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KATRIINA VARTIAINEN

The Diffusion of Dynamic Capability in Organizations in Digitalizing Operating Environments

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ACADEMIC DISSERTATION
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Responsible supervisor and Custos	Professor Mikko Ruohonen Tampere University Finland	
Supervisor	Docent, University Lecturer Tarja Tiainen Tampere University Finland	
Pre-examiners	Professor Hannu Salmela University of Turku Finland	Professor Emeritus Robert D. Galliers Bentley University USA
Opponents	Professor Emeritus Robert D. Galliers Bentley University USA	Research Manager, Dr. Katri Valkokari VTT Technical Research Centre of Finland Finland

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In Tampere, Finland
25 May 2023

ABSTRACT

Digitalization introduces new technologies changing organizations, industries, and operating environments. New capabilities and expertise are required, as organizations need to rethink their value offerings, operating models, and ways of collaborating and conducting day-to-day tasks. While dynamic capabilities are often viewed as managerial capacities of sensing, seizing and transforming, recently the focus on employees in creating organizational capacity for change has increased. Likewise, the need for a more nuanced understanding of the development of dynamic capabilities in digitalization has been noted. The aim of this dissertation is to better understand, how dynamic capability develops and spreads in organizations across different work roles. The research problem is *how dynamic capability diffuses in organizations in digitalizing operating environments.*

The research problem was studied by an interpretive qualitative multiple-case study with three case organizations representing the perspectives of a technology user, technology creator, and technology and process integrator. The main data collection method was semi-structured, theme-based interviews. In total 59 individual interviews with 36 informants were conducted, and additionally several discussions were held with company representatives. The data were collected and analysed over the period of 2018–2022 by inductive and abductive approaches, qualitative thematic analysis, and drawing from the guidelines of interpretive field research and grounded theory methodology. The reliability and validity were evaluated by utilizing the criteria of qualitative, interpretive, and case-study research.

As findings, a model of how dynamic capability in today's digitalizing operating environments appears as a multilevel phenomenon comprising of *operative dynamic capability* and *managerial dynamic capability* is presented. The managerial- and operative-level dynamic capabilities manifest differently in different work roles and contribute to organizational development through reciprocal actions of the management and employees. Additionally, the following managerial propositions are given on how the diffusion of dynamic capability could be supported in organizations: (1) *exercising continuous and genuine stakeholder participation*, (2) *ensuring clear goals, implications, way to, and benefits of change*, (3) *securing resources for individual development at work,* (4) *addressing*

underlying tensions hindering collaboration, and (5) *deploying organizational practices enabling interpersonal dynamic capability.*

As theoretical contributions, the findings provide new understanding on dynamic capabilities as reciprocal phenomena between the management and employees. As practical implications, the findings help management in their organizational and capability development efforts. As digitalization accelerates pace invoking requirements of continuous adaptation, it seems vital for organizations to utilize their full potential of sensing, seizing, and renewing capacities. The findings presented in this dissertation aim to support these endeavours. As future research, mixed-methods approaches, closer investigations on the essence of operative dynamic capability, more comprehensive considerations on organizational contextual factors, further longitudinal study incorporating both employee and managerial views, and examinations on utilizing the presented propositions in practice in organizations are suggested.

TIIVISTELMÄ

Digitalisaation myötä erilaiset teknologiat yleistyvät muuttaen organisaatioita, toimialoja ja liiketoimintaympäristöjä. Organisaatioissa tarvitaan uusia kyvykkyyksiä ja osaamista, kun niin arvontuotto ja toimintamallit kuin yhteistyön tekeminen ja päivittäiset toiminnot muuttuvat. Usein dynaamiset kyvykkyydet nähdään ensi sijassa johdon kykynä havaita organisaatioon vaikuttavia mahdollisuuksia ja uhkia, tarttua niihin ja muuttaa organisaatiota tarvittavalla tavalla. Tarve monipuolisemmalle ymmärrykselle dynaamisista kyvykkyyksistä digitalisaation kontekstissa on tunnistettu huomioiden myös muun henkilöstön tärkeä rooli organisaation muutoskyvykkyyden luomisessa. Tämän väitöskirjan tavoitteena on tuottaa uutta tietämystä siitä, kuinka dynaaminen kyvykkyys kehittyy ja levittäytyy organisaatioissa yli erilaisten työroolien. Tutkimusongelmana on, *kuinka dynaaminen kyvykkyys leviää organisaatioissa, jotka toimivat digitalisoituvissa toimintaympäristöissä.*

Tutkimusongelmaa tarkasteltiin tulkitsevan laadullisen monitapaustutkimuksen menetelmällä kolmen case-organisaation kanssa. Case-organisaatiot edustavat tutkimuskentästä teknologian käyttäjäorganisaation, teknologian kehittäjäorganisaation sekä teknologian ja prosessien integraattoriorganisaation näkökulmia. Pääasiallinen aineiston keruumenetelmä oli laadulliset teemahaastattelut. Yhteensä tutkimuksessa toteutettiin 59 yksilöhaastattelua 36 haastateltavan kanssa. Lisäksi tutkimuksen aikana toteutettiin useita keskusteluita organisaatioiden yhteyshenkilöiden kanssa. Aineisto kerättiin ja analysoitiin vuosina 2018–2022 induktiivisesti ja abduktiivisesti laadullisella sisällönanalyysilla tulkitsevan kenttätutkimuksen ja grounded theory -lähestymistavan oppeja hyödyntäen. Tutkimuksen luotettavuuden arviointiin käytettiin laadullisen, tulkitsevan ja tapaustutkimuksen kriteereitä.

