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Orchestration in Practice: A Case in Asset Intensive Industry

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ORCHESTRATING IN PRACTICE: A CASE IN AN ASSET-INTENSIVE INDUSTRY

Research paper

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Abstract

Ecosystem governance and orchestration within networks seek to explain how some firms, based on organizational-level characteristics, are comparatively more able to become central actors in a prevailing network structure and thus manage business networks and value chains. This paper scrutinizes the understanding of orchestration by exploring the orchestrating efforts of an entrepreneurial firm. The findings expose that there are variable efforts and attention directed towards differentiated partners classified as technology, application, service and industrial partners. Further, there were technical, industrial and commercial orchestration. The paper has two contributions to the literature: showing how orchestration is actually done in practice, through differentiated partner orchestration, and proposing an integrated interdisciplinary understanding of orchestration that builds on literature streams of information systems, service-dominant logic and strategic management.

Keywords: Orchestration, Ecosystem, Transdisciplinary.

1 Introduction

This article takes a critical stance against the concept of network orchestration (Dhanaraj & Parkhe, 2006; Hurmelinna-Laukkanen & Nätti, 2018; Möller & Svahn, 2006; Nambisan & Sawhney, 2011) by investigating this phenomenon in a B2B ecosystem context. The idea that networks can be orchestrated stems from the widely held assumption within the broad literature on interorganizational networks that network formations can be intentionally initiated and managed by an actor taking a central position within a network structure. This central position is supposed to stem from a superior resource base. However, little is known about how orchestration is actually performed in external business environments, be they labeled ecosystems or innovation networks. The mentioning of central organizational actors in such networked environments, referred to as hub firms (Dhanaraj & Parkhe, 2006), "keystone" organizations (Iansiti & Levien, 2004) or platform leaders (Cusumano & Gawer, 2002), is found to influence the evolution of entire business networks (Möller, Rajala, & Svahn, 2005). The central organizational actors are certain types of organizations with certain capabilities, enabling them to take certain roles (Hurmelinna-Laukkanen & Nätti, 2018). While this articulates the "whom," the "how" and the "what," the orchestration phenomenon is quite encompassing, covering large aspects of organizational learning and innovation. Network orchestration is about how knowledge is accessed, mobilized and transferred in an innovation network by the hub firm, both externally in the whole network and internally within every participating firm (Dhanaraj & Parkhe, 2006). However, while accessing, mobilizing and transferring knowledge may be regarded as the successful results of a firm's orchestration initiatives, the activities and practices that substantiate and eventually lead to such outcomes are not well understood. In particular, what is problematic with the current understanding of network orchestration is the broad and encompassing understanding of how a central actor manages

external interdependencies to generate value. We argue that this broadness in scope may be the reason why this perspective has been adopted to account for governance phenomena. In spite of similarities, interorganizational networks and ecosystems are widely recognized as two distinctive types of collaborative arrangements (Shipilov & Gawer, 2020), and because of this, assumptions of how (network) orchestration unfolds should not just be adopted, but rather *adapted* to explain (ecosystem) orchestration. We ask the following research questions: *How do the providers of a data-centric platform orchestrate the surrounding ecosystem?* and *What are the implications of our understanding of orchestration?*

The aim of this paper is twofold. We seek to gain a deeper, more concrete empirical understanding of the orchestration phenomenon. Then, we wish to use this understanding to challenge the ways orchestration has been defined in the literature and contribute by theorizing on what orchestration is in an *ecosystem* context. The empirical case is an entrepreneurial firm providing a data-centric platform and orchestrating a nascent ecosystem. The findings expose that orchestration in an ecosystem context takes place at three levels constituting a different set of practices aimed at harvesting external resources from partner firms in an ecosystem.

The paper proceeds with a theoretical positioning of the paper within the literature on network orchestration, digital innovation, digital platforms and ecosystems. In the ensuing section, the method is explained by showing how the empirical field was approached. The findings of the study expose partner orchestration and orchestrating levels, followed by an analysis of stepwise orchestration. The discussion exposes the contributions of the player-facilitator-orchestrator type and the transdisciplinary phenomena of orchestration, concluding with implications, limitations and future research.

2 Theoretical positioning

2.1 Network orchestration: The centrality of actors in a network structure

Studies of interorganizational networks tend to separate out two types of network formations based on the degree of intentionality inherent in their management (Provan & Kenis, 2008). At one end of the continuum are serendipitous network formations that emerge on the basis of actors' gradual co-adaptation to changing circumstances. The other end of the continuum represents network formations that are initiated on the basis of a specific purpose. Societal or business problems cannot be solved by one organization or firm alone, requiring a multi-organizational response in the form of a formal collaboration arrangement. What separates these two interorganizational network formations is how the mode of governance is decentralized or centralized. Goal-directed networks, especially within the private sector, tend to be centrally managed and governed by a single organizational actor that holds such a position through firm-level attributes like superior resources (Kilduff & Tsai, 2003; Provan & Kenis, 2008). These types of organizational actors have been called network entrepreneurs (Burt, 2000), champions (Doz, Olk, & Ring, 2000), local anchor tenants (Agrawal & Cockburn, 2003; Powell, Packalen, & Whittington, 2012), lead organizations (Provan & Kenis, 2008), and hub firms (Jarillo, 1988). While different as to labels, on a general level they all evoke to the phenomenon of goal-directed and intentionally initiated interorganizational networks.

