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Spiraling between learning and alignment toward digital service innovation

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Abstract

Purpose – This study aims to develop theory on the process toward digital service innovation (DSI) and to generate insight on how companies deal with the rising complexity associated with DSI, both inside and outside of the organization, through organizational learning and alignment.

Design/methodology/approach – After purposeful sampling, in-depth, longitudinal case studies of three manufacturers are presented as illustration. Per case, multiple semi-structured interviews are conducted, and insights are validated through rich additional data gathering. Each company’s DSI pathway is reconstructed with critical incident technique. Next, using systematic combining, a middle-range theory is developed by proposing a theoretical frame concerning the relations between DSI maturity, learning and alignment.

Findings – We posit that, as companies gradually develop and progress toward DSI maturity, they deal with a rising degree of complexity, fueling their learning needs. Companies that are apt to learn, pass through multiple cycles of learning and alignment to overcome specific complexities associated with different DSI stages, with each cycle unlocking new DSI opportunities and challenges.

Originality – The study applies a stage-based view on DSI combined with complexity management and organizational learning and alignment theory. It offers a theoretical frame

and propositions to be used by researchers for future DSI studies and by managers to evaluate alternative DSI strategies and implementation steps.

Keywords – Digital service innovation, Digital transformation, Servitization, Complexity, Learning, Alignment.

Paper type – Research paper

1. Introduction

These days, we see the collision of two trends: technological innovation and service innovation (Opazo-Basáez *et al.*, 2021; Vendrell-Herrero *et al.*, 2023). Both trends impact on each other, thereby generating new business opportunities and disruption in markets (Frank *et al.*, 2019; Kolagar *et al.*, 2021). The latest digital technologies, such as the Internet of Things (IoT), cloud computing, and artificial intelligence (AI), enable companies to provide more and better value for customers through smart products and advanced services (Ardolino *et al.*, 2018; Vendrell-Herrero *et al.*, 2021), often enabled by digital platforms (Cusumano, 2022; Markfort *et al.*, 2021). Digital service innovation (DSI) combines both digital and service innovation logics, leading to digital servitization and other innovative, digitally-enabled business models (Opazo-Basáez *et al.*, 2021; Raddats *et al.*, 2019; Vendrell-Herrero *et al.*, 2023).

Prior studies have used a process perspective to describe several transformation paths for DSI (Baines *et al.*, 2020; Coreynen *et al.*, 2017; Dmitrijeva *et al.*, 2022; Tian *et al.*, 2022) and smart solution strategies (Huikkola, Einola, *et al.*, 2021; Kamp *et al.*, 2017; Pardo *et al.*, 2020) enabled by different capability configurations and success drivers (Huikkola *et al.*, 2022). Notwithstanding their vast amount of recommendations, the transition toward DSI is still considered highly complex (Bustinza *et al.*, 2018; Eloranta *et al.*, 2021). When companies enhance their DSI maturity (Kolagar *et al.*, 2021; Polova and Thomas, 2020), they

continuously struggle with new tensions and barriers both inside and outside of the organization (Tóth *et al.*, 2022). Such complications and complexities (Vasconcelos and Ramirez, 2011) force companies to continuously seek solutions through organizational learning (Friedl *et al.*, 2022; Kohtamäki and Partanen, 2016). Then, they need to adapt by seeking organizational alignment, both within the company and with external actors (Alghisi and Saccani, 2015; Struyf, Matthyssens, *et al.*, 2021; Zhang *et al.*, 2022). However, enhancing DSI maturity is challenging. First, companies find it difficult to explore and exploit the potential of technological and service innovation simultaneously (Coreynen *et al.*, 2020; Kohtamäki, Parida, *et al.*, 2020; Vendrell-Herrero *et al.*, 2023). Second, when offering digital or digitally-enabled services (Raddats *et al.*, 2019), companies need to align both front- and back-end operations, such as sales, engineering, and production (Coreynen *et al.*, 2018). Third, in increasingly connected and complex markets, they also have to (re)align with suppliers (Vendrell-Herrero *et al.*, 2017) and customers (Kamalaldin *et al.*, 2020) as well as with other ecosystem partners (Kohtamäki, Parida, *et al.*, 2019; Kolagar *et al.*, 2022).

The current literature does not seem to answer explicitly how the development and upscaling process toward mature DSI evolves. Several research topics have been suggested, such as the pathways and stages for companies to adopt digital technology and advance their service business (Opazo-Basáez *et al.*, 2021; Paschou *et al.*, 2020), the approaches to manage and overcome complexity associated with DSI (Eloranta *et al.*, 2021; Sjödin *et al.*, 2020), and the sequence of learning and alignment when building the optimal configuration of smart products (Vendrell-Herrero, Bustinza, *et al.*, 2021) and digital service business models (Huikkola *et al.*, 2022). Therefore, this study answers the call of prior studies by focusing on the following research questions: *What are the pathways for companies to evolve from a low DSI position to reaching high DSI maturity? And how do they manage complexity, both inside and outside of the organization, through learning and alignment along the way?*

In our effort to decipher the DSI transformation process, we first conceptualize DSI as a specific form of innovation and discuss prior work from both a complexity management (Eloranta *et al.*, 2021; Vasconcelos and Ramirez, 2011) and a dynamic capabilities perspective, the latter specifically relating to organizational learning (Chiva *et al.*, 2010; Chiva and Habib, 2015) and alignment (Gebauer *et al.*, 2010; Matthysens and Vandenbempt, 2010). Next, we describe three illustrative cases of different DSI pathways, introducing a stage-based view on learning and alignment undertaken during different interaction cycles. Via systematic combining, a theory of the middle ground is developed (Edmondson and McManus, 2007). We construct a theoretical framework that maps the cases' DSI process along two dimensions, indicating growing complexity on one end and growing levels of DSI on the other until finally reaching DSI maturity. The frame displays companies' growing learning needs, leading into different learning and alignment cycles. These insights are then used to develop several theoretical propositions. Finally, we conclude by summarizing the theoretical contributions and managerial implications of the study and offering extensive suggestions for future research.

2. Theory

2.1 Conceptualizing Digital Service Innovation

Given that DSI combines both digital and service innovation logics, we first explain both types of innovation before discussing DSI as a third, hybrid form of innovation.

Digital transformation, also referred to as “digitalization” (Gebauer *et al.*, 2021), is broadly defined as “*a socioeconomic change across individuals, organizations, ecosystems and societies that are shaped by the adoption and utilization of digital technologies*” (Dąbrowska *et al.*, 2022, p.2). For companies specifically, it differs from digitization, meaning the shift from analogue to digital data and processes (Storbacka, 2018).

Digitalization influences companies' business models and ways of providing value to customers (Frank *et al.*, 2019; Kowalkowski *et al.*, 2022). Digital technologies drive major innovations such as process and product innovation in organizations (Opazo-Basáez *et al.*, 2021; Vendrell-Herrero *et al.*, 2023). Though such innovations unlock many opportunities, companies can only move beyond operational benefits if technology is brought to the core of corporate strategy and the business model (Siedler *et al.*, 2021).

