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Working through frame incongruences: A process perspective on (re) framing for digital servitization

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ABSTRACT

Industrial firms are increasingly seeking new means of competitiveness through digital servitization that involves incorporating digital services and platforms. Despite the growing prominence of digital servitization, we have yet to understand how such changes are being framed, reframed, and unfold in industrial firms. To this end, we undertake an in-depth longitudinal exploratory case study of an industrial firm to understand the organizational framing and reframing activities vis-à-vis digital servitization. Our findings identify how motivational, diagnostic, and prognostic framing gradually unfolds over distinct phases. Specifically, our findings reveal the occurrence of frame incongruence among different groups of actors, compelling the firm to engage in strategies and tactics to achieve frame alignment. Notably, we identify that management engages in the alignment processes of frame extension, translation, and clarification, which creates a space of *workable certainty*. While transient in nature, this state of workable certainty serves as a catalyst in propelling the firm forward in its pursuit of a digital servitization strategy. By shedding light on the process of digital reframing that firms undertake in order to materialize their digital servitization strategy, our study contributes to a deeper understanding of this phenomenon. Moreover, we raise pertinent managerial implications for firms embarking on the path of digital servitization, emphasizing the imperative of continuous attention to the ongoing framing and reframing processes accompanying such change endeavors.

1. Introduction

In the past decade, there has been a growing recognition of industrial firms' pursuit of innovation and competitiveness through digital transformation (Hanelt et al., 2021; Jovanovic et al., 2021; Nambisan et al., 2019; Yoo et al., 2012). Many industrial firms have adopted a digital strategy, entailing the rapid evolution and digitalization of business processes to create and capture value (Linde et al., 2021; Raja et al., 2020; Sjödin et al., 2020a). In this context, digital servitization has gained considerable traction (see Favoretto et al., 2022; Kohtamäki et al., 2019; Sklyar et al., 2019; Tronvoll et al., 2020), with many firms developing industrial digital services and platforms (Cenamor et al., 2017; Jovanovic et al., 2021). Compounded by the increasingly faster pace of technological developments and the hypercompetitive marketplace, digital servitization entails a dynamic, transformative, and recursive change in organizational structures, value provision, and market positioning (Hanelt et al., 2021; Jovanovic et al., 2021; Nambisan et al., 2019; Sjödin et al., 2020a). Consequently, organizations often need to continuously frame and reframe their offerings to align customers' and relevant stakeholders' cognitive representations of digital services with their own. Indeed, change and framing are inherently intertwined (Cornelissen and Werner, 2014).

However, amidst this rapid change, frame incongruence can arise among different actors throughout the digital servitization journey, presenting complex challenges in effectively framing constantly evolving digital services. An important feature of digital servitization is that it spans boundaries cross-functionally along product development, service delivery, IT, and sales. This occurs by breaking away from traditional ways of providing industrial offerings. While any organizational change involves framing, in the case of digital servitization, in particular, it involves multiplicities of individual and collective framing and reframing practices. Accordingly, a framing lens represents a rich research potential to advance the understanding of digital servitization that has been overlooked thus far.

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Groups' cognitive representation of reality (i.e., a *frame*), expresses their expectations, assumptions, and knowledge toward this digital transformation. Attributing meaning to and interpreting a particular occurrence is also referred to as *framing* (Benford and Snow, 2000; Cornelissen and Werner, 2014). Managers' efforts of purposeful communication are aimed at "shaping the frames of interpretation of others in an organization, (…) [to] collectively accept and support a change" (Cornelissen and Werner, 2014, p. 198). Yet, due to the complexity and multifaceted nature of a digital servitization strategy, multiple frames can exist, leading to incongruences of misaligned expectations and assumptions between the organization and its customers, as well as other relevant stakeholders. In such cases, "the use of rhetorical devices in communication [plays an important role] to mobilize support and minimize resistance to a change" (Cornelissen and Werner, 2014, p. 185). Rather than viewing strategic frames as stable constructs, the process of framing and meaning construction suggests continuous adjustments and interconnectedness in this joint activity.

Nevertheless, despite gaining insights into these emerging developments, our understanding of frames and framing activities that drive digital servitization strategies in organizations remains limited. Moreover, changes toward digital servitization are likely to be contested and resisted in parts of the organization and may result in ambiguities and frame incongruences in the target group, including customers and other relevant stakeholders (e.g., system integrators). Consequently, there is a need to focus on how the journey toward digitalization of service business is framed and reframed in alignment with the continuous change process. Furthermore, a processual perspective that accounts for the temporal unfolding of frames in digitalization is warranted (Davidson, 2006). Specifically, there is a pressing need for a processual understanding of the iterative framing and reframing process of digital servitization strategies to advance our knowledge and understanding of how industrial firms navigate frame incongruences that accompany such a complex change.

To address this need, this paper draws on Benford and Snow's (2000) three core framing tasks—diagnostic, prognostic, and motivational—to examine how industrial firms frame and reframe their digital servitization strategy over time. We examine industrial firms' frames to understand how action, or lack of, in moving toward digital servitization occurs. Hence, this paper explores the following research question: *How do industrial firms frame and reframe their digital servitization strategy over time?* To address this question, we detail an industrial firm's recursive framing and reframing processes in order to align the scope and the nature of the digital service offerings with those of the cognitive representations of their end customers and system integrators. This paper then presents the findings of a longitudinal exploratory study conducted with a defense firm over an extended period. Extensive fieldwork was conducted, involving in-depth explorations with the firm and selected customers. Specifically, we examine how frames and framing unfold throughout the study, the resultant incongruities amongst actors, and the frame alignment processes employed to address them.

This study contributes to understanding the role played by framing and reframing in the context of digital servitization, elucidating the temporal evolution of diagnostic and prognostic framing. Notably, the study delineates the emergence of frame incongruences amongst different stakeholders, encompassing internally within the organization as well as externally across actors such as end customers and system integrators. Moreover, the study unravels the framing processes of frame extension, translation, and clarification that the organization undertakes to achieve frame alignment. Although transient in nature, these processes establish a space of *workable certainty*[1] that propels the organization forward on its digital servitization journey. In doing so, we underscore the continual need for digital reframing, as actors persistently engage in sensemaking activities in response to the transition toward digital servitization.

The subsequent sections of this paper are organized as follows. Section two provides the theoretical background. Section three details the research approach adopted, encompassing data collection and analysis procedures. This is followed by, in section four, the findings emanating from the study across three phases in relation to our process model. Finally, section five provides the study's theoretical and managerial contributions and implications, including avenues for further research.

2. Theoretical background

2.1. Digital servitization in industrial firms

Servitization entails moving from a product-logic, where the focus is on selling products, to a service-logic that provides advanced offerings that address customer needs (Baines and Lightfoot, 2014; Kowalkowski et al., 2017). Extensive literature discusses the transformation process undertaken by industrial firms toward becoming servitized (see, for example, Baines et al., 2020; Parida et al., 2014). Of particular significance for servitization is how an organization creates, delivers, and captures value (Linde et al., 2021; Parida et al., 2015; Raja et al., 2020; Sjödin et al., 2021) . This often entails organizational changes in the type of organizational setup (Raja et al., 2018; Heirati., 2023) and roles and responsibilities both internally and externally (Sjödin et al., 2016).

In recent times, there has been a proliferation of interest in "digital servitization," which extends servitization research (Rabetino et al., 2021). Digital servitization is defined as "the transformation of processes, capabilities, and offerings within industrial firms and their associate ecosystems to progressively create, deliver, and capture increased service value arising from a broad range of enabling technologies" (Sjödin et al., 2020b, p. 478). The enabling technologies discussed as part of the transformation toward digital servitization (Coreynen et al., 2017; Sjödin et al., 2020b; Sklyar et al., 2019) include the industrial internet of things (IIoT), big data, predictive analytics, cloud computing, and artificial intelligence (AI) (Ardolino et al., 2018; Paschou et al., 2020; Porter and Heppelmann, 2014; Rymaszewska et al., 2017; Sestino et al., 2020). With these technologies, industrial firms can provide digital services such as remote monitoring, predictive and preventative maintenance, and remote diagnostics support. An important addition to digital servitization is connecting the tangible (i.e., hardware) and intangible (i.e., software) components to produce smart products for new applications (Kiel et al., 2017; Raff et al., 2020). The addition of software in this trend of providing digital offerings is significant because it works in tandem with products and services provided to create value (Hsuan et al., 2021; Kohtamäki et al., 2019). The convergence of physical and digital realms has led some to suggest that digital servitization may constitute the next frontier of service research (Paiola et al., 2021; Paschou et al., 2020). Recent studies have further extended this frontier by exploring autonomous solutions within digital servitization business models (Frandsen et al., 2022; Leminen et al., 2022; Thomson et al., 2022)

In pursuit of digitalization (Nambisan et al., 2019; Yoo et al., 2012), industrial firms often develop industrial digital platforms (Kiel et al., 2017), which are closely connected to digital servitization as part of a platform approach (Cenamor et al., 2017; Jovanovic et al., 2021; Leminen et al., 2020; Wei et al., 2019). According to Jovanovic et al. (2021), "industrial digital platforms allow to connect various IIoT-enabled machines, collect operational and equipment data, and conduct cutting-edge analytics to provide advanced platform services" (p. 1–2). This, then, is an extension of the importance of data processing and interpretation as a critical capability for industrial firms embarking on a servitization journey (Ulaga and Reinartz, 2011), with others suggesting, more recently, how platform leveraging can advance

[1] The notion of 'workable certainty,' as introduced by Weick (1995) within the context of organizational change, underscores the perpetual process of sensemaking to grasp complex situations.

Table 1
Main indictive literature on frames and framing.