Jarillo (1988) was the first to claim that such an understanding of network management also has implications for strategic management. In the argument that some firms are able to become hubs in a network, the network itself becomes a resource that can be used by the firm in question to produce value for business purposes (Jarillo, 1988). This idea was picked up on by a group of authors within the scholarly domain of innovation networks and further developed around the concept of "network orchestration" (Dhanaraj & Parkhe, 2006; Möller et al., 2005; Möller & Svahn, 2003). The most comprehensive, and most cited, attempt to do so was the contribution of Dhanaraj and Parkhe (2006). To these authors, network orchestration is an unexplored process issue in network management that occurs in the absence of hierarchical authority; it is described as "the set of deliberate purposeful actions undertaken by the hub firm as it seeks to create value (expand the pie) and extract value (gain a larger slice of the pie) from the network" (Dhanaraj & Parkhe, 2006, p. 659). Integrating literature from

organization and management studies, the authors construct a framework with three orchestration subprocesses: managing knowledge mobility, managing innovation appropriability and managing network stability. The most important part of their contribution is that these subprocesses are enabled by the status of the hub firm's organizational apparatus. Let us elaborate.

Orchestration is meant to be a metaphor for soft management approaches aimed at influencing the diversity of the total network relations. Instead of relying on formal rules and contractual incentives, network output is not "governed" in the purest sense of the word, but rather facilitated – orchestrated – through different socialization and communication techniques. It is recognized that each network member is an autonomous actor, and their continuing interaction and contribution of input resources to the overall network collaboration must be achieved by creating a certain level of trust and legitimacy. And this is where the hub firm comes in. The different actors, simply by knowing of the hub firm's existence, are prompted into sharing knowledge (knowledge mobility), promised that they will get a fair share of the output in terms of individual resources invested (innovation appropriability), and assured that the network will deliver on what it intended to do in the first place (network stability). The "existence" of the hub firm signifies a *centrality* in a network structure that gives such firms decision-making authority in horizontal firm-relations. This is in many ways the key idea and assumption underlining the phenomenon of network orchestration and related conceptions of central modes of network governance. In an attempt to further expose this phenomenon, Hurmelinna-Laukkanen and Nätti (2018) aim at providing more nuance to the network-centrality view of the hub firm by framing network orchestration as a configuration of different components: orchestrator types, orchestration capabilities and orchestration roles. Based on a hub being a particular orchestrator *type*, this firm has the orchestration capabilities to take on specific orchestration roles of conducting a bundle of activities in a certain way. And this configuration might change in the course of a network collaboration. In terms of the underlying assumption of the structural centrality of the hub firm, this fundamental idea is still kept intact. It is the resource base of the orchestrator when it comes to monetary resources and intellectual capital and their strong reputation in an organizational environment that are supposed to give such actors power in a network collaboration. The difference is to be found in the motivation of these actors, which stems from which type of organization they are. A player-orchestrator is driven by the realization of economic goals and will most likely be a business firm operating in market. A facilitator-orchestrator is an organization that is not driven by commercial gains but can act as a mediator and facilitator of collaboration through holding a strong relational position in a network. These can typically be NGOs and privately initiated firms with the sole purpose of connecting persons and firms with the intent to spur innovation. Sponsor orchestrators are organizations that fall somewhere between facilitators and players – that offer resources and connections to network members, with expectations that their investment of time and resources will pay off in later stages. Typical examples are venture capitalist and business incubators that are central actors in that they fund innovation instead of actually conducting it. Notice that player-orchestrators and facilitator-orchestrators are two types of orchestrators operating at two extreme ends of a continuum; they gain their centrality as actors in a network collaboration based on the amount of "hard" (monetary) resources they have –player-orchestrators – or the amount of "soft" (relational) resources they have – facilitator-orchestrators.

