Add-on Solution Success:
A Configurational View on Knowledge Sharing in Digital Platforms

Research-in-Progress

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Abstract

Digital platforms serve as a foundation upon which manifold firms develop complementary add-ons to address heterogeneous customer needs. In order to successfully stimulate partner contributions platform vendors need to share knowledge with partners that enables them to develop add-ons. Vendors face a trade-off between addressing idiosyncratic needs of partners while ensuring the scalability of knowledge sharing. Literature indicates that standardized or idiosyncratic knowledge sharing does not per se result in successful outcomes, but rather depends on how knowledge sharing addresses characteristics of the platform's architecture. In order to increase our understanding of this trade-off we derive a typology of platform architecture and knowledge sharing. We conduct an empirical study at a large enterprise platform vendor to uncover configurations of knowledge sharing approaches. We distill successful knowledge sharing approaches following a set-theoretic approach. Our research in progress offers insights into our preliminary results and gives an outlook on our future research.

Keywords: Knowledge sharing, digital platforms, set-theoretic methods, configurational view.

Introduction

Digital Platforms are becoming an increasingly important concept for firms to organize their software-based products (e.g. Cusumano and Gawer 2002; Parker and Van Alstyne 2005; Tiwana et al. 2010). Platforms offer an extensible codebase, which external partners can extend by developing functionality-adding applications and services (Tiwana et al. 2010). Thereby, platform vendors seek to leverage the ingenuity and experience of outside actors on an unprecedented scale (Parker and Van Alstyne 2005; Tiwana et al. 2010) in order to align with customer needs (Frels et al. 2003), and harness indirect network effects (Anderson et al. forthcoming; Katz and Shapiro 1994). Research and practice have recognized that building successful ecosystems requires a platform vendor to support partners in their development work (Ghazawneh and Henfridsson 2013; Iansiti and Lakhani 2009; Sarker et al. 2012). In particular, knowledge sharing, in terms of the "transfer of design capability" (von Hippel and Katz 2002, p. 824) from vendor to partner, is vital to the concept of platforms (Yoo 2013).

Indeed, vendor-partner relationships are characterized by heterogeneous innovation capability and knowledge resources (Ghazawneh and Henfridsson 2013; Yoo et al. 2010), where functionality, architecture, and dynamics of a platform may require a partner to substantially invest into the relationship before being able to develop successful add-ons (Dyer and Singh 1998; Fichman and Kemerer 1997; Ravichandran 2005). However, the sheer size of platforms requires vendors to scale these relationships in a low-touch, governed by arm's-length, and highly standardized manner (Ghazawneh and Henfridsson 2013; Tiwana et al. 2010). Hence, vendors face a delicate balance between addressing idiosyncratic needs of partners while ensuring the scalability of knowledge sharing. Although prior empirical evidence has advanced our understanding of platforms in terms of partners' rationales for joining (Ceccagnoli et al. 2012; Huang et al. 2013; Kude et al. 2012), trade-offs in stimulating partner contribution (Anderson et al. forthcoming; Boudreau 2010, 2012), relational variations (Sarker et al. 2012; Selander et al. 2013), and coordination (Claussen et al. 2013; Pagani 2013). However, knowledge sharing has yet to receive adequate attention. The goal of this study is to fill this gap and answer the following research question: *Which factors in the platform's architecture and the approaches to share knowledge with partners contingently contribute to successful outcomes?*

We address this research question from a configurational perspective and argue that factors prevalent in the platform's underlying technology as well as in the characteristics of knowledge sharing approaches between vendor and partner contingently result in effective outcomes. We place our research in the context of a global software platform vendor and its partner network. We investigate vendor-partner relationships across four platforms that exhibit different technological contexts and different approaches of sharing knowledge.

