Characterizing digital service innovation: phases, actors, functions, and interactions in the context of a digital service platform

Purpose – Digital service innovation (DSI) is a type of technological innovation that is recognized in practice in the innovation structure of companies. Given the breadth of digital technologies that enable digital services and the variety of these services, analysis is needed to discern the nature of these services, as well as the process that culminates in co-innovation. The literature on DSI is fragmented and spread across multiple research areas. This fragmentation impedes conceptualization of the elements that constitute DSI. This paper describes the nature of DSI through the process and elements of initiation, adoption, and routinization of DSI in the context of digital service platforms (DSPs).
Design/methodology/approach – This paper presents a single exploratory case study of a provider of a leading digital solution in customer relations. The data analysis is based on abductive reasoning.
Findings – The paper conceptualizes the nature of DSI and describes the process and elements of DSI (phases, actors, functions, and interactions). It contributes to building a common language for DSI research in service management. The analysis shows that DSI in DSPs is synonymous with co-innovation. This paper offers insight into how co-innovation occurs using hybrid agile methodologies with the coordination of multiple actors and multilateral interactions.
Originality – The originality and value of the study reside in its conceptualization and analysis of what is meant by DSI. The components of the service and the technological requirements for not only provision but also ideation and development appear to be inseparable. The study unveils the mechanisms that turn a digital service solution into a co-innovative proposal. This knowledge can facilitate scalability in digital services.

1. Introduction

The rapid growth of digital technologies is driving radical changes in products, services, and innovation processes (Sjödin et al., 2020). Manufacturing firms are shifting from product-centric models to combined digital offerings, bundling products, services, and software-hardware systems, providing higher value generation potential (Huikkola et al., 2022; Opazo-Basáez et al., 2023). This shift represents digital servitization (Sjödin et al., 2020). Firms also switch from product to service innovation (Häikiö et al., 2016). To realize the full potential of digital transformation, firms need to adopt digital platforms (Sandebrg et al., 2020). Industrial manufacturers increasingly develop digital platforms in business to business (B2B) contexts (Jovanovic et al., 2022).

Digital platforms allow connecting Internet-of-Things-enabled machines, collecting operational data, and conducting analytics to provide advanced services like preventive maintenance and fleet management, or even site optimization (Kohtamäki et al., 2020). This remote asset connectivity enabled radically new digital services across industries (Paluch & Wirtz, 2020). And so, Digital services built on product data analytics improve operations and use (Vendrell-Herrero et al., 2021b). As digital services permeate business, their importance grew substantially (Opazo-Basáez et al., 2022).

Services have become a source of digital innovation that can be revamped regarding their attributes (Gebauer et al., 2021). Digital service innovation (DSI) is challenging for B2B companies given the rapid technology evolution (Sjödin et al., 2018), need for customer co-creation (Parida et al., 2019), and limited B2B digital service development knowledge (Sjödin et al., 2020; Raddats et al., 2022). Jovanovic et al. (2022) state that a key aspect for B2B manufacturers is fitting future digital services into digital platforms, specifically how platform architecture can expand functional scope (Koutsikouri et al., 2018). When this evolution occurs,

industrial digital platforms become digital service platforms (DSPs). Initially, product platforms can incorporate digital modules (Warner and Wäger, 2019). Later, facing advanced service needs, they can add external modules to the core (Constantinides et al., 2018), evolving into DSPs. In other words, DSPs enable rapid, continual digital service innovation delivery (Carcary et al., 2022).

DSI in digital platforms has been studied as a way to innovate and transform businesses (Chowdhury et al., 2021). DSI entails co-innovation occurring on digital platforms. DSI represents a new actor network configuration for value generation (Häikiö et al., 2016). In this context, DSI is a key research priority (Field et al., 2021; Opazo-Basáez et al., 2022). The DSI literature has developed from approaches related to data-rich environments (Troilo et al., 2017), service innovation frameworks for smart product-service systems (Zheng et al., 2018), DSI strategies (Soto Setzke et al., 2021), and the interplay between smart manufacturing and and Knowledge Intensive Business Services (KIBS) in product-service innovation (Bustinza et al., 2022). Indeed, KIBS play a major DSI role with specialized expertise in technology, data analytics, and process optimization to guide digital service innovation (Seclen-Luna and Barrutia, 2018; Seclen-Luna and Miles, 2023).

The DSI literature is fragmented across domains, hindering conceptualization. Clarifying DSI elements is critical, particularly the process of innovating services on digital platforms (Jovanovic et al., 2022). While DSI differs across sectors, analyzing its nature and process on digital service platforms can establish a common DSI research language. DSI is analyzed within the manufacturing context, specifically as part of manufacturers' servitization efforts. Accordingly, there is a gap in the literature in relation to analysis of the nature of DSI and the DSI process within DSPs. There is also a need to unveil the antecedents and mechanisms that turn digital service solutions into an innovative proposal. In other words, the gap addressed by this study relates to the need to characterize DSI on DSPs.

Based on these premises, this study seeks to respond to: *What is the nature of a digital service? How does digital service innovation occur on a digital service platform?* The objective is to deconstruct a digital service into the "what", the "who", and the "how" to identify DSI elements, check them against customer needs, and design and deliver those elements. Therefore, the study aims to identify the phases, actors, functions, and interactions determining the innovation process of a digital service on a DSP. It describes the initiation, adoption, and routinization antecedents of DSI in a DSP context. An in-depth single case study based on archival data and interviews examines a leading software as a service (SaaS) digital service provider and one client. Empirical insights from DSPs can further the understanding of DSI elements and process. This knowledge can facilitate innovation scalability in digital services.

This study contributes to DSI literature in three ways. First, it depicts DSI as technological innovation, describing its commoditized process and hybrid agile methodology nature. Second, it extends actor interrelationships and highlights collaborative, customer-focused innovation routines within an organizational service culture, highlighting the KIBS role. Third, it highlights the co-innovation process in DSPs, with multi-party actor roles and functions varying during DSI. Empirical results shape propositions guiding future research. For managers, the study provides a DSI development framework and guide. Conceptualizing DSI elements and process offers a common digital service innovation roadmap while capturing sector differences, contributing to a unified DSI research language in service management.

2 - Theoretical background

2.1 Services and service innovation

What is a service? Researchers and practitioners from numerous disciplines have challenged the conventional definition. The conventional view is that a service produces outcomes that are intangible, heterogeneous, instantaneous, and perishable (Fitzsimmons and Fitzsimmons, 2000). Adding digitality is revolutionizing the concept and scope of services. In 2004, Vargo and Lusch provided service-dominant logic (S-DL) foundations, defining service as a collaborative value co-creation process between recipients and providers. Applied to services, Schumpeter's innovation concept (Schumpeter, 1934) suggests service innovation involves developing and implementing novel service process and technology combinations, developing new or renewing existing offerings (Toivonen & Tuominen, 2009). Radatts et al. (2022) address this innovation lens.

Research on service innovation has made major advances in recent years as a result of the rise of services in different domains. In management, products are distinguished from services for the purposes of both companies and consumers (Fitzsimmons and Fitzsimmons, 2000). There are likewise differences in terms of product and service innovations.. In information systems, Lyttinen and Rose (2003) introduced technological services as a type of information technology (IT) innovation service. However, their vision is limited to IT services, ignoring the scope of services in the company, as well as issues as relevant as value creation and resource integration. Service innovation can be defined as a new process or offering that is implemented and adopted by one or more stakeholders and that creates value for them (Gustafsson et al., 2020:114). And digital innovation is "the change or creation of products and innovation processes that result from the new combinations of digital and physical components enabled by digital technology" (Liu et al., 2021, p. 2).

