sup>st</sup>-order concepts.

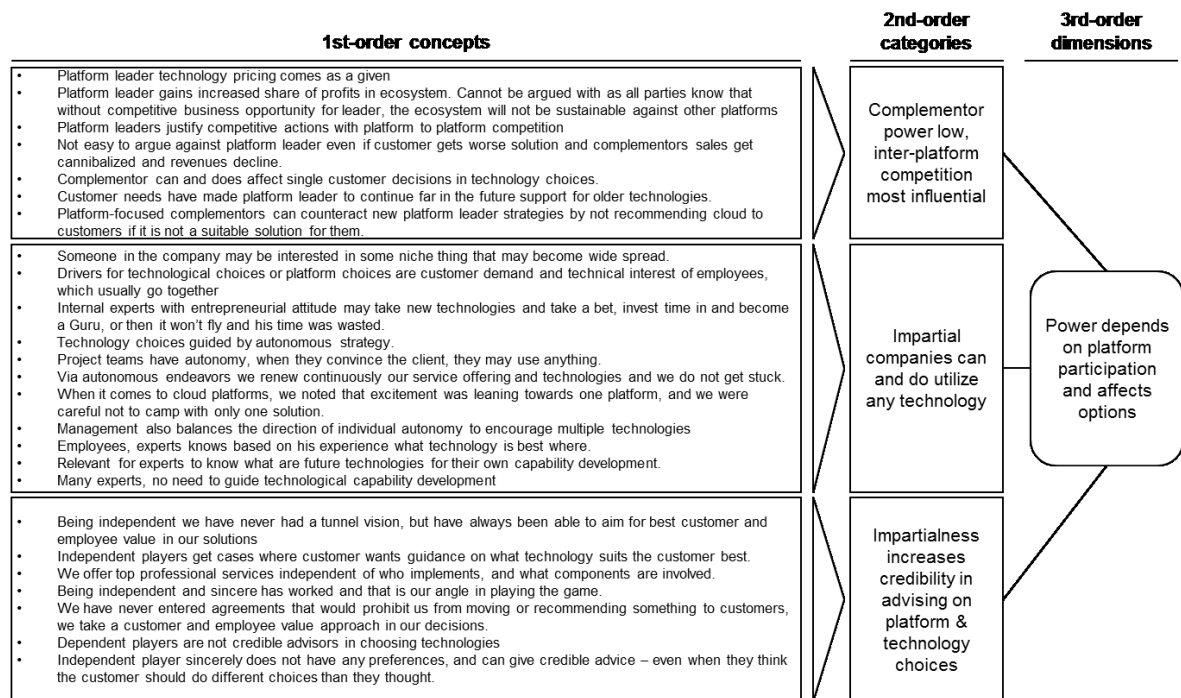


Figure 7. Data structure supporting the finding that power depends on platform participation and affects options

#### 4.3.2.i Complementor power low, inter-platform competition most influential

In the interviews, I aimed to carefully probe, and even directly asked, for ways in which complementors would have been able to negotiate with the platform leader, about e.g. how the revenues are split between the two in projects. However, it became quite clear that the complementors do not see themselves and the platform leaders as players who would negotiate with each other. Instead, platform pricing comes as a given, a fact that is generally known and accepted.

*[When asked about the distribution of value in projects where platform technology is used] Oh you mean monetary-wise? Well in these things it comes as very much a given. (CC-3)*

Complementors are willing, or forced, to accept that the division of value is developing into a direction more beneficial to the platform leader, because the ecosystem needs to provide realistic business opportunities for the platform leader in order for it to remain sustainable. The ultimate driver is the competition between different ecosystems.

*Earlier you could think as a rule of thumb that [a platform leader] would say that 1 euro to the [platform leader] meant 7, 8 or even 9 euros for the partner. Now they say that 1 euro to [the platform leader] may be 5 or 6 euros to the partner. These are established truths in a way, and will remain so, as all parties know that without a realistic business opportunity, the ecosystem is not sustainable in the future. (CC-4)*

*The power setting changes constantly in these ecosystems. As the market and technologies develop, even if we told [platform leader] that they cannot come and eat our business, they reply that they have to as their competitors take certain actions. (CC-4)*

Even though communication of a collaborative approach is possible on a higher level, those ideas do not always transfer to the practical level. Perhaps due to the unbalanced power relation, platform leader firms are in practice most concerned what sales that partners bring in.

*We are just as good in their eyes as we were today or during the last month – if there is another partner that does something well, they may gravitate to that direction. They are mainly interested in where the dollar can be found [...] [Regarding the degree of competition] Well it depends on which level we think about it. A single salesperson there, who gets a provision this month – maybe a little crude, but that is what they are interested in – they are not interested in individual partners. They are interested in the business we bring in, but that is ok, that is what they are compensated for [...] On a regional level, they may think about it on a more general level. Therefore, I would say that these frame agreements between the platform and the partners, in the end, do not really matter, but the work between people is decisive. (CC-5)*

The power is not, however limited to prices, but also to what should be offered to the customers. The main driver for those decisions is the strategy the platform leader pursues. Even if the complementor, and even the customer, may be worse off with a new solution, platform leaders may drive it.

*When you immediately know that this does not make sense – the customer gets an inferior solution, while having already a working one, and on the other hand we have a good thing rolling. Then how do you tell the platform leader that we are now taking the customer into an inferior solution and cannibalizing our own sales with the solution – it is sort of a balancing act. (CC-6)*

In these cases, complementors cannot directly argue with the platform leader, but they may be able to affect the situation more indirectly. If platform-focused complementors consider a solution not to be optimal to the customer, they can recommend customers to utilize other solutions within the platform, thus counteracting platform leader actions.

*[One opportunity to counteract platform leader urge to new models, when the model is not optimal for the customer and the complementor] is to not to recommend the solution to the client. Saying: “in our opinion you may*

*not want to implement cloud in this case, as you will not receive the benefits, and your current solutions is good for you – let's update to a newer version of the on-premise solution". (CC-8)*

In some cases, such recommendations may have a significant effect, and platform leaders may have to accommodate solutions that may not completely fit their strategy. Naturally, it is not an outcome of single complementor actions, but collectively, with the help of customer demand, complementors do wield some power.

*[The platform leader] has tried to stop support [for a solution] but has now continued it to far in the future. (CC-8)*

It is quite clear that neither of the types of firms have direct ways to affect the platform leaders – as even though the positioning of the firms in relation to the platforms may differ, platform leaders' choices are not guided by complementor actions, but by platform to platform competition and customer demand. When it comes to prices, both types of complementors must accept what the market between platform leaders determines, but platform independent complementors do not have to resort to a specific platform in all solutions, thus being free in what they offer to their customers. Platform independent complementors are, therefore, free from the risk of having to accept models from platform leaders that are not favorable to them or the customers, given that there are multiple platforms that they can utilize instead of a specific platform.

#### ***4.3.2.ii Impartial companies can and do utilize any technology that fits best***

Platform independent companies can and do freely choose which technologies to use for customer cases, not only due to the lack of alliances but also due to the talented employees making those decisions. The freedom to choose which technology to utilize is not only evident on the firm level, but also even on an individual employee level, as employees have autonomy in their work.

The lack of lock in due to focused partnerships with platform leaders is important in deciding technologies, as different technologies match different needs.

*We do not care which technology we use, but if we are free to choose, then we use those technologies that best fit the purpose. (CC-7)*

The ability to use any technologies is not only important for being able to use the most suitable technologies, but also in remaining at the cutting edge of technologies. What this means is that when the firm is not tied to a certain platform, they can take into use any new platform or ecosystem.

*As we can use any technology, it fits our story better – we can tell the story of full customer value, and we never become relics as we continuously search for the new. If some new platforms or ecosystems come, we are free to take them into use. (CC-3)*

As the previous comment also indicates, the main benefit in the end may, however, come from the fact that not having to resort always to some specific technologies, independent companies are free to use the most beneficial alternative for the client. Not only is it good

for the image towards customers, it can also be more deeply connected to the values of the company, and thus relates to an attractive value proposition to the employees

*[Platform dependence] would be against our values, as any technology would not most likely be best alternative for all use cases. (CC-3)*

*As we are not forced to a tunnel vision, we have been continuously able to aim for best customer and employee value in all the decisions we have made. [...] As we can use any technologies, it fits our story better, and we can tell the story of full customer value. (CC-3)*

Furthermore, the management may also actively make sure that a broad understanding is maintained, as noted by one of the informants. Such active management participation in decision making of the experts still relies on the internal motivation of the experts and therefore supports the culture and capability management strategy of autonomy.

*When it comes to cloud platforms, we have noted that the excitement [of employees] has originally been directed at AWS technologies. Due to such development, we are careful not to camp too much with it. From a management point of view, we seek to see, whether e.g. Azure would be good, too. We can find employees that drive it, and get to know it and a counter force forms. We actively seek to maintain a balance in our portfolio. (CC-3)*

Platform-focused companies, on the other hand do not have the freedom to utilize any technology, as they are bound to a specific platform by capabilities and necessity to generate enough sales. There may even be pressure to offer solutions within the platform that may not always be the most beneficial alternative for the customer, as noted in section 4.3.2.i.