Author(s)	Type of study	Main insights
Benford and Snow (2000)	Literature review	Provides clarification of the linkages between framing concepts and processes and other theoretical formulations based on reviewing the literature on framing and social movements.
Cornelissen and Werner (2014)	Literature review	Consolidate and advance research on framing in the management and organizational literature. Analyze the literature across different levels of analysis (micro, meso, macro) and elaborate on connections across traditions of research.
Davidson (2006)	Conceptual	Building on the technological frame of reference articulates three strategies for theoretical development, emphasizing framing as a dynamic process.
Dewulf et al. (2009)	Conceptual	Conduct a meta-paradigmatic review to delineate the ontological, theoretical, and methodological assumptions among six approaches to framing. Construct a map highlighting distinctions between alternative theoretical and research perspectives on frames and framing in conflict and negotiation.
Gilbert (2006)	Qualitative in-depth multilevel case study	Study conflicting frames within the same organization and find that structural differentiation can allow very different frames to coexist.
Goffman (1974)	Conceptual with empirical illustrations	Seminal text developing a frame analytic theoretical perspective for analyzing the interpretive issues of individuals in everyday life perceiving meaning in interactions.
Hardy and Maguire (2017)	Qualitative case study of field-configuring event	The study shows how field-configuring events generate discursive spaces and identifies three mechanisms of domination, interpretation, and translations of how new narratives lead to field-level change.
Ivarsson (2022)	Literature review	Explores the application of framing theory to the context of digital transformation and offers a synthesis emphasizing framing of digital and information technologies in organizational contexts across six subareas of framing, and at the micro, meso, and macro level.
Kaplan (2008)	Qualitative ethnographic study of a single case firm	Study the role of cognitive frames play in shaping strategic choices using framing as analytical lens, demonstrating how strategic responses are constructed through conflicts in frames.
Leonardi (2011)	Qualitative case study	Construct a framework suggesting how technology concepts frame cultural resources and address the consequences of "innovation blindness" across organizational and occupational boundaries.
Orlikowski and Gash (1994)	Qualitative case study	Establish the concept of "technological frames" and develop a theoretical framework for understanding technological development, use, and change in organizations.
Schot and Steinmuller (2018)	Discussion Paper	Discusses the framing of science and technology and innovation policy, identifies three delineated framings, and examines their historical developments.
Snow and Benford (1988)	Conceptual with empirical illustration	Identifies factors accounting for frame resonance and defines the core framing tasks as "diagnostic framing," "prognostic framing," and "motivational framing."
Snow et al. (1986)	Qualitative case study	Extends Goffman's frame analytic perspective by identifying and defining four frame alignment processes; frame bridging, frame amplification, frame extension, and frame transformation.
Wang et al. (2019)	Qualitative expert interviews	Applies individual sensemaking and technological framing to develop individual and collective cognitive maps of blockchain technology based on multiple expert interviews.
Current study	Qualitative case study	Contributes by showing how management addresses incongruences to achieve frame alignment through processes of frame extension, translation, and clarification, which creates a space of *workable certainty* for continuously reframing digital servitization.

servitization (Tian et al., 2021). Closely linked are recent calls for realigning strategic capabilities and routines that encompass products, services, and software (Huikkola et al., 2022). These recent contributions advance a fuller understanding of digital servitization.

As noted above, digital servitization emerged as an extension of servitization with the rapid proliferation of digitalization in the business world (Rabetino et al., 2021). Accordingly, digital servitization represents an increasingly quick turnover of technological, socioeconomic, and organizational change that is likely to instigate frame incongruence between the interacting parties that need to be addressed. For example, while customers acclimatize to the frame through which the current digital services are understood and embraced, service providers can be compelled to render a new set of digital services and reframe the scope and nature of digital services offered and harnessed as part of their holistic value offerings. Thus, the rapid and potentially transformative nature of digital servitization necessitates a closer examination of framing, reframing, and frame alignment among different actors involved in delivering and utilizing digital services. Further research is needed to explore how these changes unfold within industrial firms (Kohtamäki et al., 2021), considering them as as a process of metamorphosis that occurs over time (cf. Orlikowski, 1996). Specifically, there is a paucity of research examining industrial firms' frames and framing processes and activities from a process-oriented perspective on digital servitization. By investigating the dynamics of framing processes, we can gain insights into how alignment is achieved over time, leading to the realization of the envisioned digital future.

2.2. Framing perspectives on organizational and technological change

As different actors come together to co-create value, diverse understandings of various aspects of life coexist. The manner in which actors attribute meaning to these environmental aspects is guided by frames, also known as "schemata of interpretation" (Goffman, 1974). These cognitive representations of reality encompass expectations, assumptions, and knowledge, which are embedded at the individual cognitive level and can also become shared at organizational and institutional levels through common meaning attribution and a shared discourse (Stiles et al., 2015). In accordance with Cornelissen and Werner (2014), we define a *frame* as a knowledge structure that aids (individual, organizational, and institutional) actors in organizing and interpreting incoming perceptual information by integrating it into preexisting cognitive representations. Therefore, frames can be understood as socially constructed principles embedded in language, governing the subjective meanings ascribed to social events and connecting roles and situations with actions and outcomes (Cornelissen and Werner, 2014).

Table 1 details some of the main indicative studies on frames and framing in the literature. In their comprehensive review, Cornelissen and Werner (2014) emphasize that while the literature initially focused on the individual level, frames exist across multiple levels, including the organizational level. Adopting this perspective, our study primarily analyzes frame and framing at this level while acknowledging the role of individuals in aggregating framing activities. It is important to note that separating the levels into individual, organizational and industry levels represents an artificial cut (cf. Barad, 2003) as the levels are inherently interrelated. While "frames have some adaptability in context, their inferential capacity is based on knowledge represented in the frame itself – and frames are, therefore, limited and limiting by their very nature" (Cornelissen and Werner, 2014, p. 190). Consequently, frames are inherently open to change and subject to the iterative process of framing and reframing.

Snow and Benford (1988) introduce three core framing tasks in their highly influential work: *diagnostic*, *prognostic*, and *motivational* (see also: Benford and Snow, 2000). Diagnostic framing involves the identification

and attribution of underlying causes for societal problems, with consensus often reached relatively easily regarding the identified problem; however, assigning blame or causality to it is far more problematic (Snow and Benford, 1988). Prognostic framing goes beyond merely suggesting a solution to the diagnosed problem; it entails offering strategies and tactics to effectively address the issue. Motivational framing serves as a catalyst for action, providing the rationale and incentives that inspire individuals or groups to initiate action in the first place (Hardy and Maguire, 2017; Snow and Benford, 1988). Although literature prominently discusses the three framing tasks separately, Leonardi (2011) highlights that viewing them as distinct in the context of technology development is misleading as "it implies that problems exist before solutions," nor should they be viewed as occurring in a sequential manner (p. 366). Thus, in the context of digital servitization, all three framing tasks can be applicable, but it is their interconnection that enables frame alignment. Others also emphasize the interactional socially co-constructed nature of meaning-making, highlighting the importance of considering frames as interconnected structures that represent an actor's knowledge, rather than isolated entities (Cornelissen and Werner, 2014; Dewulf et al., 2009).

Of particular interest in this paper is the need to understand the processes by which organizations collectively construct strategic frames (Gilbert, 2006; Kaplan, 2008). Kaplan's (2008) study on framing contests, examining the influence of cognitive frames on organizational strategy-making, illuminates the dual nature of frames as both constraints and resources in making strategic choices. As organizations navigate an ever-changing and fiercely competitive marketplace, the emergence of digital servitization presents both opportunities and challenges for management in strategically framing technological change.

Organizational framing thus holds relevance vis-à-vis technology. As such, there has been a growing body of research on technological framing (Davidson, 2006; Orlikowski, 1996; Schot and Steinmueller, 2018; Wang et al., 2019) that can inform the framing and reframing of digital servitization. Framing a technology entails an ongoing interpretive process through which actors ascribe meaning to it and develop a usage trajectory within a specific setting (Davidson, 2006; Wang et al., 2019). The necessity for technological framing stems from the fact that "radically different patterns of technological implementation can arise when frames are incongruent between groups, and that a degree of congruence in frames within and across groups is important to align behavior into similar patterns of use" (Cornelissen and Werner, 2014, p. 200). Building upon these insights, we contend that actors, through framing and reframing, filter and interpret digital services, construct a coherent account of digital servitization and attribute specific meanings to it. As digital servitization involves changes in technology beyond the providing firm by altering commercial offerings, framing and reframing activities extend beyond the individual firm. Rather, changes often reside exactly at the boundary between the provider and its external stakeholders, including customers, systems integrators and suppliers.

2.3. Framing incongruences and alignment processes in digital servitization

At the organizational level, Cornelissen and Werner (2014) advocate for more empirical research on the processual nature of meaning construction in framing. This perspective aligns with the understanding that frames are "flexible in structure and content, having variable dimensions that shift in salience and content by context and over time" (Orlikowski and Gash, 1994, p. 176). To account for this dynamic flexibility, Snow and Benford (1988) discuss the process of attributing meaning to and interpreting a particular occurrence, i.e., *framing*. For instance, within a firm-based context, managers engage in framing processes to actively shape the interpretations of others in the organization, aiming to achieve collective acceptance and support for the implemented changes (Cornelissen and Werner, 2014). However, the selection of an appropriate framing process is never entirely deliberate, as individuals are guided by multiple frames while making sense of certain occurrences in life and evaluating a frame's underlying beliefs against their own schemata of interpretation.