Organizations increasingly operate in digitally permeated environments (Yoo et al., 2012). Manufacturing firms should adopt digital innovations (Liu et al., 2023), not only for products but also for incorporated services (i.e. digital servitization). And, the service itself has become a digital innovation source that can be revamped regarding its features (Gebauer et al., 2021).

2.2 Digital service innovation

No doubt a technological perspective is necessary to capture innovation in digital services (Droege et al., 2009). Servitization represents applying service approaches to all economic activities. Likewise, services have become important manufacturing inputs (production services) and outputs (product-related services) (Bryson et al., 2020). The digitalization of services (digital services) also represents a paradigm shift. It is the industrialization of services. In this context, DSI is an entity itself.

Thus, technological service innovation (i.e.,DSI) can be a different innovation category (Vendrell-Herrero et al., 2023). The Oslo Manual dominates innovation typology description (OECD, 2018), including digitally delivered services among product innovations. Most manufacturing innovation research has focused on technological innovation (Toivonen & Tuominen, 2009; Vilkas et al, 2022), largely ignoring service innovation opportunities. Opazo-Basáez et al. (2022a) and Vendrell-Herrero et al. (2023) recommend including technological and non-technological service innovation in this and other innovation frameworks. DSI is one technological service innovation.

DSI can be defined as innovation in manufacturers' service offerings using digital technologies that create value for manufacturers and their customers (Raddats et al., 2022; Kolagar et al. 2022; Sjödin et al., 2020; Vendrell-Herrero et al., 2021a). Soto Setzke et al. (2021) conceptualize DSI as service and product bundling using digital technologies, enabling real-time customer product usage data access. This data allows service recommendations to improve product use. Examples include real-time tracking, health monitoring, and data analytics consultancy (Opazo-Basáez et al., 2022a:101).

DSI entails adopting a new organizational mindset and logic, shifting from product to service logic (Vargo and Lusch, 2004). Töytäri et al. (2018) describe top-down and bottom-up mindset shift paths: top-down promotes new value logic effectuation, bottom-up first promotes new capabilities driving overall logic change.

Beyond technical complexity and innovativeness, DSI also has customer innovativeness regarding technology-enabled service use (Raddats et al., 2022). This dimension enables highly customized value propositions through digitally enhanced provider–customer relationships (Kowalkowski et al., 2013) under service-dominant logic (Skålén et al., 2015). DSI "requires a change in managing provider-customer relationships by adopting new and innovative co-creation approaches" (Sjödin et al., 2020, p. 479)

The service innovation frameworks by Lusch and Nambisan (2015) and Tiwana et al. (2010) reveal the integration of management and information systems domains for DSI and DSP analysis. Developing DSI requires adequate IT infrastructure like DSPs. DSPs enable rapid digital innovation development, implementation, and spread. They are the main digital service offering mode to customers (Jovanovic et al., 2022). DSPs exploit and control digitized resources, creating value by enabling multi-actor connections (Gawer, 2020). In B2B environments, digital technologies have considerable service innovation potential, offering new revenue and value generation opportunities. Here, iterative innovation is needed to create greater digitalization value, responding quickly to customer needs (Parida et al., 2019).

Indeed, DSI requires evolving traditional product/process innovation, often designing new digital innovation, speed and agility-focused structures, and new integrator roles connecting these units and the business. Business models and processes must also be digitally reinvented to accommodate rapid innovation (Ross et al, 2016). Innovation happens through co-creation at customer contact points, where value is realized (Grönroos, 2011). In this scenario, DSI occurs on digital platforms, providing necessary and sufficient DSI development conditions.

2.3 Digital (service) platforms

Digital platforms are defined as platforms with physical and software elements linked by interfaces, framed technically (Hein et al., 2019). However, socio-technical perspectives have greater researcher interest, considering technological aspects and agent interrelations (Mishra & Tripathi, 2020). So, platform nature depends on participant task type (Jacobides et al., 2018). For example, service platforms comprise tangible and intangible resources, facilitating actor interactions and resource exchange (Lusch & Nambisan, 2015). Most service platforms are digital services, i.e. digital service platforms (Fischer et al., 2020).

DSPs use diverse actor skills, knowledge, or resources to enhance service value. DSP success relies directly on enabling and enhancing interactions, co-creation, and innovation (Fischer et al., 2020). DSPs enable agility and customer responsiveness, deliver superior customer experiences, build loyalty and trust, promoting co-innovation. Structures fostering actor integration and collaboration create competitive advantages through efficient external knowledge sourcing and absorption, encouraging user-centric innovation (Fu et al., 2018; Grönroos, 2011).

Rapid digital technology development has led to software-focused DSPs, accentuating earlier DSP characteristics regarding co-innovation opportunities. These platforms include Internet providers operating SaaS or PaaS (platform as a service) as part of cloud computing infrastructure. A software service platform represents an ecosystem with interacting stakeholders (Jansen and Cusumano, 2013).

DSPs bring together a platform architecture and ecosystem members through joint exploitation activities (Jacobides et al., 2018). Platform services have been frequently associated with greater

possibilities for innovation, and they leverage digital technologies that allow for rapid scaling of knowledge search and more effective knowledge recombination (Lanzolla et al., 2020). The process of DSI is essential to the development and evolution of DSPs and requires analysis of the phases, actors, functions, and interactions involved.

2.4 Phases, actors, functions, and interactions in digital service innovation

DSI process phases in B2B contexts require analysis in practice. Scholars have identified different models for new product development (in the form of goods or services). So, models for new product (good/service) development represent innovation methodologies, including waterfall (Royce, 1987), Stage-Gate (Cooper, 1986, 2008), and agile (Beck et al., 2001) models. These models can be considered innovation methodologies. Waterfall pioneered the Stage-Gate model, prescribing detailed specifications, sequential phases, adherence to specifications, and strict criteria (Bianchi et al., 2020). It uses linear methodology emphasizing early planning and early flaw identification. Stage-Gate model depicts innovation as a deterministic, plannable, executable, and controllable process, including gates based on predefined performance indicators. In contrast, agile methodologies are stochastic - iterative planning cycles where one execution phase informs the next design (Paluch et al., 2020). Table 1 summarizes these models.

[INSERT Table 1: Innovation methodologies]

In the structured view of the service innovation process, managers must perform careful analysis of the environment and the strategic objectives of their company before deciding on an innovation methodology. In the particular case of DSI and software development, the waterfall model is widely used. It has four stages: analysis, design, implementation, and ongoing system monitoring and testing. In sum, the waterfall model forces teams to plan before building and requires a disciplined methodology for development (Bullinger, 2003).

The alternative view of the service innovation process is rooted in grounded studies using practice-based interpretations (Fuglsang and Sørensen, 2010). Under such interpretations, service innovation processes are characterized by a low level of formalization and are emergent (Toivonen and Tuominen 2009), unsystematic, conducted ad hoc as a solution to a particular problem (Gallouj and Weinstein 1997), and integrated with day-to-day operations (Kelly and Storey 2000).