#### **4.3.2.iii Impartialness increases credibility in advising on platform & technology choices**

As noted in the previous subsection, the platform independent complementors can, and do, always search for the most suitable technologies for the customers' needs. Due to their broad capabilities in different technologies, and impartialness that stems from not representing only one platform, platform independent companies are credible advisers in those choices for their customers. For them the image of impartialness is important.

The limitation in clientele for platform-focused complementors, as discussed in section 4.1.1.ii, is, therefore, not limited to those clients that already utilize some other platform technology, but also in the fact that those clients that have not chosen a specific technology are more likely turn to firms that are impartial. Customers turn to independent companies for advice on what technologies fit their needs, as platform-focused firms are not credible advisers.

*The client calls us in such cases – as they know we are technology independent – where they want guidance on what technology is suitable for their use case. You cannot – it would be quite stupid to call [a platform dependent company] and ask what they think is suitable, as it is quite obvious what they would reply. (CC-7)*

Furthermore, due to impartialness, independent companies cannot only affect those choices when the client is undecided, but also when they disagree with the client's original opinion.

*Of course we give recommendations, and it is not that uncommon that the client has an opinion on what technology to use, and we think that the technology is bad and tell the client that. We advise them that they should use this or that, and we are credible to tell them so, because we do not have any – everyone knows that we do not have any ties to anyone. (CC-7)*

Giving up the power to utilize any platforms, and the freedom to recommend any technologies to clients is against the identity of some independent companies. They abhor giving up that power, as it would mean that they would have hidden agendas when consulting customers. This implies not only that the decision regarding platform participation affects the power relationship towards platform leaders, but also that losing the power to make own choices may affect the decision of platform participation in the first place.

*Our choice has been that we have technology capabilities, but we have never succeeded in creating added value to these IBM, Oracle or Microsoft due to the fact that we have not wanted to go to the customer with a hidden agenda. (CC-3).*

The decision of giving up power to choose freely which platform technology to use and recommend, or not giving up that power, has clearly affected the way the companies operate. Furthermore, it also has an effect on how the firms can operate in the future. The ability to advise customers credibly in their decisions becomes more and more important as platforms can take on more responsibilities on the technical side, and as customers' technology choices and the ways to utilize software develop.

### 4.3.3 Software firms' strategies adapt to and exploit changes

This section is an effort to describe what is currently happening in terms of development in the firms interviewed and why, and what the future may hold. In order to build a more comprehensive view, blurring of what has happened and what is going to happen next is accepted, and the change is viewed as a whole, not dependent on the exact timing, as the firms are in different stages of development. The section is divided into two sub-sections, where the first one focuses on the platform-focused firms, and the second one focuses on platform independent firms. The data structure and the most important 1<sup>st</sup>-order concepts that provide evidence for the findings are presented in Figure 8 below.

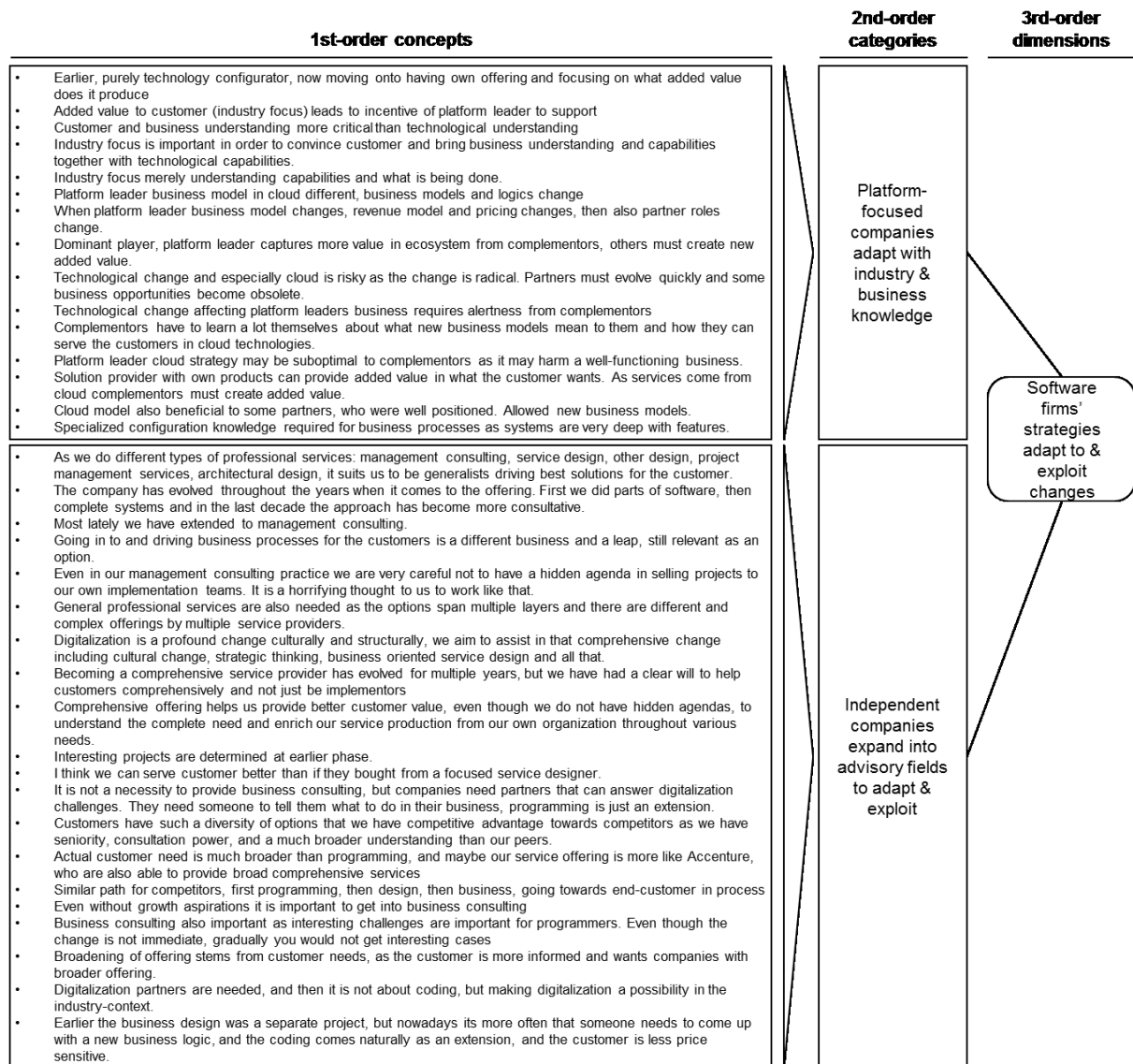


Figure 8. Data structure supporting the findings related to how the different types of complementors adapt to and exploit changes in their operating environment

#### 4.3.3.i Platform-focused companies adapt with industry & business knowledge

Platform-focused complementors, i.e. those that are closely partnered with one platform leader, generally have an urgency to develop their offering, as platform technologies develop and most importantly move to cloud technologies. There is, therefore, a need to adapt to the platform leader strategy, which is more a necessity than a choice.

As a platform leader changes its business model and logic, the partners' roles change. Those who are stuck in a model that is no longer needed may not be able to sustain their business.

*Now, as we are going to the cloud more strongly, the models change. [...] The business model and logic changes. And – as the business and revenue model and pricing changes – also the role of partners changes. [Value added resellers] who received their share of licensing revenue, in this model, their value creation in the traditional manner has weakened or even completely vanished. The change is radical [...] (CC-4)*

Furthermore, the setting is not balanced between the complementor and the platform leader, as noted already in the section 4.3.2.i. Platform leaders, sometimes justifying their behavior by competing platforms' development, have expanded and seem to continue expanding their offering and developing their model in ways that directly reduce some of the complementors' business opportunities. Even though platform leaders may appear to take a cooperative stance in their wordings, the actual relationship seems to be such that the platform leader takes what it can, and the partners must deal with the actions of platform leaders. Therefore, the setting is actually quite competitive, and partners must constantly adapt to the actions of platform leaders.

*They claim that they have to do so [competitive actions towards complementors] in order to remain competitive [against other platforms], and then we want to help you as partners – go this way, here you can be competitive, and together we can be more competitive. This is how it goes on the high level, but in practice, it is challenging. In this case, it practically goes so that the dominant player eats away value from others constantly, and others must adapt and create new value. (CC-4)*

Furthermore, the adaption must be proactive, as not only is the change radical, as noted above, the platform leaders do not give exact guidance and answers on how the firms should adapt. They, or at least some of them, have either not thought about it, or have chosen not to share their vision on how partners should adapt to their new models. Platform focused complementors, therefore, have to be alert and adapt quickly to changes, without much guidance from the platform leaders

*You have to be very alert, and we have received very little support from the platform leader on what it means in practice. Even though [platform leader] has talked about cloud and such, we have not received any instructions on what it means to our business. [...] It is quite difficult, when making the first proposition in a new model, to figure out what it means for e.g. maintenance and how to price it. Many components are left out, and the policies are new and the problems are somewhat different. There is a lot to learn. (CC-8)*

Platform focused complementors must, therefore, find new ways to add value to the platform. The adaption has in general moved increasingly from technical implementation towards highlighting the importance of understanding the customer's business.