The idea that networked environments can be intentionally managed by a single organization has also been part of theorizing on ecosystems (Jacobides, Cennamo, & Gawer, 2018), and the concept of network orchestration put forward by Dhanaraj and Parkhe (2006) has been a central part of this. Numerous studies, both conceptual and empirical, across fields use this understanding as a means of arguing for the particularities of the governance that are to take place in an ecosystem context (Azzam, Ayerbe, & Dang, 2017; Korpela, Ritala, Vilko, & Hallikas, 2013; Ritala, Armila, & Blomqvist, 2009; Tiwana, 2013; Yoo, Boland Jr, Lyytinen, & Majchrzak, 2012). Tellingly, Jacobides et al. (2018) place Dhanaraj and Parkhe's contribution within an ecosystem literature stream called "business ecosystems," signifying the centrality of their contribution to efforts at theory building of the ecosystem concept. Business ecosystems are different from other types of ecosystems in that a firm is the main unit of analysis. By arguing that some firms are hubs in an ecosystem, a business ecosystem is seen as an external environment of the focal firm and can as such influence and be influenced by it (Jacobides et

al., 2018, p. 2257). This view on ecosystems is similar to the ecosystem-as-affiliation perspective that sees ecosystems primarily as networks of organizations that are connected to each other through their linkages to a focal actor. This focal actor is explained to have a higher potential for power by holding a central position in the network (Adner, 2017).

Based on this brief review of the history and current status of the network orchestration concept within studies of both interorganizational networks and ecosystems, orchestration in such settings is perhaps best explained as a type of governance mechanism. It is a set of processes and activities that produces a mode of governance: networks or ecosystem. However, the actual orchestration is also enabled by a particular apparatus of governance within the realms of a single organization. This seeming complexity might just be what Dhanaraj and Parkhe (2006) tried to catch by evoking a player-structure duality in their network orchestration construct. Interfirm networks comprised individual firms whose individual status and identity enable their capacity for action that shapes the structural composition of the network. However, this structure affects the range of possible actions being done, given that the overall governance arrangement is decentralized, in the sense of not being based on hierarchical authority.

2.2 Ecosystems as an interdisciplinary phenomenon

Autio and Thomas (2020) expose how value is co-created in ecosystems. Discussing the term ecosystem in the scholarly domains of information systems, strategic management and service marketing, Autio and Thomas (2020) highlight how these are different and yet overlapping. Following their classification, we discuss how the concept of network orchestration can be understood in each literature stream.

2.2.1 Network orchestration within strategic management

Strategic management emphasizes the governance challenges that occur when the focal firm (here depicted as ecosystem leaders) producing an offering in a production system, has to change their way of approaching suppliers and complementors in the value chain. Orchestration becomes the non-contractual mechanisms that ecosystem leaders undertake when they try to mitigate the dilemma of producing an offering to a customer with complementary inputs of actors with no direct contractually-based control, while in need of persuasion to make co-specialized investments (Autio & Thomas, 2020). This is called an ecosystem blueprint view where the blueprint is about the roles and relationships in the ecosystem and how a value proposition is to be materialized and delivered (Adner, 2017; Hannah & Eisenhardt, 2018). The ecosystem orchestrator communicates, coordinates and implements the blueprint (Autio & Thomas, 2020).

2.2.2 Network orchestration within service dominant logic

Service-dominant logic (S-DL) says little about governance mechanisms and orchestration, but emphasizes services, not goods, making the ecosystem a demand-side consumption system instead of a production system (Vargo & Lusch, 2016). Orchestration can be the process that takes place when the service provider *and* the service beneficiary integrate their resources to make value creation occur when the offering is in use, not being produced. Orchestration is the dyadic interaction taking place in the ecosystem resulting in the "emergent phenomenological experience" the user has of the value (Vargo & Lusch, 2016). Orchestration is inherently dynamic, and the managerial instrumental aspect is downplayed. Returning to the definition by Dhanaraj and Parkhe (2006), value generation is more emphasized in S-DL than are the firm-based attributes of organizational power and capabilities. Focus is not placed on the central firm's ability to integrate resources in a network, but on how the focal firm can prompt the recipient of a service to feel that the offering has value, which in turn creates an enhanced value perception for the service provider. In S-DL, there is not a central actor who orchestrates; both actors are co-orchestrators with the initial orchestrator (service provider) and the final orchestrator (service beneficiary). Orchestration becomes a collaborative process, where the user of the service has to be engaged by integrating resources that are made available by the resource provider in the dyad exchange.

2.2.3 Network orchestration within information systems

The IS tradition represents the least form of control possessed by a hub firm, since the properties of digital artifacts yield unpredictability to the innovation process (Nambisan, Lyytinen, Majchrzak, & Song, 2017; Yoo, Henfridsson, & Lyytinen, 2010). The hub firm in a digital ecosystem becomes the actor that owns and provides the digital platform that the other peripheral firms connect to via programming interfaces and software development kits. However, the concepts of affordances (Majchrzak & Markus, 2012) and generativity (Eaton, Elaluf-Calderwood, Sørensen, & Yoo, 2011) change the ability to orchestrate the ecosystem. On the one hand, the digital platform affords the capacity of the hub to orchestrate by enabling a certain action potential that the other actors in the ecosystem do not possess. But on the other hand, the digital technologies and digital infrastructure that underpin the platform afford a generativity to the ecosystem's innovative potential at large: that is, an "…overall capacity to produce unprompted change driven by large, varied, and uncoordinated audiences*"* (Zittrain, 2008, p. 1980). This creates a governance dilemma for the platform owner balancing between technological flexibility and control. Autonomous third parties on a digital platform must be prompted into giving innovative inputs to the ecosystem, following the logic of unpredictability set forward by generativity, while the ecosystem also needs a degree of stability that makes it attractive for participants to dare to join.