Tutkimuksen keskeisenä tuloksena tuotettiin malli siitä, kuinka nykypäivän digitalisoituvissa toimintaympäristöissä dynaaminen kyvykkyys näyttäytyy monitasoisena ilmiönä siten, että *operatiivinen dynaaminen kyvykkyys* ja *johdon dynaaminen kyvykkyys* ovat erillisiä toisistaan. Johdon tason ja operatiivisen tason dynaamiset kyvykkyydet ilmenevät eri tavoin eri työrooleissa vaikuttaen näin organisaation kehitykseen vastavuoroisten johdon ja henkilöstön toimien kautta. Väitöskirjassa tuotetaan seuraavat suositukset johdolle siitä, kuinka monitasoisen dynaamisen

kyvykkyyden leviämistä organisaatioissa voitaisiin tukea: (1) *jatkuva ja aito sidosryhmien osallistuminen,* (2) *muutoksen tavoitteiden, vaikutusten, saavuttamiskeinojen ja hyötyjen selkeyden varmistaminen,* (3) *henkilökohtaisen työssä kehittymisen resurssien turvaaminen,* (4) *taustalla vaikuttavien yhteistyötä haittaavien jännitteiden käsitteleminen* ja (5) *ihmistenvälistä dynaamista kyvykkyyttä tukevien käytäntöjen hyödyntäminen.*

Teorian näkökulmasta tulokset tarjoavat lisäymmärrystä dynaamisten kyvykkyyksien vuorovaikutteisesta luonteesta johdon ja muun henkilöstön välillä. Käytännön näkökulmasta tulokset auttavat johtoa organisaation ja sen kyvykkyyksien kehittämisessä. Kiihtyvän digitalisaation ja jatkuvan muutosvaatimuksen myötä vaikuttaa ratkaisevalta, että organisaatiot kykenevät täydellä potentiaalillaan hyödyntämään kykynsä havaita mahdollisuuksia ja uhkia, tarttua niihin sekä muuntautua tarvittavalla tavalla. Tässä väitöskirjassa esitetyt tulokset tukevat osaltaan näitä pyrkimyksiä. Jatkotutkimuksena suositellaan monimenetelmällisiä lähestymistapoja, operatiivisen dynaamisen kyvykkyyden olemukseen tarkempaa pureutumista, organisaatioiden kontekstuaalisten tekijöiden kattavampaa sisällyttämistä, pitkittäisiä johdon ja henkilöstön näkökulmia huomioivia tarkasteluita sekä tutkimusta siitä, kuinka esitettyjä johdon suosituksia voidaan hyödyntää organisaatioissa käytännössä.

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ORIGINAL PUBLICATIONS

Publication 1 Vartiainen, K. & Hansen, L. K. (2019). Dynamic capabilities in information systems research - A literature review. In L. Norström, K. Vartiainen, S. Dueholm Müller, & J. Agger Nielsen (Eds.), *Selected Papers of the Information Systems Research Seminar in Scandinavia (IRIS41)*, *9*(2018), 2. Association for Information Systems (AIS).

Author's contribution: The publication was designed and written during Vartiainen's visit in Aarhus University, Denmark in collaboration with the co-author. Vartiainen had the main responsibility of the literature search, analysis, findings' formulation, and writing together with planning, commenting, and manuscript reviewing by the co-author.

Publication 2 Vartiainen, K. (2020). In search of the "how" of dynamic capabilities in digital transformation: Contradictions as a source of understanding. In *Proceedings of Americas' Conference on Information Systems 2020* (*AMCIS2020)*, 7. Association for Information Systems (AIS).

Publication 3 Vartiainen, K. (2021). Exploring tensions and unifying discourses in globally networked R&D work. In *Proceedings of Americas' Conference on Information Systems 2021* (*AMCIS2021),* 4. Association for Information Systems (AIS).

Publication 4 Vartiainen, K. (2022). Shifting to a technology-driven work mode: Workplace learning and dynamic capability in the case of a public-sector service organisation. In D. Passey, D. Leahy, L. Williams, J. Holvikivi, & M. Ruohonen (Eds.), *Digital Transformation of Education and Learning – Past, Present and Future. OCCE 2021. IFIP Advances in Information and Communication Technology, 642*, 247–285. Springer.

Publication 5 Vartiainen, K. (2023). Enabling interpersonal dynamic capability: Four emerging collaborative practices in globally distributed software development. *Journal of Information Technology Case and Application Research.*

1 INTRODUCTION

This first chapter begins by introducing the background and research environment of the doctoral dissertation project related to the digitalization development of the operating environments of many organizations today. The chapter then presents the research objectives and scope, including the main research problem and the three research questions contributing to answering the problem. Finally, the main contributions of the dissertation, and the structure of the remainder of the document are presented.

1.1 Background and Research Environment

Digitalization and digital transformations influence our lives in many ways. New and more pervasive technologies at work and in the society are continuously being introduced. Business models, task distribution, and forms of work evolve changing entire industries toward digitalized products and services through the variety of cloud-based, connected, automated, and intelligent information technology (IT) solutions (Bharadwaj et al., 2013; Loebbecke & Picot, 2015). Digital technologies and information systems (IS) are embedded in virtually all functions of organizations today (Bharadwaj et al., 2013; Salmela et al., 2022), and digitalization efforts of different scales are implemented to thrive, develop, and sustain competitive advantages in the changing operating environments (Tallon et al., 2019; Vial, 2019; Wessel et al., 2021). Some companies are users of technology, some create it, while others act as integrators of new technologies and processes to produce new service offerings and enhance the current ones.