*As tools are no longer bottlenecks [...] the things that are the bottleneck are such where the customer and business understanding is more critical than technological understanding. (CC-4)*

As a more recent direction, the platform-focused complementors have started to focus on specific industries. This development has been either a choice or a realization of a fact that the company has developed capabilities more in some industries than in others. This focus has also received support from platform leaders, as it can increase the added value complementors bring in.

*As we have analyzed where we are strong in and have customers in, we have chosen a few focus area [regarding industries]. [...] After making that strategic decision of focus areas, we have gotten traction. We have been able to get new customers there, and here we see that our strategy is also shared with [the platform leader]. [The platform leader] sees that it is in these areas that the partner can fulfill the [platform leader] ecosystem, and we have also received a lot of support from [the platform leader]. [...] It is a great example of the fact that when we have been able to create added value for the customer in the ecosystem, then [the platform leader] has a strong incentive to support us. (CC-4)*

*I guess we have just realized that maybe we do actually have industry related capabilities. (CC-5)*

*Industry focus – I believe we will have an increasing need to think about it and tighten it. [...] When you focus on something, are good in something, it helps us [grow]. (CC-4)*

Industry focus not only enables firms to add value to the ecosystem, but it also helps in being able to replicate things – and, as noted earlier, such IP is a key resource for the platform-focused firms.

*Gradually you start focusing on certain firms, as you have experience in it [the industry] and it is easier to sell when you replicate the same thing. And that is always the goal [...] There is always the aim to find an industry, and as the competition is tough, many firms try to find such specific industries so that it helps them in replication. (CC-6)*

Even though platform-focused complementors need to adapt to platform leader actions, it is not a hopeless situation for them. Even if they cannot independently decide their own direction, they can succeed if they adapt and align themselves correctly. As noted earlier, a successful ecosystem can be profitable to complementors. In addition, by specializing in one ecosystem, they can become experts in all the technologies available in it, and advice companies in choices within that ecosystem, especially as these choices become increasingly complex.

*Even though they [platform leader] have partially taken over customer sourcing with training materials, and in principle, customers can directly order applications from the cloud and watch YouTube-videos, not many do that. There is a long way from having a non-configured system and*



*watching a video to having a fully operational system. It takes experience to configure it in a way that the customer process runs as the customer wants. [With different platform technologies within the ecosystem] you can configure those business processes a lot, and as they have deep functionalities, it takes the consultant and many years of experience. (CC-6)*

#### **4.3.3.ii Independent companies expand into advisory fields to adapt and exploit**

For platform independent firms, development of business capabilities is also an important theme. The approach differs, however, somewhat from the approach of platform-focused firms, and is quite coherent with the approach to capability development in programming. Instead of accumulating replicable assets, such as frameworks or solutions, they either have hired, or are thinking about hiring, management consultants that are already proficient in their line of work, and can, perhaps, be considered top talent. Although one firm was only thinking about the option of taking such an approach, the two other informants were quite confident that it is the right choice for them.

*The latest [expansion in professional services] has been management consulting, and we have currently [x] persons in that unit. (CC-3)*

Even the firm that has not yet chosen to go into management consulting views expanding capabilities in business consulting as an option. They note that such an expansion or shift could allow them to avoid competition in pricing, and therefore reach better profitability. This draws a direct connection between technology development and the need or want to change the offering, as it supports the notion of programming commoditizing – a theme discussed in the section 4.3.1.ii.

*In order to be able to incorporate value based pricing, you would have to go into the business process, and that is a different business. [...] Instead of developing some process for the customer, you would drive that process – and it is a leap – but a strategic option.*

[...]

*It is difficult [to raise prices] as the price for the work rather decreases, as you get more and more and easier and easier it from abroad. [...] The customer can always switch to another supplier and take an offer for hourly priced work. It is difficult to get more from there. (CC-1)*

One way to respond to the need to incorporate business knowledge is to cooperate with firms specialized in business consulting. A firm that has employed such tactics, is, however, aiming to also build own capabilities in the domain.

*In a case [where the firm created a new business logic for the customer with a mobile application], as we did not have such [business consulting] business, we used a partner. (CC-7)*

The main driver for the development does not, however, at least directly, seem to have been necessity or threat, in contrast to platform-focused complementors who have urgency to adapt to platform leader business models. Instead, platform independent complementors

seem to be driven more by an opportunity to provide new services to customers, stemming from customer demand.

*It starts from having a customer demand, and then we hire a few, and then more come, and at some point it is business as usual. (CC-7)*

The reason for such demand, most likely, stems from the customer related changes discussed in section 4.3.1, i.e. value of solutions stemming from business logic, complexity and variety increasing in platforms and the need to think strategically about platforms. In general, these challenges can be summed up to digitalization challenges. As these challenges span the whole company, and are not about developing single digital services, they require a broad variety of services.

*[...] The world has changed in a way, where now all firms more or less face digitalization challenges, and they simply do not have the understanding that is required. And they need a partner who has that understanding. And that does not mean programming, but someone telling them what they should do in their business, and the programming is just an extension. (CC-7)*

*[To the way the world is changing] relates also cultural changes – in a digital change, when you think about an organization that used to produce a service with more manual processes. It is not so, that they can make a digital service, and then they have reached their goal in digitalization. In practice, it means a comprehensive change in those organizations, culturally and structurally. The organizations are very different after they have transformed into digital service providers. (CC-3)*

To those digitalization challenges, the independent firms aim to respond with a comprehensive offering in professional services.

*We aim to help [the customers] in that comprehensive transformation, and it includes certainly cultural change, strategic thinking, and business oriented service design and all that. (CC-3)*

The independent firms have not only seen an opportunity, but they are also well aligned to answer those customer challenges due to their gradual expansion in professional services. The process in expanding in professional services has already started some years ago, as platform independent firms expanded to design, after which came service design, and now as a latest addition the management consulting. Furthermore, it seems that at least for some companies, it has been due to a coherent will to help customers in a more comprehensive manner.

*It has not happened suddenly, but as we started with programming, and then came the design side, and the service design, and now business consulting. (CC-7)*

*The firm has changed throughout the years. At first, we were a software house, developing code for customers [...] but by the side, in the past ten*

*years, we have built a more consultative approach [...] project management, strategic design and service design. [...] It has been going on for the previous five six or seven years, cannot really remember, but we have had a clear will to help our customers comprehensively, and not just remain implementers. (CC-3)*

Consequently, the firms have turned into generalists, originating from software development. The generalist approach with wide capabilities enables the firms to serve their customers well in some areas, perhaps even better than firms specialized in the other professional service areas.

*The rest of our business comes from different professional services: management consulting, service design, other design, outsourced project management, architectural design, etc. And for that combination it fits well that we are general consultants looking to drive best possible solutions for the customers. (CC-3)*

*We can provide better customer value in each of the areas, although we do not have hidden agendas [in serving our own services], as we understand the comprehensive need, and can enrich our services from our own organization throughout the needs. I do think that we are more fit to serve customers, than if they bought from a purely service design focused firm. (CC-3)*

More fundamentally, the ability to serve that need stems all the way from the platform independence choice, and not being allied with a single platform leader. It is also linked to the power relation, as platform independent firms are able to advise customers credibly in their choices due to their impartialness.

*When you think about cloud platforms, we noticed that our excitement was directed in AWS technologies. We are, however very careful not to camp too much with them. From a management perspective, we seek to find out whether Azure would be just as good. [...] We see it as having to also have the other [...] which comes from very deep. It starts from the true will to help the customer. And we are very careful in our management consulting that our consultants cannot have a hidden agenda and try to sell the implementation project for us. [...] It is a horrible thought that we would operate in that way – very much like we do not want to always sell one cloud solution to customers. It is against our basic thinking. (CC-3)*

Furthermore, an important factor that favors the platform independent complementors is that the firms have capabilities in the best technologies, and importantly, in many different of them in different platforms, enabled by autonomous individual development of such skills by employees, as noted in section 4.3.2.ii. Furthermore, as noted in the same section, management may actively seek to keep a balance in the technology skills portfolio. This is also important as it provides credibility and ability to serve customers in their technology choices.

Even though the main driver for the expansion has been customer demand and the ability to exploit a business opportunity, it may also become a necessity for those firms that wish to

remain as independent generalists. This is due to the fact that platform independent companies are competing with each other, and as some develop their offering, others must, too.

*Customers have so multifaceted options to drive their business [...] It is a much more complicated and vast span [of opportunities] and I believe that we are multiple steps ahead of our competition in the understanding. We have seniority, consulting power, and a broad understanding – much broader than other digitalization consultants. (CC-3)*

*[Expanding to other professional services] is not something that we have invented, but it is more a trend in our industry. And when I think about it, our competitors have mainly taken a similar path as us. [...] If I think about our competitors [...] who compete directly with us [...] They have had exactly the same path that they have started from programming, and then the design and then – i.e. in a way we have neared the origin of the process. (CC-7)*

The competition is probably not about merely being able to maintain a position in terms of revenue, but more importantly, it is about maintaining the key resources, i.e. top talented developers. Maintaining top talent requires, among other factors such as autonomy as discussed above, interesting projects for those employees. As some competitors are able to offer more comprehensive services, they become more competitive exactly in those interesting projects; consequently, not expanding in line with the competition would lead to ultimately losing the most important resource of the company, i.e. top talent.