Servitization means the transformation of companies from offering products and/or basic services to advanced services (Baines and Lightfoot, 2013; Kowalkowski *et al.*, 2017). Instead of innovating and selling standard products, companies can pursue service innovation by customizing their offering depending on customers' wishes, making their products available for use (e.g., through leasing), or charging customers depending on their use of the product or service (Tukker, 2004; Witell and Löfgren, 2013). Like digital transformation, servitization requires companies to not just change their product and/or service offering, but also fundamentally rethink their strategy and business model (Markfort *et al.*, 2021; Raddats *et al.*, 2019).

DSI has evolved into a third, blended type of innovation. It is defined as “*the development of new services by means of digital technologies ... that exploit product connectedness in order to create value via digitally enhanced provider-customer relationships*” (Opazo-Basáez *et al.*, 2021, p.98) and “*the use of new digital solutions to meet the needs of new and existing customers and target markets*” (Kolagar *et al.*, 2021, p.152). It supports companies' transition to digital servitization, whereby companies change from a product-centered business model to a service-centered one with the support of digital technologies (Favoretto *et al.*, 2022). In summary, DSI complements traditional sources of digital innovation, namely process and product innovation, on the one hand, and service innovation, such as customization and pricing innovations, on the other. Moreover, it is the

foundation for companies to change their business model through digital servitization.

Building on these references¹, our conceptualization of DSI is visualized in Figure 1.

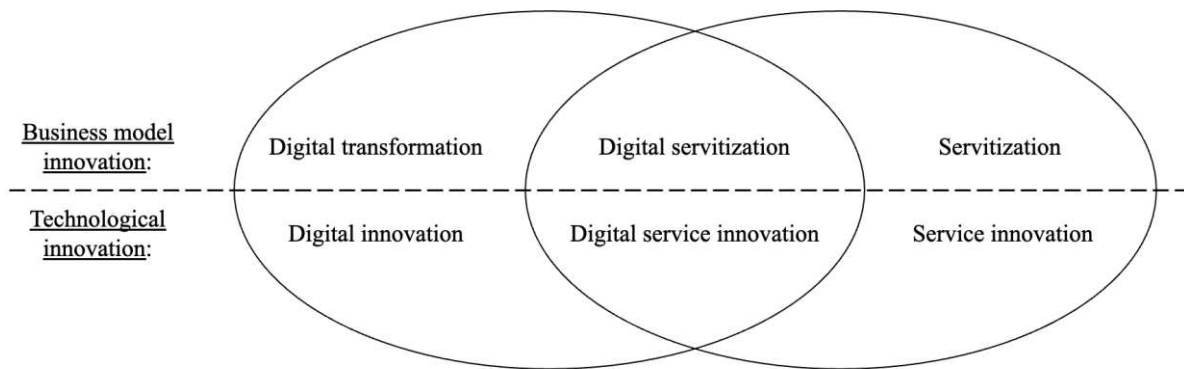


Figure 1. DSI conceptualization (property of the authors)

2.2 DSI as a complex transformation process

Despite the opportunities unlocked by digital and service innovation, companies struggle to capture their combined potential (Gebauer, Arzt, *et al.*, 2020; Kohtamäki, Parida, *et al.*, 2020). Case research describes DSI as a transformation process, unveiling several pathways (Coreynen *et al.*, 2017; Tian *et al.*, 2022), pinpointing principal stages of organizational change (Baines *et al.*, 2020), and unfolding managerial heuristics (Huikkola, Kohtamäki, *et al.*, 2021). Such studies have shown that developing and upscaling DSI is highly complex (Bustinza *et al.*, 2018; Eloranta *et al.*, 2021; Sjödin *et al.*, 2020). For instance, Lütjen *et al.* (2017) identified several strategy-, implementation- and market-related barriers associated with three consecutive stages, and Vendrell-Herrero *et al.* (2021) showed the need for growing analytic capabilities associated with smart product development and offer hybridization. To manage these issues, the literature posits that companies apply a stepwise

¹ For more in-depth discussions on the conceptualization of DSI, we specifically recommend the articles by Opazo-Basáez *et al.* (2021), Vendrell-Herrero *et al.* (2023), and Frank *et al.* (2019).

and iterative approach, breaking down complex DSI systems into smaller and more manageable parts (Eloranta *et al.*, 2021; Sjödin *et al.*, 2020).

The literature only recently started to explicitly apply a complexity perspective to DSI and digital servitization (Eloranta *et al.*, 2021; Paiola and Gebauer, 2020). Based on a narrative review of the literature², we categorize the complexities relating to the technological, organizational, and managerial issues associated with DSI into several topics: (1) enhanced offerings (e.g., Raddats *et al.*, 2019, 2022); (2) increasing ecosystem dependency (e.g., Kamalaldin *et al.*, 2020); (3) the need for organizational and market alignment (e.g., Eloranta *et al.*, 2021; Tronvoll *et al.*, 2020); (4) paradoxical tensions (e.g., Dmitrijeva *et al.*, 2022); and (5) the relationship with the business environment (Bustinza, Gomes, *et al.*, 2019). A non-exhaustive overview of the literature is provided in Appendix 1.

As theoretical foundation, we follow Scott's conceptualization of complexity as "*the number of different items or elements that must be dealt with simultaneously by an organization*" (Scott, 1992, p.230). Furthermore, we consider the distinction between complications (i.e., procedural complexity), which concerns the difficulty of solving a given and well-defined task, and complexities (i.e., contextual complexity), which concerns the challenge of finding both the problem and the solution in the absence of information (Vasconcelos and Ramirez, 2011). We do this to argue two points. First, as companies initially venture into DSI and later enhance their DSI maturity, both procedural complications and contextual complexities increase. Second, to overcome them, companies need to continuously learn (e.g., about customers, new technologies) and align (e.g., internally between departments, externally in the ecosystem), unlocking new DSI opportunities with each cycle. We return to these two issues later in the Discussion section.

² We chose to include papers that were published as of 2017, the year the digital servitization concept was first introduced (Favoretto *et al.*, 2022).

2.3 Organizational learning and alignment

Companies need dynamic capabilities to innovate and sustain performance (Teece, 2007). A dynamic capabilities perspective is often applied to DSI and digital servitization, highlighting ample capabilities as enablers (e.g., Coreynen *et al.*, 2020; Fischer *et al.*, 2010; Rodríguez *et al.*, 2021). For instance, Huikkola *et al.* (2022) showed how companies become smart solution providers by managing a complex interplay of different capabilities, and Lütjen *et al.* (2019) identified several capabilities to manage ecosystems for service innovation. Specifically, the ability to learn is increasingly being associated with business model innovation, specifically digital servitization (Brenk *et al.*, 2019; Friedl *et al.*, 2022; Gomes *et al.*, 2021). Furthermore, in order to implement and benefit from what has been learnt, companies also need to continuously align (Matthyssens and Vandenbempt, 2008), both within the organization (Huikkola *et al.*, 2016) as well as outside with customers, suppliers, and ecosystem partners (Struyf, Matthyssens, *et al.*, 2021). In the following subsections, we describe both capabilities—learning and alignment—as organizational enablers to progress in DSI while dealing with its many complications and complexities.