Hence, there are two areas in need of more empirical research. First, the literature on network orchestration gravitates towards the broad conceptual framework of Dhanaraj and Parkhe (2006), focusing on how prominent and powerful organizations in a network structure initiate and lead an innovation network through the three orchestrating processes of knowledge mobility, innovation appropriability and network stability. There is a need to clarify the road from abstraction to concrete empirical evidence. Other than an understanding that orchestration is a firm-level capability (Ritala et al., 2009) and a dynamic process (Hurmelinna-Laukkanen & Nätti, 2018; Paquin & Howard-Grenville, 2013), we still know little about how orchestration is actually done in practice – that is, the set of actions undertaken by the hub firm (Dhanaraj & Parkhe, 2006, p. 659). Secondly, the notion of network orchestration is applied in different disciplines explicitly or implicitly (Ceccagnoli, Forman, Huang, & Wu, 2012; Dattée, Alexy, & Autio, 2018; Eaton, Elaluf-Calderwood, Sørensen, & Yoo, 2015; Ghazawneh & Henfridsson, 2013; Jacobides et al., 2018; Wareham, Fox, & Cano Giner, 2014). Yet, the actual link between network orchestration and ecosystems is not clear. Although the concepts of orchestration and ecosystem have co-evolved, this concomitance is not well understood. We therefore turn to our empirical case to illuminate how ecosystems are orchestrated.

3 Methods

Since the research questions ask how rather than how many, and the project is exploratory, a qualitative method is best suited (Pratt, 2009). The inference mechanism of abduction is used as a means of seeing empirical material as entangled with theory, as opposed to inductive or deductive approaches seeking at developing research designs where the theory has to "fit" with the data. The theoretical framework has been flexible, and the research strategy was reflexive (Alvesson & Kärreman, 2007). Starting with the idea that something is being orchestrated by someone, instead of adhering strictly to the assumptions of the framework of network orchestration, we were surprised and exposed to the unexpected when collecting and analyzing the empirical material. Rather than seeing orchestration simply as subtle leadership or the creation and capture of value, reflexivity involves being critical towards vague descriptions of the orchestration phenomenon that may not reflect the empirical complexity of what is really going on (Alvesson & Sköldberg, 2017).

3.1 Case description

We conducted an empirical case study to acquire an intensive and in-depth knowledge of a single unit for the purpose of understanding a larger class of (similar) units (Gerring, 2004, p. 342). The case is the firm "Digitize" (pseudonym), which was established in 2016 as a software industrial company. Starting out with only a few employees, after five years of operation, Digitize counts 650 employees from all

over the world. The main mission of Digitize is to develop and sell a data-centric platform (here called the Digitize Platform) to heavy-asset industries. The functionality of this platform is to make industrial data more accessible, available and usable for companies operating in traditional heavy-asset industries, not born as digital enterprises. The Digitize Platform offers to connect with the IT infrastructure of customers' organizations through integrating, gathering and storing different data sources in their own cloud infrastructure, thereby "contextualizing" the data and making digital representations of the physical industrial reality. Digitize as an organization is divided into an engineering department consisting of developers, designers and data scientists who develop the products that are part of the offering, and a customer department that works on delivering the products to the customers.

3.2 Data collection

In our study of orchestration in Digitize, six interviews lasting from 60 to 90 minutes were conducted with four senior managers and one midlevel manager in Digitize, and one senior manager in one customer firm. In addition, 119 press releases were read, 28 documents analyzed, and 14 webinars watched.

3.3 Data analysis

In conducting an abductive and reflexive methodological approach (Alvesson & Kärreman, 2007; Alvesson & Sandberg, 2011; Alvesson & Sköldberg, 2017), we analyzed the empirical material in four steps: In the first step, we familiarized ourselves with literature on orchestration and on digital platforms. In step two, we read press releases and systematized web pages, webinars and online courses from Digitize in relation to orchestration. Specifically, all the secondary sources (including press releases, documents and webinars) were used to inform us on background information, such as the functionality of the platform and the company history. The different webinars explained how the architecture and infrastructure behind the digital platform works. The main function of the press releases was to gain an understanding of the processual account of events also presented in a sequential manner on the company's website. The documents reveal how the company collaborates with partners and what the main strategic focus areas are within these collaborations. In step three, we interviewed the different informants. And finally, in step four, we analyzed the empirical material in relation to the literature, which led to two surprises: 1) The way Digitize orchestrates their ecosystem and business networks is more complex than existing literature has exposed, and 2) the way Digitize speaks of and works with orchestration were interdisciplinary in nature. Regarding the interdisciplinary nature of orchestration, we went back to the three scholarly domains of information systems, strategic management and service marketing, expounded upon by Autio and Thomas (2020), and found by surprise that the three were present empirically. Hence, we first expose the different types of actors that are orchestrated by Digitize and then the three different ways Digitize orchestrates. In the analysis, we present an integrated focus of how the types of actors and the means of orchestration can be interpreted as a more coherent understanding of orchestration practices taking place in early ecosystem creation, which is the main contribution of the paper.