*[The expansion in other professional services] has been mainly in order to remain competitive. Even if we did not seek for growth, I think we should still go there, exactly due to our employees, which indirectly leads to our competitiveness. In order for us to be able to keep our people, we have to have interesting projects, and we could not have that without the consulting side. Of course, those interesting projects would not stop immediately, but little by little, those cases would come less frequently. And that is why it is important. (CC-7)*

It is not, however, enough for the platform independent firms to expand into management consulting. As their advantage partially stems from the ability to be credible advisers on platform decisions, they must also know those platforms well.

*We as consultants, especially generalist consultants, have to maintain a broad understanding in what these platforms and ecosystems have to offer in order to be able to recommend the best possible option for the customer. (CC-3)*

Having to maintain such a broad understanding on the platform technology and ecosystem options is not an easy task, and will become harder and harder as complexity and variety is increasing. On one hand, the culture of autonomy for top talent, and their interest alignment for their own professional development helps. On the other, it may be that platform-focused companies will have the upper hand in their own ecosystems, due to their specialization and accrued experience within the specific ecosystems.

#### 4.4 Summary of the findings

A fundamental decision that complementors have to make regarding their platform strategy is whether to partner up with a platform leader or not. In contrast to a working hypothesis guiding this research, firms do not in reality balance between different ecosystems, but they have to choose whether to partner up and which platform leader to partner up with. The benefits of partnering only come, when the firm commits to and focuses on only one platform. In contrast, those firms that do not wish to partner with some specific platform are better off remaining completely independent, or more practically not declaring alliance with any partners at all.

Even though some firms indicate alliance with more than one platform leader, they *de facto* have one main partner and possibly use some other secondary platforms. Conversely, firms highlighting independence may utilize any platforms, but in reality due to practical constraints only use a subset. They are to some extent partners with platform leaders, but the effects of highlighting and marketing those alliances would be more negative than positive, as only via focused commitment can complementors reap benefits from the alliances. The independent and impartial image has its own, significant benefits in terms of being able to serve a broader clientele credibly.

The decision to partner is even more intertwined with how the companies look like than anticipated. Firms that are independent from platforms look surprisingly much alike, even though there are some differences, especially in the degree of expansion to management consulting services. These platform independent complementors are very different from complementors that are focused to a specific platform, i.e. platform-focused complementors. Even though there are also some differences between platform-focused complementors, perhaps due to ecosystem specific characteristics, such as ecosystem growth, the differences within the category are small compared to the differences across the two categories. Essentially, the key resources and offerings of the complementors are aligned with their platform participation decision, warranting a categorization of the firms to platform independent complementors and platform-focused complementors.

The power relation of the complementors with platform leaders is generally unbalanced. Platform leaders set their prices and do not need to worry about any single complementor, independent of or focused on them. Neither independent nor focused complementors can influence the strategies of the platform leaders directly, but both have some indirect power via customers. The platform independent firms may have less direct power against platform leaders, but their position is still more favorable in terms of flexibility that enables them to exploit changes in the operating environment driven by technology development and changes in customer needs. Platform-focused complementors, even though not very easily admitting it, are quite deeply locked into their ecosystems, due to specialized alignment and financial benefits that depend on the level of focus. They approach changes in a quite adaptive manner, and therefore power seems to mediate the way firms can react to change. As flexibility affects the relationship and power between the complementors and platform leaders, and key resources and offerings are either flexible or standardized as a result of alignment to the platform participation decision, the power relationship seems to be have an interdependent relationship with the platform participation decision. Not only does the way to

approach participation affect power dynamics, but also the way companies align their resources and offering to their participation decision affects the power platform leaders have on the complementors.

The major drivers of changes in the operating environment are technology development, in general and in platforms, and changes in customer needs. These two themes seem to be interdependent, and, mediated by power relations with platform leaders, they affect the direction of development of the firms. The current directions of the firms are fairly similar within the two categories, and different across. This indicates that platform participation is a decision with effects on not only the past and present, but also the future of the firms.

To conclude, the platform decision is binary and mainly made based on the firm's view on the tradeoff between market access and lock-in. The complementors are fundamentally aligned with the platform decision when it comes to their offering and key resources, which altogether affect and are affected by the power relationship with the platform leaders. Furthermore, power and ultimately the platform participation decision have an effect on how firms react to change caused by technological development and changes in customer needs. Firms either mostly adapt to change, as is the case for platform-focused complementors, or adapt to and exploit the opportunities caused by changes, as is the case for platform independent complementors. The emerging process model of complementor strategies is presented in Figure 9.

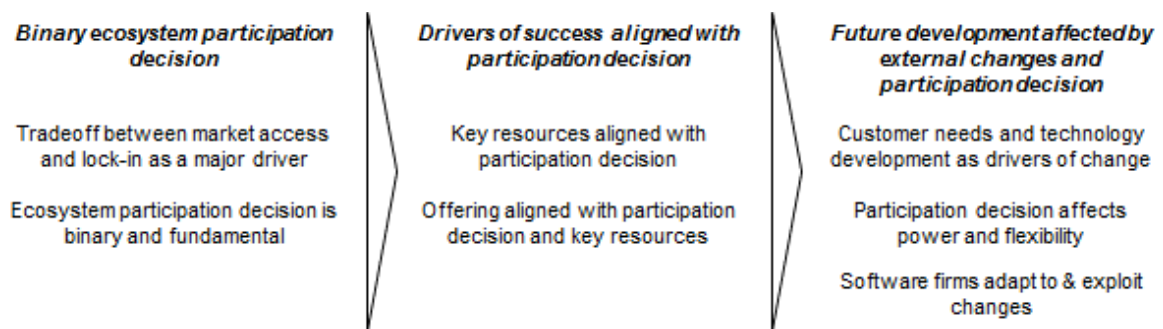


Figure 9. Process model of complementor strategies

## 5. Discussion

In this chapter, the findings of the inductive empirical case study are evaluated by relating them with existing ideas and theories from prior academic literature, as recommended for employing the methodology by Gioia et al. (2013). The section is structured in a manner where findings of prior literature are compared to the findings of the inductive study in an order following the structure of the Findings chapter.

All in all, even though the research questions have not been studied directly before, many of the findings for each research question find parallels in prior theories and findings. Not only do these parallels and alignment of the findings to prior literature support the findings of this thesis, but drawing these parallels and relating the findings of this thesis to prior literature may also provide further insight to the prior theories and findings.

### 5.1 Ecosystem participation decision

In this section, the findings related to the first research question: “What decisions regarding ecosystem participation do complementors have, and what drives those decisions?” are evaluated by comparing them to prior academic literature. The discussion is divided under the two main sections of the relevant findings, namely “Tradeoff between market access and lock-in”, and “Binary platform participation decision”.

#### 5.1.1 Tradeoff between market access and lock-in

When it comes to a tradeoff between market access and lock-in, prior academic literature has not widely highlighted it. Venkataraman et al. (2018), do, however, note that there is a tradeoff between specializing and therefore keeping coordination costs low and investments that enable multihoming. Furthermore, the logic behind, and drivers for, both focusing into one ecosystem, and to avoiding such a focus, and therefore participating in many ecosystems, find support from prior literature.

Prior literature has assessed platform participation as a decision for complementors. Most importantly Ceccagnoli et al. (2012) have showed that platform participation is beneficial for complementors, and the benefits increase if complementors have an ability to protect their appropriation ability. Dellerman et al. (2017) and Kude et al. (2012) provide a more detailed understanding on how exactly does platform participation aid complementors, where market access, or commercial and social capital, are a common benefit for the studies, supporting the finding of this thesis that market access may be the most important benefit for complementors. Technological capital, identified as a major benefit in prior studies (Dellerman et al., 2017; Kude et al., 2012), may not be as important as customer access, and it is also available to some degree for all complementors, whereas customer access requires more commitment and focus to a specific platform.

The findings of Wareham et al. (2014) of the benefits of platform partnership being stratified in a sense where higher levels of partnership yield more benefits, supports the finding that complementors can only attain the benefit of market access if they commit significant efforts to a platform. This together with the suggestion of Jacobides et al. (2018) of platform leaders crafting rules to tie complementors in, supports the finding that the rules for benefits crafted by platform leaders may lock-in complementors to a specific platform, as they may find it hard to reach enough sales in multiple ecosystems to attain benefits in them.

The finding that independence is favored due to being able to serve a broader clientele is in line with the consensus of prior literature where a major, perhaps most commonly identified benefit of multihoming is the increase of market reach of complementors in terms of being able to serve a broader audience when multihoming (e.g. Cennamo et al., 2018).