Thus, actors engage in frame alignment to establish congruency among their interests, goals, values, and ideologies (Snow et al., 1986). They employ various framing processes, such as frame extension, to foster a shared understanding of a diagnosed problem among individuals and groups (Benford and Snow, 2000). *Frame extension* involves expanding existing frame(s) beyond the primary purpose to account for new additional issues that have become particularly relevant for groups (Benford and Snow, 2000). When engaging in such frame alignment processes, it is crucial to consider prevailing epistemic and cultural stances within and across organizations, as they can impede progress by creating inertia rather than facilitating forward movement (Ivarsson, 2022). The emergence of frame incongruences underscores the need to reorganize certain practices or engage in reframing. Put differently, articulating new schemata of interpretation to create a common ground with shared vocabulary and interpretation among actors can be understood as *reframing* the existing cognitive representation. Understanding the process of reframing through frame extension can be valuable in exploring how incongruences concerning different expectations and assumptions about strategic directions are addressed. Given the interactional nature of strategy development and implementation, strategic framing processes are inherently relational, as interactions foster and generate new or alternative understandings of a strategy's meaning for the organization (Ivarsson, 2022). However, there is still a need to explore how groups engage in frame alignment to address prevailing frame incongruences that arise as firms embark on their journey toward digital servitization.

Despite the recent literature on digital servitization (Kohtamäki et al., 2019; Sklyar et al., 2019; Tronvoll et al., 2020), there remains a gap in understanding how such a transformative change is being framed. We argue that the meaning of digital servitization can only be fully comprehended and its value assessed within the context of its use and its users, namely, customers and system integrators. However, it is not surprising to find digital servitization is likely to be contested (cf. Palo et al., 2019), and conflicting frames exist amongst groups. It can be argued that product and service divisions traditionally possess different frames, as evidenced by early attempts to integrate products and services (see Rabetino et al., 2018, for an overview). More recent work has focused on how organizations cope with conflicting demands on an ongoing basis (Kohtamäki et al., 2020), and others have examined how alignment is achieved with digital servitization (Huikkola et al., 2022). To advance our understanding, it is necessary to investigate how reframing processes facilitate organizations' progress toward digital servitization. When frame incongruences are aligned, a state of temporary stabilization is achieved, enabling continuous progression. Consequently, such changes are best described as always being in a state of 'becoming' (Tsoukas and Chia, 2002) or emergence (Kohtamäki et al., 2021; Raja et al., 2022). Adopting a processual view (Cloutier and Langley, 2020; Langley, 1999; Pettigrew, 2003) allows for a deeper exploration of the emergence of different frames and their ongoing reframing.

Based on the above considerations, this study delves into the framing tasks and incongruences that emerge when organizations attempt to implement a change toward digital servitization. We investigate how organizational actors seek to make sense of and reframe the change in strategy over time. In the next section, we detail our research methods and describe the empirical work conducted.

3. Research methods and data

3.1. Research approach and case selection

We undertook an in-depth exploratory case study (Strauss and

Corbin, 1990) with a European headquartered Defense firm (referred to by the pseudonym 'DefenseCo' hereafter) that had recently implemented a digital servitization strategy. A qualitative research approach (Miles and Huberman, 1994; Strauss and Corbin, 1990) was deemed appropriate, given we were seeking to understand the frames and framing activities taking place to propagate the digital servitization strategy. A single-case research design was deemed suitable for theory building purposes, allowing for an in-depth examination (Edmondson and McManus, 2007; Gioia et al., 2013) of the framing processes. Following a processual approach, the study aimed to uncover detailed and nuanced insights into the frames and framing activities and how they unfold over time (see Langley, 1999).

The selection of the case organization followed a purposeful sampling approach (Miles and Huberman, 1994; Patton, 2015), guided by the objective of understanding the dynamics of digital servitization within organizations, particularly focusing on the existing frames and the activities of participants involved in (re)framing. Given the need for a high level of access and openness, DefenseCo's senior management willingly granted the researchers permission to observe and track developments over an extended period. Throughout the study, a strong foundation of trust was established with the case organization, facilitating deeper exploration of framing activities and multiple interviews with participants at various stages of the research. This approach allowed for a comprehensive understanding of the emerging constructs. Furthermore, in adherence to the abductive research approach, the study combined emergent insights with existing theoretical understanding of the focal phenomenon in an iterative manner (Dubois and Gadde, 2002; Strauss and Corbin, 1990).

3.2. Case overviews

DefenseCo, a prominent player in the defense and security sector, holds a dominant position in global markets spanning across several continents. DefenseCo provides advanced technologies for applications in diverse sectors such as aerospace, maritime, and critical infrastructure. Notably, DefenseCo's cutting-edge solutions are extensively utilized in various settings, including airports, ports, wind farms, and naval defense. The company's product portfolio encompasses radar systems for coastal surveillance, airports, vessel traffic, mission systems for defense and naval surveillance, avionics encompassing a range of protection systems, and space-related offerings such as flight hardware, software, and satellite control systems. Furthermore, DefenseCo offers a range of services tailored to its products and technologies, including advanced engineering services and comprehensive service level agreements (SLAs) that extend throughout the equipment and system lifecycles across diverse markets. Recently, DefenseCo has made significant strides in its digital strategy by developing a digital platform and portfolio of digital services such as remote diagnostics, predicative maintenance, alert systems, remote diagnostics, monitoring, and software applications.

DefenseCo primarily serves two types of customers: systems integrators and end customers. Systems integrators, often large defense contractors, procure DefenseCo's equipment through competitive tendering processes. Remarkably, DefenseCo boasts as impressive success rate, winning four out of five tenders it submits. Additionally, DefenseCo directly sells its products and services to end customers. These customers offer valuable perspectives from an external vantage point on DefenseCo's digital offerings.

Table 2 provides an overview of the focal firm, including the interviewed systems integrator and end customers, whose insights complement our understanding of DefenseCo's digital offerings.

3.3. Data collection

The data collection for this study spanned from 2019 to 2022, and it involved a longitudinal approach with the focal firm, DefenseCo. The primary method employed was semi-structured interviews, conducted with individuals from various functions and levels within DefenseCo. A total of 25 key respondents were interviewed, including top management team members who provided an overview of the business and its strategic direction. Through these interviews, relevant individuals involved in the development and sale of digital services were identified and invited to participate in the research study. Additionally, respondents were asked to suggest other relevant individuals who would be valuable to the research study, utilizing a snowball sampling approach. The interviewees represented a range of positions within the organization, including senior vice president, vice president, business development managers, sales managers, pricing manager, product managers, aftermarket service representatives, and other relevant personnel (refer to Table 3 for an overview). By interviewing staff at different levels, a comprehensive understanding of the subject matter was achieved, encompassing diverse perspectives.

To ensure a systematic approach, an interview template was created and employed with the respondents. The interview template facilitated open-ended discussions on topics related to digital servitization, business models, (digital) service development, digital strategy, resources and capabilities for digitalization, technologies, and product and service portfolios. Questions such as the following were asked: Can you describe your digital strategy? What is the motivation behind moving toward digital servitization? What does this mean for the business model? Which platform services are being developed and offered? What do you understand digital services to entail? What challenges and obstacles do you encounter in developing and selling digital services? What actions are necessary to address these challenges? How do customers perceive digital services? What resources are required for digitalization? Clarification was sought on the responses provided, and follow-up questions were asked. In some instances, interviews were conducted multiple times as the digital strategy evolved and was implemented over the course of the study. The longitudinal nature of the study allowed us to dig deeper into emerging themes based on ongoing analysis and consultation of the domains of literature, namely digital servitization and framing. As such, our approach to data collection is best described as being abductive due to this constant back-and-forth movement between data, theory and case context (Dubois and Gadde, 2002).

The interview durations varied, ranging from 34 to 173 min, with the average length being 91 min. The interviews were conducted both in-person and online, using video conferencing technologies. While the study commenced before the outbreak of the Covid-19 pandemic, it continued during the pandemic period, necessitating the majority of interviews to be conducted online. This shift to virtual interviews offered advantages such as the ability to easily interview participants located in different geographical locations through videoconferencing tools. Collaborative software tools were utilized to aid discussions on digital services, including visualizing them using cards, pictures, and other visual aids. These tools facilitated focused discussions on specific digital services, enhancing clarity in explanations. The whiteboard feature of the collaborative software was employed to capture thoughts and allow respondents to contribute their comments. An unexpected benefit of the online interviews was the ease with which relevant documents (e.g., PowerPoint presentations, strategy materials, pricing spreadsheets, digital roadmaps, etc.) could be shared using the screen-sharing feature, providing additional clarity and context. Respondents also shared relevant internal documents, which were all logged, reviewed and analyzed. Additionally, members of the research team attended internal day-long strategy meetings at DefenseCo, providing further insights into the digital servitization strategy.

In addition to interviews with DefenseCo respondents, we had access to interview data with customers of the focal firm, including systems integrators and end customers. These interviews involved multiple respondents and were conducted online. During these interviews, respondents were asked about their perceptions of DefenseCo's digital services and platform, their understanding of the various services

Table 2
Overview of case firms.

Firm	DefenseCo	Systems integrators	End customers
Core business/sector	Aerospace, Maritime, Critical infrastructure, Space	Proprietary solutions for defense systems	Port operations and logistics
Products	Radars, Mission Systems	Information technology	Not applicable
Application/business areas	- Aeronautics - Surveillance & Mission Systems - Space - Support & Services	- Air traffic - Transport - Defense and security	- Cargo - Storage and Transhipment - Transport modes (ocean-going vessels, railway, inland waterway vessels)
Traditional services	Maintenance, Support, Service, Equipment Testing, Consumables	Training solutions and services	Nautical and maritime services (linear and feeder services)
Digital services	Remote diagnostics, predicative maintenance, remote monitoring and surveillance, software upgrades, apps, remote dashboard, data storage	Surveillance, Platform Solutions, Cloud solutions, Automation systems	Smart supply chain navigation and connectivity tool, Automatic identification system
Number of employees (Approximate)	+1,500	Not relevant	Not relevant
Revenue	+250 million USD	Not applicable	Not applicable

offered, and the value they saw for customers or their own application. The majority of these interviews were recorded and transcribed verbatim, while detailed notes were taken for interviews that were not recorded. The notes were reviewed and discussed among the research team immediately after the interviews to ensure a comprehensive account.