Our discipline provides a unique vantage point at the intersection between technological design and its governance. We thereby expect to contribute with insights absent in the extant management and organization science literature on knowledge sharing across firm boundaries. In particular, we strive to contribute with a theory that explains how the benefits of a platform's design choices can be diminished or reinforced by how a platform vendor shares knowledge with partners. Platforms represent an extreme context where knowledge sharing is (1) crucial for success, (2) needs to be highly scalable, and (3) is focused on complex, development-related knowledge. Despite the acknowledgement of the role of a platform's design in practice, little attention has been paid to incorporate it into theory development (Tiwana et al. 2010; Yoo 2013). Thereby, we seek to address the call that platforms offer "an unusual opportunity to bring back the IT artifact into the core of theory development" (Tiwana et al. 2010, p. 677). This study represents an attempt in opening the black box of platforms (Yoo 2013), by linking its architecture to how vendors share knowledge with partners to stimulate their development. Finally, our set-theoretic approach contributes to the methodological pluralism in these fields.

The remainder of the paper is structured as follows. First, we motivate a knowledge sharing perspective on platforms and discuss relevant background literature. Second, derived from a structured review of literature, we propose a typology of platform and knowledge sharing characteristics. Subsequently, we detail our research setting followed by the presentation and discussion of our preliminary results. Finally, we draw a first conclusion and give an outlook on our research endeavor.

Theoretical Foundation

Sharing Knowledge in Platforms

Platforms are software-based systems, which serve as a foundation upon which partner organizations develop complementary add-on products (Tiwana et al. 2010). We conceptualize a platform as an "extensible codebase of a software-based system that provides core functionality shared by the modules that interoperate with it and the interfaces through which they interoperate" (Tiwana et al. 2010, p. 675). Platforms are well-known in the consumer (e.g. Apple's IPhone operating system iOS) and business segments (e.g. SAP's enterprise systems). Platforms, unlike traditional software systems, are designed to leverage the expertise of outside firms – with skills and an understanding of customer needs the platform vendor may not possess – to creatively develop innovations unforeseeable by the platform vendor (Nambisan 2013; Tilson et al. 2010; Wareham et al. 2014). For some platforms, the number of organizations developing add-on solutions has far exceeded several thousands. These add-on solutions range from oil rig management systems to payroll solutions for Icelandic fisherman. These complements address heterogeneous customer needs and thereby extend the overall value of the platform (Wareham et al. 2014).

In order to develop a deeper understanding knowledge sharing in platforms, it is important to describe the relationships between vendor and partner in more detail. Therefore, we structure platform relationships on two layers; the platform/asset layer and the knowledge sharing layer (Dyer and Singh 1998; Grover and Kohli 2012). The *platform/asset layer* spans the relationship between vendor and partner, wherein the vendor contributes with a common, technological basis, i.e. the platform (Grover and Kohli 2012; Nambisan 2013). With their brick-like structure, platforms offer a lean technological base for incorporating the domain expertise of partners (Ciborra 1996; Ghazawneh and Henfridsson 2013; Kim and Kogut 1996).

In order to share knowledge about how partners develop add-on solutions on base of the platform, vendors conduct activities on the *knowledge sharing layer* (Dyer and Singh 1998; Grover and Kohli 2012; Teece et al. 1997). We refer to knowledge sharing as the transfer of useful know-how or information across company lines (Appleyard 1996). Indeed, the sharing of knowledge, in terms of a "transfer of design capability" (von Hippel and Katz 2002, p. 824) from vendor to partner, has been attributed as a key role in platforms to generate new capabilities and to support partners in their development efforts (Ghazawneh and Henfridsson 2013; Teece 1986). Sharing knowledge is a key enabler for driving platform adoption and innovation capability (von Hippel and Katz 2002; von Hippel 1998). Knowledge sharing is inherently linked to the platform layer, because it seeks to enhance a partner's capability to reuse, recombine, and extend the platform's functional core. However, the platform itself may exhibit high degrees of modularity and decomposition, making an oversight for partners complex (Baldwin and Woodard 2008; Schilling 2000; Tiwana et al. 2010). Vendors face a delicate tension as knowledge sharing needs to address this issue in terms of idiosyncratic needs of partners, but on the other hand needs to be scalable to the magnitude of platforms (Ghazawneh and Henfridsson 2013; Tiwana et al. 2010). The sheer amount of participating partners requires knowledge sharing to be standardized in a way that it is scalable and efficiently distributable to this magnitude (Boudreau 2010; Claussen et al. 2013). Effectively addressing the heterogeneous capabilities of partners becomes challenging, especially when the technological constraints of the platform require substantial investments from partners into building absorptive capacity (Cohen and Levinthal 1990; von Hippel 1998).