The notion of ecosystem focus dictating growth and profitability, or more specifically the finding that either growth, or popularity, of the ecosystem, or softness of competition in an ecosystem can be beneficial to complementors is generally supported by the findings of Cecagnoli et al. (2012), as, even without constraints or conditions, they find that platform participation is beneficial for complementors. More specifically, the tension of popularity, or dominance, of a platform and the degree of competition in the platform being somewhat contradictory, and both being attractive to complementors found by Venkatraman & Lee (2004), supports the notion that also less popular platforms may be attractive to some complementors.

### **5.1.2 Binary platform participation decision**

The decision of which platform to partner with has been explained by various ecosystem related characteristics in prior literature (Venkatraman & Lee, 2004). The findings of Venkatraman and Lee (2004) imply that inter-platform competitive factors and intra-platform competitive factors influence complementor decisions. Prior literature has acknowledged a tension between platform dominance and competition within ecosystems (Venkatraman & Lee, 2004; Wareham et al., 2014). The competitive environment within the ecosystem does not, however, seem to be that relevant for the initial decision to join a platform, at least as much as platform dominance, a finding in line with the findings of Venkatraman & Lee (2004). In addition to platform, or ecosystem, characteristics, it seems that complementor firm internal factors may have been influential in ecosystem decisions. Three of the four platform focused firms participated in an ecosystem, which the founders had prior experience from. This aspect has not been highlighted in prior literature.

More generally, the platform-focus decision or the decision to remain independent from platforms are related to specialization and multihoming, two important themes in the ecosystem literature. As costs of specialization are not fully fungible (Jacobides et al., 2018), and the coordination costs increasing when multihoming (Venkataraman et al., 2018) it may be too costly for complementors to specialize in multiple ecosystems, i.e. specialize and multihome at the same time. The notion of Venkataraman et al. (2018) that there is a tradeoff between specialization and multihoming importantly supports the major finding of this thesis, namely a binary pattern in platform participation.

In addition to the tradeoff identified by Venkataraman et al. (2018), a binary pattern in the behavior of software firms has been anticipated by Lee et al. (1995) in the form of information systems activities in either applying information systems to business needs, or integrating the technological infrastructure of organizations.

It should be noted that the interview question relating to the ecosystem strategy of the firms highlights the decision regarding partnerships. As such, it cannot be concluded that ecosystem strategy would be primarily about partnership decisions. The interviewees did, however view the decision as fundamental, and as such the multihoming decision should perhaps be viewed more as strategic, as characterized by Venkataraman et al. (2018) in contrast to the characterization of Jacobides et al. (2018), who describe the decision tactical.



## 5.2 Drivers of success

In this section, the findings related to the second research question: “What drives complementor success?” are evaluated by comparing them to prior academic literature. The discussion is divided under the two main sections of the relevant findings, namely “Key resources aligned with platform participation”, and “Offering aligned with platform participation and key resources”.

### 5.2.1 Key resources aligned with platform participation

The findings of this thesis are in line with the finding of Venkataraman et al. (2018) that human capital plays an important factor in the ability to multihome. Interestingly, the findings illustrate that having very capable employees, i.e. top talent, may be an important enabler for multihoming, a finding perhaps shedding new light to the findings of Venkataraman et al. (2018), who suggest the importance of individual employees, but do not explore it further.

Even though literature in the tackled domains does not seem to point directly to a conclusion that platform independence as a strategy is favored by top talent, some parallels can be found. One of the reasons for firms to engage in Open Source activities, listed by Bonaccorsi & Rossi (2006) is that they are motivated by being able to hire good IT specialists. Even though the specific mechanism is not identified, we can draw on motivations of the developers to engage in Open Source activities, and that developers attach a high value on learning, wish to be free from the power of platform leaders, and more generally value social aspects (Bonaccorsi & Rossi, 2006). Even though monetary rewards are important motivators for developers, extrinsic motivations include also learning and career benefits (Battistella & Nonino, 2012). These motivators are directly linked to findings of platform independent companies, who note that professionals’ autonomous technology choices, and their willingness to develop themselves for their own professional benefit are aligned with the firm’s choice to remain platform independent, as they do not dictate what technologies employees should use, but enable and facilitate them in their areas of interest.

The platform independent firms’ strategy of autonomy not only enables them to attract and keep top talent, but it may also enable them to tackle the problem identified by Venkataraman et al. (2018) of high coordination costs of having a diverse range of human capital, namely technical and functional, that is required to be able to multihome as a firm. As platform independent firms do not have to actively steer talent, and as the employees autonomously and independently take care of their needs to develop skills, the coordination is handled via culture and mission, which results in perhaps less need for active coordination, and therefore lower costs.

The ability and will to systematically develop employees skills in a chosen platform technology, employed by platform-focused complementors relates to the notion of Venkataraman et al. (2018) that firms need to be able to build capabilities that grasp all the elements of the platform, i.e. technology, functionality and industry context, and also to embed these elements in their organizational routine. Furthermore, as these firms do not multihome, the coordination costs to do so remain relatively low, a finding in line with the problem of high coordination costs that stem from multihoming (Venkataraman et al., 2018).

Furthermore, as platform-focused firms are specialized in mainly one specific platform, they can align their firm fully to the platform. This alignment, in prior literature, can be related to

specialization, and superior performance configurations (Bresnahan & Greenstein, 1999; Cennamo et al., 2018; Jacobides et al., 2018; Kapoor & Agarwal, 2017; Teece, 1986, 2007). The benefit of experience in sustaining superior performance (Kapoor & Agarwal, 2017) in the case of the interviewed firms materializes as replicable solutions and references from prior customer cases that help the firms to win customer cases and execute them profitably.

The notion that the systematic capability development, and the key resources, i.e. replicable solutions, or IP, are tied to the platform of focus for platform-focused complementors relates to the notion that the benefits of experience that lead to firms having superior performance configurations are platform specific (Kapoor & Agarwal, 2017). The lock in to the specific ecosystem is explained in prior literature via the notion of not fully fungible investments, i.e. investments that are not transferable to other ecosystems (Jacobides et al., 2018). The lock in, not only being limited to specific platforms, but also to configurations or modes of operation in ecosystems, relates to the idea of a superior performance configuration not being limited to offering, but to tasks and organizations (Kapoor & Agarwal, 2017).

### **5.2.2 Offering aligned with platform participation and key resources**

The findings in the section covering the offerings of the two different types of complementors fundamentally relate to the notion of complementarity. As both of the types of firms have offerings that in their ways add value jointly with the platform, their offerings seem to fulfill the criteria of a complement (Jacobides et al., 2018). For platform-focused firms, the complementarity of the offering is the primary aim, as the firms offering is meant to add value to the platform. Informants in platform independent companies describe their offering as something that can never be offered by platforms, as by definition, the differentiating solutions they offer, are such that the competitors of their customers do not have them.

Packaged software, or enterprise software platforms, in their core, are not customized, and are meant to be widely distributed efficiently (Kittlaus & Clough, 2009). The very benefit for the platform leaders is that they can efficiently, without additional cost, sell their platform to increasing number of customers, i.e. the product is easily scalable (Kittlaus & Clough, 2009). This is also related to the more general nature of the platform as a stable element, whereas complements can and should vary (Baldwin & Woodard, 2009).

The informants in platform independent firms note that they build their offering on top of the platforms, and they must be able to get data in and out of the platform systems. Without this basic structure provided by platforms, the complementary offering of the platform independent firm would have less or no value. This does not work the other way around, namely there is no necessity for customers to have a tailored solution from an independent complementor to enable them to utilize a platform, although it could also be argued that the platforms are more valuable for the customers, when they can buy tailored differentiating solutions on top of the platform. These findings relate to unidirectional complementarity as discussed by Jacobides et al. (2018).

Furthermore, even though platform independent complementors do not solely offer their solutions related to a specific platform, they must customize the solution to the platform, relating to the concept of unique or nongeneric complementarity (Jacobides et al., 2018). Even though they can work with various different platforms, they still need to know each one of them very well as indicated by the findings relating to not fully fungible investments into platform technologies discussed in prior literature (Jacobides et al., 2018). Furthermore, the

solutions platform independent firms provide for their customers must be tailored to the customers own platforms, implying even more than “some degree of customization” (Jacobides et al., 2018).

Unilateral nongeneric complementarity, and therefore specialization, instead of cospecialization (Jacobides et al., 2018) is more evident in the case of platform-focused complementors. It seems that their offering is not required for the platforms to function, but their offerings do need the platform (see corresponding example by Jacobides et al. (2018) in section 2.1.1.ii) On the other hand, prior literature has noted that platforms do, however, need complementors as a set of actors (Gawer & Cusumano, 2008; Jacobides et al., 2018).

The avoidance of competition with platform leaders of platform independent firm relates to advice by Iansiti & Levien (2004) to players they call niche players. According to them, “[a] niche player aims to develop specialized capabilities that differentiate it from other companies in the network [or ecosystem]” (Iansiti & Levien, 2004, p. 9). Even though the differentiation is more apparent in the case of platform independent firms, differentiation via a specialized offering is also very important for the platform-focused complementors. Namely, as firms that are focused on specific platforms aim to create added value to those platforms, they produce it in a way that the platform leader can or does not want to take over, relating to the notion of Schütz et al. (2013), as discussed in section 2.2.4.ii.