2.3.1 Organizational learning

The organizational learning literature distinguishes between two types of learning: adaptive and generative (Chiva *et al.*, 2010). Adaptive learning permits organizations to maintain their present policies and achieve current objectives by adjusting or adapting their behavior (Argyris and Schön, 1974). It takes place when goals, values, and strategies are taken for granted, and existing competences, technologies, and paradigms are refined without examining their underlying beliefs and assumptions (Chiva *et al.*, 2010). For instance, while some companies continuously upgrade technologies to further improve efficiency, decrease costs, and improve quality, others expand their service offering by gradually moving from

basic services (e.g., repair) to more advanced ones (e.g., preventive maintenance). Adaptive learning is usually exercised through deductive reasoning, whereby companies focus on improving their mental model, knowledge, processes, and routines (Chiva and Habib, 2015).

Generative learning requires organizations to look differently at the world and transcend themselves, whether by better managing the business or understanding customers from an overall, holistic perspective (Chiva *et al.*, 2010; Senge, 1990). It occurs when organizations modify their underlying norms, policies, and objectives (Argyris and Schön, 1974). For instance, companies that evolve from a product-dominant to a service-dominant logic consider the needs of customers as a whole and view them as co-creators of value (Vargo and Lusch, 2004, 2018). To better understand customers and support them in their needs, heavily technology-oriented companies can switch from selling high-tech products to providing cloud-based services, while service-oriented companies may integrate novel technologies (e.g., AI) into their offering. Therefore, generative learning is generally associated with more radical innovation (Kang *et al.*, 2007).

2.3.2 *Organizational alignment*

In order to optimally exploit DSI, companies pursue alignment between their innovation strategy and the internal organization, on the one hand, and the outer environment, on the other hand (Chorn, 1991; Venkatraman, 1989). We describe both types of organizational alignment—internal and external—in relation to DSI here.

Internal alignment covers both vertical and horizontal organizational dimensions, such as strategy, culture, and organizational design (Chorn, 1991). Vertically, there needs to be alignment across all levels of the organization (i.e., corporate, business, and functional) in terms of stating objectives, making decisions, and implementing actions to achieve those objectives (Kathuria *et al.*, 2007; Quiros, 2009). Some companies aim for higher profits by

implementing efficient, cost-saving technologies, while others prefer to adopt new pricing strategies to lock in customers and have more stable revenues. Horizontally, activities across functions need to complement and support each other as well. For example, the marketing and purchasing departments need to collaborate and integrate activities to produce better customer value (Kathuria *et al.*, 2007; Matthyssens *et al.*, 2016), while salespeople have to develop new competences to sell digitally-enabled, outcome-based offerings (Jovanovic and Morschett, 2021; Vendrell-Herrero, Bustinza, *et al.*, 2021).

External alignment also covers both vertical and horizontal dimensions, this time outside of the organization and relating to the supply chain and broader ecosystem. Vertically, companies can form strategic partnerships across the supply chain with suppliers and customers to define, design, and deliver new value propositions (Kamalaldin *et al.*, 2020; Ziaee Bigdeli *et al.*, 2018). Horizontally, they can also form partnerships and align with other parties such as knowledge-intensive business service (KIBS) providers (Bustinza *et al.*, 2018; Bustinza, Lafuente, *et al.*, 2019) to cocreate and coproduce value (Kohtamäki, Parida, *et al.*, 2019; Kohtamäki and Rajala, 2016). However, such digital service ecosystems may add partner orchestration complexities (Tian *et al.*, 2021), especially when scaling up DSI (Di Pietro *et al.*, 2017).

3. Case illustrations

3.1 Methodology

Three in-depth case studies were developed as illustration based on the following arguments. First, case studies are advised for exploratory research into managerial challenges (Yin, 2017) and complex social phenomena (Bryman and Bell, 2015), for which the DSI process and its different stages toward mature DSI classify. Applying a qualitative approach allows us to gather rich data (Eisenhardt and Graebner, 2007), which supports the discovery

of different cycles of organizational learning and alignment. Additionally, the exploratory approach adds to our understanding of the relationship between DSI and its context (Dubois and Gadde, 2002; Woodside and Wilson, 2003), which is particularly important for DSI given its increasing interdependency with companies' surrounding ecosystems. Second, a retrospective, longitudinal approach is used to capture process dynamics, allowing for the identification of the main stages of learning and alignment throughout the company's DSI transformation process (Eisenhardt, 1989; Quintens and Matthyssens, 2010).

3.2 Case selection

Purposeful sampling was used to maximize learning through the identification of information-rich cases (Patton, 2005). Industry experts from the branch federation of the high-technology industry in Belgium identified five manufacturing companies as exemplar DSI cases, among which three were selected as illustration based on their different DSI transformation processes: Case A demonstrates the move of an equipment manufacturer toward smart products (i.e., merging digital technology with service elements), while Cases B and C exhibit two product suppliers implementing a digital platform to serve customers (i.e., merging service with digital elements).³ The cases thus cover both service foci, namely the product and customer process (Coreynen *et al.*, 2017; Kindström and Kowalkowski, 2014). Moreover, all three companies ultimately bank on data collected via smart products and digital platforms to further enhance DSI maturity: In Case A, data insights impact on the core of the product, while Cases B and C use data insights to further enhance customer relations. Table 1 provides an overview of the case companies' characteristics.

Table 1. Overview case characteristics (property of the authors)

³ The names of the companies, their employees, partners, and specific technologies have been anonymized to ensure confidentiality.

	Case A	Case B	Case C
Industry	Construction	Furniture	Construction
Size	Large	Medium	Large
Starting position	Technology-oriented	Service-oriented	Both service- and technology-oriented
DSI driver	Be closer to the end-customer	Complex production	A customer request
DSI outcome	Smart products	Digital platform	Digital platform

3.3 Data collection and analysis

Critical incident technique (CIT) (Flanagan, 1954) guided our data collection and analysis efforts. Case studies were developed based on semi-structured interviews with key managers, member checks, an industry workshop, company-specific workshops, and secondary data sources. This way, we gain a multidimensional view that suits the research topic at hand and boosts validity (Edmondson, 2016; Yin, 2017; Zuiderwijk-van Eijk *et al.*, 2016).

The interviews followed a semi-structured format, allowing us to gather rich qualitative data necessary to reconstruct the case and present it vividly, as is typical for illustrative case studies. Table 2 offers an overview of the interviews conducted per case, which were later transcribed verbatim. During the interviews, an industry expert from the Belgian high-tech federation was present, with whom the interviewer conducted a member check after each interview.