Paluch et al. (2020) discussed traditional product development model adequacy in the digital age versus agile methodologies. They propose principles for Stage-Gate or Agile model selection based on technology, task, customer, and organization characteristics (Paluch et al., 2020). Bianchi et al. (2020) found Stage-Gate model attempts to control uncertainty upfront to avoid later changes, while agile methodologies accommodate longer uncertainty to enable changes, delivering high-quality, timely, in-budget outcomes.

Behind the design and development of new digitally enabled service innovations, there is a network of actors with a wide range of resources that can be used in value co-creation (Lusch and Nambisan, 2015). Within the framework of DSPs, there are different actors: clients or end users, service or technology providers, platform owners, platform sponsors, KIBS, and others. Service-dominant logic analyzes multi-actor DSI processes. DSI represents value co-creation guided by capabilities and practices (Koskela-Huotari et al., 2016).

Actors do not assume static customer/provider roles but can simultaneously assume multiple actively changing roles (Ekman et al., 2016). Ekman et al. (2016) present a typology with provider/beneficiary and active/passive roles playable by different actors. For example, in DSI, KIBS can play intermediate and initiation roles, transferring knowledge between actors and

being an innovation source (Sheamur and Doloreux, 2019; Seclen-Luna and Barrutia, 2018; Seclen-Luna and Miles, 2023). An initiator role triggering innovation was also conceptualized.

DSPs enable actor interactions and resource exchange (Böhmann et al., 2014). DSP actor interactions are complex and dynamic, with service providers, users and regulators key for platform development and evolution through effective interactions to ensure service innovation success (Jovanovic et al., 2022). Relationships become interdependent as data collection, storage and sharing require greater collaboration, enabling transparency, connectivity and joint analysis (Parida et al., 2019).

Lusch and Nambisan (2015) established a framework of service innovation in which DSPs act as mediators among service ecosystems actors that enhance the exchange of resources and the provision and commercialization of services. The success of a DSP therefore relies directly on its ability to enable and enhance interactions, service co-creation, and innovation (Fischer et al., 2020). External, collaborative, and co-creative ideas in digital (service) platforms can converge to create organizational and shared value. This approach to innovation is called co-innovation. Through co-innovation, new ideas or approaches from various internal and external sources or actors are applied differently to create new value or experiences for all stakeholders, including consumers (Von Hippel et al., 2011).

Accordingly, DSPs offer an ideal scenario for describing co-innovation in digital services. Classical push innovation involves producing and pushing goods/services to stakeholders. Collaborative co-innovation involves stakeholders. Effective governance mechanisms are necessary for cooperation, coordination, and diverse activity/interaction integration (Jovanovic et al., 2022). These reduce uncertainty and coordinate varying actor capabilities (Huikkola et al., 2022).

3. Method

3.1 Research design and case selection

In this research context, a qualitative approach suits the complexity of developing multi-actor DSI in B2B contexts (Yin, 2003). Specifically, case study methods provide good fit. Case studies suit considering complex social phenomena in real contexts (Yin, 2003) and context-based theory building/testing (Gioia et al., 2012). This study presents an exploratory single case study, suitable when the assessed action lacks a clear outcome set (Yin, 2018). Exploratory approaches aid understanding phenomenon “hows” and “whys” (Eisenhardt, 1989) through abductive flows between theory and observations (Dubois and Gadde, 2002; Piekkari et al., 2010).

For this purpose, a firm co-creating DSIs with customers in a B2B setting was sought. That is, a leading global software solutions provider was chosen as the supporting digital platform. This SaaS company was selected for several reasons. First, it leads the market with over 30% share. Second, it has successful, long-term digital service development experience across complex projects and customer relationships. Third, its wide client base provides rich co-creation knowledge. Fourth, key respondent and data access enabled contextual understanding.

The data collection protocol (including the interview guide) and the description of data analysis is incorporated in the appendix.

[INSERT LINK for Supplementary_material_appendix_1]

[INSERT Table 2: Information on key informants]

[INSERT Figure 1: Data structure]

4. Findings

This section presents and examines the main findings of the research. The analysis identified the phases, actors, functions, and interactions in DSI. The aim was to shed light on the nature of DSI on a DSP in a B2B context.

4.1 Digital service innovation phases as a solution for customers

In this study, the client is the analyzed organization's IT department. Around 15 years ago, the client decided to prepare for the future. Until then, prospect/customer relations were managed by users building their own basic databases. When deciding how to address this CRM challenge, IT turned to a trusted consultant for advice. Custom solutions meeting user needs were common then, having the advantage of being tailored but the disadvantage of vendor dependency. However, the consultant recommended adopting an out-of-the-box SaaS platform.

> "Fundamentally, one of the things that has changed in enterprise software in recent years is that when you take it out of the box, it works. And even more so with these services that are cloud-based, where you don't even have to set up servers or databases or anything else." (Provider A – CEO)

Among other advantages, the software's out-of-the-box nature allowed direct user cloud utilization. The client only had to pay licensing based on users and customize the platform.

Before any description of the phases of each instance of DSI, two methodologies to work toward the solution should be mentioned. These methodologies are waterfall and agile. In the most traditional waterfall methodology, a solution is agreed upon at the beginning of the contract and delivered at the end of the contract. The client pays an amount of money upon signing the contract, another amount in the middle, and the rest when the solution is delivered. If needs are well defined or new needs do not appear during the contract, it can work effectively. However, such situations are rare in real life. The only guarantee is that the budget is set from the beginning of the contract. No additional amount is charged at the end of the contract if changes are made during the contract because the client learns the implications of their needs or because new needs or conflicts of use appear. The importance of the commoditization of business processes was highlighted by the provider.

> "With the advent of agile projects with more open budgets, they are much more involved. But of course they all have to be on the same page, because if one has one methodology and another has another, it doesn't work." (Provider A – CEO)

Agile methodology means that the two parties work hand in hand in so-called "sprints". These sprints are short periods (e.g., two weeks). After each sprint there is a micro-delivery. A sum is paid for each delivery, and the client knows that their needs are being properly met. Centralized decision making and a global perspective appear to be necessary from the provider's perspective.

> "Everybody is asking for agile, but nobody knows how to work in agile . . . I think that first you must have a global vision of where we are going and first establish a core, the initial part of the system, and then you can start talking about smaller things and little cards." (Provider A – Senior consultant)

If this methodology is followed, the final service is always an effective solution for the client, although it is difficult to set a budget from the beginning. However, the case study used a hybrid methodology. This methodology mixes the best features of each pure methodology. For instance, a budget is set from the beginning. Clients must meet the budgets they get from the annual company budget. The first phases are shared with the waterfall methodology. The

development phase of the DSI is the one that is developed through sprints, as in agile methodology. If the whole DSI is not completely fulfilled, it should be continued in subsequent years until finished. The cost should be set against the budget for each year. At least this way, the client gets some partial innovations that can be fully used at the end of each year.

> "For me it is ideal. That is to say, once you already have something that you have defined and that is something that is solid, since it is a minimum viable product, from there on, then you can start working on agile methodology." (Provider A – Senior consultant)

Accordingly, each DSI round began with user needs definition (phase one). Before platform adoption, each client´s user worked independently with the provider. Some were heavily involved, others less so. Consequently, some solutions lacked adequate budgets or progress. The IT department solved this by organizing a user committee to define annual needs. Once approved, IT and the user called the provider to begin the process.

The provider then performs a gap analysis to properly define and scope the work. This analysis matches platform capabilities to user needs, which could be simple or complex if connections to other organizational platforms are needed. On the provider side, senior consultants perform this with client IT and users.