4 Orchestration activities

In Digitize, there were different aspects of what orchestration is and what it means to orchestrate. The findings show that orchestrating was explained as the activities that underpin the collaboration with partners. Moreover, the findings are differentiated according to "what" is orchestrated, being the segment of ecosystem partners, and "how" these are to be orchestrated, being the types of practices and strategies used by Digitize to enable the orchestration.

4.1 Partner-orchestration

Digitize's approach to orchestrate their partners is based on how they collaborate with their partners and is defined as a partner-ecosystem. A director explained:

> *I started looking into what we need of an ecosystem to scale out in the world to both reach as many customers as possible, but at the same time also deliver the value that our customers expect from us. So, what I arrived at pretty quickly was that we may have four types of defined partners that we need to work with…*

Hence, the ecosystem is divided into four different types of partners, which are deemed strategically important for Digitize to deliver their data platform to and subsequently become the target of orchestrating efforts. These are technology partners, application partners, service partners and industry partners.

4.1.1 Technology partners

The first subset of partners is those delivering the technical components serving as building blocks to the digital platform. These are important partners because they build the digital infrastructure for Digitize by providing the cloud service that gives functionality to the data platform. However, these partners may have another function since they have relations to important industrial customers Digitize envisages selling their platform to:

> *So that type of technology partner often has two types of values for us: Both to make sure that we have the technology that we can build the platform on, and also as a collaboration partner that we can do go-to-market activities and account planning with. They can help us with sales awareness from the top down into their large sales environment.* –Digitize manager

A technology partner can be a door-opener to untapped markets and orchestrated to become a sales channel for Digitize. This double role of technology partners is exposed by Digitize's approach to two large, internationally known technology providers (anonymized as "Green" and "Blue"):

> *Here, I saw also early, before we started working with Blue, that we had built the platform on Green's technology, which was a really good technology, but Green didn't have the same type of impact field when it comes to enterprise customers. So, we have not gotten the same type of traction aid from Green when it comes to the pure commercial. But very much so on the technical, so a technology partner can be valuable in different ways. And now the customers can choose if they want to have the platform on Green or Blue.* –Digitize director

4.1.2 Application partners

Initially, the idea behind the Digitize Platform was that Digitize would not build any applications themselves on top of the platform:

> *I was pretty naive. I started three years ago. I thought that there would be a whole army of companies out there that had done applications that we could just plug in on top of our platform. However, it would show that that market was very immature. A large part of the application partners that we tested was really more a bunch of data scientists that sat in the backroom and coded and made it look like a product. There [are] not many that have solved machine learning and AI and the very advanced logic. ... So, when these industrial partners come and if they say they have, we don't believe them. Because we have not seen anyone that can solve it yet.* –Digitize manager

Due to these experiences, the application partners receive less attention compared to the other partners. Nevertheless, there are niche partners Digitize collaborates with:

> *That can, for example, be someone who has solved some things within sustainability reporting, which is a very concrete thing, or it can be a partner that*

> *has a very specific application that we often have to integrate with physics simulators because it is not enough data to do predictive maintenance or [the like]. So, we in a way must simulate data, and then there are not many companies that have applications, and this is very deep, for example, "virtual flow meters" that simulate flows of liquid, applications that does that, very specific things, that we can combine with data in the platform.* –Digitize employee

The belief is that the more customers buy the platform, the importance of and number of application partners will grow.

4.1.3 Service partners

Employees in Digitize understand the company as a platform company. They want to build a product to sell to as many customers as possible. The plan is not to become a professional service organization. Therefore, together with the technology partners, the service partners receive the most strategic attention due to their role in Digitize's ability to scale. Service partners are often large and well-known consulting firms specialized in business development and technical system integration. Business development is about developing a digital strategy, and system integration revolves around helping customers integrate data in the Digitize Platform and solve use cases on top of the platform:

> *So right now, we are in a shift. We have just started to embed consultants into our projects. That is sort of the first step, and the next step is that we have started to co-sell with these partners so that we can identify customers together that we can approach together. And here we have come quite far in several customer-dialogues where we position this type of partner as the main owner of the project, and Digitize provides more a shadow team that is going to support the partner, but still make sure that what we have learned in the project is assured. And our long-term goal, let's say 3–5 years, is that the partners are able to ... sell, deliver and implement the platform, completely independently. But we will still have a professional service team that can take care of the biggest customers, where we can learn something that we can bring back to improve our projects. But as one says, "the long tail" of customers is going to be handled and rolled out by the partners.* –Digitize director

4.1.4 Industry partners

Digitize wants to increase the focus on more traditional industrial partners, Original Equipment Providers (OEMs):

> *Many of those that deliver equipment to the industry today also want to start delivering more digital solutions and they do it already today. There, we think there is big opportunity for a collaboration, and we see more interest from them as we have become a little more known in the market.* –Digitize manager

Accordingly, *partner* orchestration represents distinctive strategic focus areas with variable effort and attention.