While technologies, organizations, and operating environments change, the ways of working also change (Loebbecke & Picot, 2015). The pace of work becomes different, new kinds of skills and expertise are required, the employees need to renew their ways of collaborating and conducting their day-to-day tasks. In the face of the changes created by digitalization and other volatilities of our society, the need for a new kind of understanding of IT and business function related capabilities in

organizations, including those understood as dynamic capabilities, has been noted (Tallon et al., 2019; Teubner & Stockhinger, 2020; Vial, 2019). Dynamic capabilities essentially encompass an organization's capacity to sense opportunities and needs from the environment, seize them, and renew the organization and its resources accordingly (Teece, 2014).

Much of the prevailing dynamic capability literature, especially in strategic management, understands dynamic capabilities primarily as managerial capacities (Day & Schoemaker, 2016; Salmela et al., 2022; Teece et al., 2016). However, recently the focus has shifted toward the inclusion and importance of employee participation in creating a sustained organizational capacity for adaption (Salvato & Vassolo, 2018; Wohlgemuth et al., 2019). This has been of interest not only under the concept of dynamic capabilities (e.g., Salvato & Vassolo, 2018; Wohlgemuth et al., 2019) but also more broadly when addressing organizational agility in the "digital era" (Salmela et al., 2022). This finding appears highly relevant in the light of the new requirements stemming from the changes, uncertainties, and competition of the current environment. Against this background, the aim of the present qualitative, multiple case doctoral dissertation is to better understand and create new knowledge of dynamic capability diffusion in organizations in digitalizing operating environments especially from the emergent processes' perspective. Diffusion in this context means the spreading of dynamic capability "widely in all directions" (Oxford University Press, n.d.) of an organization.

The dissertation has some defining starting points. The first one is to view the study of organizational dynamic capabilities in digitalizing operating environments as a holistic endeavour. This means that from the beginning of the dissertation project, the theoretical frame had room for a broad set of potential capabilities to be investigated, without limiting them from the start. The second one is the aim to study dynamic capabilities in a way that encompasses various organizational roles, importantly also including those outside the management. The third starting point is related to the first one. This study focuses on an *emergent* perspective of capability development in contrast to purposeful and deliberate organizational development (Markus & Robey, 1988; Mintzberg, 1987). Finally, the research environment is characterized by organic organizational settings. For example, dispersed control, discussion, and negotiation are traits suitable to such unstable environments where the knowledge of actors, rather than their authoritative position, is central for task accomplishment and innovation (Courtright et al., 1989).

Drawing from Steininger et al.'s (2022) recent work, this dissertation resembles a setting where the role of IT is approached as *context*. In particular, the concepts of

digitalization and *digital transformation* are focal to the context of the research environment. Oftentimes while working on this research, I found myself baffled with the demarcation between the concept of digitalization and digital transformation. One may wonder, where one ends and the other one begins. Or are they, in fact, completely different things? And if so, how are they defined and differentiated from one another? This discussion will also take place as part of the theoretical foundation but let us begin here.

Digitalization of operating environments is in this study understood as the increasing pervasiveness of digital technologies, including technologies such as high-speed internet connections, mobility, cloud services, and applications of artificial intelligence, which are changing the ways organizations are operating and the work is being conducted (Bharadwaj et al., 2013; Kraus et al., 2022). The related term of digital transformation then concerns organizations more closely, and it involves an organization's application of the digital technologies in a manner that digitalization is embedded in its operations, so that a profound change in the ways of operating, value propositions, and required capabilities takes place (Kraus et al., 2022; Vial, 2019; Wessel et al., 2021). In the end, both digitalization and digital transformation are here understood as society-level phenomena (Kraus et al., 2022; Vial, 2019) where the change pressures come not only from within the organization but also from the broad and versatile change in the operating environment (Vial, 2019; Wessel et al., 2021).

Finally, most generations seem to state that their world is changing faster than ever before to a point that might be called a cliché. However, this does not make it less true. Let us assume that the statement is correct, and the landscapes of many organizations are turning into more "dancing" and "rugged" with less predictability and more complexity and disruption (Tanriverdi et al., 2010) than before, even in the industries that we today may regard as traditional. In such an environment, it may also become more difficult to predict which kind of capabilities are required in the future. This sparks an interest in me to explore how organizations' capabilities and particularly organizations' capability to adapt diffuses in organizations, without limiting the examination to a set of predefined capacities. With this, let us move on to the objectives and scope of the dissertation, including the research questions.

1.2 Objectives and Scope

Against the background and research environment described in the previous section, the aim in the present work is to create new scientific and practical knowledge on how the diffusion of dynamic capabilities takes place and how it can be supported in organizations. The overall research problem of this study revolves around the formation of dynamic capabilities in organizations as their operating environments become more digitalized. The dissertation explores the interaction and interplay between "ordinary" capabilities and dynamic capabilities (Teece, 2014) as well as that of management and other employees in organizations. The conceptual framing (Mathiassen, 2017) is that of dynamic capabilities (Pavlou & El Sawy, 2011; Salvato & Vassolo, 2018; Teece, 2007, 2014; Teece et al., 2016) initially studied as emergent rather than as purposeful, deliberate phenomena (Markus & Robey, 1988; Mintzberg, 1987). These notions will be discussed in more detail in the subsequent chapter.

The overall research problem is formulated as follows: *How does dynamic capability diffuse in organizations in digitalizing operating environments?* The research problem is further divided into three research questions (RQ1–RQ3). The RQs explore the diffusion of dynamic capability from different organizational perspectives through an interpretive qualitative multiple-case study approach (Taylor & Søndergaard, 2017; Walsham, 1995; Yin, 2018) and three participating case companies: Case 1 (a longitudinal case study in logistics and procurement), Case 2 (a two-location case study in global software research and development (R&D)), and Case 3 (a reflective benchmarking case study in technology and process consulting). The RQs and their perspectives are presented next.