Table 2. Overview interviews (property of the authors)

	Interviewees	Duration
Case A	1. Chief Technology Officer	01:00
	2. Digital Project Manager	00:55
	3. Founder Design and Innovation Agency	00:45
Case B	4. Marketing Director	00:55
	5. Digital Lead	01:00
Case C	6. Chief Product Officer	01:00
	7. Former Industry 4.0 Project Manager	01:10
	8. Current Industry 4.0 Project Manager (x2)	02:20

Other sources: (a) member checks, (b) an industry workshop, (c) company-specific workshops, and (d) secondary data (e.g., official websites, internal documents).

Insights from the interviews and member checks were validated in an industry workshop organized together with the Belgian high-tech federation and company-specific workshops with the individual case companies. During the industry workshop, common themes and similar industry examples were discussed with approximately 50 managers (including the case interviewees). The company-specific workshops served as debriefings to critically reflect on the case companies' evolution, drivers, and inhibitors, enabling or hindering them to move forward in DSI. The data gathered during these interactions were supplemented with secondary data from official company websites, online videos, news articles, and internal documents.

Congruent with CIT, we defined the critical incidents for each case as triggers (or blockings) that provoked the start of the DSI process and subsequent steps in the process toward gaining DSI maturity. Next, we compared the critical incidents between the cases, which enabled us to distinguish overarching patterns in their development. Four major stages were acknowledged as pivotal, which we define as “Awareness”, “Development”, “Upscaling”, and “Maturity”. In the following section, the cases' different pathways toward DSI maturity and their pivotal moments are described. A descriptive summary of the cases is presented in Appendix 2.

3.4 Case descriptions

3.4.1 Case A: Smart climate solutions for the construction sector

Case A describes a family-owned, international business that produces healthy indoor and outdoor living spaces for the construction sector at reduced energy costs. Founded more than a century ago, the company evolved from purely producing fittings to offering innovative

total ventilation and sun protection solutions. Today, the company counts over 1,300 employees worldwide, and the rate of employees employed in research and development (R&D) is more than 10 percent. Though innovation initially consisted of developing high-quality hardware, the company gradually started to focus on improving customer experience by adding sensors and software to their products. The transition toward smart products also supported the company in expanding its customer base from the Business-to-Business (B2B) to the B2B-to-Consumer (B2B2C) space.

Stage 1: Awareness – In 2015, after the Chief Technology Officer (CTO) returns from an inspiring trip to China, the company’s digital journey kicks off. An external consultant is hired to facilitate a strategy workshop for the R&D department. Different teams are asked to imagine what the world would look like in twenty to fifty years and the opportunities that this would present for the company. After the workshop, the teams feel a disconnect between the company’s current direction and the digital opportunities presented by the consultant, such as digitally enhanced sales and potentially new digital business models. At the time, the company is already experimenting with IoT sensors in its existing ventilation systems, and an in-house engineering team has also developed its first web application. However, the new app insufficiently considers the experience of the end-user. According to the CTO: “*It was a super-mega-crappy engineers’ app*”. The workshop has made the team aware of the increasing importance of the app, which would not suffice to realize the company’s future goals.

Stage 2: Development – Not having the required skills inside the organization, the company reaches out to a design and innovation agency suggested by one of its employees, who had collaborated with the agency during a former employment. In the following years, a close partnership is developed whereby the agency guides the company throughout the entire innovation process, from idea development and business model strategy to change

management. The agency inspires the company to think differently about design, for example, by using color codes instead of technical terms as the app's language. They also suggest several ideas for new business models, such as selling insights from customer data collected through the app. Though the company is initially interested in the idea, it quickly becomes apparent that the amount of data needed to grow the business has to increase significantly.

Stage 3: Upscaling – Despite the company's first steps in the data business, their current back end is not ready. The company's Enterprise Resource Planning (ERP) system, which was developed in house, is already challenged by its internationalization efforts. The development of smart products as well as the new data business further push system requirements. To overcome this bottle neck, new partnerships with IT providers are established to set up an improved ERP system that can handle "*the massive amount of data that is on the way*", according to the company's Digital Project Manager. Furthermore, the improved ERP system would allow the company to benefit from increased connectivity, e-commerce, and other potential digital opportunities.

Stage 4: Maturity – The first smart products are successfully launched in 2018, but internal and external tensions are rising. The gap between the company's digital ambitions and the construction sector's digital immaturity leads to tensions between the need to maintain day-to-day operations and the urge for continued, exploratory innovation. With most activities still in a "*business as usual mode*", according to the Digital Project Manager, the company hesitates to reorganize sales, adding: "*We're gathering valuable information, but at a certain moment you want to partially recuperate that investment. That's when you start to realize that your business model is still based on the traditional sales of albeit smart products.*" Pushing for organizational alignment is particularly difficult. To partially reduce this tension, the company acquires a start-up, which enables them to quickly spot pioneering projects in the construction sector. Additionally, the start-up offers access to new markets and supports the

development of more advanced total solutions, including construction elements that the company does not manufacture.

3.4.2 Case B: A digital platform for customized furniture fittings

Case B exhibits a family-owned, medium-sized company that has become a renowned player in the local furniture industry since its establishment over half a century ago. Today, its 350 employees serve over 9,000 B2B customers, mostly kitchen installers. For long, the company only focused on the distribution of furniture fittings, until it launched its own product line in 2014. Despite this sidestep toward manufacturing, the company states that its strength still lies in service addition, particularly customization. The past ten years, the company has seen a revenue growth of nearly fifty percent.

Stage 1: Awareness – By 2014, a continuous emphasis on service has generated so many options for customized furniture fittings that customers suffer from “*choice paralysis*”, according to the Marketing Director. A small, in-house team is tasked to develop an online configurator to support customers in their configuration and purchasing process, but the configurator fails at producing the desired results. So, the company starts looking for a partner to further professionalize the configurator. A match is found with a software provider that, up until that time, was only responsible for maintaining the company’s website. Though the company is not entirely sure whether the provider’s skills are up to the task, the Marketing Director is charmed by their “*professional and down-to-earth approach*” and appoints them as their main IT partner.

Stage 2: Development – The new partnership triggers the need for a Digital Lead (DL) with a strong IT profile that can coordinate different digital projects cross-company. In 2016, the new DL is appointed to upgrade the configurator and turn the company’s basic website into a user-friendly, digital platform. At the time, customers hesitate to use the company’s

website, because they are afraid of making mistakes when purchasing products. Also, most customers do not have a computer in their workshop, so calling the company's salesperson remains their preferred way of placing orders. Tasked with the assignment to lower the platform's adoption barrier and achieve a 100 percent digital order intake, the DL starts to proactively reach out to customers. The decision to involve customers early in the development process is marked as one of the platform's critical success factors, according to the DL. However, a switch in mindset among the company's salesforce is also necessary. Feeling threatened, salespeople are hesitant to introduce the new platform to their customers. To deal with this issue, the DL starts to accompany them on customer visits, thereby not only lifting the company's service profile but also boosting confidence among the sales team in the platform's advantages.