> "Especially at the beginning of the project in the analysis phase, try to be very clear about the tasks that are everyone's responsibility and the dates. Have a joint plan or, if they are separate plans, check that they fit in the timelines." (Provider A – Senior consultant)

The *gap analysis* leads to a *feasibility analysis* and *initial solution design* presentation for the client, defining at minimum the potential innovation, estimated budget/timeline, and provider team (size and profiles).

> "In the first phases, we, the more senior people, what we always work on is expectation management. What does the client want, what have they contracted, what can we give them? And if there is a GAP, watch out, because there will be a fuss." (Provider A – CEO)

If the end solution, budget, and timeline are agreed on (phase two), the process moves forward. Otherwise, the parties discuss and negotiate based on discrepancies until agreement is reached. This may entail splitting the innovation over two or more years if required budgets exceed annual IT allocations.

The next phase involves *developing* (phase three) or *executing* the innovation. This phase is developed sequentially in progressive agile sprints. Although these sprints are substantial for the client, they constitute the methodology followed by the provider.

> "And then what we do is for each sprint, that is, for each mini-deliverable that we do, we do not deliver everything at the end. We deliver by tenure, so every two to three weeks, we deliver a project that is functional and that can be tested. Then, we do a sprint review, which is a review of everything that has been done in that, in that micro deliverable." (Provider A – CEO)

In each of these sprints, the micro-delivery usually consists of a mock-up (a screenshot, for instance) because in two weeks, there is not enough time to finish a microservice (an autonomous piece of software that works on the platform). However, after some sprints, those microservices may go live and there is a final delivery that is fully operative. In this phase, decentralization and a close relationship between analysts and developers (provider) and users (client) is crucial.

> "Though, eventually, we can deliver a microservice at the end of a sprint, microservices are more frequently delivered when developing apps, as apps function as a bunch of microservices that can work, more or less, autonomously." (Provider A – Project Manager)

Next is the production phase (phase four) where everything is assembled into the final delivery and platform-integrated. Testing ensures microservice functionality individually and merged, plus connections to other platforms if needed. Once working properly, delivery to client occurs.

> "I was thinking about other critical factors: the involvement of the client's team in the tests. That they get involved in doing the tests they have to do and that they do them well, because there are times when you realize that they haven't even passed the tests. Then that production comes out and then it's when they detect all the errors. In the end, it's time." (Provider A – Senior consultant)

The final delivery (phase five) should match the feasibility analysis agreements. However, deviations can occur through sprint agreements between parties. As mentioned, final deliveries involving other provider platform connections entail accommodating that in relevant sprints. A joint committee of client, user, main provider and third parties is sometimes formed on client or main provider initiative.

Post-delivery training (phase six) may occur. Usually, users learn throughout the process, but training can expand to all users or train-the-trainers approaches.

4.2 - Actors in digital service innovation

One of the aims was to understand which actors are involved in the DSI development process and how these actors co-innovate when developing digital services. When analyzing DSI in platforms, one of the key findings is that multiple actors are involved in this process. First, the client has a need derived from business. In some cases, it is identified by the IT department with the help of a consultant acting as a knowledge-intensive business service (KIBS). In the present case, one consultant was the one who pushed the client to migrate its systems to a platform.

> "Well, it arises from a consultant we had at the time, RD. The IT department director hired the consultant to do some innovation and to help us innovate a little bit." (Client – Assistant director of IT)

Apart from the KIBS key initiating role, the client has different in-house actors. Here, the digital service did not emerge from strategy or business:

> "For me, the birth of the service is not the right one. And it was born out of IT (the need). It was not born out of business." (Client – Assistant director of IT)

An additional client-side difficulty is production orientation rather than market orientation, indicating a service mindset lack.

> "Basically, the challenge is to move from a production culture to a market-oriented culture..." (Client A – User A)

Second, IT acts as intermediary between product owner and users, and translator between users and provider partners.

> "And it is very noticeable, the provider turned partner. That mentality of saying I know I am paying, they are giving me a service and what I have to do is to squeeze them . . . because we are multi-sectoral, so we can be your partner." (Provider A – CEO)

As stated by providers, organizational digital culture changes rapidly but some methodologies/procedures still lack widespread digital mindset.

> "More and more projects are led by people who are digitally literate in companies." (Provider A – CEO)

When analyzing a main DSI partner, multiple actors re-emerge with various roles/responsibilities. First, senior consultants play a major pre-sales and project definition role to understand client needs and prevent friction.

> "Perhaps the most important thing, and I think it has to do with the frictions of project expectations that may occur." (Provider A – CEO)

Second, project managers lead internal provider analyst/developer teams and liaise with clients.

> "I am in charge of reviewing, monitoring the project, analyzing the risks that may occur throughout the project cycle, communication with the client, as well as different follow-ups . . . and then also the management part is a bit more numerical." (Provider A – Project Manager)

This actor also facilitates team soft skills growth:

> "But it's really leadership where we rely a lot on the team . . . You try to give and take so that they don't feel, not too overwhelmed either. Also try to help them." (Provider A – Project Manager)

> "We have had a program for a few years now, and we also focus on helping them grow in the soft skills they need." (Provider A- Project Manager)

Third, the provider team has different technicians (analysts, developers, back-end, user experience). Good knowledge/skills are important, but the CEO noted many engineers need mindset change:

> "That cultural part that we are a service provider and not a technology provider is important, and when that is not clear, there are usually problems. We get it into the heads of our engineers that what we do is provide a service to a client that consists of making software, but we are at their service. In other words, we are not a product, we are a service." (Provider A - CEO)

Multiple provider teams may work in parallel for the same client.

> "The execution of the project usually involves several teams in parallel, depending on the size of the Project." (Provider A – Senior consultant)

In digital services, multiple service delivery providers are common.

> "For example, I am just resuming the service with Client S and there is us, there is another provider D, there is a French company, in other words, we are 3 or 4 providers." (Provider A – CEO)

Integration between different providers and IT can complicate DSI, making coordination vital.

> "The partner starts working with the user, and we are in the middle, coordinating and supporting. And, also, there are usually integrations with other systems, so this person of ours who is going to do CRM also acts as an interlocutor to integrate it with other issues." (Client – Assistant director of IT)

> "It is the responsibility of the client to coordinate all providers, but sometimes we have to take that responsibility, with the permission of the client, to join all the providers in a committee." (Provider A – Project manager)

4.3 - *Functions and roles*

Initially, IT played strategist/leader roles, seeking new approaches open to unfamiliar proposals and recognizing strategic needs.

> "So, 15 years ago, we discussed inside the IT department how to embrace the future . . . We had several users managing their relations with (potential) customers with homemade solutions . . . We sought advice and hired a consultant . . . and decided to implement a CRM platform provided by Salesforce." (Client – Assistant director of IT)

In this journey, the consultant's role is similar to the role of a KIBS because it is defined in servitization theory. As an expert envisioning cloud/SaaS digital service futures via out-of-the-box solutions, the consultant played a key role in identifying the need and addressing initial legal/privacy difficulties.

> "As a consultant, I create confusion, shake up the organization, and act as a catalyst." (Consultant)

Afterwards, IT approved a trusted, reliable provider to implement the platform.

> "We chose a provider we knew in advance to implement the platform and to adapt to the internal users . . . We opened an internal call to see who wanted to use the CRM platform." (Client – Assistant director of IT)

At this stage, the IT department plays different roles. It paid SaaS licensing as a platform hirer. As a provider hirer, it configured the platform. It acted as product owner representing users and decision making. Finally, IT prescribed the solution to users.

