Exploring the New Service Development Process of Digital Services: Insights from Expert Interviews

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Abstract: As the economy increasingly shifts from product- to service-driven, New Service Development (NSD) – the process of developing new services from ideation to launch – becomes crucial. Of particular interest are digital services, like mobile applications, which have specific features, like the fruition through a blend of digital and non-digital media, which may require different actors, activities, and management approaches in the NSD. However, few studies have delved into the NSD process for digital services, or New Digital Service Development (NDSD). Therefore, our objective is to describe the activities and actors typical of NDSD, and identify possible managerial guidelines and tools that can support its efficient deployment. To achieve this, we reviewed extant literature, and conducted expert interviews with 10 managers from companies who recently developed and launched a digital service in the industrial, insurance, retail, and banking sectors. By comparing the results of the interviews with the insights from literature, we describe the main activities and actors of NDSD, showing the importance of specific activities for the development of the service features, the service delivery process, and the digital service ecosystem. From a theoretical perspective, we confirm the need for unique approaches for NSD, and show different levels of importance between the stages of NDSD depending on the context. From a practical perspective, our results may help to plan resources and activities to efficiently and effectively develop new digital services.

Keywords: New Service Development, service operations management, digital services, digitalization.

I. INTRODUCTION

New Service Development (NSD) is the process of developing new services from ideation to launch [1]. NSD is becoming increasingly relevant, since the modern economy has shifted from product- to service-driven businesses [2], while the recent technological advancements have enabled new "digital services", such as e-commerce or mobile applications.

Digital services share unique features that differentiate them from both products and non-digital services: for instance, they are experienced through a blend of digital and non-digital media [3]; they evolve much faster than other services [4]; they require a broad set of competences, especially with respect to Information Technology (IT) [5]. Hence, the NSD process of digital services – hereafter, New Digital Service Development (NDSD) – may require the involvement of a higher number of actors, with a broader skillset. Moreover, NDSD may consist of different activities (e.g., the development of user interfaces) which, in turn, may require different management approaches.

There are studies providing guidelines on the NSD process [6], but few of them focus on the NSD of digital services. Moreover, there is a debate on whether the methodologies typical of New Product Development (NPD) could also be extended to NSD [7], [8]. Overall, a description of the activities and actors typical of NDSD is missing, as well as of the guidelines and tools that can be used to overcome its challenges. Hence, our paper seeks to the following Research Questions (RQs):

RQ1. What are the activities and actors typical of the NDSD. i.e. how is the NDSD structured?

RQ2. What managerial guidelines and tools may be adopted to face the challenges of NDSD?

To address these RQs, we integrated insights from academic literature, "grey" literature, and

interviews with 10 company experts. Our results highlight some peculiarities of NDSD, as well as some ways on how to manage them.

II. Theoretical Background

A "service" is "an activity, or a series of activities, of more or less intangible nature, that normally, but not necessarily, take place in interactions between the customer and service employees, and/or physical resources or goods and/or systems of the service provider, which are provided as solutions to customer problems" [4, p. 52]. A "new" service occurs when a new service offering is included, or when there are changes in the "service concept", i.e. the blueprint of what customers except to receive from employees [1]. A "digital" service is "an activity or benefit that one party can give to another, that is provided through a digital transaction" [5, p. 507]. Digital transactions are transactions involving information, software modules, or consumer goods, exchanged through an Internet Protocol. Examples of digital services include e-commerce, social networks, or on-demand Customer Relationship Management (CRM) platforms [4].

Extant NSD models generally follow iterative development schemes, meaning that the individual development steps are cyclical, and cover all activities from idea generation to phase out [1], [10], [11]. Although these models describe the main stages, they provide less insights on the specific activities of each stage. Moreover, while few NSD models discuss some of the tools which could be used in each stage [6], most studies do not provide specific guidelines for each stage.