Furthermore, it is important to note that DefenseCo, the focal firm of this study, actively participated in an industrial research project (IRP) focused on digital servitization. As part of the IRP, bi-annual meetings were held, in which DefenseCo sent multiple representatives who actively engaged in discussions and delivered presentations.

Throughout the study, a detailed research log was maintained by the research team to document all data collection activities, including interviews, meetings, and interactions with the focal firm and other stakeholders. This log served as a comprehensive record of the research process and facilitated the organization and analysis of the collected data.

3.4. Data analysis

In our approach to data analysis, we followed an iterative process, continuously moving back and forth between the data, existing literature, and emerging theory (Dubois and Gadde, 2002; Strauss and Corbin, 1990). This allowed for a comprehensive examination of the collected data, facilitating the development of a nuanced understating.

Our analysis proceeded in a number of steps. First, we meticulously scrutinized all available data, including interviews, documents, notes, and secondary material, through repeated readings. This thorough examination served as the basis for subsequent analytical endeavors. Second, we developed a coding scheme to facilitate the identification of specific categories that emerged from the respondents' descriptions of the transition toward digital services. Third, these categories were then employed to code the data, focusing on the motivational, diagnostic, and prognostic framings associated with the move toward digital servitization. Within this framework, conceptual categories emerged, encompassing motivational frames (i.e., opportunities, demand, and value capture frames), as well as diagnostic frames (i.e., flattening revenue stream frame, inertia frame, and data access issues frame). Moreover, prognostic frames (i.e., digital servitization frame, commitment frame, and data assurance frame) were included in the framing analysis. The data structure is illustrated in Fig. 1a.

Furthermore, an open coding process was undertaken to identify additional conceptual categories, which were subsequently aggregated into two dimensions. By searching for relationships among these

Table 3
Data collection.

Case Firm	Data Source	Position of informant	Format	Number	Duration (mins) or quantity
DefenseCo	Interviews	*Top management:* Senior vice president, Vice presidents	In-person and online	10	120, 60, 140, 131, 68, 53, 133, 140, 66, 47
		Product and service management: Managers (Proposal manager; Applications, Support, and Service; Product Manager; Director, Digital products; R&D Managers)	In-person and online	10	116, 167, 34, 60, 85, 173, 86, 65, 63, 54
		Sales: Sales (Business and Strategy Analyst – Aftermarket Sales; Director of Sales; Sales Manager; Senior Director, Head of Security Sales; Service Sales Manager)	Online	5	53, 115, 97, 96, 53
	Feedback Workshops	Senior Management and R&D	Online	3	89, 71, 90
	Strategy meeting	Senior management	Hybrid		540
	Documents	Not applicable	Presentations, annual reports, sales and marketing material, digital roadmap, etc.	50+	Not applicable
	Webinars	R&D, Digital service development	Online	2	30, 30
Systems integrator	Interview	Manager Tower Services	Online	3	105, 29, 87
End customer	Interview	Senior Asset Manager, Cyber Security, and Network Specialist	Online	1	102
IRP meetings/events	Observations and notes	Senior executives	In-person, hybrid and online	7	Day-long events

categories, we compiled related concepts into higher-order themes, following Braun and Clarke's (2006) approach to organizing the coding categories into themes at a more abstract level. This led to the identification of frame incongruences experienced (i.e., coopetition, innovation inertia, and data security) and the frame alignment processes employed (i.e., frame extension, frame translation, and frame clarification), to achieve workable certainty. The resulting data structure is presented in Fig. 1b (see Gioia et al., 2013).

Based on our analysis, we developed a process model elucidating the digital reframing processes observed throughout our study, delineated into three distinct phases. In adopting Langley's (1999) temporal bracketing approach, we accounted for the temporal dynamics and relationships between our coding categories and identified themes, offering an explanation for the unfolding framing processes at play.

Lastly, to validate our evolving understanding of the emerging findings, we engaged in feedback sessions and discussions with representatives from the focal firm. This collaborative dialogue clarified our understanding and provided an opportunity for critically examining the emerging insights.

4. Findings

In this section, we present a detailed account of the frames identified and how they develop and unfold across three phases. We commence by providing an overview of the motivational framing, which serves as a baseline for understanding the digital reframing exhibited by different actors throughout these phases.

4.1. Motivational framing for digital servitization

The motivational framing practices—*opportunities framing, demand framing, and value capture framing*—identified are found to persist over

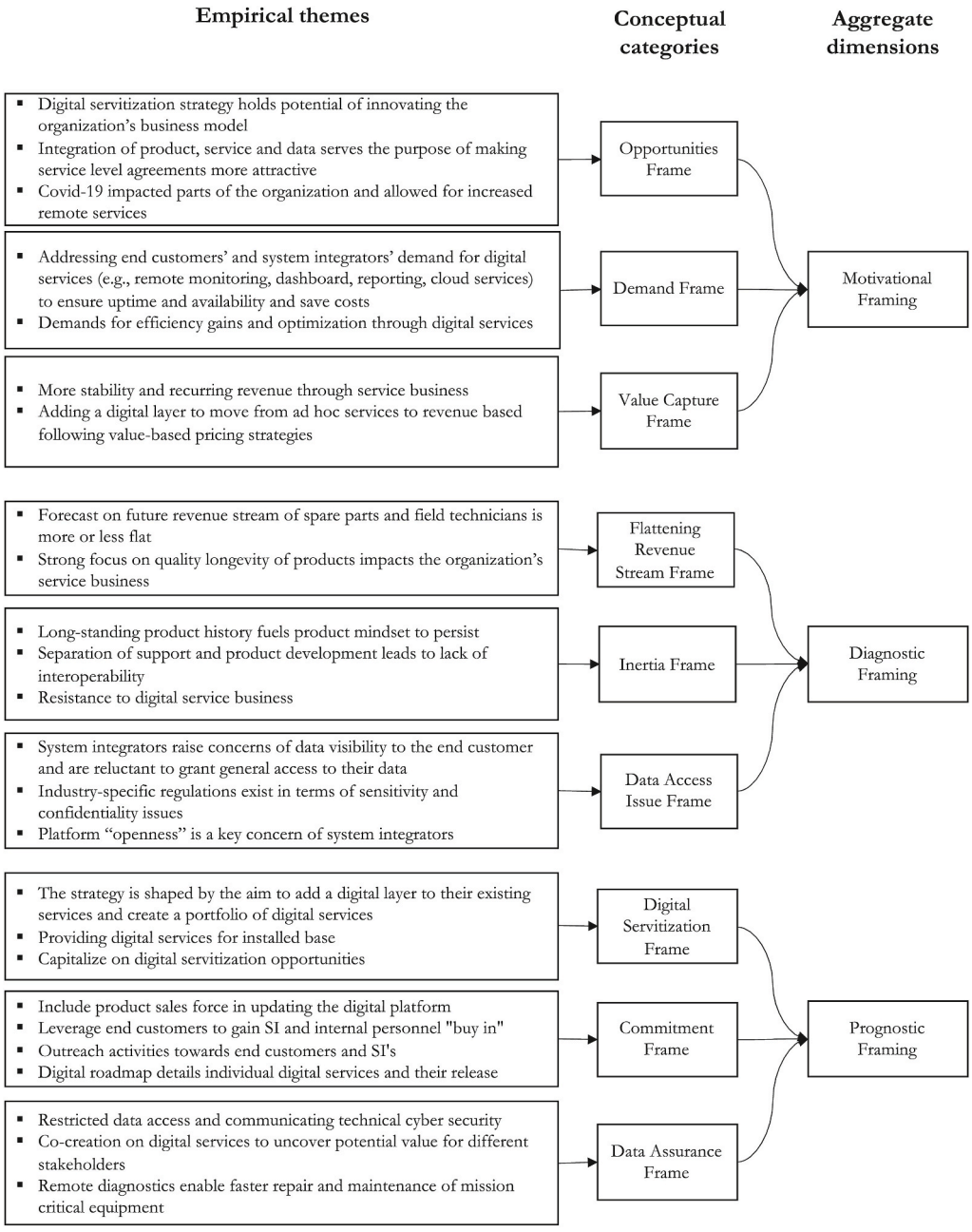

Fig. 1a. Data structure of framing tasks.

time and exert a significant influence on the interplay between diagnostic and prognostic activities within each phase. We elaborate upon each motivational framing in turn.

Opportunities framing. The focal firm, DefenseCo, is a prominent leader in the field of surveillance equipment provision, seeking to harness the potential of new opportunities that digitalization affords. By augmenting their existing services with a digital layer encompassing product integration, service enhancement, and data utilization, DefenseCo aimed to attract a larger customer base for their service level agreements (SLAs) and generate increased revenue. This strategic move aligned with their objective of securing recurring and stable revenue streams (cf. Raja et al., 2017), thereby facilitating long-term planning.

The recognition of the potential of innovating their business model provided DefenseCo senior management with opportunities to promote framing for internal collaboration and with business partners in the development of digital services. This opportunity framing practices became particularly advantageous in the context characterized by the far-reaching impact of the Covid-19 pandemic on various parts of the organization and customers. For instance, digital services allowed for remote support sessions as well as remote diagnostics and monitoring of the installed base, something that was previously met with resistance from certain customers. Furthermore, travel restrictions during the Covid-19 pandemic rendered accessing customer sites more challenging. As such, digital services provided the possibility of still being close to the customer and their equipment. For example, providing remote support sessions to customers created new opportunities for DefenseCo and their customers, with "more qualified people sitting remotely looking at what's taking place and guiding people." Moreover, the opportunities framing for digital services enabled DefenseCo to reconfigure its existing processes, such as performing commissioning work remotely.