Stage 3: Upscaling – The digital platform, which includes a revised website, web shop and configurator, is launched in 2017. To increase its adoption even further, the company designs a new web application that offers users the experience of a mobile app, though it is in fact delivered through a regular web browser. With the app, the company also enables customers to access the platform on their smartphones. By 2019, 90 percent of customers are already ordering online. Moreover, the company realizes that insights from these transaction data offer new business opportunities, such as improving their current services and moving into data-enabled sales.

Stage 4: Maturity – The company's existing back end, however, is not up to par. Replacing the thirty-year-old, in-house developed ERP system turns out to be more challenging than expected. The hampering integration across the new ERP, Customer Relationship Management (CRM) and web shop systems leaves the company with insufficient data to generate the envisioned insights into customer needs, and progressing toward more data-enabled sales are put on hold. Instead, the company finds a new growth path in the

acquisition of a large, international customer. With new priorities set for the next years, the company continues to build on the platform's previous success with regular system updates as well as the launch of a new app aimed at their acquired company's clients to further boost sales.

3.4.3 Case C: A digital platform for aluminum products for the construction sector

Case C shows a family business that since its foundation in the late 1960s has grown into a multinational company with about 2,300 employees active in over 40 countries. The company caters to the construction sector by manufacturing aluminum products, such as frames for windows, doors, and building exteriors, which are delivered via a network of installers that customize their products to the specific installations in which they are integrated. While these services have been offered from the company's early beginnings, the benefits of digitalization are recognized early on. For instance, the company was already experimenting with digitally connecting manufacturing equipment in 1980s, so production information could be exchanged more easily inside the organization.

Stage 1: Awareness – Around 2010, a customer approaches the company with an idea for a paperless production environment to improve workflow and optimize operations. The company's automation manager at the time further explores the idea with other customers, and the initial feedback is positive. However, management is less supportive, because earlier investments in digital technology have not yet paid off, and they decide not to allocate funding to the project. Instead, the automation manager works out a solution with company's main software provider, which seriously reduces their development costs, accelerating the project's kick off.

Stage 2: Development – At the start of the 2010s, local industry organizations are heavily promoting the benefits of industry 4.0, confirming the automation manager's

confidence in digital innovation as the key to secure the company's future. Up to that point, earlier steps taken in developing and testing the digital production platform have remained mostly under the company's radar, but internal presentations held by likeminded colleagues finally convince the company. A further rollout of the platform is included in the strategy and budget. However, the automation manager, who has now become responsible for industry 4.0 applications, has become skeptical about their current software provider. Although continuing the collaboration makes sense—the company and the software provider have a history together, so their processes are already aligned—the application that the software provider has developed is quite general, and it does not fully match with the customers' wishes for product variety and customization.

Stage 3: Upscaling – A few years later, the application starts to show its first cracks. Customers are increasingly reporting technical errors, and the company's own technical support team, which does not have direct access to the underlying software, is unable to solve them. However, the software provider caters to many other clients and does not feel a similar sense of urgency. The company does not realize the importance of its technical support team in further developing and fine-tuning the platform—earlier projects had only required limited customer service—and they delay in finding a solution to the problem. As the number of issues piles up, belief in the platform starts to falter. The sales team needs to deal with a growing number of dissatisfied customers, who have become increasingly concerned about the malfunctioning platform. By that time, the platform has become an integral part of their operations, and it is now endangering their own business. After waiting for assistance for more than two years, one customer even offers the company with a formal notice of default.

Stage 4: Maturity – Although a new ticketing system has alleviated some of the technical support team's concerns, the software provider continues to resolve issues at a painfully slow pace. Disappointed in the delayed response from the company to take proper

action and lack of additional resources, the industry 4.0 project manager leaves the organization and is replaced. Despite these difficulties, the project registers a 50 percent success rate by early 2020, and an online dashboard for customers to monitor production is added to the platform. Also, international rollout of the application has commenced.

4. Discussion and theory development

4.1 A DSI process and complexity framework

The cases show that, as companies develop and scale up DSI, they deal with a rising degree of complexity. We argue that companies gradually enhance their DSI maturity by managing complications and complexities. We visualize this process in Figure 2, moving from a low digital and service innovation position to increasingly combined DSI maturity levels (Kolagar *et al.*, 2021; Polova and Thomas, 2020) on the x-axis, and from managing a rising complexity level, from procedural complications to later also more contextual complexities (Eloranta *et al.*, 2021; Vasconcelos and Ramirez, 2011), on the y-axis. We posit that the rising complexity associated with the DSI transformation process requires higher levels of learning, which we refer to as “learning needs” (Grant, 2002). As companies progress toward DSI maturity, gaps between the current and desired situation (e.g., in terms of skills, organizational culture) are continuously detected, causing companies’ learning needs to grow exponentially. Henceforth we display the learning needs curve as a convex curve with four DSI-complexity stages. We discuss this framework, moving through each stage from Figure 2’s bottom-left corner to its upper-right corner, using the cases’ relevant findings as illustrations and referring to the DSI and digital servitization literature.

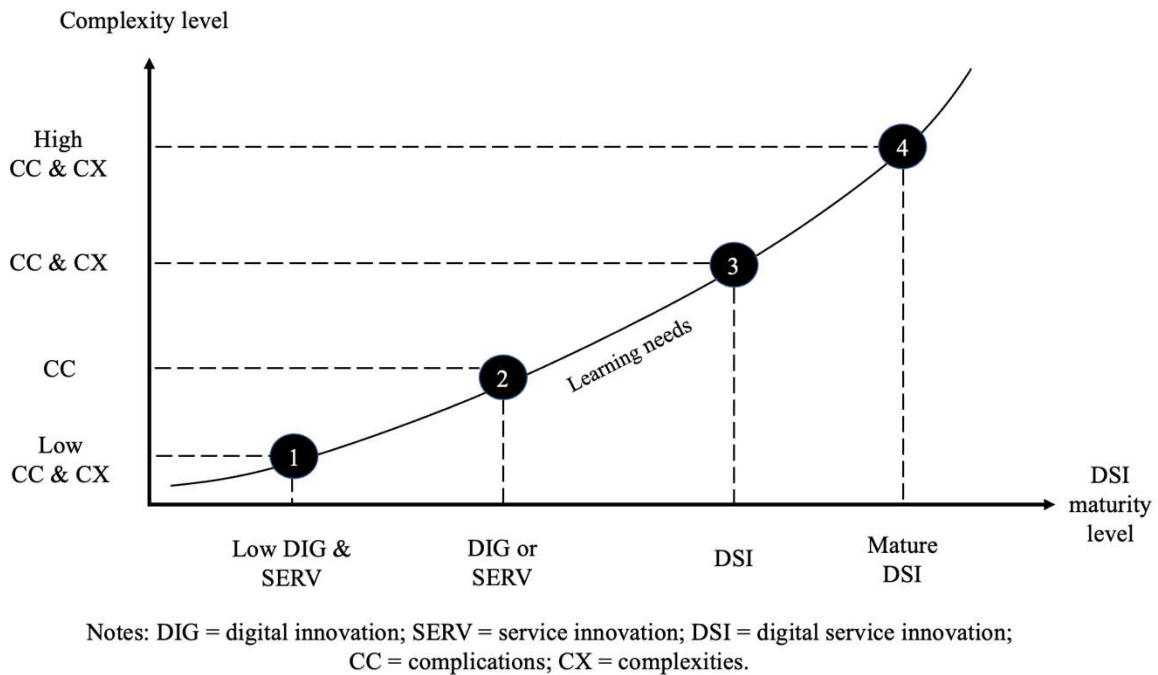


Figure 2. DSI process and complexity framework (property of the authors)