RQ1: *What facilitates the diffusion of dynamic capability in an organization during major digital transformation efforts?* RQ1 explores the research problem through cases where companies implement major digital transformation efforts. Thus, RQ1 represents a perspective, where digitalization materializes as a transformation project throughout many functions of an organization (cf. Wessel et al., 2021). The main findings are drawn from the Case 1 with a reflection from Case 3.

RQ2: *What facilitates the diffusion of dynamic capability in an organization during a shift to digital working practices?* RQ2 approaches the research problem firstly through a case of a sudden shift to technology-driven working mode caused by the Covid-19 pandemic (cf. Carroll & Conboy, 2020), and secondly through the changing working practices as part of digitalization efforts. Thus, RQ2 represents a perspective, where organizational actors must adjust and develop new ways of operating, also under

time pressure (Carroll & Conboy, 2020). The main findings are drawn from the Case 1 with a reflection from Case 3.

RQ3: *What facilitates the diffusion of dynamic capability in an organization operating in a complex environment?* RQ3 contributes to understanding the research problem firstly through a case of inherently digital-intensive operation of global software R&D, and secondly through a case where digitalization efforts are implemented in a more traditional field, where the complexity stems from the industry practices of multi-party company networks. Thus, RQ3 represents a perspective, where organizations operate in a complex environment with multiple tensions and boundaries (cf. Brooks et al., 2020; cf. Levina & Vaast, 2008; cf. Putnam et al., 2016). The main findings are drawn from Case 2 with a reflection from Case 3.

Together, the RQs contribute to answering the overall, integrative research problem. The answer to the research problem synthesizes the findings from the RQ1–RQ3 and presents a model of the diffusion of dynamic capability in organizations in digitalizing operating environments. The study additionally provides propositions for practitioners, primarily managers dealing with capability development issues in contemporary organizations. Finally, the aim is also to identify fruitful future research avenues in dynamic capability management in the context of digitalization. The research problem represents a perspective, where dynamic capabilities are explored as multilevel (Wilden et al., 2016), socially accomplished (Salvato & Vassolo, 2018) and emergent (Markus & Robey, 1988) constructs. It is with gratitude acknowledged that the work by Salvato and Vassolo (2018) has been inspirational in crafting the present research design by their discussion on "diffused ability" (p. 1735, 1745), emergence of dynamic capabilities, and recommendations for interpretive qualitative, and longitudinal studies.

During the work on this dissertation, many research streams have been encountered and utilized to support the understanding of the researcher, even though they all are not dived deep into here. At the same time, some streams have been largely omitted to remain within the scope of the dissertation project. For example, the explorative and exploitative modes of organizational learning (Levinthal & March, 1993) have contributed to an understanding of the relationship between utilizing existing capabilities and developing new ones in organizations (e.g., Vartiainen, 2023). Similarly, workplace learning literature (Tynjälä, 2008) has provided important insights into how learning in the workplace may happen as formal and informal processes (e.g., Vartiainen, 2022). Finally, different practice research perspectives (Feldman & Orlikowski, 2011; Marabelli & Galliers, 2017; Peppard et al., 2014) have been utilized to better understand organizational daily

activities and their interaction with capability development. On the contrary, for example, organizational change management literature (Burnes, 2004) has been scoped out, as dynamic capabilities was chosen as the comprehensive lens (cf. Pavlou & El Sawy, 2011) in our quest to better understand the processes of organizational capacity for dynamism. Overall, the dissertation lies in the intersection of IS, organizational, and management research.

1.3 Contributions

The dissertation contributes to the understanding of the emergent processes of dynamic capability diffusion in organizations in digitalizing operating environments. The aim is to create new insights to theoretical and practical knowledge on how dynamic capability growth and dissemination can be supported in organizations. The types of contributions involve development of concepts, drawing specific implications, and creating rich insight (Walsham, 1995) as well as propositions (Eisenhardt, 1989) to practice. In terms of research innovativeness, this research represents a "deriving" study with "changing levels of analysis/stakeholders" (Grover & Niederman, 2021, p. 1774). This means that the present study derives from the existing dynamic capability and digitalization knowledge and brings to light new interactions between different organizational roles – that is, the different levels and different stakeholders – which have previously been underexplored (cf. Grover & Niederman, 2021).

The contributions are formed of three main insights based on the findings from the original publications (Publications 1-5) and the synthesis drawn. First, the findings highlight that amplified by digitalization, it appears *crucial for both project-driven and continuous organizational development that dynamic capabilities are understood and developed as multilevel constructs* encompassing both the managerial level and employee level in an organization. Second, the enhanced concepts of *operative dynamic capabilities* and *managerial dynamic capabilities* were derived. A model depicting their interaction and implications to organizational development was drawn. Third, the first and second contribution resulted in recommendations to practice as *propositions for supporting the diffusion of dynamic capability in organizations in digitalizing operating environments*. The propositions are as follows:

(1) exercising continuous and genuine stakeholder participation,
(2) ensuring clear goals, implications, way to, and benefits of change,

(3) securing resources for individual development at work,
(4) addressing underlying tensions hindering collaboration, and
(5) deploying organizational practices enabling interpersonal dynamic capability.

The contributions are expected to be valuable "in the future in other organizations and contexts" (Walsham, 1995, p. 79), similarly as in the case organizations that participated in this research project. First, the value lies in the more informed understanding of the "surfaced interactions" yielding "actionable insights" in the domain (Grover & Niederman, 2021, p. 1774) of organizational development for sustained competitive advantage in digitalizing operating environments by the cultivation of the multilevel dynamic capability. The dissertation aims for no statistical or cross-population generalization (Tsang & Williams, 2012; Yin, 2018). Instead, the insights are hoped to motivate actions, such as a more structured deployment of organizational practices to enhance continuous and genuine stakeholder participation or addressing tensions and contradictions that hinder the sought-for change (cf. Publication 2; Publication 4). Second, value can be identified in the new research paths that the findings encourage. In line with a stream of recent literature (e.g., Salvato & Vassolo, 2018; Wohlgemuth et al., 2019), the findings support the view that the role of employees outside management teams should in more versatile ways be included in the dynamic capability research in the IS field.