4.2 Type of orchestration

We found three types of orchestration: technical, industrial and commercial.

4.2.1 Technical orchestration

Technical orchestration is how Digitize is able to orchestrate based on the functionality of their platform. Technical orchestration can be understood as the main selling point of the functionality of their digital platform. According to a director at Digitize:

> *This technical orchestration contributes in making it easier for companies to make data available and transferable both internally and externally. … Digitize wishes to make the data more accessible for their customers, but in addition to this, they also want to make it easier for their customers to share data with their suppliers or with companies that can deliver an application or a specific solution.*

The technical aspect of orchestration was emphasized by several informants as an integral part of Digitize, given the company's operation in a business-to-business market. As a vice president of Digitize explained:

> *If you are a start-up and you want to build a new solution and get an organic access to users, it is a thousand times easier to do this within business-to-consumers, both because this is an area that people understand better, but also because persons are really simple to get in contact with today and to distribute solutions. But within companies there are very large barriers that must be overcome. …. [Y]ou have to integrate with all the systems that they have. So, if you have built an innovative solution that requires integration with 6-7-8-10 different systems at the customer side, then suddenly you have to finance probably 4–12 months of an implementation project to connect all these. … [S]o for a small company without that experience, it is virtually impossible to deliver a solution to the industries that they can work with. What we can do is to do that job for them, and that is the job that we have done with all our customers. To gather the data in one place, make it accessible, guarantee its safety end-to-end and expose a flat that is more comparable with the flat that Facebook, Google and others expose to start-ups or to application developers, so that they can work with what they know and process the data from the industry in the same way as one would process the data you get from phones or from Google.*

4.2.2 Industrial orchestration

Industrial orchestration revolves around different industrial solutions aimed at helping the customer solve actual business problems through the shared and aggregated data associated with the customer's need of digital transformation and smart maintenance. These industrial solutions enable digital transformation in heavy-asset companies by breaking down data silos. In contrast to technical orchestration, Digitize plays a role, and thus orchestrates industrially, not just by sharing the data but also by sharing the generated insights, so that the customer can get a total view across all equipment through their solutions. As one informant from a customer firm explained:

> *If I am an engineer, I use several applications of workflow that help me develop and build a model that is consuming data from Digitize Platform, and then I have several different applications from vendors. Once we create that workflow, and we see that we are able to orchestrate that workflow, then you have the incentive in place for new vendors. Because they see okay, there is already value being created here, I can add value to that. For me, it is very difficult to get to that point if you don't do the first critical mass in a way, the first workflow.*

In this example, Digitize serves as a facilitator and orchestrator for the customer to be able to manage their internal business operations.

The platform offering is developed to make it easier for companies to have their data available and transfer it both internally and externally so they can make better and more holistic decisions related to key organizational processes and functions, such as production and maintenance. That is the main transformation. And to do this, Digitize orchestrates their customers to enable the digital transformation of their companies. A vice president of Digitize explained:

> *Digitize delivers access to the digital platform through some applications that [are] used actively by those who actually run the factory or the large assets, and one of the main purposes with those applications is that [they are] a type of orchestration surface. An interface into this forest of solutions, so that companies being asset heavy, easy can engage third parties to develop a special solution for a special equipment and put it into their system and make it available in the same way with the systems they already have and actually have the capacity to handle the number of solutions. Every company today [has] a vision of getting closer to a "fully automated industry" and to do this … you have to automate all the little processes and the complex processes that people are involved in today. So that requires an orchestration of the best things that exist in the market, but also to facilitate a quick and secure development of that type of solution that is required to bridge the gaps that exist today for installation. … So, we started to build a solution, … a solution for those who try to optimize production, a solution for those who try to optimize maintenance. But all these are connected right, so if we can say that I optimize production and if I know that it [maintenance] is supposed to be done ... in four weeks, then maybe I then can adjust my production plan to that. And facilitating that type of collaboration is also something that we work with and we also try to stitch together those types of applications across. If that is possible, since the data is accessible across the solutions, then we don't need to operate with static interfaces which have been used in the industry.*

4.2.3 Commercial orchestration

Commercial orchestration consists of top-management directed activities and can roughly be divided into setting the agenda in the industrial context and facilitating incentive alignment between two different firms cooperating in the ecosystem.