The provider also played multiple roles, configuring platform menus/functionalities per user type. It then trained platform use/potential. Once adopted, the KIBS disappeared but the client/provider remained.

Regarding the client, the main actors are the IT department and the users. The IT department plays the role of orchestrator. It arranges a joint commission with users to gather details of their needs, encouraging discussion among them to establish priorities and estimate a budget presented to the general management for approval. If the users are new in the use of the platform, the IT department can help them define their needs to guide the conversation with the provider. Of course, the IT department ensures that the final DSI works properly from a technical point of view.

In the client organization, there are different units and different users. Normally, the users (and, by extension, the product owner) are not experts in the platform. They are experts in their business, so in the process of developing a DSI, they can only state their needs and agree or disagree with the solution proposed by the provider.

On the provider side, there is a distinction between the roles of senior consultant, project manager, analyst, and developer. Senior consultants perform the gap analysis, feasibility analysis, and initial design of the solution. As a result, the potential solution emerges, and the final budget, time, and the nature of the team they have to dedicate to the client becomes clear. The senior consultant proposes the project manager, the person responsible for the successful completion of the DSI. The rest of the team is made up of analysts and developers who design and code the final DSI. The project manager is the main representative of the provider in all meetings.

Finally, more stakeholders emerged if DSI required connecting to other platforms/solutions like the affected platform's project owner and IT provider. Their timely, properly functioning DSI role was crucial. The DSI provider sought early involvement, sometimes proactively forming joint task forces if client proactivity was insufficient.

> "If it is an integration between us and another provider, it should allow the client to set up a joint meeting with us and with them. This is the theory, but in the end, you often end up setting up these meetings yourself. Obviously the customer is always copied in and kept up to date with everything that is going on." (Provider A – Senior consultant)

4.4 - Interactions in digital service innovation

Findings reveal a recent shift toward agile methodologies, with continuous, multi-level client/stakeholder interactions. Agile teams work concurrently on project phases, often with tight deadlines.

> "We don't deliver everything at the end. We deliver by tenure, so every two to three weeks, we deliver a project deliverable that is functional and that you can test. Then we do a sprint review, which is a review of everything that has been done in that, in that micro deliverable." (Provider A – CEO)

Clients now desire greater project control, intensifying relationship frequency/intensity.

> "The client has changed a lot. Before, what the client wanted was a project already in hand. And now what they want is to have a lot of control over what is happening on a day-to-day basis" (Provider A – CEO).

Additionally, teams now drive projects more than managers, requiring self-direction yet enabling motivation/productivity.

> "In waterfall projects, I did find that I was more the one interacting with the client and the development team . . . This type of agile methodology forces them (developers) to be in daily communication with the client." (Provider A – Project Manager)

Regular internal provider team and client stakeholder meetings are therefore necessary:

> "We have a 15-minute meeting every day. . . After that, we have a weekly meeting, and there we talk about progress in general, and if there is any risk that has come out. And then what we do is for each sprint, that is, for each mini-deliverable that we do." (Provider A – CEO).

Another element that has emerged as necessary is evidence of the regular meetings and decisions that are made. Recording meetings/decisions helps prevent friction.

> "It's important that I record it in case I missed something. And by the way, the messaging channels and so on help a lot in the projects." (Provider A – CEO)

These meetings and reports serve as milestones to validate progress and continue in the desired direction or, if necessary, redirect the project.

> "Once we have agreed on what the requirements of the project are, we make minutes of the sessions and documents, where we actually write down everything they have told us, how we understand it . . . we validate it to make sure that we have understood it correctly." (Provider A – Senior consultant)

In digital service generation processes, relationships are multilateral and multilevel rather than dyadic. They are multilateral because more than one provider is involved in complex projects,

for example in the integration processes of different software. In these cases, the constant multilateral interactions among different providers and the client and the alignment of timing and priorities is crucial to avoid friction and delays in the project.

> "With Client S we have a team of 39 people. It is part of a team of almost 70 people. And there are 3 or 4 different providers." (Provider A – CEO)

Given that several users ask for services, the solution is to set up a commission with all involved users to plan the work according to the most urgent needs. Increased cross-functional collaboration avoids internal conflicts and improves the overall understanding of the needs of the organization.

> "Until we set up a small commission with all of them... And we started to get them together on a weekly basis and we planned what the provider was going to do during that week." (Client – Assistant director of IT)

Relationships are also multilevel. Specific project teams and cross-unit commissions provide a broader service provider interaction perspective.

> "Well, I think the most important thing is visibility. Okay, the fact that they see that there are limited resources and different needs . . . And then, well, people understand it a little more . . . And obviously, it is also better to control the provider." (Client – Assistant director of IT)

These commissions provide a holistic organizational IT/digital service needs view. Figure 2 summarizes main DSI process actors, functions, interactions and phases on a DSP.

[INSERT Figure 2: Characterizing DSI]

5. Discussion

This study offers a comprehensive DSI concept analysis, examining its phases, actors, functions and interactions within a DSP context. It investigates how the DSI process (Opazo-Basáez et al., 2022a; Raddats et al., 2022) occurs on DSPs in B2B contexts (Jovanovic et al., 2022). Focusing on a leading service provider in a digital platform context aided understanding of the phases, actors, functions and interactions involved in offering a digital service.

Analyzing DSI phases, actors, functions and interactions in a DSP helps provide deeper DSI understanding. It reveals inseparable service components and technological requirements not just for provision but also ideation and development (Kohtamäki et al., 2020). DSI represents a technological innovation option complementing traditional business innovation sources like product/service and process innovation (Opazo-Basáez et al., 2022a).

The findings suggest DSI nature involves constant interplaying dynamics among actors affecting needed processes, functions and interactions. Specifically, DSI exhibits:

(a) A service culture and mindset among actors entailing a user-centric approach focused on meeting customer needs and expectations (Nylén and Holmström, 2015).

(b) A hybrid agile and iterative methodology, with companies first using waterfall then adopting lean methodologies to rapidly prototype and test new ideas (Sjödin et al., 2020).

(c) Collaboration, involving different internal teams and external partners/customers (Frey et al., 2019), embedding inter-firm and intra-firm actors in each other's processes (Eloranta and Turunen, 2016).

(d) Management commitment through implementing strong senior management support for more effective processes (Troilo et al., 2017).

(e) A multi-disciplinary nature with experts from fields like design, technology and business working together to create innovative solutions (Tronvoll, 2017). In addition, KIBS have expertise in technology, data analytics as well as process optimisation. Therefore, KIBS play a very important role as the interaction between KIBS and smart manufacturing helps to develop innovation in digital services (Seclen-Luna & Miles, 2023).

(f) Platform-based commoditized processes (Markus and Loebbecke, 2013) enabling easy service access/integration to create customer service ecosystems.

(g) Scalability, referring to the ability of service providers to adapt capacity to meet required levels (Kleinschmidt et al., 2019).

Firstly, this study identifies DSI as technological innovation, describing its commoditized process and hybrid agile methodology nature. Secondly, it extends actor interrelationships and highlights collaborative, customer-focused innovation routines within an organizational service culture. Thirdly, it highlights co-innovation processes in a DSP context, with multi-party actor roles and functions varying in DSI.