To sum, the dissertation contributes to the theoretical understanding of the essence of dynamic capability by emphasizing the multilevel nature of the dynamic capability construct (cf. Wilden et al., 2016) spanning across organizational roles, and created, and enacted together by the management and employees. Further, the thesis contributes to the practical understanding on how and what kind of issues influence the diffusion of organizational dynamic capability to drive, adopt and adapt to change. The emphasis is on the reciprocal relationships between the actions of the management and employees as well as the aspects of mutual understanding, participation, and collaboration in organizational development.

Finally, digitalization and, relatedly, digital transformation create both internal and external change pressures for organizations (Vial, 2019), which according to the findings, require multifunctional collaboration and continued understanding of the operation at all levels of the organization. Attention should thus be paid to a heightened understanding by the employees of the goals and implications of change across different organizational layers. The research supports the recent finding that

employee participation is important in organizational dynamic capability development efforts (Salvato & Vassolo, 2018; Wohlgemuth et al., 2019). In this dissertation, it is argued that this applies especially in today's digitalizing operating environments, where change is often complex, simultaneous, and in many ways connected resulting in transformations of organizational processes.

1.4 Dissertation Structure

The dissertation is composed of five original publications which together address the overall research problem, and RQs 1–3 which build the contribution from different perspectives creating a mosaic-like picture of the problem space. Figure 1 and Table 1 below describe how each publication and the cases connect to each other forming the overall contribution.

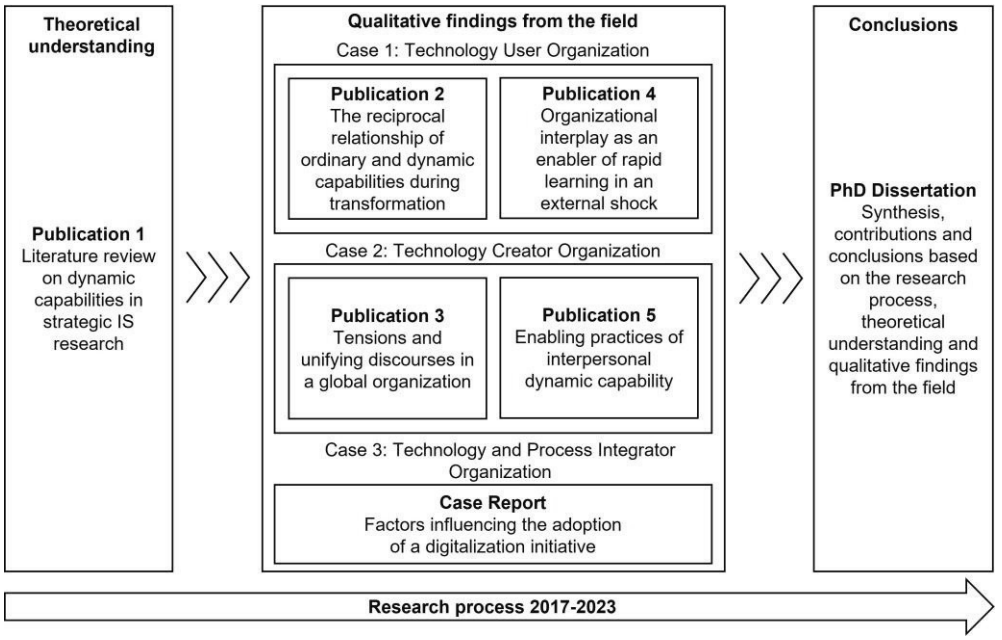

Figure 1. How the publications and cases connect to one another and the contribution.

Table 1. How the case-based research output addresses the research questions. The bolded **X** denotes the main source of the findings, and the regular X the supporting findings. (Table layout applied from Heikkilä, 2020.)

Overall research problem: How does dynamic capability diffuse in organizations in digitalizing operating environments? **Explored through the research questions of RQ1-RQ3:**		**Cases 1-3, Publications 2-5 (P2-P5), and Case Report**				
		Case 1 "Tech User"		**Case 2 "Tech Creator"**		**Case 3 "Tech Integrator"**
		P2	**P4**	**P3**	**P5**	**Case Report**
RQ1	What facilitates the diffusion of dynamic capability in an organization during major digital transformation efforts?	**X**				X
RQ2	What facilitates the diffusion of dynamic capability in an organization during a shift to digital working practices?		**X**			X
RQ3	What facilitates the diffusion of dynamic capability in an organization operating in a complex environment?			**X**	**X**	X

The rest of the dissertation is organized as follows. Chapter 2 presents the theoretical foundation, beginning from the philosophical starting points and moving on to the context of digitalization and digital transformation, and finally to the multifaceted literature on dynamic capabilities. Chapter 3 presents the research method of the multiple-case study and introduces the cases, while Chapter 4 summarizes the Publications 1-5 and the previously unpublished Case Report. Chapter 5 first presents the findings derived from the individual publications to each RQ, and then synthesizes the findings responding to the overall research problem in a form of a model of operative dynamic capabilities and managerial dynamic capabilities. Chapter 6 concludes the dissertation by discussion on the theoretical and practical implications. The chapter also evaluates the reliability, validation, generalization, and limitations of the study, and makes recommendations for further research.