In the literature there is also a debate regarding the applicability of New Product Development (NPD) tools and methodologies to the NSD. According to the "assimilation approach" [7], NPD tools, such as Qualify Function Deployment (QFD), Failure Mode Effect and Analyses (FMEA), can be applied also to NSD. Conversely, supporters of the "demarcation approach" emphasize the differences between NSD and NPD [8].

A major difference between digital and non-digital services is the convergence of formerly separate user experiences. This means that experiencing a digital service occurs through the media channels, different digital and non-digital products, and even different industries [3]. Another major difference is the higher "malleability" of digital services, meaning that digital services change much faster than non-digital ones [4]. Such features impact the NSD of digital services, posing new technological and managerial challenges.

Technological challenges include establishing proper data analytics [5], and ensuring connectivity, compatibility, and modularity within the IT systems [12]. It is important for companies to explore IT systems upfront, and to invest in technological enablers to set up data infrastructure, database systems, and interoperable systems that can enable future service enhancements [13]. Higher IT skills are consequently required, by involving data scientists, data engineers, and big data architects [14]. Also the strategic configuration of the digital ecosystem is a pivotal decision to be consciously addressed [15]: when internal capabilities development is not feasible, companies should aim to build a healthy ecosystem of partners [16].

Firms face managerial challenges due to both the internal and external environment. Internally, companies must overcome silo-thinking by establishing a data-oriented culture and fostering marketing and IT integration [5]. Regarding the ecosystem, firms must share data and processes across organizational boundaries, which implies rethinking roles, rules, and ownership [17]. The ecosystem's actors include infrastructure and technology providers, digital marketing or UX (user experience) and UI (user interface) experts, and legal advisors [15]. Concerning the micro-level management of development activities, companies need to synchronize their software, service, and product development cycles to achieve faster development cycles, and improve intrafirm collaboration [18]. Adopting Agile approaches for development is regarded as a best practice, as it helps coping with contextual uncertainty [19]. A further recommendation is to develop new services incrementally through many iterations of investment, development, and learning phases [20].

III. Methodology

Our methodology consisted of three steps: a review of "grey" (i.e., non peer-reviewed) literature; an academic literature review; and expert interviews.

A. Grey Literature Review

We carried out a grey literature review to identify methods and tools applied by practitioners. We used the Google search engine, with NSD-related keywords such as "New Service Development", "Service Innovation", and "Service Development Process". To increase the reliability of the results, we limited the sources to three leading strategic

management consulting companies (McKinsey & Company, Boston Consulting Group, and Bain & Company), eventually finding 25 relevant reports.

B. Peer-reviewed Literature Review

We then conducted a peer-reviewed literature review, using the Scopus search engine. Due to the focus of our RQs on the NSD process of digital services, we used a search string including both keywords related to NSD, and the adjective "digital". This because, after various attempts, we found that "digital" was consistently present in the titles, abstracts or keywords of the papers related to our research objectives. We also applied further filters to limit the scope of the review to the most relevant papers.

C. Expert Interviews

The academic and grey literature reviews led to a NDSD process model describing key stages and activities, complemented by a set of guidelines, challenges, and capabilities. The framework was validated through expert interviews [21], whose protocol included four sections. The first elicited general information on the company, its previous experience with NDSD, and the features of the developed digital service. The second section, linked to RQ2, addressed the processes and the managerial structure established to support NDSD, in terms of formalized guidelines or processes, team management, and involvement of external actors or customers. The third section, linked to RQ1, investigated in-depth the main stages and activities, to elicit the whole range of operational activities. The fourth and final section, also linked to RQ1 and RQ2, scrutinized the challenges encountered along the process, the capabilities established, and the lessons learnt.

A preliminary search allowed the identification of potential companies, and the collection of information about the business environment and the digital service(s). The first contact included a presentation letter of the project, and the interview protocol. When possible, we involved multiple complementary profiles (e.g., marketing manager and IT manager) in the same interview. After analysing the findings from each interview, we validated them through follow-up calls and email-exchanges with the interviewees.