Demand framing. Another motivation behind the development and provision of services is reflected in the prominence given to the customer demand framing for enhanced efficiency. As expressed by one executive, DefenseCo "needs to figure out what kind of additional services and products and data [we] can provide through [our] systems." The objective was to formulate and implement a digital servitization strategy that catered to the requirements of both end customers and system integrators (SIs) in terms of needs for remote monitoring, reporting, and cloud services. These digital services played a crucial role in ensuring the continuous availability and uptime of the radars, resulting in substantial cost savings for both end customers and SIs through the implementation of remote diagnostics, as reflected in the following:

> *"But if they come out there and find out they don't have the right spare part … they can't solve it. It just adds time to the downtime. So, and that goes for the end-user, but also goes for the SI that will send you people from Norway or the Netherlands or Spain or wherever they have their service organization. If they are not able to know exactly what* [is] *to be done, they have a higher chance of wasting their time when they get out there and have to revisit the site in order to have it up and running. And that's a significant cost. So, all these services that enable you to know what to solve out there, or enable you to do things remotely, or enable you to guide a local guy that had very little knowledge about the system of what to do. So, he can turn down the power, and he can take that part out by your support remotely. So, all these things would help the SIs in giving a better service".* (Director, DefenseCo)

The above illustrates the demand framing that existed among both end customers and SIs for enhanced efficiencies and optimization via digital services. For DefenseCo then, digitalization presented opportunities to effectively address customer demands for efficiencies by growing the service segment within the business.

Value capture framing. The third identified motivational framing practice pertains to the aspiration of establishing increased stability and recurring revenue by capitalizing on emerging opportunities from digital services. This objective was aptly reflected in the following comment:

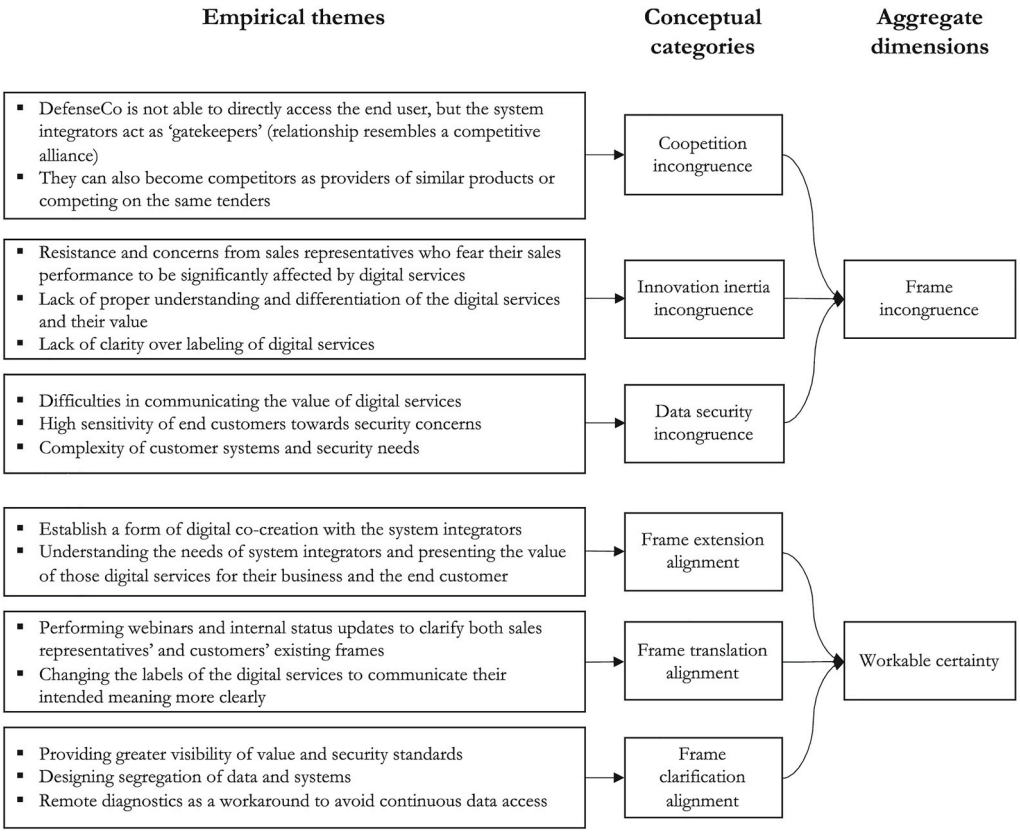

Fig. 1b. Data structure of frame incongruences and alignment processes.

> *"… the service business is a recurring revenue business, most of it. Today, we have a project revenue stream, meaning that it goes up and down depending on the different kinds of projects we win. So, there's also an aim to chip maybe [into] a more stable revenue."* (Vice President, After Market Sales, DefenseCo)

DefenseCo's has explicitly stated its "strategic ambition to turn [digital services] into being more revenue based" to ensure recurring and stable returns. We find senior management used value capture framing practices to articulate the potential digital services offered. For them, this entailed a departure from the traditional cost-plus structure employed for products and a shift toward adopting a value-based pricing approach for their digital services (cf. Frandsen et al., 2019; Raja et al., 2022) Buoyed by notable price increases in their traditional services, DefenseCo was motivated to capture additional value from their digital services. By incorporating a digital layer into their existing service portfolio, DefenseCo not only created new opportunities, such as remote monitoring of the installed product base, but also unlocked the potential for capturing additional value.

In the subsequent sections, we provide an in-depth analysis of each identified phase, detailing the framing process of diagnosing underlying issues and formulating subsequent prognostic strategies and tactics to address the root causes. Specifically, in each phase, we unpack frame incongruence and alignment processes, highlighting their role in spurring further practices of digital reframing. Fig. 2 illustrates how underlying motivational framing practices affect the unfolding interplay between diagnostic and prognostic activities, thereby enabling a progressive process of working through frame incongruences through digital reframing over time.

4.2. Phase 1

Flattening revenue stream frame. While DefenseCo thrives on the sale of its radar products, there was a growing realization within the senior management team that the integration of digitally-enabled services holds promise for revenue expansion, prompting a reevaluation of its existing business model. There was a recognition that the current "service business is very much [dependent] on when things break down," underscoring the need for enhanced monitoring and optimization of installed products. Notably, DefenseCo placed great emphasis on the quality and durability of its products during the development stage, resulting in longer production lead times for new offerings. As a consequence, the service business faced the challenge of not having a continuous influx of "new [products] out every year". In light of this, DefenseCo forecasted a relatively steady or flat future revenue stream from spare parts and field technicians, thereby highlighting the growth potential in digital services and SLAs.

> *"The contract is only five percent. So, 95 percent is spare parts and technicians. And that part is more or less flat in the future because the installed base is more or less as it is. So, we have predicted more or less flat revenues from the spare parts and the field technicians also. So, all the growth is in SLAs and digital services."* (Vice president, After Market Sales, DefenseCo)

As such, the above highlights how senior management used a projected flattening of the revenue stream from spare parts and traditional services, prompting DefenseCo to consider alternative futures to mitigate this issue.

Digital servitization frame. To address the projected flattening of revenue streams frame that existed for products and traditional services, DefenseCo developed a digital servitization strategy, with a specific emphasis on augmenting its existing portfolio with a digital layer. Consequently, DefenseCo's digital strategy sought to enhance the appeal of its SLAs by incorporating digital service offerings and solutions. In essence, the senior management of DefenseCo recognized that by assuming greater responsibility in servicing their own products, they could generate increased profitability and as such promoted a digital servitization frame, as reflected in the following.

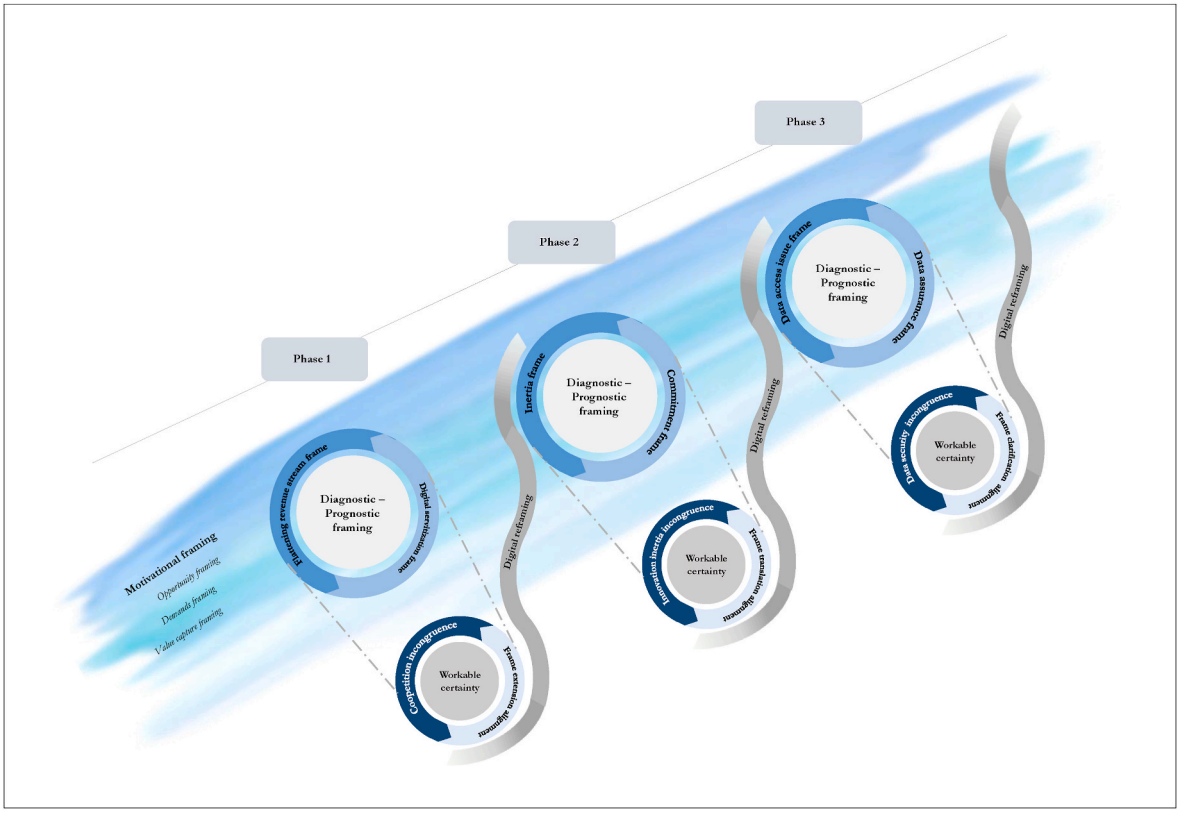

Fig. 2. Process model of (re)framing digital servitization strategy.