Therefore, this study contributes to the growing DSI literature (Jovanovic et al., 2022; Opazo-Basáez et al., 2022a; Sklyar et al., 2019). Empirical analysis can shape propositions guiding future research. For managers, the study provides a DSI development framework and guide.

5.1 Theoretical contributions

This paper makes several DSI literature theoretical contributions. The first is that DSI requires commoditized processes shared by networks, ecosystems and communities (Davenport, 2005; Markus and Loebbecke, 2013). While standardized processes allow customization, commoditized processes are essentially identical across a community (Davenport, 2005). As noted by the provider CEO “all have to be on the same page . . . it doesn’t work.”

In responding to the challenge of decision making, the study supports previous research (Sklyar et al., 2019; Soto Setzke et al., 2019; Tronvoll et al., 2020) showing that the decision-making process becomes increasingly centralized when customer interactions move to a higher managerial level. The present study adds a further contribution in two areas. The first area relates to involving not only customers’ top managers in DSI decisions but also providers’ top managers, mainly in the initial phases of the process. The second area is decentralization in the development and delivery of solutions. In the approval phase, there is decentralization to check the match between needs and solutions, and centralization of the technical integration with the platform. Hence, the present study extends the contributions of other authors on decision making (Sklyar et al., 2019) by exploring the stages of DSI at which centralization is most appropriate and the stages at which decentralized decision making is most appropriate.

Additionally, a hybrid agile service innovation process is proposed, dependent on delivered service scope to overcome limitations of previous methodologies. Waterfall (Royce, 1987) uses linear methodology with exhaustive initial specification and final verification, sometimes seen as impeding creative flexibility and agility. Prior studies show linear digital service development methodologies are unsuited to fast-changing environments (Beck et al., 2001; Paluch et al., 2020). Instead, flexible, iterative, adaptive agile methodologies are needed (Parida et al., 2019; Sjödin et al., 2020). However, the present study highlights purely agile methodology difficulties for digital services.

Hence, despite the trend toward agile, the study shows that, depending on the type of digital service, some organizations may prefer to use a hybrid agile methodology. Implementing a fully agile methodology requires profound changes in both processes and technologies, as well as in the organizational culture. Therefore, in addition to being beneficial for the implementation of projects, the *hybrid agile* methodology can offer an important step toward achieving agility in the company. In light of these findings, this paper addresses the call by Raddats et al. (2022) for the study of how DSI takes place. It also verifies the proposal of Sjödin et al. (2020), who concluded that before "eating the elephant in small bites following a microservice innovation approach" it is important to have an overall vision of the "size of the elephant to be eaten."

To support further research, the following proposition is formulated:

Proposition 1: Innovation in digital services requires commoditized processes shared by different networks, ecosystems and business communities. Decision-making tends to be more centralized in initial phases, decentralized in later development and delivery phases. The service innovation process is hybrid agile.

A second theoretical contribution relates to the multi-actor DSI process perspective (Tronvoll, 2017; Parida et al., 2019; Opazo-Basáez et al., 2022a). DSI, in a B2B context rarely entails dyadic relationships, with multiple firms delivering different systems. Consequently, customer system integration is often needed (Lusch and Nambisan, 2015). Following several authors' suggestions (Kowalkowski & Ulaga, 2017; Sklyar et al., 2019), primary data were gathered from multiple actors - a digital service provider, customer and consultant (KIBS). Obtaining data from multiple actors in the digital ecosystem illustrated actor innovation scaling up in each phase, revealing required skills. Here, the consultant (KIBS) plays a key role in phase 0 as digitalization catalyst and driver for the client, overcoming initial legal/privacy hurdles (Cenamor et al., 2017).

On the client side, the IT department plays a leading strategic role to scale up innovation processes. In the initial phases of DSI, it internally mobilizes the customer's initial structures and investments (Kowalkowski & Ulaga, 2017). Meanwhile, externally, it contracts the platform, participates in the configuration of the platform, and acts as an interlocutor or project owner with the provider. In the other phases, the IT department plays an important role as a prescriber of new innovations for the company's users and as a referee in prioritizing needs on use committees. Accordingly, its exploration skills are a key capability (Sklyar et al., 2019). Another group of actors on the client side consists of the users of the different business units or departments, which each have different needs. Their skills must be upgraded because in the development, delivery, and approval phases, they must discuss solutions, technologies, and procedures with providers' analysts and developers.

On the provider side, senior consultants play a crucial role in the early stages of the process (definition and agreement), where they must understand the customer's needs and manage expectations to avoid future frictions. Throughout the other stages (development, delivery, and approval), the project manager is responsible for the successful completion of the DSI. In the development and delivery phases, the DSI may require a connection with other platforms or solutions. If so, project managers can potentially convene meetings with other providers to integrate platforms and systems if this integration has not taken place from the start. Although they may have exploration capabilities (proposing improvements from other projects), they mainly have exploitation capabilities (mostly development activities). Hence, this actor must

have commercial, technical, and team management capabilities. Analysts and developers are also key actors in the development, delivery, and approval phases, so they should have exploitation capabilities. Because digital innovation requires new capabilities, firms need to evaluate their mechanisms for supporting continuous learning to set up dynamic innovation teams (Nylén and Holmström, 2015) and ensure exploration and exploitation capabilities for different actors.

One of the challenges that all the actors face is moving from a product-oriented culture to a service culture. This switch entails a shift toward a service mindset (Sklyar et al., 2019). This shift occurs not only at the customer level (IT department and users) but also at the provider level, where analysts and developers often focus on technology, not on service. Therefore, they need to switch from a goods mindset to a service mindset (Sklyar et al., 2019).

These findings provide empirical multi-actor DSI evidence (Tronvoll, 2017). Actors include providers, customers and KIBS, offering diverse role/function perspectives (Sjödin et al., 2016; Sklyar et al., 2019). This leads to the following proposition:

Proposition 2: DSI involves participation of several actors who must integrate systems, constantly upgrade capabilities (exploitation/exploration) to innovate, and consequently all share a service culture and mindset.

The third theoretical contribution illuminates different actor functions/roles in DSI. Earlier servitization (Cenamor et al., 2017; Skylar et al., 2019) and platform (Eloranta and Turunen, 2016) studies distinguish between back end and front end. Research shows a platform approach enables back end orchestration and front end building (Cenamor et al., 2017). This paper adds to platform-based DSI actor function/role literature, explaining back end/front end adaptation. It also contributes by explaining how back end and front end actors adapt their functions and roles. In addition, another contribution is to consider the perspective of multi-party actors, namely the provider (comprising several actors), the client (also comprising several actors), and the KIBS (the consultant). The study shows that in platform-based multi-actor DSI, the initiator role may be external (KIBS). Given the complexity of the processes and the presence of multiple actors, the orchestrator role is crucial, and functions are elevated to the top management level.

The catalyst for initiating digital innovation can be internal (via strategy or IT) or external (KIBS consultant). In this study, the consultant helped the client "think outside the box", playing DSI process initiator (Ekman et al., 2016). Alongside the consultant, client IT played a leading strategic role to start innovation. Early DSI functions included internal business unit promotion. IT functions changed, becoming an inter-firm intermediary and intra-firm priority setter. Accordingly, it adopted orchestration internally and across external companies (provider/KIBS). Client users communicate needs and are crucial for testing/validation, partaking in co-innovation with provider analysts/developers.