IV. Results

We conducted 14 interviews with 10 companies. One is a technology provider (Case 10), while the others are companies, from a wide range of sectors, which have developed digital services (Table I). In the following sections, we will discuss the framework that resulted from the integration of literature and interviews.

TABLE I
COMPANIES INTERVIEWED

Case	Industry	Service developed
1	Insurance	Mobile application
2	Machinery	Equipment management platform
3	Food	Mobile application
4	Coffee machines	After-sale services platform
5	Entertainment	Virtual assistant
6	Banking	Virtual assistant
7	Heating systems	Mobile application
8	Industrial systems	Performance tracking platform
9	Retail footwear	3D shoe configurator
10	Software development	Mobile application

A. How is the NDSD structured?

NDSD consists of six stages: Identification, Analysis, Modelling, Development, Test, and Launch. Table II shows the specific activities of each stage, as well as guidelines and tools (in italics) supporting each activity.

Identification. It is related to: empathizing with the possible end-users of the service; analysing their needs and pain points; outlining the service concept and, consequently, a draft of the UX. At this stage, a cross-functional team is created. Moreover, external actors, such as UI/UX experts, market research providers or technology providers, are often involved. Furthermore, Proof of Concepts (PoCs) – i.e., small (and sometimes even incomplete) pilot projects – can be used to gather early feedback (Case 6).

Analysis. While refining the service concept, it is necessary to generate a "business case", namely gathering enough evidence to justify the development of the new digital service. Also technology capabilities and constraints are analysed. Despite being challenging (Cases 3,5), all the features of the new service should be described quantitatively, if possible. Based on these considerations, the go/no-go decision is drawn. The service roadmap is defined, including KPIs, and deadlines for the development of new service features, technological infrastructures, and possible collaborations. Concerning partnerships, results suggest to provide a tender document without overly technical specifications.

TABLE II
NDSD PROCESS MODEL

Activities	Guidelines and examples of *tools*	Case
IDENTIFICATION		
Analyze customer needs	*Interviews or customer surveys*	1,2,3,4,5,6 7,8
Define service strategy		1,3,4,7,8
Create cross-functional team	Internalize resources to increase flexibility	2,3,4,6,8
Develop service concept and draft of the UX	- Consider both "dummy" and "savvy" users - Develop a prototype - *Design thinking*	1,2,7,9
Identify digital ecosystem	*Stakeholder mapping*	3,4
ANALYSIS		
Define service roadmap	- Consider future iterations - Set target quantitative KPIs	2,6,9
Scout partners	Request prototypes	3,8
Analyze technologies		6,8,9
MODELLING		
Analyze requirements	Include all requirements in a single document	1,6,10
Define "epics" and "user stories"	- Detail user stories with mock-ups and acceptance criteria - *"BaseCamp"*	1,6,8,10
Design IT architecture and "tech stack"	Detail data collection and analytics tools	10
Create marketing guidelines	Elaborate a plan for customer engagement	1,9,10
DEVELOPMENT		
Implement technology enablers		2,6,10
Develop UI mock-up	*"Figma", "Zeplin"*	1,9,10
Implement front-end and back-end	- Parallel development - Cyclical tests - Agile guidelines - *"Jira", "Confluence"*	4,6,8,9,10
Integrate IT systems		2,4
Develop marketing campaign		1,2
TEST		
Alpha and Beta testing		2,5,7,9
Test system and touchpoints	Cyclical tests	1,3,9
LAUNCH		
Rollout the service		1,3,5,8,9
Train customer and personnel		2,4,6,8
Launch marketing campaign		1,2,6,9
Establish continuous integration	Validate level of data aggregation	1,2,3,4,5,6 7,8,9
Monitor through analytics		1,2,3,4,5,6 7,8,9

Instead, when scouting for partners, interviewees suggested to request a prototype quickly:

"Everyone was very good at making slides and presentations showing how powerful their chatbots were, so [we said] show us what you can develop, on a small scale, in two days. After the initial presentations, few providers were able to make it" (Case 6).