> *"So if you want to grow the service business, we can do two things. We can, of course, get as many customers as possible into the SLA, (…) and we can launch all these new digital services simply to grab a larger part of [the customer's] pocket and the money in the pocket. So, I think that's more or less our strategy in a few words."* (Vice president, After Market Sales, DefenseCo)

Initially, DefenseCo's digital servitization strategy focused on "establishing [their] own service organization," with a primary objective of providing digital services for the company's existing installed product base. This step was seen as a crucial basis for their broader digital servitization endeavors. Subsequently, DefenseCo envisaged progressing to the next step of its strategy, which involved formulating proposals for third-party equipment providers, thereby expanding its reach beyond its own product portfolio.

> *"… as soon as everybody can see that* [our] *radars are superior, but not only because of digital technology but also because of the service, then we can add onto that service business. I think that's the strategy behind it."* (Proposal Manager, DefenseCo)

With a clear vision of their business development, DefenseCo devised a set of strategies and tactics to effectively address the diagnosed flattening revenue stream frame. These initiatives aimed to leverage a digital servitization frame to maximize revenue growth. By implementing these strategies, DefenseCo sought to diversify its revenue streams and capitalize on the opportunities presented by digital services. Through proactive measures, DefenseCo aimed to reshape its business model and ensure sustained financial stability in the face of changing market dynamics.

Working through coopetition incongruence. The interplay of the diagnostic (flattening revenue stream frame) and prognostic (digital servitization frame) framing gave rise to incongruences among different stakeholders. During this phase, a *coopetition incongruence* emerged between DefenseCo and SIs, where they simultaneously acted as competitors and collaborators, with one respondent describing the relation as akin to "frenemies." While SIs were traditionally important partners for DefenseCo, the company sought to sell its digital services directly to end customers, potentially bypassing the SIs and risking business relations.

> *"So it's a little bit delicate to maneuver around these SIs. And it's actually one of our big challenges how we can do that. But we hope that by this digital connectivity, we start having some interaction with the end-user*." (Vice President, After Market Sales, DefenseCo)

This dynamic created a competitive alliance, as DefenseCo recognized the SIs as vital distribution channels and gatekeepers to the end customers for advancing its digital servitization strategy.

To address this incongruence, DefenseCo embarked on *frame extension* processes, aiming to establish digital co-creation initiatives with SIs. Instead of completely bypassing them, DefenseCo engaged in outreach activities to understand the needs of SIs and demonstrate the value of those digital services for their business.

> *"What we're doing [to incentivize SIs to accept SLAs] is that, first of all, we're trying to train them how to relay the information on it.* […] *So if they could get service data and maybe you can also* [put] *operational data from our radars into their system in an easy way that would be a value add for the SI."* (Director, Digital products, DefenseCo)

Joint business cases were developed to showcase the benefits to both SIs as well as end customers. Through this extension of existing understandings and the alignment of prevailing frames, a temporary resolution of the tension was achieved.

However, it is important to note that the frame incongruence was not fully resolved but rather temporarily aligned, creating a state of workable certainty for the organization to progress with its digital transformation journey. This temporary stabilization allowed DefenseCo to make sense of its digital servitization strategy and the desired form of collaboration with SIs and end customers. While certain product-centered interpretive schemes were retained, efforts were made to embrace a digital service mindset. Digital technologies served as a resource for weaving these different interpretive schemes and facilitating a technology-enabled change in DefenseCo's service business. This process of digital reframing emphasized the importance of the human factor in the development of digital services, foregrounding the role of individuals in the organization.

4.3. Phase 2

Inertia frame. DefenseCo's history and long-standing reputation for product development driven by "very capable engineers," resulted in a strong focus on product quality. This entrenched mindset posed challenges in shifting the orientation of product managers towards a more service-oriented way of thinking. As such, an inertia frame captures the existing understandings, norms, and values within the product-centric business model, thereby impeding the adoption of a service-oriented mindset. Put differently, the accumulation of extensive product knowledge over the years acts as a barrier, hindering the willingness of some staff to embrace a broader understanding of the business model that encompasses digital servitization. Consequently, the inertia frame pervaded among staff in product and sales functions, as their engineering and product sales mindset reinforced resistance to change and inhibited the transition to a digital servitization strategy.

The inertia frame was particularly evident in the product team, where the focus remained on the production of 2D radars, instead of accounting for innovation and development by extending production into 3D models. Senior management acknowledged the need for new ways of thinking to overcome the inertia and promoted digital services among the sales personnel, necessitating DefenseCo to embrace "out of the box thinking" to move forward with the digital strategy and in support of prioritizing digital sales.

Furthermore, the confusion surrounding the precise nature of the digital services being developed and offered as part of the digital strategy exacerbated the inertia frame within parts of the organization. For instance, it is unclear "what the difference [is] between 'Connect Monitoring' and 'Connect Active Monitoring'" digital services being offered, both internally and externally. This confusion stemmed from two sources: label-based ambiguity, where the titles assigned to digital services lacked differentiation, and meaning-based ambiguity, wherein the value proposition of these new digital services to SIs and end customers was not clearly articulated. As a result, conveying and promoting these digital offerings to customers becomes challenging.

Commitment frame. To overcome the inertia frame associated with the digital servitization strategy, proactive steps were taken to effectively communicate and emphasize the significance of digital services. Consequently, the digital servitization strategy assumed a prominent role in internal meetings, serving as a platform to introduce and implement the organization's digital service platform. These meetings served the purpose of conveying the change toward digitalization to staff members, while also addressing questions and concerns. More importantly, they sought to establish a commitment frame that underscored the strategic direction that had "been decided by the board of directors." Given the challenges encountered in securing complete "buy-in" and support from the sales teams regarding the digital servitization strategy, DefenseCo's product management team sought to enlist the endorsement of end customers, thereby fostering demand for digital services. This approach is exemplified in the following:

"I thought that DefenseCo would absorb the change and put it to the market. But actually, we did it the other way around. And I think it took me some three months or something to identify that. I actually had to start with the end customers to have them kind of push back on the SIs, to have them push back on our internal salespeople because I couldn't make the internal salespeople understand." (Director, Digital products, DefenseCo)

By adopting this approach, DefenseCo successfully generated a demand for digital services among its end customers, which was then communicated to the internal sales teams. DefenseCo's management recognized the importance of transparency and actively "include[ed] the product sales force in [their] strategic work." This inclusive approach aimed to secure buy-in and support for the strategic initiatives, enabling DefenseCo to introduce and promote a new wave of digital services every six months in the future. This commitment to continuous innovation and the release of digital services reflected the organization's dedication to meeting evolving customer needs and staying at the forefront of the industry, as illustrated in the following:

"So that they feel an ownership in the whole setup. We have a few webinars with our regions and also with our, basically with our sales force, product management, and project management to explain what is the new version of [digital service product title], what have we done since the last time, what are the new digital services that we're now offering …" (Proposal Manager, DefenseCo)

The commitment frame was specifically targeted to address the perceived inertia frame prevalent among the product and sales teams. It aimed to harness their expertise in the field and empower them to effectively engage customers by communicating the comprehensive portfolio of digital services. Recognizing the imperative to educate and train the sales teams about the digital roadmap aligned with DefenseCo's digital servitization strategy, the organization sought to equip them with the necessary knowledge and understanding of the diverse digital services offered. In this endeavor, the development of DefenseCo's digital service platform played a pivotal role in actualizing the organization's vision and strategies for digitally-enabled services. Consequently, the staff gained enhanced clarity and comprehension of the nature and scope of the digital services offered and under development as part of the digital service platform.

Working through innovation inertia incongruence. The interplay between the diagnostic (inertia frame) and prognostic (commitment frame) framing gave rise to intra-organizational incongruences. During this phase, an *innovation inertia incongruence* emerged between the sales and management teams. Despite top management presenting their future strategic plans for DefenseCo's service business, they encountered resistance and concerns from sales representatives who expressed doubts about the feasibility of implementing these digital services and feared the potential impact on their sales performance. This resistance and skepticism among the sales representatives were attributed to a lack of proper understanding and differentiation of the digital services and their value. Moreover, "it [was] not crystal clear for the sales organization what these 'new' offerings actually include", further impeding their ability to embrace the digital servitization strategy.

In the product management department, there was a prevailing perception that the organization relied too heavily on past successes in product innovation and lacked motivation for driving new digital innovations.

"… in some places of the company, it's still that innovation [being groundbreaking in radar technology] *we live on. So, it gives a satisfaction, but also sometimes a little bit lean back attitude that we were the best 30, 40 years ago and we're still the best."* (Director, Digital products, DefenseCo)

They emphasized the need for dedicated resources, specifically, sales representatives specializing in digital services, to facilitate the desired change, as the current sales staff seemed more inclined towards "selling radars, other equipment, or large-scale service agreements."