Theoretical Considerations

A missing theoretical account for this issue may be due to the complexities of evaluating approaches for sharing knowledge. Indeed, a distinction is a matter of perspective on the relationship's outcome. Seen from a vendor's perspective, empirical evidence indicates that both higher, i.e. idiosyncratic synergistic (Sarker et al. 2012), and lower, i.e. standardized (Ghazawneh and Henfridsson 2013), investments into knowledge sharing may prove successful. From a partner perspective, effective outcomes may not only depend on high or low levels of knowledge sharing, but rather lead to different outcomes depending on how these address the platform layer's characteristics and the partner's own capabilities (Das and Teng 1998; Lavie et al. 2012). Prior research has argued that both variance and process theories may be

insufficient to study this equifinality (cf. Pavlou and El Sawy 2010), which refers to a situation where "a system can reach the same final state from different initial conditions and by a variety of different paths" (Katz and Kahn 1978, p. 30). It has been noted that configurational approaches may add to our understanding of the dynamics inherent in platform relationships (El Sawy et al. 2010). Configuration theories emanate from understanding patterns and combinations of elements and how they cause certain outcomes to occur and form an integrative, meaningful whole (El Sawy et al. 2010; Meyer et al. 1993). Patterns of these elements will exhibit different features and lead to different outcomes depending on how they are arranged (Meyer et al. 1993; see Figure 1B). The transfer of contingency-oriented approaches into multivariate settings, while addressing equifinality, has been attributed as a key advantage to configuration theory (Fiss 2007, 2011; Meyer et al. 1993). From a methodological stance, the concept of set-theoretic methods (Fiss 2007) gained popularity. Set-theoretic methods differ from conventional configurational approaches in that they do not aggregate cases into independent, analytically separate aspects, but instead treat configurations as different types of cases (Fiss 2007). A set-theoretic approach is particularly promising as it allows the combination of abstract concepts with the analytical rigor of logical relationships, thereby setting the stage for theory development (Fiss 2011).

Configurations of Knowledge Sharing in Platforms

We conducted an extensive review of the literature on alliances, software architectures, and platforms in order to increase our understanding of factors in the platform's architecture and knowledge sharing that contingently contribute to successful outcomes. In the following, we outline a distillation of characteristics of the (1) *platform* and (2) *knowledge sharing* layer that serve as concepts to identify configurations in our subsequent empirical analysis. Figure 1A depicts the resulting typology.
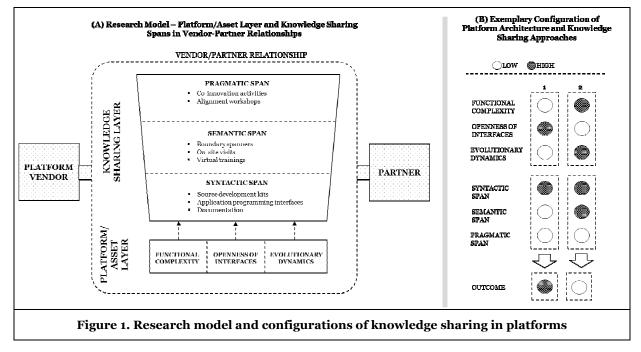
Characteristics of the Platform Layer

We derived *(1) functional complexity, (2) openness of interfaces, and (3) evolutionary dynamics* as configurational characteristics of the platform layer. These characteristics are inherently connected to the platform's architecture, which serves as a blueprint for how its core elements are organized (Baldwin and Clark 1997), how they interact obeying design rules (Tiwana et al. 2010), and patterns of their composition and constraints of those patterns (Henfridsson et al. 2014). In the following, we elaborate on these characteristics in more detail.