Modelling. The Scrum Agile methodology was frequently encountered from this stage on (Cases 1,2,5,7,8). Agile provides fixed roles for the development team: a business representative, an IT representative, and a team of software developers. It also provides guidelines to organize the work, which is arranged in large work packages, called "epics", that address the service functionalities, named "user stories". Teams use timeboxed iterations, or "sprints", to deliver their goals. Sprints are marked by recurrent meetings, named "ceremonies", to organize the work, and make sure IT and business are aligned. Indeed, improved alignment is one of the key benefits of Agile:

"IT and business communicate daily. The business knows what the team is doing, and adjusts the trajectory when needed, risking, at most, only one day of work" (Case 1).

One or more technology partners may be involved in connecting the service idea to its implementation. The service concept and the business case are turned into functional requirements and non-functional requirements, organized according to the Agile tools of epics and user stories. Requirements are inputs for the architectural and technological stack design. It is important that the technological design also considers the possible evolutions of the service, in terms of level of integration with IT systems, data sources for analytics, and legal and data privacy constraints. In parallel, marketing guidelines regarding wording and tone are generated. The outcome of the modelling is possibly a single document, covering all relevant areas (Case 5), containing guidelines and specifications for the implementation.

Development. When the technology enablers (edge device software, cloud platform, Application Programming Interfaces, and build-and-deploy pipeline) are set, the implementation starts with the generation of a detailed UI mock-up (Cases 1,3). The front- and back-end parts of the UI are generally developed in parallel (Cases 1,2,3,5), through cyclical testing phases. External software

developers often support the development team for speeding up the process under internal supervision (Case 8). This can be due to the temporary need for additional workforce (Cases 1,5,6,7,8), or cost reasons (Case 2).

"The workforce needed during a project has a bell-shaped trend. After a stage in which you need many people, only maintenance and operations will be required at the end. The total labour force needed is, initially, fifty people, but you will only need fifteen, or five, at the end. External partners allow avoiding hiring all these people" (Case 5).

Once a Minimum Viable Product (MVP) is reached, the code is released to production. Early corrections are carried out while, in parallel, the marketing campaign is developed.

Test. The service might be tested on pilot customers in alpha and beta releases (Cases 2,4,5,8). In particular, several tests are needed in the key touchpoints with the customers, to ensure that the different elements of the service are properly integrated (Cases 2,3).

Launch. While the service is being completed, pre-launch training might be necessary for the sales team (Cases 2,8). The service is launched together with the (digital) marketing campaign, and additional customer training might be required (Cases 4,8). The outcome and adoption of the service are monitored through qualitative methods, such as surveys and interviews (Cases 4,6), and dashboard analytics.

The importance of each stage varies, mainly depending on whether the business offers the service to consumers (B2B), or to other businesses (B2B). B2C digital services with several features need more detailed Identification and Analysis stages (Cases 3,4,7). B2B services with fewer features need more detailed Modelling, Development, and Test stages (Cases 2,5,6,8). We also noticed that, as the number of service features increases, the customer involvement in the process increases. Increasing levels of customer involvement require prioritizing the most impactful functionalities among a wide range of choices, and validating more sophisticated value propositions.

B. *What are its challenges, and how can they be overcome?*

The challenges encountered during the NDSD process include both service and IT architecture design. The designed service must address a relevant customer problem (Case 3), consider different levels of digital expertise (Case 7), and have an adequate trade-off between response time and variety offered (Cases 1,2). The IT architecture should support future evolutions of the service, allow integration with additional customer touchpoints, and enable effective data analytics. In addition, difficulties in Agile adoption were reported in some cases, both within internal departments (Case 6) and with external partners (Case 3), mainly due to contrasts with established delivery methodologies.