The way platform-focused complementors provide value in ecosystems is essentially rooted in the dynamics of the packaged software industry. Prior literature has noted that complementors are especially focused to customizing products to specific customer needs, as packaged software does not solve customer problems without customization to the business problem and integration to business processes (Kittlaus & Clough, 2009). Perhaps not surprisingly, this is very clear to the platform focused complementor informants. They seem to understand their role, and quite generally understand that they must create added value in this specific way in order to sustain their business.

The expansion of platform-focused complementors in providing services covering increasing functionalities of platforms is related to the idea of platform complexity (Cennamo et al., 2018; Kapoor & Agarwal, 2017). As noted earlier, increasing platform complexity has been found to increase the probability of sustaining superior performance of complementors, especially when the complementor is more experienced in the specific ecosystem (Kapoor & Agarwal, 2017). It does, however, also increase the degree of (co)specialization needed (Cennamo et al., 2018). Furthermore, specialization not only increases the value of joint use i.e. complementarity, but it also increases lock in (Teece, 2007).

### **5.3 Future development**

In this section, the findings related to the third research question: “What drivers affect the future of ecosystems and complementors and how will the complementors respond to changes?” are evaluated by comparing them to prior academic literature. The discussion is divided under the three main sections of the relevant findings, namely “Technology development and customer needs as drivers of change”, “Power depends on platform participation and affects options”, and “Software firms’ strategies adapt to and exploit changes”.

### **5.3.1 Technology development and customer needs as drivers of change**

The effect of transition of the platforms to cloud pointed out by the informants seems very much comparable to platform transitions studied by Kapoor & Agarwal (2017). Some prior superior performance configurations have definitely exited the stratum (Kapoor & Agarwal, 2017) as license vendors are struggling to find a new place in the ecosystem. Those that have managed to sustain their performance have had to change their configurations, as technical services are increasingly being provided by the platforms. Complementors also need to continuously find new ways to add value, as the value from some of their services is being taken over by platforms, when they integrate these services to their own offering – a threat noted in prior literature (Dellermann et al., 2017; Iansiti & Levien, 2004)

There is still need for complementors' services, as customers need advisors in utilizing platform technologies. Furthermore, as noted by Schütz et al. (2013), any non-scalable way to respond to individual customer needs will most likely not be an attractive option for platform leaders, as the partner model provides them with a share of the benefits without any of the costs. Prior literature has noted that even though platforms may have initially thought that they do not need service complementors in their cloud models, they have been forced to retreat to partner models, as adjustment to customer business is still needed, and cannot yet be carried out by customers themselves (Schmidt & Braun, 2015). Therefore, there is still need for complementors in consulting customers in how to utilize platform technologies to get the most out of them.

The changes are not, however only limited to platform technologies. Customers seem to have new needs that complementors are able to serve, and cannot be served directly by platform leaders. First, software without incorporation of business logic and integration to business processes is much less valuable to customers than software that does incorporate such logic and is integrated to the business processes. This is related to the commoditization of programming that is amplified by the increasing availability of programming skills. Generally, a fusion of IT and business strategy is identified and discussed in information systems literature (Bharadwaj et al., 2013).

### **5.3.2 Power depends on platform participation and affects options**

Power in ecosystems, or more specifically power between the complementors and platform leader from the point of view of the complementors, was a theme that had not been tackled in prior literature directly. In general, the findings show that complementors do not have much power against platform leaders. There is no indication that they would even consider the possibility to affect the strategies of platform leaders in a direct manner.

Platform to platform competition seems to be an influential driver of platform leader actions. However, in contrast to prior research that identifies it as a driver for platform leaders to act in the interest of the whole system (Teece, 2018) it seems to also be a way for platform leaders to justify their competitive actions towards complementors. They may leverage platform to platform competition as a method for soft power and alignment of interest, which relates to the theories of Yoffie & Kwak (2006). It also seems to be an effective way, as the informants accept that in order for the ecosystem be successful and healthy, it must provide an attractive business opportunity for the platform leader.

The focus on complementor revenues brought in may not be a result of badly designed incentive structures in platform leader companies, i.e. failing to create such incentive models

for internal partner correspondents that reflect the high-level partner strategy. There is a possibility that it is actually a way to increase partner-to-partner competition, as prior relationships with the platform leader, or prior accomplishments do not give any advantages to partners. If so, such strategy is very much in line with the ideas of increasing mobility and competition in the complementary components (Jacobides et al., 2006).

The finding that a platform leader may drive models that are not as favorable to complementors or even customers relates to the threat of opportunistic behavior noted in prior literature (Dellermann et al., 2017). The notion of platform independent complementors being able to utilize any platform, and therefore not being affected as much by possibly harmful strategies and models of platform leaders is related to the notion of a threat of opportunistic behavior leading to multihoming (Dellermann et al., 2017). However, it seems to be more of a benefit from platform independence, than a reason for it, in contrast to the assessment of Dellerman et al. (2017).

On the other hand, complementors have power on a collective level. Platform independent complementors specifically, in their own words, are credible advisors on platform and technology choices. Perhaps more importantly, and objectively, the fact that customers seek their advice on their platform and technology decisions grants the platform independent firms the power to affect customers' decisions. This, together with the fact that platform independent firms may build on any platforms also relates to a position of guarantor of quality (Jacobides et al., 2006), as discussed in section 2.1.2.i. Even though platforms are not yet standardized, the increasing interfaces between them may facilitate development towards standardization, and support the position of platform independent complementors in the future.

From the perspective of platform-focused complementors, the power to resist platform leaders' harmful strategies stemming from advising customers in their decisions within the limits of platform leader technologies, relates to a source of power identified in literature as downstream capabilities (Ceccagnoli et al., 2012; Huang et al., 2013). The findings of this thesis seem to provide a more specific understanding on how exactly the downstream capabilities aid complementors in defending themselves from expropriation.

### **5.3.3 Software firms' strategies adapt to and exploit changes**

The findings indicate that there has been a certain urgency for platform-focused complementors to adapt business models to platform leader strategic changes. As one important example of this, as noted in the findings section, the transition to cloud has rendered some prior businesses obsolete. License vendors business has weakened or completely vanished. The effects of cloud technology on platform-focused complementors business, especially the decline of license vendors, is very much in line with the suggestions of prior literature (Schütz et al., 2013). Increasing industry focus seems to be the direction of development for platform-focused complementors, as also anticipated by Schütz et al. (2013).

The finding that platform leaders expand their business to areas complementors used to take care of implies that platform leaders may not only use soft power, in terms of explaining their actions via platform-to-platform competition, as noted in section 5.3.2. They also expand to areas previously served by complementors, a way to utilize hard power as discussed in prior literature by Yoffie & Kwak (2006).

The notion of platform-focused complementors not receiving much help from platform leaders in the transition into new models is somewhat contradictory with the orchestrating function platform leaders have, described by prior literature (Iansiti & Levien, 2004; Rickmann et al., 2014). On the other hand, complementors having to decide on appropriate models for themselves corresponds to a lack of hierarchical governance and control, which is an important characteristic of ecosystems in contrast to e.g. a supply chain (Jacobides et al., 2018).

The findings of this thesis somewhat contradict the findings of Kapoor & Agarwal (2017) of complexity increasing the likelihood of exit from a stratum of superior performance in platform transitions, as one would most likely call the platforms, in which the firms in the sample operate in, complex. It may be that platform transitions are not such a long jump, as described by Kapoor & Agarwal (2017) for the firms interviewed, perhaps as their configurations are more adaptable to the new model. On the other hand, some firms not in the sample have faced problems in operating in the new model according to the interviews, due to not being successful in adapting to the transition.

However, the findings of this thesis are in line with the findings of Kapoor & Agarwal (2017) in regards of experience being beneficial for the firms, as IP and replicability were important resources or assets for the platform focused complementors, and these resources or assets build on experience. Furthermore, it is easy to believe that the more complex the platform is the more specialization is needed, as noted in prior literature by Cennamo et al. (2018).

The finding that it seems that the skills needed to succeed in the future for both of the two types of complementors studied are increasingly tied to the customers' business domain is in line with the findings of Lee et al. (1995). Lee et al. (1995) note that technology management skills that help linking technology with business and user needs are important. Furthermore, it seems that the two different patterns relating activities and skills, observed by Lee et al. (1995), may be observable on a firm level.

The first pattern Lee et al. (1995) observe, as discussed earlier, is that the activity of effectively applying information systems to meet business needs is related with in-depth business knowledge and excellent interpersonal skills. This pattern of development is observable in platform independent complementors, as the expansion in management consulting will probably increase those skills and knowledge.

The second and different pattern observed by Lee et al. (1995), relates the activity of integration of the organization's technological infrastructure to an absolute need in technical competence. As the technical competences are accompanied by technology management skills, common for both patterns (D. Lee et al., 1995), this pattern seems to be observable in platform-focused complementors. They indeed need to know their platforms of choice comprehensively, even though they do not need to know the intricate deep technological features. Furthermore, they are increasingly focus on the alignment of technology and business, which shows as an increasing focusing on certain industries.