Functional complexity. We refer to functional complexity as the uncertainty and ambiguity that surround the development of modules for the platform (Weidong and Lee 2005). Functional complexity is a result of the degree and depth of core functionality a platform offers partners for reuse and recombination (Baldwin and Woodard 2008). High degrees of functional complexity interfere with the process of comprehending the technology (Banker and Slaughter 2000). The component-based or modular organization of platform functionality necessitates partners to acquire knowledge about the interrelationships between its various elements (Ravichandran 2005), thereby imposing substantial barriers for development (Fichman and Kemerer 1997). Addressing functional complexity requires investments into building knowledge, expertise, and familiarity (Banker et al. 1993; Espinosa et al. 2007), which may otherwise result in constrained development (Attewell 1992).

Openness of interfaces. Interfaces refer to specifications and design rules that describe how the platform interacts with its add-on modules (Baldwin and Woodard 2008; Tiwana et al. 2010). A particular stream of research has gathered around the concept of a platform's openness (Boudreau 2010, 2012; von Krogh et al. 2012). Opening a platform, in terms of easing the restrictions on its use and development, is associated with reaching larger numbers of partners, whilst being exposed to the risk of losing control or quality (Boudreau 2010, 2012). A platform's openness is inherently linked to the openness of its interfaces (Tilson et al. 2010; Tiwana 2008; Yoo et al. 2010). We argue that a platform's openness of interfaces relates to knowledge sharing in that third parties share knowledge that partners may process, e.g. available in wikis or books. Thus, the potential search space of partners is extended, allowing partners to be the receiver of several sources of knowledge sharing entities (Garriga et al. 2013).

Evolutionary dynamics. We refer to the operation and interaction of the platform's architectural elements over time as the evolutionary dynamics of a platform (Tiwana et al. 2010). These dynamics are shaped by partners in that they develop add-on functionality for the platform that, in turn, shapes the

platform itself (Yoo 2013). Moreover, these dynamics are created by vendor-side post-hoc modifications that correct, adapt, and enhance a platform (Barry et al. 2006). During its trajectory, various components of a platform remain stable, while others are subject to alterations, changes or disappear completely (Baldwin and Woodard 2008; Tiwana et al. 2010). Some changes may be rather incremental (e.g. adding of functionality), whereas others may be more radical (e.g. strategic or architectural changes; Henderson and Clark 1990). By providing a stable and standardized core, a platform reduces the necessity to continuously adjust the knowledge about the platform (Schilling 2000; Tiwana et al. 2010).

Figure 1. Research model and configurations of knowledge sharing in platforms

Characteristics of the Knowledge Sharing Layer

Although knowledge sharing has not attracted much attention within the domain of platforms, it has been well-studied in the contexts of IS outsourcing (e.g. Cha et al. 2008; Chang and Gurbaxani 2012), distributed development (e.g. Ravichandran 2005; Weidong and Lee 2005), and alliances (e.g. Li et al. 2012; Mowery et al. 1996). Prior research has coined the term of organizational knowledge boundaries (Brown and Duguid 2001), that is, differences, dependencies, or dynamics of knowledge at the boundary between vendor and partner (similar to Carlile 2004). Knowledge boundaries provide a theoretical foundation on how different approaches seek to overcome these boundaries between vendor and partner. We refer to these approaches as *spans*, because platform vendors utilize them to bridge the boundary to their partners. Spans can be viewed as either a vendor-side supply to partners, i.e. in terms of supporting offerings, which may not actually be adopted by the particular partner, or as an actual span established between vendor and partner. We argue that the latter perspective, which focuses on outcomes of knowledge sharing approaches, enables us to focus on which knowledge sharing approaches are de-facto utilized, rather than only being provisioned. We derived *(1) syntactic span, (2) semantic span, and (3) pragmatic span* as characteristics of knowledge sharing approaches. Following our review of literature, we propose the following typology:

Syntactic span. In a *syntactic span* the knowledge transferred takes the form of being explicit (Kogut and Zander 1992), and capable of being codified, captured, stored, retrieved, and transferred across actors and contexts (Szulanski 1996). Syntactic spans relate to an information-processing perspective (Galbraith 1973, Lawrence and Lorsch 1969). Knowledge transfer in this mode is solely transfer-oriented and seeks to establish a shared *syntax* between the actors (Kellogg et al. 2006). Difficulties arise as a result of missing or dysfunctional knowledge transfer due to the lack of a common syntax (Kellogg et al. 2006). In platforms, syntactic knowledge takes the form of application programming interfaces (API). APIs simplify development by providing an abstracted vocabulary that enables partners to call up parts of the platform's functionality (Boudreau 2012). Ghazawneh and Henfridsson (2013) provide a first theoretical account for

the design and use of a syntactic span in terms of overcoming syntactic boundaries on the one hand, but also to control for the exertion of vendor-side interests. Conclusively, high degrees of syntactic span relate to the platform vendor's success in transferring syntactic knowledge to the partner.

Semantic span. In a *semantic span* the knowledge transferred seeks to establish a shared meaning between vendor and partner (Carlile 2004; Nonaka 1994). As knowledge turns more tacit, it becomes less codifiable, teachable, and thus, less transferrable (Inkpen and Dinur 1998; Kogut and Zander 1992). Tacit knowledge is highly context-specific, unarticulated, and has a personal quality, which makes it difficult to formalize (Nonaka 1994). For developing the core components a platform vendor uses its expertise within particular contexts of development or customer reference, and knowledge is embedded within the developing individuals performances and shaped by the vendor's internal organization and norms (Kellogg et al. 2006). Such knowledge is largely situated and experiential in a way that a sole transfer is either not possible or sufficient (Kellogg et al. 2006). Consequently, difficulties arise because of differences in meanings, assumptions, and contexts (Carlile 2002). Overcoming these differences is linked to overcoming the missing semantics between vendor and partner by direct interaction and brokerage (Carlile 2004; Pawlowski and Robey 2004). Knowledge sharing approaches with a semantic span aim to make tacit knowledge explicit (Kellogg et al. 2006; Nonaka 1994). The efforts are directed towards creating shared meanings between vendor and partner and to provide an adequate means of sharing knowledge (Carlile 2004). High degrees of semantic span may encompass on-site visits, virtual trainings, and the use of boundary spanning individuals (Grandori and Soda 1995). However, when knowledge becomes embedded and inseparable from people's interest semantic spans turn inadequate (Zhao and Anand 2013).

Pragmatic span. In a *pragmatic span* knowledge shared seeks to create common interests among partner and vendor (Carlile 2004; Im and Rai 2008). Indeed, knowledge is rooted in the accumulated experience and know-how of individuals and directed by ways of doing things (Carlile 2004). Because knowledge is seen to be inseparable from people's interests and actions in specific contexts, knowledge sharing requires individuals to modify some of their existing knowledge and to engage in a process of knowledge transformation (Kellogg et al. 2006). Pragmatic knowledge transfer is crucial when interests between vendor and partner differ (Im and Rai 2008). It aims at creating shared and common interests among vendor and partner (Carlile 2004; Im and Rai 2008). Transferring pragmatic knowledge requires significant relational investments (Kellogg et al. 2006) and demands each of them to surrender some of their own autonomy and build trust in each other to do what is in the interest of both sides of the relationship (Madhok and Tallman 1998; Sarker et al. 2012). Pragmatic knowledge transfer is facilitated by relationships between the organizations on both the individual and organizational level (Das and Teng 1998; Szulanski 1996). In particular, strong relationships between individuals in different organizations have been identified as a primary mechanism of pragmatic knowledge transfer (Szulanski 1996). We regard their presence or absence in partner-vendor relationships as indicators for high or low pragmatic span. Further examples encompass alignment workshops or co-innovation activities.