On the provider side, senior consultants manage expectations and decide on contracting, performed at top levels. The project manager represents providers in all meetings, resolving issues and supporting internal analyst/developer teams. Given DSI nature, functions/roles can upgrade or downgrade based on project complexity and provider numbers. The provider project manager acts as an intra-firm hinge raising/lowering responsibilities. They may also assume orchestration across providers to integrate systems/procedures. In addition to designing/developing, analysts/developers have constant user interactions for co-innovation, adopting builder roles. Now, with hybrid agile, they perform new front-end functions (Cenamor

et al., 2017; Sklyar et al., 2019; Parida and Jovanovic, 2022). Hence, in multi-party DSI settings, actor functions can shift. These new functions and roles should be discussed at the definition phase and should be aligned among the actors in order to be effective (Parida and Jovanovic, 2022).

Proposition 3: Given DSI complexity, the initiator role may be external. Initial orchestration is performed by top management of both customer and provider setting key project conditions. Development/delivery is delegated to middle management, analysts and developers in builder roles.

Proposition 4: Multi-party actor roles/functions vary in DSI. Intra-firm redefinition is essential. Inter-firm back-end/front-end alignment and adjustment is critical for co-innovation.

The fourth theoretical contribution relates to DSI interactions. This study shows digital service development represents iterative co-innovation (Häikiö et al., 2016; Fisher et al., 2020; Von Hippel et al., 2011) among B2B providers/customers (Raddats et al., 2017), involving governance mechanisms (Jovanovic et al., 2022).

To succeed in DSI, the companies involved (actors) must establish effective communication and mutual trust. They must work together effectively to coordinate their innovation efforts and ensure that they are working toward a common goal (Sjödin et al., 2016). In addition, companies must be willing to share information and resources to achieve success in co-innovation. For example, they may share technical expertise, financial and human resources, and market data and experience.

Some governance mechanisms are client-side, some provider-side, with inter-firm multilevel mechanisms across firms. In DSI, initial project governance definition occurs between top managers of different firms (provider senior consultants and client IT). This discussion may be most important for avoiding friction.

Thus, the mechanisms for orchestrating several actors participating in numerous projects with different functions and roles, involve continuous interaction and monitoring mechanisms through frequent meetings, as well as validation through recordings and minutes of meetings that capture and record the evidence. Because of the numerous actors and interactions at different levels, new routines (Parida and Jovanovic, 2022) and control mechanisms are required to identify problems and correct deviations quickly in digital servitization (Sklyar et al., 2019).

In this scenario, multilateral relationships emerge between several companies. The relationships must be coordinated and managed. Furthermore, each of the companies involved (whether providers or customers) needs cross-functional coordination across business units to break down silos and gain a better overall understanding of the organization's digital challenges (Huikkola et al., 2022). The present study shows the relevance of committees in digital transformation and DSI (Soto Setzke et al., 2019).

These findings contribute to the literature by providing complementary provider/customer perspectives. Evidence shows the importance of initially establishing governance documentation specifying actor management to enable organizing intra/inter-firm interactions and avoid "time thieves". Unlike prior provider-focused studies, customer DSI perspectives were obtained as suggested by Raddats et al. (2022). This leads to the following propositions:

Proposition 5: Initial project/governance definition by top managers of different firms is necessary in early definition/agreement phases. Multilateral interactions and intra-firm cross-functional committees and inter-firm committees are also required throughout the DSI process.

Proposition 6: To avoid deviations/delays, control mechanisms should be established for digital service co-innovation in complex multi-party contexts.

5.2 Managerial implications

This study shows how to co-innovate in a digital service development process with the participation of various actors. DSI has some important implications for managers because digital services are becoming more prominent in all kinds of companies. First, although there are different methodologies (e.g., waterfall and agile) with their own advantages and disadvantages, in most services with a certain degree of complexity, the actors opt for a *hybrid agile* methodology to develop digital services. This hybrid agile model could be used in situations: where only part of the work within the project can be anticipated, where the budget, timeline, and scope of the project are not fully known, where the service is being developed for the first time, where user feedback is needed for the project to advance, or where a transition to the use of agile techniques and tools is undertaken. This *hybrid agile model*, based on Scrum, softens the adaptation curve, while maintaining the capacity for introspection, transparency, and iteration of agile methodologies. It also includes certain characteristics of more traditional methodologies, making work teams and clients feel more comfortable in environments where there has been little training in agile methodologies.

The second managerial implication relates to the importance of intra-firm and inter-firm coordination in developing DSI. Intra-firm coordination takes place by establishing internal coordination mechanisms and assigning roles to organize workflows (e.g., with the client's IT department taking the lead). It also takes place by arranging commissions that spread across business units to provide a holistic view of the customer's needs in relation to the provider. The third managerial implication refers to the importance of constant communication and interactions to achieve a comprehensive DSI follow-up that avoids friction and minimizes deviations as early as possible. To this end, adequate preparation in both hard skills (technical and platform knowledge) and soft skills (teamwork, communication, and empathy) are essential in work teams.

6. Limitations and future research

This study has limitations providing avenues for further research. Firstly, future studies could explore optimal methodologies (waterfall, agile, hybrid agile) depending on service type/complexity (maintenance, evolution, new service) and stage, for deeper DSI understanding. Secondly, the described case involved three firms (KIBS, provider, client) with multiple actors as ecosystem members. Adding a longitudinal perspective could provide insights into DSI process evolution. Thirdly, multiple case study methods could compare DSI processes across ecosystems. DSI differences may depend on sector characteristics. More empirical evidence is needed to generalize DSI elements/process results beyond this single case study. Fourthly, the in-depth B2B case could be complemented by B2C context focus. However, many DSI nature results could extend to B2C environments since, as explained earlier, DSI differs across sectors but shares output, customer and field data generation/gathering/analysis in all cases.

After DSI functional analysis, future studies should address organizational dynamics, examining the best organizational fit with DSI. Researching potential DSI-created tensions inside

organizations is also relevant - transitioning to DSI may provide benefits but also problems like inertia, technological dependency or talent access incapacity that prevent promised DSI benefits.

Finally, this descriptive research offers clues for more prescriptive approaches. New research avenues are necessary to offer predictive/prescriptive tools to the business community and academia, particularly as artificial intelligence impacts customers and suppliers. Customers can interact more easily with platforms to design/implement DSI, while supplier coder work gains less relevance compared to solution design.