The finding that the need or wish to expand into consulting of platform independent companies does not only stem from ability to serve customers in new ways and grow, but also from being able to win interesting projects, and therefore retain top talent is interesting. It relates the multihoming strategy in a new way to human capital, in a way where multihoming is not only enabled by diverse human capital, but also that multihoming may enable attracting the needed human capital to multihome. Such a mechanism is not explicated by Venkataraman

et al. (2018), but they note the importance of path dependencies, i.e. that adapting to an environment to compete effectively may make it difficult to readjust the operations later on. In contrast to Venkataraman et al. (2018), who seem to see such a path dependency mainly as a threat, it may be that successful continuous alignment to a multihoming strategy also enables platform independent firms to sustain their competitive advantage.

In essence, this holds true for both of the types of complementors. The participation decision has led them to align themselves in a certain way, and they may find it difficult to transfer across the categories, i.e. platform-focused complementors cannot easily become platform independent and vice versa, but on the other hand, via successful adaptation, they also benefit from the way they have aligned to the participation decision. Their strategies in capability development, and the compatible key resources enable them to be competitive in the offering they provide, and the way they adapt to changes are a logical consequence of their prior decisions.

## 6. Conclusions

This chapter concludes this thesis by highlighting the most important implications of the thesis to both practice and theory, and by assessing limitations and avenues for further research. From the practical perspective, the focus is on implications to complementors, and especially those complementors that operate in contexts similar to the case companies. From the theoretical perspective, the focus is on what the findings of the research add to prior academic literature. The limitations and avenues for future research build mainly on the scope of the research, and on the limitations posed by the employed methodology.

### 6.1 Practical implications

This thesis, as one of the first studies focusing on complementors, provides insights into how to succeed in ecosystems for many firms in industries where platforms have emerged, or are beginning to emerge. As most firms ponder how to create platforms and leverage their own platforms, a primary insight is that firms can benefit from ecosystems even if they do not own a platform, by taking the role of a complementor. Complementors can benefit greatly from participating in platforms, if they understand that the way they approach platform participation is a decision that may deeply affect their operations and options in the future. Not only are the findings relevant to firms that need to decide on whether to focus on one platform, or to remain independent and contribute to multiple platforms, but they are also relevant to firms that have already, knowingly or implicitly, made that decision earlier.

Firms that are focused on one platform can utilize the following implications to understand the possible limitations of their options, find ways to both maximize the benefits of their current position, and perhaps mitigate the threats that they face.

Even though some informants in the case companies labeled as platform-focused claim that they are not locked in their platform of choice, it seems that it would be costly and difficult for them to transfer to another platform. Not only are the capabilities of their employees mainly limited to the platform of their choice and it would require considerable investments in training to transfer those capabilities to other platforms, but the benefits that they currently receive from the platform of their choice also impose significant opportunity costs on to a potential transition.

The best way to approach a multihoming platform strategy for platform-focused complementors would be to retain sales and capabilities in the platform of choice this far, and at the same time grow capabilities and sales in another, or multiple other, platform(s). As some of the case companies already have secondary platforms, it seems plausible that this may succeed. Such a strategy would, however, require considerable growth, especially in order to achieve financial benefits from another platform. Furthermore, as platform-focused complementors currently benefit from the homogenic capability pool as they can systematically develop capabilities, coordinating two or more platforms of focus simultaneously would lead to increased costs. Perhaps the best way to implement a strategy to focus on two or more platforms would be to separate different business units for the different platforms.

Whether continuing with a single platform focus or aiming to add other platforms as focus areas, the platform-focused complementors should leverage their current strengths and keep developing them. The systematic capability development practices allow them to circumvent the problem in hiring new employees that are in high demand, i.e. aiming to attract top talent.



Together with replicable solutions, or processes, systematic capability development may also reduce the pressure for salary costs to increase, as the firms are less dependent on individual experts. By keeping salary costs in check, platform-focused complementors can retain their ability to be competitive in terms of costs, and therefore remain both competitive in winning customer projects and profitable in executing them.

Winning customer projects and executing them profitably is also supported by IP and replicability of solutions. Platform-focused complementors should focus on generating IP by codifying and distributing the knowledge they learn and assets they generate during customer projects. They may wish to focus on certain industries in order to retain and increase their competitiveness within the customer segments of those industries.

With or without industry focuses, platform-focused complementors need to be wary of platforms taking over an increasing number of functionalities, and especially the fact that value of purely technological capabilities is rapidly decreasing and technological issues are increasingly being taken over by platforms. Therefore, platform-focused complementors should accumulate knowledge and IP specifically in the business applications of platform technologies.

Firms that are platform independent should understand and leverage the benefits of their independence. They seem to have an advantage in attracting top talent, and that advantage exceeds just being able to pay higher salaries. They should embrace their ability to provide employees with autonomy in making technology choices, to enable learning and autonomous capability development in contrast to building systematic and mandatory capability development practices, and to keep in mind in their sales efforts that interesting projects are important to top talent.

If they succeed in retaining their top talent and in enabling top talent to develop top capabilities in multiple technologies, they can leverage their position as an impartial, and highly skilled and knowledgeable advisor to their customers. As technological choices regarding platforms become more strategic, customers will need advisors in navigating the increasingly complex landscape. Even though by holding on to their top talent, platform independent complementors most likely retain their ability to win projects where differentiating software needs to be created— a type of projects that will likely not be taken over easily by platforms — they may wish to exploit the business opportunities in professional services or advisory. In any case, they need to incorporate business understanding into their capabilities, as not only does strategic advisory in technology require incorporation of business logic, but so will creating differentiating software also, in an increasing manner.

As expanding to advisory services requires new and different capabilities from the firms, platform independent complementors may wish to hire new employees that are more able and willing to take on roles that require business knowledge. Coordinating such a mixture of human capital may not be easy, but the success of some early movers shows that it is possible. It does, however, require careful organizational design and skillful communication by management. If the expansion is not managed carefully, especially taking into consideration the wishes, worries and needs of the current technically talented employees, the expansion can be risky for the firms. Platform independent complementors should first and foremost consider their strategic moves from the perspective of their top talent, as they are in

such a high demand that they can easily find jobs elsewhere, and as they are the firms' most valuable resource.

The threat of top talent desertion is especially crucial for platform independent complementors if they consider changing their approach to be more focused on specific platforms. Firms considering such strategies should also keep in mind that even though a more focused platform participation approach may become more attractive in the future, their models may not be suitable in competing directly with platform-focused complementors. Beginning to leverage systematic and focused capability development and replicability in projects may be very detrimental to retaining top talent. Furthermore, even if platform independent companies would be willing to give up the competitive advantage that stems from top talent, they may find it hard to compete with costs, as platform-focused competitors can leverage replicability more easily, as they are more aligned to systematic capability development and replicable processes, and have accumulated experience in operating in that manner.

## **6.2 Contributions to theory**

This thesis contributes to the nascent and limited understanding on complementors as actors in ecosystems. Via inductive sensemaking from interview data collected from real case companies, the thesis not only provides answers to how complementors act in ecosystems, but also to why they do so.

As the main theoretical contribution, the proposed two categories of complementors, namely platform-focused complementors and platform independent complementors, illustrate and highlight that complementors, even if similar in their operating segments, can differ fundamentally in their decisions regarding platform participation. The two types of behavior patterns observed lead to being able to characterize some complementors as platform-focused or specializing complementors and others as independent or multihoming complementors.

Contributing to prior studies on platform participation decisions, the thesis provides support for market access, and more specifically support in winning customer cases, as an important driver for platform participation. The thesis also suggests that being able to reach a wider customer base is an important benefit, and perhaps the most influential antecedent, of multihoming.

The findings indicate that platform leaders award benefits to complementors, mainly in terms of leads and joint customer cases, based on sales generated to the platform. This type of crafting of rules induces specialization and therefore lock-in. The findings also suggest that specifically the market access benefits that help complementors win customer cases may be the benefit that differentiates platform-focused complementors from platform independent complementors in terms of benefits attained from partnerships. The benefit of market access also differentiates primary platforms from secondary platforms for those platform-focused complementors that also participate on a secondary platform.

The findings imply that the platform participation decision may be more fundamental and strategic than some previous articles have assumed, as key resources and offerings of the complementors are aligned to the platform participation decision. Furthermore, the alignment that follows from the decision implies a tradeoff between specialization to a specific platform and multihoming, instead of regarding them as optional tactics for complementors at all times.

The way key resources, or sources of competitive advantage, differ across the two different types of complementors is an important finding, especially as it is linked to the way the complementors are organized. Platform-focused complementors build on replicability in solutions and on a systematic approach to capability development, whereas platform independent complementors organize via autonomy of top talent in terms of how to solve and approach customer problems, and employ an enabling and facilitative approach in capability development.

The important role of human capital, and its linkage to multihoming, noted earlier by Venkataraman et al. (2018), is supported by the findings of this thesis. Importantly, an example of how firms have tackled the issue of coordination of different types of human capital via autonomy is provided. Furthermore, in the case of platform-focused firms, the findings suggest that lower coordination costs are a benefit of specialization, enabled by focusing only on one platform.