Finally, in terms of the References section of the dissertation, it should be noted that Chapter 2 summarizes the core literature of the dissertation project. Other related literature is covered in a more versatile manner in the publications. In particular, Publication 1 as a literature review is noted to cover an array of literature on dynamic capabilities within the IS field. The publication is available in full in the Appendix of this dissertation. This choice was made by the author to achieve a concise presentation of the theoretical foundation.

2 THEORETICAL FOUNDATION

This chapter presents the theoretical foundation of the dissertation. The theoretical foundation combines, first, insights from a narrative style literature review (Rowe, 2014, p. 244) with a broad scope of recent and foundational literature around the area of concern and the conceptual framing (Mathiassen, 2017). Second, the findings from a more systematic and focused literature review first presented in Publication 1 (Vartiainen & Hansen, 2019) are utilized. Following Rowe's (2014) discussion, the aims of this chapter include consolidating literature and aligning the study goals; identifying the meaningful gaps in knowledge, theory, and research themes; and understanding the theoretical underpinnings of the research area. In the beginning of the dissertation process, the goal of the review was to "map the territory" (Rowe, 2014, p. 243), to conceptualize the research problem. Thus, at first, the aim was to reach a sufficient level of comprehensiveness to make enough sense of the field in order to conduct informed, practically relevant, and rigorous empirical research (cf. Alvesson & Sandberg, 2011; cf. Mathiassen, 2017; cf. Peppard et al., 2014). Toward the end of the process, the goals leaned more in the direction of theorizing (Rowe, 2014).

Next, the ontological and epistemological starting points are discussed, followed by views of emergence in organization research. After like this laying the philosophical ground, the current understanding and previous literature on digitalization, digital transformation, and dynamic capabilities are covered.

2.1 Philosophical Starting Points

The subsequent sections present the philosophical starting points of the doctoral dissertation. The overall philosophical stance is first discussed as the ontological and epistemological considerations, followed by the perspective of emergence in organizational research.

2.1.1 Ontological and Epistemological Considerations

Walsham (1995) argues that the philosophical stance of a researcher must be reflected on when reporting their work. Ontologically, this study views reality as a social construction of meanings, values, interpretations, actions, and interactions (Deetz, 1996; Feldman & Orlikowski, 2011; Hirschheim & Klein, 1989; Archer, 1988, as cited in Walsham, 1995). The focus of this dissertation includes organizational and social aspects in addition to technological ones (cf. Galliers & Land, 1987). The study emphasizes relevance to practice, as is characteristic of IS research. In the context of the study, the present researcher contends with the views that organizations are made of human action which is continuously changing (Tsoukas & Chia, 2002), and the ability to continuously change is one of the critical success factors in many industries (Brown & Eisenhardt, 1997). Epistemologically, following Archer's terms (1988, as cited in Walsham, 1995), the present study adopts a non-positivist perspective to creating scientific knowledge. This means understanding that there rarely exists one truth, but that facts and values are entangled, which influences the nature of knowledge.

The complexity, and even "imprecision" of the research topic calls for a research method capable of capturing the "different interpretations of the same phenomena" (Galliers & Land, 1987, 900). Following these ontological and epistemological starting points, the approach of this study is interpretive research (Klein & Myers, 1999; Walsham, 1995) in contrast to methods utilizing statistical tests or laboratory experiments (Galliers & Land, 1987). The interpretive approach is suitable for aiming to understand underlying human and social aspects (Klein & Myers, 1999; Walsham, 1995), which in a study concerning capability development in organizations was deemed a necessary focus.

Essentially, interpretive research views the social world as formed of subjective realities and multiple perspectives entangled with personal experiences, philosophies, and values (Taylor & Søndergaard, 2017). Thus, actors not only process and react to information in their environments but also create, enact the environment by their actions generating further complexity to the world. These notions have commonalities with the IS development paradigm of social relativism, where the system developer is seen as a catalyst or facilitator (Hirschheim & Klein, 1989). Reality is thus described as complex, elusive, and being formed of different perceptions and evolved through different social codes, such as laws, conventions, norms, and attitudes. Further, each actor sees a different part of the reality, and even

conscious choices and instinctive reactions may become confounded, as noted by Hirschheim and Klein (1989).

The focus of an interpretive researcher is to understand and interpret the world from the perspective of actors (Taylor & Søndergaard, 2017). Instead of objective truths in isolation of the influence of the surrounding components, it is viewed that one phenomenon can have multiple realities. The strength of interpretive research is that it can help capture the complexity of the phenomenon studied.

Illustrative of this approach is that already in relatively initial stages, and especially as the dissertation project matured, it became apparent that rather than examining an a priori defined set of clearly cut capabilities and their evolution, the researcher was entangled with capabilities as "messy" constructs (Peppard et al., 2014, p. 5) and organizational life as "a moving target" (Klein & Myers, 1999, p. 73). This appears to align with Deetz's (1996, p. 195) "local/emergent" dimension where concepts are developed with organizational members throughout the research process. This kind of an entity requires a powerful set of guidelines supporting their interpretation. In the present study, the chosen set of guidelines is that of Principles for Interpretive Field Research (Klein & Myers, 1999), the utilization of which is accounted for in Chapter 3 as part of the research method.

2.1.2 Organization Philosophical Orientations

Moving towards the substance of the dissertation, this section discusses the concept of emergence, as it has been understood in the present study. Here, emergence is viewed as a philosophically related concept to interpretive research. Following Fulmer and Ostroff (2016, S123), emergence is seen as "a dynamic process" occurring across time. It stems from the individual elements of a system which form a higher-level entity. Interaction of the elements in the system is focal, as it allows the emergence of "a new pattern or form […] as a collective, higher-level phenomenon." The authors distinguish between emergent *processes* and emergent *properties*, where the first denotes the "process and pattern" happening over time, and the latter the result of that process yielding "higher-level collective construct[s]" (Fulmer & Ostroff, 2016, S134).