Figure 1B depicts three exemplary configurations of characteristics on the platform and knowledge sharing layers. Each configuration (each column) represents a particular relationship between platform vendor and the focal partner. For instance, whereas in configuration 1 the platform exhibits low functional complexity, high openness of interfaces, and low evolutionary dynamics. Knowledge sharing is solely focused on a syntactic span. The outcome of this relationship is successful. In contrast, configuration 2 exhibits high functional complexity, low openness of interfaces, and high evolutionary dynamics on the platform layer. Knowledge shared takes syntactic and semantic form. However, configuration 2 has a low outcome.

Methodological Background

We empirically ground our research in the enterprise systems industry. We chose a multiple case research design (Yin 2008) at *AlphaCorp*, a global software firm. In recent years, AlphaCorp has embarked on the platform strategy and spent considerable effort in transforming existing products into platforms as well as introducing new platforms to the market. AlphaCorp's rich partner ecosystem, operating across different markets, multiple platforms, and leveraging various approaches for sharing knowledge, stands out as a unique case, thus rendering suitable for our research interest. We collected data on the following platforms of AlphaCorp: a mobile platform (MOBILE), which enables partners to efficiently build mobile

apps; an application integration platform (INTEGR), which offers integration functionality between various software systems; a cloud computing platform (CLOUD), which offers a cloud based system; and a business intelligence platform (BI), which provides data manipulation and representation systems. This selection allows us to leverage the breadth of a set-theoretic approach in terms of a variance in the motivated configurational characteristics. The identified characterizations, as shown in Table 1, are based on online material and available technical documentation, endorsed by insights gained from interviews with partners. This triangulation of data is intended to increase the internal validity of our approach (Eisenhardt 1989; Yin 2008).

Table 1. Characterization of the evaluated platform technologies						
	FUNCTIONAL		**OPENNESS**		**DYNAMICS**	
BI	*Provision of simple data acquisition and transformation functions*	Low □	*Usage of open standard technology (SQL)*	High ■	*Neither interfaces nor functionality change frequently*	Low □
CLOUD	*Cloud-based business software platform*	High ■	*Usage of proprietary standards and technology*	Low □	*Frequent changes and enhancements of functionality*	High ■
INTEGR	*Specific and extensive business logic*	High ■	*Usage of standardized interfaces and technologies (OData)*	High ■	*Underlying functionality stable over time*	Low □
MOBILE	*Provision of functionality for developing interfaces on mobile devices*	Low □	*Usage of standard technology (HTML5, JavaScript)*	High ■	*Functionality and interfaces undergo frequent changes*	High ■

Our qualitative approach is well-suited for exploring new theoretical relationships as hypothesized in our study (Eisenhardt 1989). At present, we have completed 21 interviews with executives of the partner organizations of the different platforms. The method for selecting the interview partners followed purposive sampling, as we aimed to identify a large variety of successful and unsuccessful configurations (Yin 2008). The interviews are conducted in a semi-structured manner, following a pilot-tested and subsequently refined guideline (Yin 2008). Each of the interviews lasted about 60 minutes and covered nine open questions designed to collect qualitative data. Following Silverman (2010), we used a systematic and analytical approach to parse and code our collected documents and interviews to achieve results with high credibility. We used MAXQDA to code each interview with regards to the identified attributes of platform and knowledge sharing attributes, and, if applicable, with a measure of tendency: *low* or *high*. We illustrate the procedure of coding with the examples displayed in Table 2. We distilled a distinct set of unique configurations following the minimization algebra of Fiss (2007). Finally, regarding the outcome variable *success*, we coded statements as *low* if a relationship resulted in the partner either not releasing an add-on product or withdrawing from the relationship to AlphaCorp. In contrast, if the partner released or was in the process of releasing one or more add-on applications, we regarded the relationship as a success. We observed both *low* and *high* themes for each attribute, except for *syntactic* span.