First, when companies focus on neither digital nor service innovation, they provide relatively standard products, and basic services are offered mainly reactively to the customer. For instance, Case A initially manufactured and sold standard ventilation and sun protection equipment. Although some administrative processes had already been digitized, customer and supplier relations were still conducted in a highly personal manner (e.g., product demonstrations, sales). In Case B, customers initially called the company’s sales representative to order specific furniture fittings. In this DSI stage, complications and complexities are rather limited, and the need for learning is experienced as low.

In a second stage, once companies become aware of the benefits of either digital or service innovation, they start to develop their own approach. The digital innovation approach focuses on exploring new technologies for mostly process innovation (e.g., smart manufacturing) or product innovation (e.g., smart products) purposes (Opazo-Basáez *et al.*, 2021; Vendrell-Herrero *et al.*, 2023). This transformation increases the number of complications, because new technological knowledge and skills need to be acquired and

integrated. Hence, companies' learning needs start to grow. For instance, Case A initially integrated sensors in its ventilation products, but because they were unable to build a user-friendly web app, they started collaborating with a design and innovation agency. Case C intensified the collaborating with its software provider to develop a digital production platform. The service innovation approach, on the other hand, focuses on better serving customers by making products available via different pricing options (e.g., leasing, pay-per-use) or customizing products to their needs (Tukker, 2004; Witell and Löfgren, 2013). At best, servitization is supported by digital administrative processes. For instance, Case B focused on customizing its own furniture line, which required them to better listen to their customers to fully understand their needs.

At this early DSI stage, companies seek to cope with complications through learning by (re)training staff, hiring new employees, and by aligning internal departments. For instance, managers who are used to selling expensive, high-tech equipment (e.g., ventilation systems) may not be eager to switch to selling (seemingly cheaper) pay-per-use contracts (Gebauer *et al.*, 2005). Also, front-end employees in sales and delivery may be more used to selling standard products (e.g., furniture fittings, aluminum products) rather than serving to customers' unique needs (Ulaga and Loveland, 2014). In summary, companies experience that they have to rethink their business model and reconfigure their organizational design to match their new digital or service innovation strategy, including its development, sales, and delivery processes, organizational structure, and corporate culture (Fischer *et al.*, 2010; Gebauer *et al.*, 2010; Oliva *et al.*, 2012).

Third, when companies start to focus on both digital and service innovation, they venture into the realm of DSI upscaling. Here, companies use digital technology, either in the front or back end of the organization, to further enable service (Coreynen *et al.*, 2017; Tian *et al.*, 2022). In the front end, smart products and platforms are used to better connect with

customers, gather data to further improve products, and pro-actively attend to customer needs. For instance, Case A redesigned its web app connected to its ventilation systems, while Cases B and C launched digital platforms for customers to configure and order products. In the back end, smart manufacturing technologies enable companies to further customize products, offer specific advice to customers (e.g., on production), and even take care of some of their production and assembly processes (e.g., outsourcing). For instance, Cases A and B showed efforts to update their ERP and CRM systems to increase efficiency and boost data-enabled sales. In Case C, the platform became an integral part of their customers' operations.

When companies scale up DSI, on top of the mostly internal complications mentioned earlier, contextual complexity (i.e., outside of the organization) rapidly increases, uncovering new gaps between their current and desired situation. On the one hand, customers may not be willing to share valuable information (Matthyssens and Vandenbempt, 2010), or they may not have similar digital resources or skills to easily connect with the provider (Kamalaldin *et al.*, 2020). In Case B, for instance, customers initially did not have internet access in their workshops. On the other hand, customers that *are* digitally able to connect, may expect their provider to continuously maintain and update their products' software (Tóth *et al.*, 2022). They may even transfer responsibility over their own operations to the provider, increasing the provider's risk profile (Snieška *et al.*, 2020; Ziaee Bigdeli *et al.*, 2018). In Case A, customers expected ventilation systems to be updated to also monitor air quality (to prevent the spread of COVID-19). In case B, a dissatisfied customer even issued a formal notice of default to the company.

In the fourth stage, companies reach DSI maturity. Today, the three reported cases have all started integrating front-end with back-end operations to further improve efficiency and scale up DSI. Moreover, Cases A and B are leveraging their data to explore new business opportunities. However, DSI not only affects individual companies' business model, it also

requires both learning from and alignment with other players in the supply chain as well as the broader ecosystem (Bustinza, Gomes, *et al.*, 2019; Kohtamäki, Parida, *et al.*, 2019). From an R&D and production perspective, companies need to increase collaboration with suppliers and KIBS providers to cocreate and coproduce value (Kohtamäki and Rajala, 2016; Vendrell-Herrero *et al.*, 2018), as exhibited in Case A's collaboration with other pioneering companies in the construction sector. From a sales and delivery perspective, companies that deal exclusively through distributors may not have access to the end-customer (Marcon *et al.*, 2022; Paiola and Gebauer, 2020), as also observed in Case A's efforts to expand from B2B into B2B2C via its smart products.

In addition, when creating and managing DSI platforms, network orchestration becomes a core activity to obtain the needed resources (Kolagar *et al.*, 2021) and generate market acceptance (Chandler *et al.*, 2019; Tian *et al.*, 2021). This is shown in Cases B and C's difficult development of their respective digital platforms. Companies can also form cross-border strategic alliances to enter international markets (Vendrell-Herrero *et al.*, 2018). For instance, Case B acquired an international customer and launched a new app to also reach the acquired company's clients, while Case C rolled out its app to foreign markets after building sufficient experience in its own local market.

4.2 DSI learning and alignment cycles and propositions

In the previous subsection we posited that, as companies pass through different DSI stages, their learning needs exponentially grow. Here, we further argue that they overcome complications and complexities associated with each stage by sequencing different learning and alignment cycles. Following the four stages of the DSI maturity and complexity framework of Figure 2, the cases' learning and alignment cycles as well as their opportunities

and challenges are analyzed deeper in Table 3. Combined with the literature, we offer several theoretical propositions.