To address these frame incongruences and foster alignment among the different groups, management embarked on *frame translation* processes. Top management aimed to enhance the sales team's understanding of digital services and translate their adopted approach so that it aligned with customer needs. Coupled with this, product management sought to clarify the existing frames held by both sales representatives and customers regarding DefenseCo's digital servitization strategy. These efforts included dedicated webinars, internal updates, and presentations to provide an understanding of the benefits of digital services.

"We have a digitization strategy which goes towards customers, which is more like downstream, that's a part of the digital products and all that. We have part of our strategy going upstream inside the company that's about integrating much more on the IT system and so on." (Senior Vice President, Supports & Services, DefenseCo)

Additionally, product management reviewed and revised the labeling of specific digital services to improve communication of their value proposition and intended meaning, both internally and externally. These initiatives aimed to address the perceived gaps in meaning associated with the planned and newly developed digital services, leading to temporary alignment of prevailing frames and mitigating incongruences to an extent.

It is important to note that the frame incongruence between product development practices and the need for innovation in digital services was not fully resolved. However, the temporary alignment and stabilization of frames provided a state of workable certainty for DefenseCo to advance its digital servitization strategy. This workable certainty allowed management to address the meaning voids through outreach activities, which aimed to differentiate the digital services being developed and offered. Consequently, a 'shared' vision of digitalizing DefenseCo's service portfolio emerged that staff could work with. Nevertheless, sales representatives still retained specific product-centered cognitive representations, necessitating management to weave different interpretive schemes and embrace a technology-enabled change in DefenseCo's service business. This process of digital reframing foregrounds that data access through new digital services is value-adding for SIs and end customers.

4.4. Phase 3

Data access issue frame. The critical issue of data access figures prominently as it impacts DefenseCo's digital servitization strategy and digital service platform. Data access refers to the organization's ability to view and analyze data collected from its installed radar systems. However, DefenseCo faces considerable challenges from some customers that are hesitant to grant access to operational data, hence leading managers to allude to the data access issue frame. In particular, SIs prevent and express concerns about DefenseCo gaining access to radar data, which hinders platform openness and restricts the availability of captured data to different stakeholders. Moreover, SIs are cautious about the level of data visibility provided to end customers, specifically because they "don't want to provide so many [sic] information to customers" to limit the number of questions and queries they may receive.

Furthermore, industry-specific considerations play a significant role in data sharing. In sectors like defense, regulations and confidentiality concerns related to sensitive data have significant implications for national security. This is illustrated in the following:

"And it has turned out to be a little bit more complicated to get access than what we had actually hoped because there's a lot of security issues that get access to the radar. And we haven't basically been able to tell the customer that we only need operational access. We don't need access to the radar information, the customer is afraid that we can now start seeing the radar information, which we can't. We just need to get access to the operational part of the radar. Really that has been a very difficult discussion with the customers because they're afraid that we get access to data from the radar." (Vice president, Support and Services, DefenseCo)

However, in other settings like airports, wind farms, and coastal surveillance, there is a greater willingness to grant access to and share data. In these settings, DefenseCo has the capability to collect real-time data from their installed radars. As such, the ability to access this kind of data can either enable or impede the development of various digital services.

Data assurance frame. To address concerns SIs and end customers envisaged with regard to how their data might be used, DefenseCo sought to take steps to framing assurance as to how and what purpose data would be used and convince them of the technical aspects of data security.

The innovation team devised a digital roadmap to plan and develop digital services as part of DefenseCo's digital platform. Specifically, the integration of products, services, and data allows DefenseCo to collect a substantial volume of data from its installed base, facilitated by the deployment of additional sensors. While DefenseCo acknowledges some uncertainty regarding "what kind of value [it] can get out of it," the organization recognizes the importance of data capture and storage for monitoring and analyzing the performance of equipment throughout its lifecycle.

"Well, currently, if we take the digital services, what we have built is a server that collects a lot of information from our radar systems, and is able to present this basically in a monitoring app, so, that you can get alarms when your radar is not acting as it should. We have been able to do this. If you were sitting staring at the radar picture, of course, you would see that something was wrong, but there was no alarming feature. You couldn't see this if you were 10 steps away from the monitor. Now you can have a smartphone in your pocket that will [trigger an] alarm if something's not correct. Plus, we can extract a lot of this data and we can, well, when we have enough data, then hopefully we can data mine and figure out, what is the average or we can be better at predicting mean time between failures (MTBF), and stuff like that on our systems based on, where in the world are they positioned, what kind of environmental or what kind of environment are they working in, etc." (Proposal Manager, DefenseCo)

It is pivotal to access the equipment performance data to provide value-added digital services, however, customers, in many instances, are reticent due to perceived data risks.

To address the concerns expressed by SIs, DefenseCo emphasizes that "nobody [external] can access that data, but it's just collected and stored" within the digital service platform, serving as a basis for delivering value to the customer. Moreover, managers emphasized that stringent security restrictions prevented unauthorized access and visibility of customer data, as illustrated in the following:

"… you need an authenticated access. It only works on the customer network. So, you either need a secure remote connection to the customer network, or you need to be physically on the customer network." (Director, Digital products, DefenseCo)

Moreover, DefenseCo emphasized that the highest information security risk principles had been applied in the development of the digital platform. Specifically, they sought to provide assurance through the adoption of security techniques, such as ISO/IEC 27005 standards.

Working through the data security incongruence. Based on the interplay between the diagnostic (data access issue frame) and prognostic (data assurance frame), the framing identified gave rise to a data security incongruence. This incongruence stemmed from the challenge of effectively communicating the value of digital services to SIs and end customers. Given the highly sensitive nature of customer operations, the prevailing view was described as one where there was not enough value in taking the security risk relative to the perceived value of digital offerings. This was reflected in sales representatives experiencing difficulties in articulating the value of individual digital services to customers for whom the overriding concern pertained to cyber security and protecting their systems, as articulated by one manager as follows:

"We have some difficulties in getting close enough to the end users, because the end users have to give permission for this, because this product will connect to their internal network. … And they are very, very protective, because the majority of our radar systems are actually sitting in, should we say, secure network because they are part of a vital service, being control of a port or even more if it's the more policing role. So, they are very, very careful about allowing third party products to come in, and third party products that then establish a new connection out to the outside world. So, there has been long discussions about that, and I know we have been doing everything we can to secure it …" (Sales Director, DefenseCo)

Coupled with this, DefenseCo was confronted with the customers whose operations were highly sensitive to security issues. In large part, the complexity of customers' systems and how they were classified from a security perspective resulted in these incongruences, as aptly explained in the following:

"… they have classifications on their systems. So if you have a network in fact, like on a ship. So if one part in the network, in the system handles something classified as secret, then every bit and piece connected to that IT system is automatically deemed secret. And that is a national secret. And then you are not allowed to share that …" (Director of Services, DefenseCo)

For the customers, allaying the concerns about data access then acted as a significant barrier that necessitates providing greater visibility.

To address the perceived data security incongruence experienced by SIs and end customers, DefenseCo embarked on *frame clarification* processes in order to achieve a degree of alignment on two fronts. First, they emphasized the benefits that DefenseCo's digital platform afforded in terms of greater visibility of systems and performance that were integral to realizing a future vision, as commented in the following:

"… you can monitor the operational status of all your [DefenseCo] *surveillance and mission systems in one view. But I consider it more than just a tool; it's a vision, it's the framework for the system maintenance digitalization that we believe is the future."* (Vice President, DefenseCo)

Importantly, DefenseCo's framing practices sought to propagate that by leveraging the capabilities of the digital service platform, customers gain the ability to "follow the status of [their] radar [in real-time]. Is it running as it should? Is it running too fast?" Increased visibility was used to make the case that allowing DefenseCo to assess whether the equipment is functioning optimally or whether any deviations have occurred was of value to customers' operations. Such framing held particular significance for customers with radar installations that are situated in challenging or hazardous environments, making physical access difficult.

On the second front, DefenseCo sought to address customers whose operations were highly sensitive by providing a workaround to address the security concerns by segregating systems where possible, as suggested in the following:

> *"… so our system should be able to segregate, let's say, operational data, i.e. what the radar sees, the picture it can see, and what data the command control system handles to the byte-information about how is the [radar] power supply? Is it OK? Is it faulty* […] *so we should be able to segregate those data sets very clearly. And that is in some products, OK, but in others not. Because they are a bit mixed up."* (Director of Services, DefenseCo)

DefenseCo then attempted alignment on data access by purposefully segregating their equipment from other systems containing classified or sensitive information where possible. For example, one respondent commented about being able to provide remote diagnostics to customers in high-value situations where they found equipment was in need of critical attention as follows:

> *"And that can be by disconnecting the radar from the internal network and establishing a separate network link or a 4G modem or something, and then use TeamViewer or something, completely disconnected from their internal main network that runs their systems. Whereas the* [remote services] *are placing one of our servers in the middle of their network, you know. And I know we have done a lot of cyber security and all those things about that server, but it still raises a flag".* (Sales Director, DefenseCo)

Although the data security incongruence that existed between DefenseCo and customers was not completely reconciled in all contexts, it did, however allow for a clarification frame to emerge that emphasized greater visibility and workarounds. Consequently, it was possible to achieve a level of alignment that allowed for temporary stabilizing of existing frames to provide a workable certainty for DefenseCo. By no means can it be claimed that the alignment was permanent or complete but it afforded sufficient scope to allow DefenseCo to offer its digital services by clarifying the technical aspects of data security. As such, DefenseCo was able to reframe data security concerns by distinguishing between different levels of connectivity and their associated customer value. For customer-facing employees, the remote services of monitoring and diagnostics offered value in distinctly different ways, requiring different types of data access. Whereas monitoring required online access to operations performance data from assets, diagnostics only involved establishing a remote connection on an ad hoc basis. Monitoring would provide a valuable overview of conditions across multiple assets, but due to security concerns, this was not palatable for customers operating in highly sensitive contexts.