A classic example of the emergence discussion is that of Mintzberg's (1987) work from the realm of strategic management, which differentiated the concept of strategy through "Five Ps", strategy as *plan, ploy, pattern, position,* and *perspective.* In the context of this dissertation, the interest lies in strategy as *plan* and *pattern.* While plan is

defined as "some sort of *consciously intended* course of action" (Mintzberg, 1987, p. 11, italics in original), pattern indicates a consistent stream of action, either intended or unintended. Mintzberg (1987) further muses that the unintended pattern can also constitute a realized strategy. In other words, there can be both intended and unintended realized strategies. The first one would be distinguished as deliberate, and the latter one as *emergent*.

In real life, deliberate and emergent strategies exist on a continuum, and it seems unlikely that either of the poles would take effect in their pure forms (Mintzberg & Waters, 1985). Instead, it is argued that tendencies towards the different forms can be expected, influenced by factors such as the precision, concreteness, explicitness, and sharedness of leadership and other organizational intention; firmness and pervasiveness of organizational central control over actions; and controllability, and predictability of the environment. Moreover, the authors point out that identifying intentions is challenging, as knowing what was really intended may differ from what was voiced out. The intentions of actors may also differ, and one actor's intentions count more than those of others.

Fundamentally, intended strategies relate to direction and control, whereas emergent strategies open opportunities for strategic learning, collective action and convergent behavior in the face of evolving, unstable and complex environments (Mintzberg & Waters, 1985). An emergent approach thus seems helpful for utilizing and building organizational competence in a versatile way across organizational levels, and it also appears in line with the organic organizational settings (Courtright et al., 1989). We can also think that the emergent approach lifts the requirement from the management to always have enough detailed and current knowledge of all organizational activity for strategy formation (Mintzberg & Waters, 1985). In the experience of the present researcher, this requirement would ring unrealistic in many cases.

With strategy and capability development follows the perspective of organizational change. In the examination of theoretical models of IT and organizational change, Markus and Robey (1988) discuss external forces, purposeful intended objectives, and emergence from the interaction of people and events as causes of change. The latter considers change to emerge as users interact unpredictably with IT. In more general terms, this can be seen as "the dynamic interplay among actors, context and technology" (Gasser, 1986, as cited in Markus & Robey, 1988, p. 588). This view accommodates the diversity of meanings that can be connected to a phenomenon in different social contexts (Markus & Robey, 1988).

In more recent work, the socially constructed nature of phenomena is noted as a view shared by many traditions (McLaren & Durepos, 2021). For example, in the context of practice theoretical research, social life is perceived as "an ongoing production and thus emerges through people's recurrent actions" (Feldman & Orlikowski, 2011, p. 1240). In that sense, practice theorists go even further, and understand that the social world is created by the everyday activity of human agents. For example, knowledge, central to organizational activities, is seen not as stable but dynamically produced and enacted in ongoing engagements by actors (Feldman & Orlikowski, 2011).

In this dissertation, these lines of reasoning are extended to capability development in organizations. While some capability is developed as intended plan and pattern, some will emerge as unintended actions and interpretations, and some somewhere in between. It can also be seen that these development directions can be either productive or unproductive. Again, the reasoning for this extension lies in the interpretive premise of the world being constructed of subjective realities (Taylor & Søndergaard, 2017), and organizations as collections of people with a common mission (Mintzberg & Waters, 1985). Even though direction and control in capability development strategies are undoubtedly necessary, in this dissertation, the researcher is intrigued by the emergent processes that take place in the midst of the planned, consciously intended development strategies. Perhaps these processes are also hidden, emerging out of plain sight, when organizational actors interpret, interact, and react. As Wenzel et al. (2021, p. 401) view it, emergent organizational change may happen through the enactment and gradual change – "drifting" – of routines. By that, dynamic capabilities and more broadly change in general are extended beyond a purposeful, intentional managerial action all the way to "actors' mundane, every-day work".

To sum, organizations need strategic goals and intent, but how organizational development, including that of capabilities, actually unfolds can hardly be determined beforehand. Thus, capability development in the mind of the researcher leans towards emergent tendencies (cf. Mintzberg & Waters, 1985), as it is heavily influenced by actions and responses from the organizational actors as well as their evolving situations and environments. Next, digitalization and digital transformation are discussed.

2.2 Digitalization and Digital Transformation

There appears to be confusion between the concepts of *digitalization* and *digital transformation* (Kraus et al., 2022). In this section, the aim is to define these concepts and discuss their relation and utilization in the present study. Several literature reviews have been conducted in the IS and management research fields in recent years to create understanding on and the boundaries of these concepts (Hanelt et al., 2021; Kraus et al., 2022; Vial, 2019; Wessel et al., 2021). Based on these readings, three guiding principles are drawn. 1) Digitalization and digital transformation are distinct but related concepts. 2) Digitalization is more clearly an operating environment level phenomenon whereas digital transformation more closely ties with an organization or an industry. However, there seems to be some difference in the definition regarding the second point, as will be discussed soon. 3) Both of the concepts relate to change, even to disruption, digitalization with a broader and fuzzier scope and digital transformation with a narrower scope.