Table 3. Organizational learning and alignment cycles (property of the authors)

	Learning	Alignment	Opportunities	Challenges
Cycle 1	Mostly adaptive, such as refining current skills and technologies	Mostly internal, such as between R&D, production, sales, and delivery	Incremental product/service improvement Increasing efficiency	Lack specific IT knowledge and skills Allocate funding
Cycle 2	From adaptive to generative, such as exploring new (data) business models	Mostly internal (see above) Some external, such as involving customers, suppliers, and consultants	Business model improvements Customer insights through data collection	Internal resistance to change Digitalization paradox
Cycle 3	Mostly generative, such as exploiting new (data) business models	Mostly external, such as complex relationship building with knowledge partners	Platform-enabled smart manufacturing Radical business model change	Difficult resource integration with partners Convincing customers
Cycle 4	Balancing both adaptive and generative learning	Balancing both internal and external alignment	Value co-creation with customers New revenue models with ecosystem partners	Difficult orchestration of the service ecosystem Lacking IoT mindset in the sector

In the first cycle, when companies focus exclusively on digital or non-digital forms of service innovation, they apply mostly adaptive learning to overcome procedural complications inside the organization. Existing skills and technologies are refined to achieve current goals. As illustrated, Case A first started leveraging IoT technology to upgrade its ventilation systems with sensors, Case B expanded its customization services for furniture fittings, and Case C started experimenting with an internal, digital platform to optimize workflow. To use

an analogy: When companies apply adaptive learning, they stay within their innovation lane by focusing on either digital or service innovation.

In cycles two and three, when companies first combine digital with service innovation logics and later further progress toward DSI upscaling, generative learning techniques are increasingly required. Here, companies challenge and modify underlying norms and objectives by infusing their technology mindset with service elements, or *vice versa*. To do so, companies start working more closely with customers and suppliers, they obtain new knowledge by hiring employees with specific skills, and they learn from other companies such as consultants. For instance, Case A first started working more closely with an innovation agency on product development and design, Case B initially employed a digital expert to develop and implement their online platform, and in Case C, a customer initially approached the company with an idea for a paperless production environment. To continue the analogy: When applying generative learning, companies switch innovation lanes, moving from digital to service innovation, or *vice versa*, toward integrated DSI.

DSI can only be successful if the different stakeholders are aligned with each other. Therefore, learning needs to alternate with phases of alignment. Inside the organization, the people driving DSI have to overcome resistance among decision makers, colleagues, and employees (Gebauer *et al.*, 2010; Lenka *et al.*, 2018). Although Case A is now producing smart ventilation systems, the traditional business of selling products is still conducted as before. In Case B, the Digital Lead had to overcome resistance among the company's salesforce to use and promote the online platform. In Case C, it was the company's leadership that initially hesitated to allocate funding, because other digital investments had not yet paid off. This initial lack of return and reluctance to make further investments in IT is known as the "digitalization paradox" (Kohtamäki, Parida, *et al.*, 2020).

Besides internal alignment, companies also have to align with crucial external partners, such as customers, suppliers, and other actors, to get used to the new ways of working in the emergence of an ecosystem-based DSI setting (Matthyssens *et al.*, 2016; Struyf, Galvani, *et al.*, 2021). Sometimes sensitive information must be shared to make DSI successful. Therefore, tactics to create interorganizational trust between partners is crucial (Kamp *et al.*, 2017; Kohtamäki, Parida, *et al.*, 2019). For instance, Case A still encounters difficulties in introducing new ventilation solutions to the conservative construction sector, Case B initially stumbled on customers' hesitance to use their platform, and Case C experienced difficulties with its software supplier to efficiently solve technical issues.

Based on the above discussion of cycles one till three, we offer the following propositions:

Proposition 1a: Combining both digital and service innovation, the path to DSI is paved with complications and complexities requiring a major increase in (a) learning capacity, evidenced by the enhanced need for generative learning, and (b) alignment capacity, evidenced by the enhanced need for market and ecosystem alignment.

Proposition 1b: DSI is an iterative process between learning and alignment, where companies start with “close to home” applications, building on adaptive learning and executing through internal alignment structures and existing customer relations, and gradually “spiral out” toward generative learning backed by new forms of internal alignment and ecosystem engagement.

In cycle four, when DSI has become an iterative process between learning and alignment, new technical and business opportunities as well as unexpected challenges continue to emerge. We call this the “DSI mirage effect”. To finish our analogy: When companies think they are nearing their final DSI destination, it has seemingly moved further down the road. For instance, Case A first started with integrating sensors into its products,

continued by developing a user-friendly app for customers to interpret the data more easily, to then updating its ERP systems to handle the large amounts data, and lastly acquiring a start-up to balance exploring new business opportunities while maintaining regular business operations. Case B started with product customization, continued with developing a digital platform for customers to order products online, and finally acquired an international customer to tap its local market. Therefore, adjusting and pivoting the DSI transformation process is imperative to be successful, and agile management inside the company (Sjödin *et al.*, 2020) as well as adaptive alignment with partners (Di Pietro *et al.*, 2017; Randhawa *et al.*, 2022) are crucial factors in leading DSI ecosystems.

Based on cycle four, we offer two more propositions:

Proposition 2a: As companies progress toward mature DSI and deal with rising complexity through cycles of learning and alignment, new market opportunities are unlocked through a co-evolution of market learning and alignment.

Proposition 2b: Continuous challenges during the DSI process may lead companies to persist in seeking and interpreting market and ecosystem actors' input during DSI from an adaptive learning (i.e., problem solving) perspective rather than seeking path-breaking ideas and tapping their potential through generative learning.

5. Conclusions

5.1 Implications for theory

The study contributes to the DSI literature in three ways. First, building on prior digital transformation and servitization research, it merges both digital and service innovation logics to create a new conceptual lens to plot and discuss companies' pathways from DSI awareness toward development, upscaling, and finally maturity. Second, drawing from the complexity management literature, we associate the DSI transformation process with rising

levels of procedural complications and contextual complexities, which each time trigger new learning needs. While evolving toward DSI maturity, we posit that companies' learning needs intensify exponentially. The presented model shows the co-evolution of learning and alignment passing through different stages, with each stage displaying different market opportunities and challenges.

This leads into our third and final contribution, namely the connection between different types of organizational learning (i.e., adaptive and generative) and alignment (i.e., inside and outside of the organization) to reach DSI maturity. Through different learning and alignment cycles, companies develop new digital abilities, access additional user data, and grasp new market opportunities. To do so, learning and alignment must “spiral out” from adaptive learning and incremental digital service adaptations for known customers toward more daring generative learning and radical forms of DSI co-created with a wider set of ecosystem partners. However, companies may be blinded by operational challenges, and their adaptive learning style might blur their DSI driven search for more path-breaking opportunities.