Preliminary Results

Although the collection and analysis of data is still in progress, we are able to present a preliminary set of results. Our dataset comprised 19 configurations, which we, following the set-theoretic approach as suggested by Fiss (2007), distilled to 9 sets by identifying unique configurations (see Table 3). These nine sets span over the four platforms, which exhibit the same configurations for all partners. We observe six configurations that lead to *high success* (1, 3, 5, 6, 7, 8) and three that led to *low success* (2, 4, 9). Our analysis of the derived configurations focuses on understanding constellations of elements, the relationships among these elements, and the consequent observed outcome. By evaluating each of the configurations in more detail and exploring the attributes that influence the relationship outcome, we find patterns that represent promising avenues for our research.

		Table 2. Exemplary coding of knowledge sharing attributes
SYNTACTIC SPAN	High ■	*"So your [BI interfaces], the front and the back end; those documentations are very extensive so I really appreciate that, how the different data structures are documented, that helps a lot." (P_14_DEV)* *"But I would say, in general, learning [platform] stuff went really well for me. There's like two main places where I went. One of them is [the online documentation] [...] And in general, all of that went pretty well." (P_26_DEV)*
	Low □	*"Some of the information was a little inconsistent. So like maybe a new version of [platform] would come out and the information would be updated in one place but then not in another for some time and you could download the wrong version or an old version." (P_28_DEV)* *"Then that [online documentation] is almost like a very sophisticated ERP application, mostly level and manual, and many places that they used to get lost. They don't know what to do with it." (P_21_DEV)*
SEMANTIC SPAN	High ■	*"So sometimes we have some errors or some situation, we keep constant communication [...] and all that was pretty much okay." (P_10_CEO)*
	Low □	*"The training was not effective to put into practical use in what we were doing [...]." (P_5_CEO)*
PRAGMATIC SPAN	High ■	*"[AlphaCorp Executive] also clearly stated that they see us as a strategic partner, therefore we also get all the support we need." (P_5_CEO)* *"Our CTO, Tom, was a former [AlphaCorp] employee. He's been in [AlphaCorp] for about eight years. [...] On Monday before the show, we all came to headquarters and there was a – sort of a partner meeting, where [AlphaCorp manager] was there, [AlphaCorp head of development] was there, a number of people [...] talk about, you know, the – sort of the secrets of the show and sort of what helped us." (P_17_EXEC)*
	Low □	*"We have multiple projects [AlphaCorp] could participate in, [...] But we are not taken seriously [by AlphaCorp]. I had hoped [AlphaCorp] would support us here." (P_8_CEO)*

First, by looking at the attributes in isolation, we observe *pragmatic span* to be exceptional and to occur only in three configurations. However, each of these three configurations resulted in a high outcome (3, 6, 7). Second, by comparing and identifying patterns within the set of configurations, we observe configurations in which identical architectural attributes result in the same outcome, while differing only in its knowledge sharing (1, 2; 3, 4). While this suggest a significant role of knowledge sharing attributes for these two particular architectural configurations, for other architectural configurations knowledge sharing does not seem to matter as much (5, 6, 7 ,8), as various knowledge sharing configurations lead to a successful outcome. By contrast, the knowledge sharing attribute *pragmatic span* seems to be decisive for the ultimate relationship outcome for configuration 3 and 4, as both exhibit *high functional complexity* and *high evolutionary dynamics*. This hints towards a strong interdependency between this particular architectural configuration and the alignment between partner and vendor.