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Figure 1: Data structure

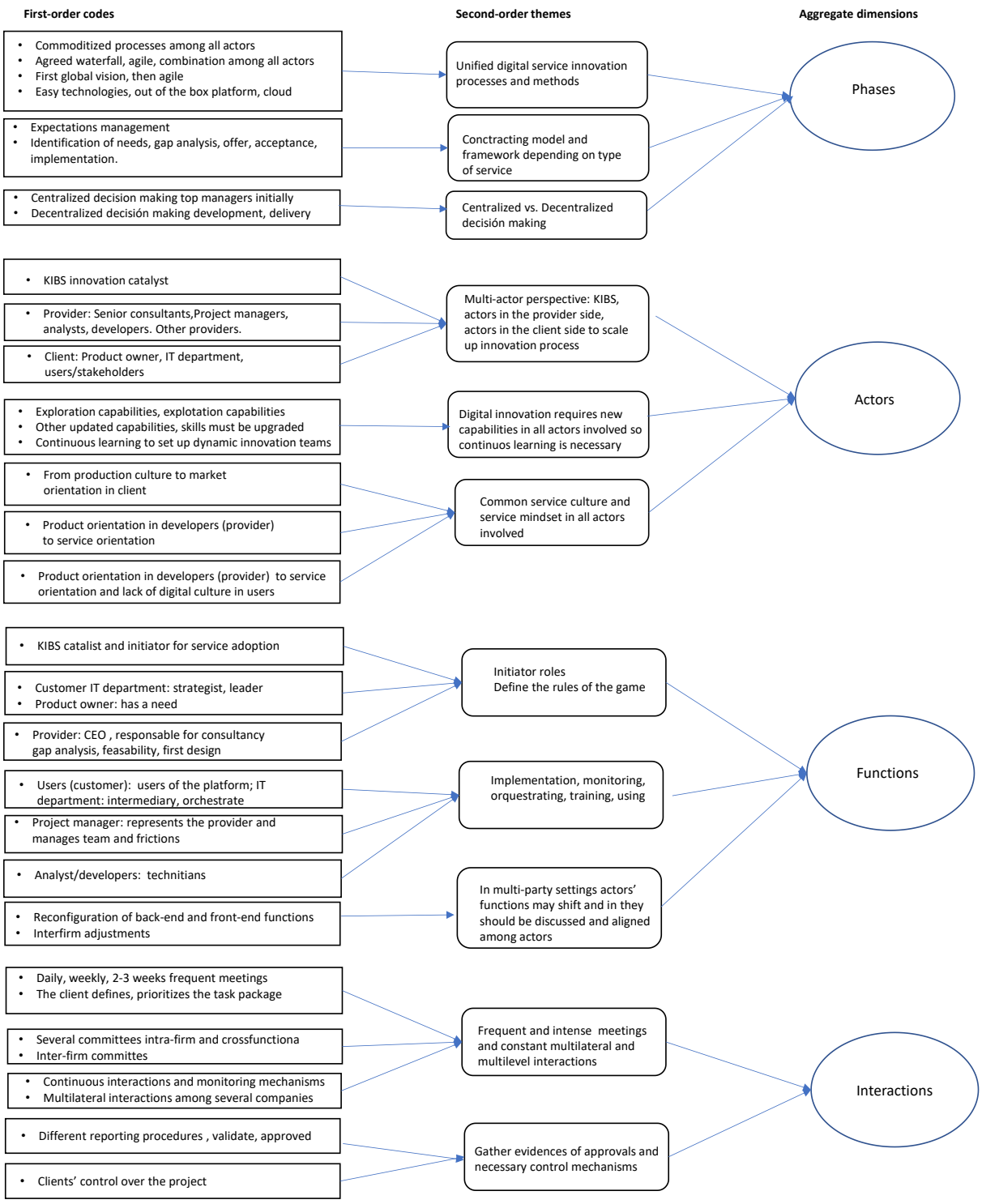

Figure 2: Phases, actors and interactions in DSI

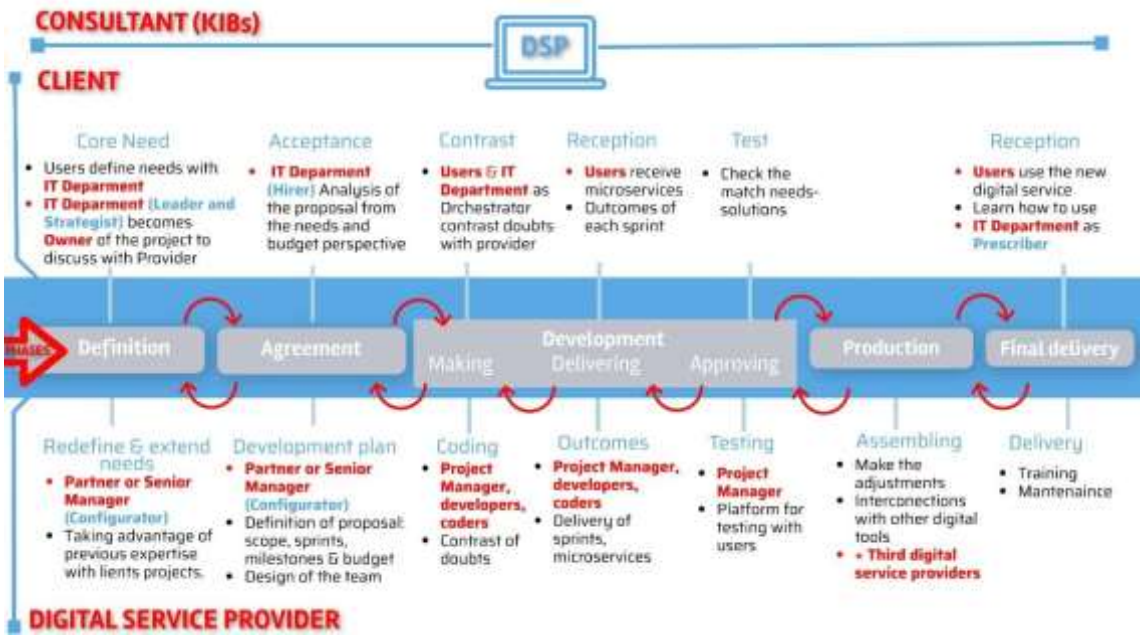

Table 1: Innovation methodologies

	INNOVATION METHODOLOGIES		
	Waterfall development	**Stage-Gate development**	**Agile development**
Purpose	Lineal and Sequential model	Investment model for sequential resource allocation	Tactical model for guiding largely self-managed teams
Focus	Quality	Risk and quality	Learning and speed
Logic	Deterministic	Deterministic	Stochastic
Directionality	Largely linear	Concurrent	Highly iterative
Scope	Detailed design	Idea to launch	Development and testing
Customer involvement	Puntual	Episodic	Continuous
Customer characteristics	Known customer needs	Known customer preferences Limited customer willingness to interact	Changing customer preferences High customer willingness to interact
Phases	Analysis, design, implementation, and ongoing system monitoring and testing	Idea generation, idea assessment, design, testing and validation, and market launch.	Creation, analysis, design, realization, diffusion

Source: Adapted from Paluch et al. (2020)

Table 2: Information about key informants

Key informant	Description of the key informants	Interviewee's description	Description of the evidence
Provider A	CEO	Top manager with more than 30 year of experience in digital services	Interview on 4 October 2022. Transcription of the interview: 7876 words.
Provider A	Project manager	Senior manager with more than 9 years of experience in digital services	Interview on 7 November 2022. Transcription of the interview: 10639 words.
Provider A	Senior Consultant	Senior top manager with more than 20 years of experience in digital services and more than 10 years of experience with the platform	Interview on 30 November 2022. Transcription of the interview: 7484 words.
Provider A	Developer	Technician with more than 25 years of experience in IT	Interview on 15 December 2022. Transcription of the interview: 7857 words.
Client A	Assistant director of the IT department	Senior top manager with more than 30 years of experience in IT	Interview on 22 November 2022. Transcription of the interview: 10065 words.
Client A	Client A - user A	Corporate relations manager with more than 14 years in the company and 14 years of experience as a platform user	Interview on 23 November 2022. Transcription of the interview: 3258 words.
Client A	Client A - user B	Marketing and communication technician with more than 20 years experience in the company and more than 12 years of experience as a platform user	Interview on 13 December 2022. Transcription of the interview: 7772 words.
KIBS	Consultant	Consultant with more than 30 years of experience in digitalization processes.	Interview on 5 December 2022. Transcription of the interview: 4317 words.

Source: own elaboration