The finding that complementors can affect collectively and indirectly, to some extent, the actions of platform leaders via advising customers is interesting, as it provides insight into how exactly do complementors' downstream capabilities help them defend their position in ecosystems, giving insight to the findings of Huang et al. (2013) and Ceccagnoli et al. (2012).

The findings imply that multihoming does have an effect on power, especially in terms of power that platform leaders wield on complementors. The findings that platform leaders may drive new models or solutions, even in cases where those new models may not be optimal to complementors or customers, is an example of opportunistic behavior by platform leaders. Such a finding is interesting as earlier examples of opportunistic behavior have mostly been limited to integrating functions previously served by complementors – although such integration towards complementors' business is also noted in the findings of this thesis and, therefore, prior theories are not contradicted, but augmented.

The findings of this thesis support the need to incorporate business knowledge to software services identified in prior literature. Furthermore, it seems that both types of complementors identified share such need, therefore suggesting that it widely affects firms in the industry.

Overall, the interdependent nature of platform participation decision and alignment to the decision, and the way the decision and alignment together affect the power relation between complementors and platform leaders, which altogether affect the ways complementors respond to changes in the environment, proposes that complementor strategies are not only complex, but the strategy making process is also dynamic. The process model depicted in section 4.4, even though not likely to be complete, gives primary insights to understanding complementor strategies as an interesting category within ecosystem strategies. Whereas the two different types of complementors employ different strategies, they both take into consideration similar problems, which seem to differ from the problems that are most important to platform leaders.

### **6.3 Limitations and avenues for further research**

The main limitations of the thesis stem from the scoping of the research and the methodology employed. The scope and methodology have an effect on the generalizability and validity of the findings. Considering the limitations, future research could both study the phenomenon in other contexts, e.g. in other industries or from the perspective of product complementors to explore what strategies complementors employ in other contexts, and how the strategies differ from the context of this study. Furthermore, future research may aim to validate the findings of this study via a different methodology employing a deductive approach.

The scope of the thesis is motivated in section 1.3, and even though necessary in order to generate meaningful insights with limited resources, the scope also leads to some limitations in generalizability. Within the software industry, and for the complementors in it, the findings may be valid only for business-to-business service complementors. Service and product complementors seem to differ in multiple dimensions, and therefore, product complementors may be able to employ different approaches to platform participation. It may be that product complementors are able to multihome more easily leading to and enabling different ways to align the firms successfully to platforms. Easier multihoming and a different approach to alignment may have effects on power dynamics, on drivers of change, and on the ways firms adapt to change. Offering services to business customers in contrast to consumers is also likely to affect the dynamics. Future research could aim to understand the strategies product complementors utilize, or to understand how complementors offering products or services to consumers strategize in ecosystems, and compare those strategies to the strategies presented in this thesis for service complementors targeting business customers.

The findings of this thesis are more likely to apply generally to service complementors operating in the enterprise software industry. However, the sample consists of case companies operating in mainly one geographic area, and, therefore, local characteristics of the operating environment may reduce the generalizability. Finland may be a less focal market for international platform leaders than some others, and the supply of capable employees may differ across geographical regions. Future research could focus on service complementors in other geographical regions in order to explore how different local dynamics affect ecosystem dynamics e.g. in the way platform leaders integrate towards consultation of important clients in larger markets.

The findings of this thesis may or may not be generalizable across different industries as the scope of the research is limited to one industry. It is, however, likely that the thesis gives also insight to complementors in other industries, especially ones where platforms have emerged and where continuous development of specialized platform related capabilities is required in order for complementors to succeed.

The methodology being inductive and the number of interviews being limited may pose limitations on the validity of the findings. The purpose of the thesis has not been to confirm any prior hypotheses, and, therefore, the findings are propositive and implicative in nature. Even though theoretical saturation to a pragmatic degree was reached, a claim of complete exhaustion of different categories of complementors cannot be made, thus meaning that the findings may not cover or apply to all companies even within the scope.

However, as the research methodology and limitations of scope and validity are described transparently, and the research methodology has been rigorously followed, the findings are

credible. Furthermore, the limitations are typical to the methodology, which, when applied properly, has its own strengths, and thus employing such a methodology has earned its acceptance in the academic community.

A deductive approach to further research could utilize the findings of this research to develop hypotheses testable with quantitative data. Such an approach could perhaps test whether the pattern of the two different approaches towards platform participation, i.e. platform-focus and platform independence can be proven quantitatively. It may not be easy to test such an assumption by datasets readily available, as platform-focused complementors may nominally participate on multiple platforms even though they practically focus on one. Perhaps obtaining partnership-data where different tiers of partnership can be observed may help in such a quantitative approach, or even better, getting access to revenues contributed to different platforms on a company level may allow to tangibly assess the degree of focus.

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## Appendix I: Interview structure

### Interview structure (original)

# Haastattelukysymykset

- 1. Kuvailisitko yrityksenne strategiaa liittyen eri alustakeskeisiin ekosysteemeihin (kuuluuko yrityksenne useampaan 1.a. suoraan kilpailuvaan ekosysteemiin kuten SAP ja Oracle, ja/tai 1.b. ekosysteemeihin jotka eivät ole suoraan keskenään kilpailevia kuten SAP ja Salesforce, vai 2. onko se keskittynyt johonkin tai joihinkin tiettyihin, tai mahdollisesti 3. joku muu strategia tai hybridi edellisistä + miksi näin on?)**
  - a) Miten strategia on muuttunut viime vuosina?
  - b) Mitkä ulkoiset ja yrityksen sisäiset asiat ovat ohjanneet strategiaa tai vaikuttaneet siihen? (Alustojen ominaisuudet, alustan tarjoajien toimet, teknologian kehitys, sisäiset kyvykkyydet, uudet toimijat alalla, regulaatio, asiakkaat etc.)
  - c) Mitä hyötyjä ja haittoja liittyy hajautukseen tai toisaalta keskittymiseen tiettyyn alustaan?
- 2. Kuvailisitko yrityksenne tarjoamaa ja sen laajuutta eri alustoihin liittyen (eri palvelut ja tuotteet eli roolit tai positiot ekosysteemeissä)**
  - a) Minkälaisia muutoksia tuote- tai palvelutarjoomassa on tapahtunut viime vuosina? Ts. miten roolinne on muuttunut? (Laajennukset tai divestoinnit esimerkiksi asiantuntijapalveluissa tai ohjelmistotuotteissa)
  - b) Mistä sisäisistä tai ulkoisista syistä muutokset tarjoomassa tai roolissanne ovat johtuneet? (Alustojen ominaisuudet, teknologian kehitys, sisäiset kyvykkyydet, uudet toimijat alalla, regulaatio, asiakkaat, etc.)
  - c) Minkälainen yhteys yrityksenne positiolla ekosysteemeissä on sen strategiaan liittyen hajautukseen tai keskittymiseen tiettyyn alustaan?
- 3. Kuvailisitko ohjelmistoalan ekosysteemien kehitystä viime vuosina ja näkemystäsi niiden tulevaisuuden kehityksestä**
  - a) Miten ekosysteemien tai alustojen valta-asetat ovat muuttuneet? Miten uskot tilanteen kehittyvän?
  - b) Mikä on tuottanut kilpailuetua kaltaisellenne toimijalle? Mikä tulee tuottamaan sitä tulevaisuudessa?
  - c) Miten kuvailisit osuuttanne alustoihin liittyvää arvon jakautumisesta? Minkälaisia muutoksia on tapahtunut? Miten uskot tilanteen kehittyvän tulevaisuudessa?

## **Interview structure (translated)**

**1. Please describe the strategy of your firm related to different platform ecosystems** (does the firm belong to multiple 1.a. directly competing ecosystems, e.g. SAP and Oracle, and/or 1.b. ecosystems that do not compete directly e.g. SAP and Salesforce, or 2. is the firm focused on some specific ecosystem(s), or 3. some other strategy or a hybrid of the previous. + why so?)

a) How has the strategy developed in the recent years?

b) What external and internal factors have guided the strategy and had an effect on it? (Platform characteristics/features, platform leader actions, technology development, internal capabilities, entrants to the industry, regulation, customers, etc.)

c) What benefits and costs are related to on one hand diversification and on the other hand focus to a specific platform?

**2. Please describe the offering of your firm and its extent in relation to different platforms**

(different services and products, i.e. roles and positions in ecosystems)

a) What kind of changes have there been in the service or product offerings in recent years? I.e. how has the role changed? (Broadening of offering or divestments in e.g. advisory services or software products)

b) Which external or internal drivers have affected the development of the offering? (Platform characteristics, technology development, internal capabilities, entrants to the industry, regulation, customers, etc.)

c) How would you describe the relation between the position of the firm in the ecosystem(s) and its strategy related to diversification between platforms or focus in a specific platform?

**3. Please describe the development of ecosystems in the software industry in recent years and your view on the future development**

a) How have the power relations changed when it comes to ecosystems and platforms? How do you believe the situation will develop?

b) What have been the drivers of competitive advantage for players like your firm? What will drive competitive advantage in the future?

c) How would you describe your firm's share of the value created in terms of appropriation? What kind of changes have occurred? How will the situation develop in the future?