The agenda setting is about publishing, marketing and exposing well-functioning customer stories. Digitize commercially orchestrates by exposing what they do and what they make possible, like when they facilitated data sharing between two large companies, thereby altering their business model and collaboration arrangement:

> *We try to be visible by publishing opinionated texts about our thoughts on digitalization, what is important, what is dangerous and what is valuable. We try to get our CEO to have many interviews in the newspaper (…) Being seen as someone who has the good thoughts and recipes on how to succeed (…) it is that promotion that we mean we have been really good at, in spite of being such a young and small company.*

Through organizing conferences with different state-of-the art topics with several industry leaders and government officials and keeping a strong international presence in key geographical locations like Houston and Tokyo, they communicate their vision of an industrial ecosystem underpinned by no data silos. On commercial orchestration, a manager in the company also noted:

> *A lot of other companies have to recruit and make themselves attractive through LinkedIn campaigns, etc.…we don't have that problem. We are so spoiled, given that our CEO is so well known, the projects we have had are so well known, so with us, the partners that want to work with us just arrive.*

Besides facilitating for more openness in the industry, Digitize seeks to bring the branding reputation they have into a more direct orchestrating role of facilitating a novel collaboration process between firms in an existing value chain or ecosystem. The informants highlight how the incentives need to be in place for the transformation to occur from a "traditional" value chain collaboration model to an ecosystem collaboration:

> *The first case we did along the ecosystem dimension was a collaboration between Digitize, firm B (pseudonym of an oil company) and firm A (pseudonym of an OEM firm), where firm A is a subcontractor to firm B that delivers and maintains pumps. That collaboration was not optimized because the structure was like that after firm A had delivered pumps to firm B, the pumps disappeared from firm A's visibility. The pumps are offshore out in the North Sea and are in operation without firm A being able to make an assessment of how they function without flying out to the pumps. ... This is pretty negative since you would have to go out typically on an annual or semi-annual basis, not based on if the pump works wrong or well. And then firm A just do things because they feel they need to do things, like change oil or some other type of operations that might not be necessary at that time. So, our contribution is to be the facilitator between firm B and firm A so that firm A can get real time data from their pumps, and that they can sit in their offices and understand how the pumps operate and assess if they need to go out and do an activity or not. And the result is that firm A is less often out on the platforms and the number of operations per pump has gone significantly down. And that has also enabled firm A to get more insight into how the pumps actually work in the real life. Instead of just having test data, they now have data from actual operations. ... And on this area Digitize is a very neutral part in that interaction, so in [the] best case, our role is to be a facilitator of that discussion, but it is up to the suppliers and their industrial customers to find out how one approaches it. ... The industrial customers have to be willing to give incentives on both sides of the table. Digitize does not have any incentives in the industry other than being a facilitator of data, with enhanced trust and legitimacy.*

4.3 Analysis

The analysis of the main findings reveals a larger pattern of how Digitize actually orchestrates. For analytical purposes, it is fruitful to envision the orchestration as activities that are undertaken in a certain stepwise manner. In the first orchestrating step, the core product – the data-centered digital platform – has to provide functionality to the potential customers. To enable this, Digitize (re)combines the technical resources that the technology partners and application partners provide into a coherent product offering. The next orchestrating step is to increase the value generation of the platform for all stakeholders. The goal is here to create successful use cases of how the platform has been used in a specific organizational context of a customer that can then be scaled to other customers by representing a success story of how it has been done. Combining the technical and the commercial orchestration, Digitize promotes a distinctive solution to a company's challenge of digitally transforming their internal processes and operations. For this orchestration to be done, Digitize is required to harness external resources provided by their service partners that specialize in both digital strategy making and system integration.

The next step of the orchestration process is the selling of ideas. Digitize orchestrates by combining the network position some of their technology partners have into a business network. Then they couple this with the reputation of their CEO and success stories in use cases of the value creation from the platform to influence their ability to scale this platform offering as a product that can be sold at unbounded and exponential growth. The commercial orchestration is where they sell the idea of them being a hub (Dhanaraj & Parkhe, 2006) in their ecosystem, thereby orchestrating the construction of their ecosystem.

This stepwise process is not necessarily linear or sequential. The commercial orchestration with some particular technology partners will feed back into the technical orchestration with consequences for how the technology partners combine their resources to the functionality and interoperability of the digital platform, that in the next instance can enhance the value potential of the platform as an offering in a business context. The orchestration strategies may also occur at once or differ in sequence. The technical orchestration and industrial orchestration often occur interchangeably, being hard to separate.