This process of reframing security concerns in phase three is indicative of how digital servitization is continuously unfolding as the organization grapples with frame incongruences that need to be aligned enough to provide workable certainty to continue. As such, digital reframing is required to leverage the capabilities of the digital service platform. Overall, the adoption of the digital service platform empowers customers with greater visibility to remotely monitor their radar systems.

5. Discussion

In this study, our aim was to investigate the framing and reframing processes adopted by industrial firms during their digital servitization journey. To achieve this objective, we undertook an in-depth case study of a defense organization that embarked on integrating a digital service layer into its offerings. Changes in support of digitalization are rarely smooth, often contested and met with internal challenges and resistance inside firms (Kaplan, 2008), and DefenseCo is no exception in this regard. Furthermore, comprehending the dynamics of these changes necessitates a process-oriented approach to examine how they unfold over time and take shape (cf. Orlikowski, 1996; Palo et al., 2019). By adopting such an approach, we contribute to the existing knowledge on how organizations make sense of digital servitization by shedding light on the framing and reframing process involved. Below, we expound upon the theoretical and managerial contributions and implications of our study while also offering suggestions for further research.

5.1. Theoretical contributions

Our study makes several contributions to the understanding of framing and reframing processes in the context of digital servitization within industrial firms. First, we draw upon the framing literature (Benford and Snow, 2000; Cornelissen and Werner, 2014; Kaplan, 2008; Snow and Benford, 1988) to explore the different frames that emerge during the implementation of a digital servitization strategy. In so doing, we complement the digital servitization domain (e.g., Coreynen et al., 2017; Kohtamäki et al., 2019; Linde et al., 2021; Tronvoll et al., 2020) by adopting a framing lens to understand the cognitive representations within traditionally product-oriented organizations that are moving toward becoming digital service providers. This extends previous studies on servitization journeys (Alghisi and Saccani, 2015; Martinez et al., 2017; Parida et al., 2014) by considering interpretive schemes employed by actors. Moreover, we extend previous work examining digital strategy (Jovanovic et al., 2021; Tian et al., 2021) by studying the cognitive representations that foreground strategic frames to provide a fuller understanding of the incongruences firms are confronted with. By zooming in on how actors frame and reframe their digital strategies, the current study accentuates the difficulties organizations face as part of their digital transformation. This study then begins bridging this gap by providing an understanding of the reframing processes actors engage in continuously. More specifically, it does so by providing a processual account of the change (cf. Davidson, 2006).

Second, we examine the motivational, diagnostic, and prognostic framing tasks identified (Benford and Snow, 2000) and their interplay in understanding digital servitization. Rather than viewing those in isolation, it is the interplay amongst them that is relevant to consider in order to understand the alignment of incongruent frames (cf. Leonardi, 2011; Cornelissen and Werner, 2014). Our research shows that motivational, diagnostic, and prognostic framing tasks persist over time. We contribute to the call for more empirical research on the processual nature of meaning construction in framing (Cornelissen and Werner, 2014) by exploring how organizations work through incongruences and engage in digital reframing processes.

Our study then contributes a process model detailing the incongruences that arise in each phase and the responses from the case firm in an attempt to achieve frame alignment. As such, our study accounts for what triggers organizational members to engage in framing practices to shape strategic choices (cf. Kaplan, 2008). Whereas existing literature discusses the frame alignment processes in the context of social movements—frame bridging, extension, transformation, and amplification (Benford and Snow, 2000)—our research builds on this by identifying and introducing additional frame alignment processes that are particularly relevant in the context of digital servitization. Similar to Benford and Snow (2000), our research finds frame extension as a means of frame alignment in the first phase. Our findings show that existing understandings and cognitive representations of the relationship between DefenseCo and the SIs are extended to account for service-related issues. Whereas previous research suggests that existing old understandings are exchanged with new meanings in the process of frame transformation (Benford and Snow, 2000), our study shows that there is value in retaining existing interpretive schemes to support the organization moving forward on its digital servitization journey. This then challenges existing accounts that suggest a linear transition from a product to service orientation (Parida et al., 2014) and concurs more with the view akin to a transformation occurring, whereby the product and (digital) service orientations are preserved (Baines et al., 2020). As such, rather than a complete shift in reframing, our study shows that organizations engage in frame clarification and translation processes to align incongruences that they experience in communicating the value of digital servitization. Our findings on frame alignment complement

previous work on managerial cognitive capabilities and realignment modes (Huikkola et al., 2022). Furthermore, we extend Huikkola et al.'s (2022) work by suggesting that not only do managers benefit from having cognition of the firms broader mindset, but rather show how they are actively framing and reframing digital servitization, and thereby engage in meaning-making in interactions within and across organizations.

Third, our study suggests that a space of workable certainty is created as organizations work through the incongruences they experience. Rather than resolving the incongruences that organizations face in the process of embarking on their digital servitization journey, frame incongruences are being temporarily aligned. This temporary stabilization then enables organizations to embrace both retaining product-oriented interpretive schemes and weaving those with a newly developed digital servitization mindset to propel the organization forward. As old product-related frames cannot simply be replaced, attention instead needs to be given to the complementarity and combinatory elements of product, service, and software development (Hsuan et al., 2021; Kohtamäki et al., 2019). This highlights the aspect of understanding digital servitization not solely as a transition from selling products and providing traditional services to offering digital solutions. However, the relationship between them is particularly important.

Finally, our study contributes by showing that product, service, and data cannot be viewed in isolation but rather symbolize a complementary entanglement, which echoes previous work in this respect (Hsuan et al., 2021). This has implications for firms that seek to develop industrial digital platforms (Jovanovic et al., 2021; Kiel et al., 2017; Wei et al., 2019) with interoperability between products, services, and data. The establishment of such digital service platforms is contingent on an openness that is not always forthcoming where data sensitivity is critical. In our case, DefensCo faced the challenge of convincing systems integrators and end customers to use the digital services and platform. Perpetual concerns about data security acted to constrain the adoption of DefenseCo's digital platform in certain sectors. In light of such concerns, management needs to be increasingly aware of the need to continuously provide frame clarification for all stakeholders to allay concerns and reservations.

5.2. Managerial implications

This study has several managerial implications. First, it is incumbent upon managers to try to understand and be clear as to their motivation for digital servitization. Having the right resources in place is decisive for such digital transformation to succeed in the long term. Getting to know the people of the organization and their capabilities and skills to support them throughout this journey is an important step. That way, managers become aware of the gaps they must fill and the digital resources that are required. Paying particular attention to the cognitive representation and interpretive schemes that prevail amongst organizational members enables managers to take action. Second, managers need to work towards a state of workable certainty, as identified in this study. This will provide a form of temporary stabilization, which enables the organization to refocus its practices and encourage reframing processes of existent incongruences to drive its digital servitization journey. Managers can view this workable certainty as a means of propelling their strategic digitalization actions. It is also a means that allows managers and employees to cope with different contradictions and tensions that emerge as they embark on their digital servitization journey. Finally, undoubtedly, many tensions emerge and persist from digital servitization (Kohtamäki et al., 2020, 2021). Coping with these tensions is no simple task and requires coordinated and ongoing efforts from managers. Here, we propose that actively engaging in reframing activities can support managers.

5.3. Limitations and further research

Like most studies, this one is not without limitations. First, although the framing perspective has been largely neglected in the (digital) servitization domain, and we begin to address this through an in-depth exploratory case study, there are clear limitations in the generalizability of the findings presented here. However, the rich data and insights presented in the process model are analytically generalizable, and we encourage other researchers to build on this work. Moreover, the findings raise important implications for firms regarding how they address frame incongruences emanating from various misalignments that will be of relevance in different contexts. Second, our study presents a case that occurred in real-time over a period of three years rather than relying on retrospective sensemaking. In so doing, this allowed us to delve into and explore more in detail the unfolding process of how the organization works through the different frame incongruences. However, the story is far from being done, nor, given our ontological assumptions, is it possible to claim an endpoint in a change if, as we do, a view of continuous unfolding and 'becoming' view is adopted (cf. Tsoukas and Chia, 2002). Third, studying the framing contests (Kaplan, 2008) that might play out between different traditional functions (e.g., R&D, product, and service) and newly established digital units provides a fruitful line of further inquiry. Finally, other studies can go further by adopting an ecosystem perspective to incorporate how framing plays out across multiple actors and the resultant implications for propagating digital servitization.

5.4. Concluding remarks

By way of concluding thoughts, we would reiterate that digital transformation and servitization is a continuous journey with no actual endpoint. As such, it is incumbent upon organizations to learn to manage and cope with the uncertainty and the many hurdles that will present themselves throughout. Driving change in organizations is largely dependent on a multiplicity of factors that unfold gradually over time. It is not simply a case of devising a strategy determining the plans and actions necessary for progressing a firm's digital servitization journey, but rather a complex intertwining of relations between people and technologies that unfold, and which lead to incongruences requiring a constant pursuit of alignment to provide workable certainty to propel them forward. It is then little wonder that managers are confronted with various types of hurdles and tensions that persist as they move along their digital servitization journey (Kohtamäki et al., 2020; Raja et al., 2022). This reminds us of Weick and Quinn's (1999) saying that "change starts with failures to adapt and that change never starts because it never stops" (p. 381). This is just as applicable for organizations and their digitalization strategies as there are many incongruences that need to be worked through that necessitates a never-ending process requiring adaptation by constantly framing and reframing.

Data availability

The data that has been used is confidential.

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