Companies must implement managerial, digital, and technology capabilities to face these challenges. New digital skills related to creating marketing content and UX/UI design are required. As technology is the foundation of digital services, a key role is played by capabilities in the areas of software development, IT architecture, systems integration, data privacy, IT maintenance and operations, cybersecurity, or even more advanced capabilities, such as IoT platform development, or Natural Language Processing (NLP). Internal capabilities development was presented as a best practice (Cases 2,5,6,8), as it improves the flexibility and the velocity of reaction to customer requests and changing needs. However, due to cost and strategic reasons, the whole set of capabilities was internalized only in few cases (Cases 1,2,8). External actors were often involved, especially for the most advanced capabilities. Remarkably, companies involved partners on a long-term perspective, rather than an ad-hoc project involvement, to establish continuous learning processes (Cases 3,4,6,7,8,9).

V. DISCUSSION

A. *How is the NDSD structured?*

The NDSD framework we propose integrates previous models from extant literature with further details. For instance, we can make a comparison with the Stages Activities Techniques (SAT) NSD model [6], which is a reference framework in NSD, used to develop a telemedicine service. SAT focuses on the service development stage, which we simply called "Development". As Table III shows, our NDSD model adds additional activities, tools, and guidelines.

Another difference with traditional NSD models is the importance of the different stages. According to Menor et al. [1], the focus of NSD lies in the Identification and Analysis stage. This claim is partially challenged by our results. Identification and Analysis stages were emphasized only when the service targeted B2C customers and offered

many functionalities (Cases 3,4,7), whereas in case of services (usually in a B2B context) with less functionalities (Cases 2,5,6,8), the emphasis is on the Development stage.

TABLE III
COMPARISON BETWEEN SAT MODEL AND NDSD

	SAT Model	NDSD model
Stage	Service development	Development (4th stage of our framework)
Activities	- Service prototyping - Service testing	- Develop UI mockup - Implement technology enablers - Implement front-end and back-end - Integrate IT systems - Develop marketing campaign
Tools	- Customer observation - Prototyping - Lead user analysis	- Figma, Zepplin - Jira, Confluence
Guidelines		- Parallelize front-end and back-end development - Test cyclically by other team members than the code owners - Use Agile guidelines

In addition, we expected that, in manufacturing firms, the Launch stage was critical, to help customers understand the value of the offering, and create valuable relationships with them, in line with Kindström and Kowalkowski [10]. However, this stage had a significant importance only in Case 2, probably because digital services were a novelty to customers. In the other cases, manufacturers focused either on the Identification and Analysis stages (Cases 3,4,7) or on the Modelling, Development, and Test stages (Case 8).

B. *What are its challenges, and how can they be overcome?*

As legacy NPD methodologies might be too structured for the malleable nature of digital services, companies should adopt Agile methodologies and switch to more flexible processes (Case 2). Related to the applicability of NPD methodologies to NSD [8, 9], this result corroborates the "demarcation approach", which stresses the unique characteristics of services and the need for specifically designed concepts and models [8]. Moreover, Poeppelbuss [19] proposes practitioners' involvement to adapt complex Agile methodologies to service development. In this regard, some firms simplified Agile methodologies by using person-days over story points (Case 8) or easing the structure of fixed ceremonies (Cases 3,10).

While creating a digital service often requires external partnerships, internal capabilities must be built to be flexible and reactive to market requests (Cases 2,4,9). Anke [15] stresses the primary importance of IT and business capabilities, such as digital innovation and systems' integration. In addition, interviewers revealed the relevance of UX/UI capabilities, whose introduction triggers collaboration and co-creation practices for effective service value proposition design [22].The IT infrastructure poses further challenges. As it must support upgrades and integrations, and effective analytics, its modernization is often required. The need for modernization might be a mediating factor between different approaches proposed in the literature. In fact, when unnecessary, it is useful to adopt an incremental approach of micro-service investment, development, and learning [20]. On the other hand, when the development requires modernization, it is useful to think ahead how to reuse the technological foundation at a large scale [19]. A further option is to develop a standalone service and plan further integrations at a later stage (Cases 3,10). When integrations are required, a best practice is to identify a single partner for both development and further integrations (Cases 3,4).