In particular, the configurations that simultaneously exhibit *high evolutionary dynamics* and *extensive pragmatic span* lead to high success. In configuration 9, although the platform exhibits *low functional complexity*, a *high openness of interfaces*, and *low evolutionary dynamics*, the presence of a *high syntactic* and *semantic span* did not result in a successful outcome. It is noteworthy that in this case, the partner decided to leave the ecosystem.

ID	# of obser-vations	PLATFORM			KNOWLEDGE SHARING			Outcome
		Functional Complexity	Openness of Interfaces	Evolutionary Dynamics	Syntactic Span	Semantic Span	Pragmatic Span	
Table 3. Unique configurations derived from the preliminary results								
1	5	High ■	High ■	Low □	High ■	High ■	Low □	**High**
2	3	High ■	High ■	Low □	High ■	Low □	Low □	**Low**
3	2	High ■	Low □	High ■	High ■	High ■	High ■	**High**
4	1	High ■	Low □	High ■	High ■	High ■	Low □	**Low**
5	1	Low □	High ■	High ■	High ■	High ■	High ■	**High**
6	3	Low □	High ■	High ■	High ■	High ■	Low □	**High**
7	2	Low □	High ■	High ■	High ■	Low □	High ■	**High**
8	1	Low □	High ■	High ■	High ■	Low □	Low □	**High**
9	1	Low □	High ■	Low □	High ■	High ■	Low □	**Low**

Discussion and Outlook

Regarding our future research, we find promising avenues in our preliminary results. The factor pragmatic span seems to have a link to the partnership outcome as a high manifestation is accompanied by a high partnership outcome. This may also be related to what Sarker et al. (2012) described as synergistic integration relationships; namely that a symbiotic relationship between vendor and partner heavily relies on effective knowledge sharing. Moreover, we observe syntactic span as high throughout all configurations. Although this may be due to a limited set of observations, this result suggests that a high syntactic span may not solely cause successful outcomes. Indeed, our results give an indication that different configurations of a platform's attributes and knowledge sharing approaches may lead to desired outcomes in distinct ways, thus contributing to partnership success. This points to the inherent complexity and equifinality of evaluating knowledge sharing approaches in platforms that we seek to address in more detail in the next steps. Prior research provides empirical evidence that both highly standardized (Ghazawneh and Henfridsson 2013) and idiosyncratic synergistic knowledge sharing approaches may prove successful. By taking in a configurational perspective, we are able to uncover the underlying causes and address the inherent equifinality. In particular, we plan to comparatively analyze the outlined conflicting configurations and drill deeper by conducting in-depth case studies for these specific cases to investigate why these knowledge sharing approaches led to successful outcomes.

Currently, we are in the process of collecting further data. In order to make our results more generalizable we established a cooperation with a second platform vendor, *BetaCorp*. BetaCorp maintains a number of platforms covering customer relationship management, mobile, and office products, which may complement our existing configurations, especially with regards to low syntactic spans. We plan that our final sample size will encompass 50 interviews with partners of AlphaCorp and BetaCorp. As contributions of our research, we expect to provide (1) a refined understanding of interactions among architectural and knowledge sharing characteristics and (2) a theoretical base for understanding the interplay between architectural and knowledge sharing attributes and successful relationship outcomes. The final results of this study are expected to contribute to existing literature on platforms and inter-organizational knowledge sharing, as well as to provide valuable insights for decision makers regarding knowledge sharing in the context of digital platforms. In particular, we expect to find patterns of knowledge sharing attributes that complement architectural attributes. In doing so, our research may help to solve the puzzle of how knowledge sharing can both address the needs of partners while being scalable to the magnitude of platforms. We expect the set-theoretic approach to be particularly promising, as it allows one to conduct a detailed assessment of how architectural and knowledge sharing-related approaches jointly result in successful relationship outcomes in platforms.

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