5.2 Implications for practice

We highlight three implications for practice. First, this study raises awareness among managers about the meaning and opportunities of DSI and its subcomponents, enabling them to pinpoint their companies' current position and discuss potential future DSI pathways for growth. Second, it highlights the importance of two organizational skills, namely learning and alignment. After learning, both internal alignment, meaning vertically across all hierarchical levels and horizontally between different departments and business units, and external alignment with suppliers, customers, complementors, and other eco-system actors need to take place. Third, it shows that DSI as a destination is never quite reached. Each learning and

alignment cycle unlocks more business opportunities. Therefore, managers should build a dynamic perspective on capabilities that allows a widening of their companies' learning and alignment cycles.

5.3 Future research opportunities

As with any theoretical or conceptual work, future empirical research is needed. The DSI complexity framework and propositions on learning and alignment are derived from an extensive review and discussion of the literature as well as three cases as illustration. This new, middle-range theory triggers many opportunities for further research, among which we discuss several.

First, the selected cases show several pathways toward DSI maturity, whereby companies initially focus on developing digital innovation and later also service innovation, or *vice versa*. Akin to the chicken-or-the egg dilemma, it is unclear what comes first, and future studies can further explore the sequence of digital and service innovation adoption.

Second, we have shown that companies progress in DSI by balancing adaptive and generative learning. Other studies have linked different ways of learning to the industry lifecycle. For instance, it has been shown that in the ferment phase, companies learn from their own experience, while in the transition phase, they learn from other companies, such as competitors (Gomes *et al.*, 2021; Vendrell-Herrero, Gomes, *et al.*, 2021). The interplay between the company's life cycle, its industry's lifecycle, and organizational learning opens new, intriguing questions.

Third, besides learning, this study shows how companies evolve toward DSI maturity through organizational alignment. Following prior work on organizational change and change management (Bigdeli *et al.*, 2017; Sautter *et al.*, 2022), future studies can investigate how

companies proactively identify barriers and overcome them to successfully change toward mature DSI.

Finally, this study triggers many questions regarding the relationship between DSI and performance. For instance, does a wider conception of organizational learning and alignment lead to DSI success? If so, are these relationships linear (i.e., learning and alignment lead to DSI, which then leads to success) or non-linear (e.g., U-shaped), as also found earlier (e.g., Fang *et al.*, 2008; Kohtamäki, Parida, *et al.*, 2020)? The costs associated with learning and alignment may initially be higher than the value generated by DSI, but they may also decrease as companies further progress in DSI. Also, are these relationships moderated by other factors, such as relevant capabilities supporting DSI (Marcon *et al.*, 2022) or the business environment wherein companies are active (Ambroise *et al.*, 2017; Kohtamäki, Henneberg, *et al.*, 2019)? These future research opportunities are summarized in Appendix 3.

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Appendices

Appendix 1. DSI complexity literature (property of the authors)

Complexity factor	Description	Illustrative references
Offer	DSI encompasses a growing range of digitally enhanced products and services that become increasingly complex (e.g., tailor-made, outcome-based solutions).	Coreynen <i>et al.</i> (2017), Frank, Mendes, <i>et al.</i> (2019), Paiola and Gebauer (2020), Raddats <i>et al.</i> (2019, 2022)
Increasing ecosystem dependency	Advanced services require tight collaboration with customers and other ecosystem partners. New capabilities and relational ties are essential to facilitate value co-creation, delivery, and capture.	Gaiardelli <i>et al.</i> (2021), Kamalaldin <i>et al.</i> (2020), Kohtamäki <i>et al.</i> (2019), Sjödin <i>et al.</i> (2020), Sklyar <i>et al.</i> (2019), Tronvoll <i>et al.</i> (2020), Vendrell-Herrero <i>et al.</i> (2017)
Organizational realignment	DSI often entails a lengthy organizational change process to ensure that a viable business model is designed and installed, necessary capabilities are acquired, mindsets are realigned, and resources can be flexibly arranged.	Bustinza <i>et al.</i> (2018), Eloranta <i>et al.</i> (2021), Kamalaldin <i>et al.</i> (2020), Lenka <i>et al.</i> (2018), Raddats <i>et al.</i> (2019), Struyf <i>et al.</i> (2021), Tronvoll <i>et al.</i> (2020), Yeow <i>et al.</i> (2018)
Paradoxical tensions	Conflicting demands and tensions stemming from the digitalization, servitization and the coopetition paradox, the need for exploration and exploitation, and the simultaneous existence of a product and service logic.	Brax <i>et al.</i> (2021), Davies <i>et al.</i> (2021), Dmitrijeva <i>et al.</i> (2022), Gebauer, Fleisch, <i>et al.</i> (2020), Kohtamäki, Einola, and Rabetino (2020)15/11/2023 18:58:00
Business environment	Raising customer demands, unexpected, disruptive global events, and the diversity of numerous stakeholders and service components are becoming increasingly intertwined, rendering the business environment complex.	Ambroise <i>et al.</i> (2017), Bustinza, Gomes, <i>et al.</i> (2019), Coreynen <i>et al.</i> (2020), Eloranta <i>et al.</i> (2021), Rapaccini <i>et al.</i> (2020), Ziaee Bigdeli <i>et al.</i> (2018)

Appendix 2. Case summaries (property of the authors)

	Case A	Case B	Case C
<u>Stage 1:</u> <u>Awareness</u>	The CTO initiates a strategic workshop with a consultant. Ideas evoked during the workshop are considered too far-fetched. The company starts integrating sensors into its existing products.	A strong focus on customization has led to a choice paralysis among customers. An in-house developed configurator does not generate the desired results. Collaboration with an existing software provider is intensified.	A customer suggests an idea to improve workflow, setting in motion a bottom-up initiative to develop a digital production platform. The company is reluctant to allocate funding to the project.
<u>Stage 2:</u> <u>Development</u>	Current skills prove insufficient to build a user-friendly web app. The company starts collaborating with an innovation agency to support them in product design and business model innovation.	A digital expert is hired to upgrade the configurator and develop a digital platform. Customers are involved in the development process. Salespeople are hesitant to promote the new platform.	Promotional campaigns boost the company's confidence in the benefits of industry 4.0. Funding for the platform is provided. The current software provider is chosen to develop the app.
<u>Stage 3:</u> <u>Upscaling</u>	The new data business demonstrates the need for an upgraded ERP system. New partnerships with IT providers are set up to accelerate its roll-out.	A new web app further pushes customers to the platform. The company considers new business opportunities based on customer data.	The software provider is not pressured to solve technical issues. The company delays in finding a solution. Customers become concerned about their own operations.
<u>Stage 4:</u> <u>Maturity</u>	Tensions rise between the need to run day-to-day operations and pursue future DSI ambitions. A start-up is acquired to overcome some of these issues.	Upgrading the back end turns out difficult. A new growth path is found in the acquisition of a large customer. The company continues with regular system updates and the launch of a new app.	The software provider continues to resolve technical issues at a slow pace. An online dashboard is added. International rollout of the platform has commenced.