VI. CONCLUSIONS

This paper explores the development process of new digital service by means of a review of the literature, both grey and peer-reviewed, and expert interviews. From a theoretical perspective, this paper contributes to the debate on how service design processes should be organized, by summarizing the results in the form of a NDSD process, highlighting phases and providing examples of tools. In this sense, we corroborate the "demarcation approach", in that we found differences among the NDSD process and the NPD process. Moreover, this paper suggests that the organization of the NDSD process depends on customer characteristics, i.e. the type of target customer (B2C vs B2B), and the digital literacy of the customer.

The results are also a valuable tool for managers or consultants in charge of development activities, as the framework can be used a reference for conducting step-by-step NDSD activities. The guidelines and support tools reported in each phase might anticipate challenges and ease the process.

Fourteen interviews were carried out in ten companies in different industries; however, future studies might enlarge the sample in size and industry variety. When feasible, information was triangulated by involving company members with complementary roles. However, this was only possible for five companies out of ten. In addition, many companies partially or entirely outsourced development processes. Only in one of these occurrences the technology partner was involved in the interviews. Hence, we had only a partial access to the technology-related challenges.

Despite being validated through expert interviews, the applicability of the framework should be tested on the field with an action research approach. Moreover, various levels of process formalization were observed in different companies, which might be used as a starting point to outline specific NDSD maturity models. Future studies might also investigate the link between NDSD formalization and success. Finally, as the NDSD often involves multiple actors, future research might highlight how to foster value co-creation practices in a digital ecosystem [23].

VII. REFERENCES

[1] L. J. Menor, M. V. Tatikonda, and S. E. Sampson, "New service development: Areas for exploitation and exploration," *J. Oper. Manag.*, vol. 20, no. 2, pp. 135–157, 2002, doi: 10.1016/S0272-6963(01)00091-2.

[2] P. Buckley and R. Majumdar, "The services powerhouse," *Deloitte Insights*, 2018. https://www2.deloitte.com/content/dam/Deloitte/my/Documents/risk/my-risk-sdg8-the-services-powerhouse-increasingly-vital-to-world-economic-growth.pdf (accessed May 12, 2023).

[3] F. Wiesböck, T. Hess, and J. Spanjol, "The dual role of IT capabilities in the development of digital products and services," *Inf. Manag.*, vol. 57, no. 8, 2020, doi: 10.1016/j.im.2020.103389.

[4] K. Williams, S. Chatterjee, and M. Rossi, "Design of emerging digital services: A taxonomy," *Eur. J. Inf. Syst.*, vol. 17, no. 5, pp. 505–517, 2008, doi: 10.1057/ejis.2008.38.

[5] G. Troilo, L. M. De Luca, and P. Guenzi, "Linking Data-Rich Environments with Service Innovation in Incumbent Firms: A Conceptual Framework and Research Propositions," *J. Prod. Innov. Manag.*, vol. 34, no. 5, pp. 617–639, 2017, doi: 10.1111/jpim.12395.

[6] F.-R. Lin and P.-S. Hsieh, "A SAT View on New Service Development," *Serv. Sci.*, vol. 3, no. 2, pp. 141–157, 2011, doi: 10.1287/serv.3.2.141.

[7] E. J. Nijssen, B. Hillebrand, P. A. M. Vermeulen, and R. G. M. Kemp, "Exploring product and service innovation similarities and differences," *Int. J. Res. Mark.*, vol. 23, no. 3, pp. 241–251, 2006, doi: 10.1016/j.ijresmar.2006.02.001.

[8] R. Coombs and I. Miles, "Innovation, Measurement and Services: The New Problematique," in *Innovation systems in the service economy: Measurement and case study analysis*, 2000, pp. 85–103.

[9] C. Grönroos, *Service management and marketing*, Vol. 27. Lexington, MA: Lexington books, 1990.