5 Discussion and conclusion

The objective of this paper was to answer the following research questions: *How do the providers of a data-centric platform orchestrate the surrounding ecosystem?* and *What are the implications of our understanding of orchestration?* The network orchestration literature offers limited insights on how orchestration activities actually occur in an ecosystem context (Belussi & Arcangeli, 1998; Dhanaraj & Parkhe, 2006; Möller et al., 2005; Nambisan & Sawhney, 2011; Paquin & Howard-Grenville, 2013). The literature assumes a move from an (innovation) network to an (innovation) ecosystem (Azzam et al., 2017; Dessaigne & Pardo, 2020; Hurmelinna-Laukkanen & Nätti, 2018; Korpela et al., 2013; Pellinen, Ritala, Järvi, & Sainio, 2012; Perks, Kowalkowski, Witell, & Gustafsson, 2017; Ritala et al., 2009). However, literature on ecosystems (Adner, 2017; Jacobides et al., 2018) and digital innovation (Nambisan et al., 2017; Nambisan, Lyytinen, & Yoo, 2020; Nambisan, Wright, & Feldman, 2019) highlight that collaboration patterns between pipeline firms operating under traditional value chain business logic have dramatically changed due to the transformative effects of digital technologies (Hinings, Gegenhuber, & Greenwood, 2018; Parker, Van Alstyne, & Choudary, 2016; Vial, 2019). The change from a network model to an ecosystem model of value generation may have other implications for how we think of the actors that influence and manage the emerging arrangements. To answer the first research question, the findings from the study expose that the entrepreneurial firm Digitize, as the provider of the data-centric platform, orchestrates their surrounding ecosystem by defining their ecosystem as a partner ecosystem by classifying the roles that different partners have in the ecosystem they aim at creating. The implications expose who the central actor is and what this central actor does at this stage in the ecosystem process, which might change as the ecosystem become more established, answering the second research question. The paper makes two contributions.

Given the fact that Digitize is a small and young firm with a relatively limited internal resource base, our findings contradict existing understandings of who the hub firms are, as outlined from the literature on innovation networks (Dhanaraj & Parkhe, 2006; Ritala et al., 2009) and also related knowledge on platform leadership (Cusumano & Gawer, 2002; Iansiti & Levien, 2004). What makes Digitize central in their network is not their superior size and level of production- and administrative apparatus, but rather how they are able to position themselves as neutral and visionary that act as a mere facilitator in the construction of the ecosystem. Digitize both plays the game by seeking to benefit monetarily through collaboration, while at the same time they have the incentives of acting as a neutral party that can facilitate collaboration, thus taking on the orchestrator type of both a player-orchestrator and facilitator-orchestrator. Because of this, our findings do not follow the categorization of orchestrator types (Hurmelinna-Laukkanen & Nätti, 2018). The first contribution to the understanding of orchestration is that there exists an orchestrator type being player-facilitator-orchestrator.

The second contribution is a coherent and integrated interdisciplinary perspective on orchestration in an ecosystem context. Showing how orchestration involves technical, industrial and commercial aspects underlines the practices of orchestration as transdisciplinary phenomena, like the emergence of ecosystems (Nambisan et al., 2020). Technical orchestration resembles strongly how IS explains orchestration in an ecosystem. Digitize is able to perform technical orchestrating activities based on how their digital infrastructure enables technical partners and application partners to contribute with their technical components to the functionality of the digital data-centered platform. Industrial orchestration blends perfectly with the S-DL perspective on value generation, since this type of orchestrating takes place in a dyadic relationship between Digitize as a software-as-a-service provider and the customer as a service beneficiary. Together they co-orchestrate, by integrating their resources into a distinctive solution to a (perceived) business problem of the customer, which creates value for the platform being offered by Digitize. The way Digitize orchestrates commercially is closely related to the insights of the strategic management tradition of value co-creation. By having a vision – a "blueprint" of how the value proposition of their platform offering should be materialized to customers and how the roles and relationships between actors should be defined – Digitize tries to coordinate, communicate and influence the overall industrial structure towards this image. The second contribution, therefore, highlights the

transdisciplinary phenomena of orchestration, involving technical, industrial and commercial orchestration activities.

The theoretical implications of the paper are the orchestrator type of player-facilitator and that orchestration should be seen as interdisciplinary. To apply insights and scoping from one discipline, such as IS or strategy, inhibits a more holistic picture of how orchestration actually is done in practice. The managerial implications are that the findings elucidate how complex and large orchestration is as a strategic process in a business firm. There are many individual persons, with different skillsets, at different departments, involved at any time who have to contribute to an overall capability of the firm to orchestrate their surrounding ecosystem. The employees who focus on a specific partner segment need to know how their function and role contributes to the orchestration process to better align internal resources and strategic goals with the external ecosystem.

The limitations of this study are not being able to conduct participant observation or see how they actually orchestrate by observing meetings and conference interactions due to COVID-19.

Future research can see orchestration from the customer's perspective. Interesting findings regarding ecosystem dynamics can be uncovered if research focuses on how incumbents and other customers orchestrate their ecosystem through the use of a provided platform. Future research could also go deeper into the orchestrating activities, thereby enhancing and contributing to the findings of this study. Specifically, we welcome empirical findings on how orchestration has both an internal and external dimension.

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