[10] D. Kindström and C. Kowalkowski, "Development of industrial service offerings: A process framework," *J. Serv. Manag.*, vol. 20, no. 2, pp. 156–172, 2009, doi: 10.1108/09564230910952753.

[11] G. Pezzotta, F. Pirola, R. Pinto, F. Akasaka, and Y. Shimomura, "A Service Engineering framework to design and assess an integrated product-service," *Mechatronics*, vol. 31, pp. 169–179, 2015, doi: 10.1016/j.mechatronics.2015.05.010.

[12] S. Akter *et al.*, "Building dynamic service analytics capabilities for the digital marketplace," *J. Bus. Res.*, vol. 118, no. February, pp. 177–188, 2020, doi: 10.1016/j.jbusres.2020.06.016.

[13] J. Häikiö and T. Koivumäki, "Exploring digital service innovation process through value creation," *J. Innov. Manag.*, vol. 4, no. 2, pp. 96–124, 2016, doi: 10.24840/2183-0606_004.002_0006.

[14] A. Urbinati, M. Bogers, V. Chiesa, and F. Frattini, "Creating and capturing value from Big Data: A multiple-case study analysis of provider companies," *Technovation*, vol. 84–85, no. July 2018, pp. 21–36, 2019, doi: 10.1016/j.technovation.2018.07.004.

[15] J. Anke, J. Poeppelbuss, and R. Alt, "It Takes More than Two to Tango: Identifying Roles and Patterns in Multi-Actor Smart Service Innovation," *Schmalenbach Bus. Rev.*, vol. 72, no. 4, pp. 599–634, 2020, doi: 10.1007/s41464-020-00101-2.

[16] D. Soto Setzke, T. Riasanow, M. Böhm, and H. Krcmar, "Pathways to Digital Service Innovation: The Role of Digital Transformation Strategies in Established Organizations," *Inf. Syst. Front.*, no. Vial 2019, 2021, doi: 10.1007/s10796-021-10112-0.

[17] Y. Yoo, R. J. Boland, K. Lyytinen, and A. Majchrzak, "Organizing for innovation in the digitized world," *Organ. Sci.*, vol. 23, no. 5, pp. 1398–1408, 2012, doi: 10.1287/orsc.1120.0771.

[18] T. Huikkola, R. Rabetino, M. Kohtamäki, and H. Gebauer, "Firm boundaries in servitization: Interplay and repositioning practices," *Ind. Mark. Manag.*, vol. 90, no. October 2018, pp. 90–105, 2020, doi: 10.1016/j.indmarman.2020.06.014.

[19] J. Poeppelbuss, M. Ebel, and J. Anke, "Iterative uncertainty reduction in multi-actor smart service innovation," *Electron. Mark.*, vol. 32, no. 2, pp. 599–627, 2022, doi: 10.1007/s12525-021-00500-4.

[20] D. Sjödin, V. Parida, M. Kohtamäki, and J. Wincent, "An agile co-creation process for digital servitization: A micro-service innovation approach," *J. Bus. Res.*, vol. 112, no. January, pp. 478–491, 2020, doi: 10.1016/j.jbusres.2020.01.009.

[21] S. Döringer, "'The problem-centred expert interview'. Combining qualitative interviewing approaches for investigating implicit expert knowledge," *Int. J. Soc. Res. Methodol.*, vol. 24, no. 3, pp. 265–278, 2021, doi: 10.1080/13645579.2020.1766777.

[22] I. Iriarte *et al.*, "Service design for digital servitization: Facilitating manufacturers' advanced services value proposition design in the context of Industry 4.0," *Ind. Mark. Manag.*, vol. 110, no. March, pp. 96–116, 2023, doi: 10.1016/j.indmarman.2023.02.015.

[23] A. Immonen, E. Ovaska, J. Kalaoja, and D. Pakkala, "A service requirements engineering method for a digital service ecosystem," *Serv. Oriented Comput. Appl.*, vol. 10, no. 2, pp. 151–172, 2016, doi: 10.1007/s11761-015-0175-0.