Digital technologies, such as mobile technologies, cloud computing, data analytics, and connectivity networks contribute to digitalization (Bharadwaj et al., 2013; Kraus et al., 2022). This development means that ways of working, communicating, and collaborating change (Kraus et al., 2022), which also means new ways of creating revenues, and executing business processes, and designing operating models (Bharadwaj et al., 2013). At this stage, the researcher understands digitalization as a societal-level phenomenon. When integrated, embedded into an organization's operations leading to a profound, fundamental change in the organization's way of operating, value propositions, and even its identity the phenomenon would then be called digital transformation (Kraus et al., 2022; Vial, 2019; Wessel et al., 2021). It is noted debatable which, technology or strategy, drives digital transformation (Kraus et al., 2022). While some researchers examine IS/IT strategies in a more traditional sense in the context of digitalization, others speak for the fusion of business and IS/IT strategies into a digital business strategy (Bharadwaj et al., 2013; Teubner & Stockhinger, 2020).

According to the present researcher's understanding, a degree of difference exists in how tightly digital transformation is perceived to be connected to organizational transformation efforts (Wessel et al., 2021), and how much it is seen as stemming from the society-level change (Vial, 2019). Particularly, some find that adequately to speak of digital transformation, the change an organization is implementing should be re-defining by nature (Wessel et al., 2021). Otherwise, it would be regarded a case of IT-enabled organizational change. Central to digital transformation appears the

"organizational change in association with the widespread diffusion of digital technologies" (Hanelt et al., 2021, p. 1173). Helpful for understanding this phenomenon is to view it through different dimensions and perspectives. Digital transformation can be viewed, on the one hand, with the narrow scope through "specific organizational adaptations" and impacts imposed by the diffusion and existence of particular technologies (Hanelt et al., 2021, p. 1174). On the other hand, it can be viewed through the broad scope of holistic, co-evolving adaptation processes and systemic shifts due to digitalization of the environment or an industry. Vial (2019) defines digital transformation as "a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies" (p. 118).

The difference between IT-enabled organizational transformation and digital transformation appears difficult to demarcate (Wessel et al., 2021). The difference could be viewed, albeit slightly provocatively, to be dependent on one's vantage point. This dissertation views digitalization as the broad context, and digital transformation as the concrete transformative change efforts, where digital technologies are used to an extent that new business processes are created, and the value offering changed. Therefore, the researcher is inclined to incorporate the societal level nuance to the concept of digital transformation in a way that the overall trend of digitalization drives organizations towards the diverse change efforts.

2.3 Dynamic Capabilities in General

Dynamic capabilities are a much-researched construct, which presents both a challenge and opportunity for their study. On the one hand, the importance of dynamic capabilities for organizations in contemporary environments is established. On the other hand, the research field is debated and divergent (Peteraf et al., 2013) making it difficult to define and operationalize the construct to achieve a solid basis for their study in organizations (cf. Mintzberg & Waters, 1985). This section and the remainder of the chapter covers the basic definitions of dynamic capabilities, visits the debate over them, and describes how the construct is understood and utilized within this dissertation both in the context of digitalization and as a relational phenomenon embedded in organizational everyday life.

A central grounding work outlining dynamic capabilities is that of Teece and colleagues from 1997, where dynamic capabilities are referred to as the "ability to achieve new forms of competitive advantage" (Teece et al., 1997, p. 515). At this

stage, the term dynamic conveys "the capacity to renew competences" to remain compatible with the changing business environment. Capability is tied to the strategic management's ability to adapt, integrate, and reconfigure the "skills, resources, and functional competences" to meet the demands imposed by the environment. Notable here is that while dynamic capabilities are seen largely to reside with upper management, they are also noted as closely linked with an organization's business processes (Teece, 2007; Teece et al., 1997). In later work, dynamic capabilities are defined as *sensing,* for example, new technological opportunities in relation to customer needs, *seizing*, that is, mobilizing resources to capture value of the sensed opportunities, and *transforming*, renewing the organization continually (Teece, 2007, 2014).

To study dynamic capabilities, it is important to distinguish between them and operational competences (Pavlou & El Sawy, 2011; Teece, 2007), or ordinary capabilities (Teece, 2014). Operational competences can be defined as basic, daily functions of an organization, such as order entry, purchasing, or financial reporting (Teece, 2007). Ordinary capabilities encompass administrative, operational, and governance functions required for task accomplishment and they are often measured in speed, quality, or efficiency (Teece, 2014). They materialize as "technical fitness" (Teece et al., 2016, p. 19). In more practical terms, "operational capabilities" have been defined "as the ability to execute day-to-day activities" (Pavlou & El Sawy, 2011, p. 242). Thus, these can be seen as overlapping, similar concepts. For clarity, in this dissertation, the term of *ordinary capabilities* is adopted when contrasted with *dynamic capabilities*.

Overall, dynamic capability is "a meta-competence that transcends operational competence" (Teece, 2007, p. 1344). It focuses on the management directing ordinary capabilities of an organization to achieve higher payoffs and sustained competitive advantage by adaption, orchestration, and innovation in changing business environments with high and innovation-driven competition (Teece, 2014). In addition to the management, an organization's values and culture as well as its capacity to implement change influence the quality of an organization's dynamic capability (Teece, 2014). Similarly, Teece and colleagues (2016) elaborate that organizational capabilities along with managerial capabilities form the basis of dynamic capability in which routines and processes play an important role. These latter notions support the comprehensiveness of the dynamic capability framework (cf. Pavlou & El Sawy, 2011) making room for its extension from the managerial domain to encompass also other parts of an organization.

This is a distinction of interest in the present study, and it is elaborated next. If it is as asserted by Teece and colleagues (2016, p. 19) that ordinary capabilities "are by definition unable to help the organization respond creatively to positive or negative volatility and/or surprises", then it seems difficult to accept that dynamic capability would be a trait of the management alone. Further, in earlier work it is defined that:

> *Whereas ordinary capabilities are about doing things right, dynamic capabilities are about doing the right things, at the right time, based on new product (and process) development, unique managerial orchestration processes, a strong and change-oriented organizational culture, and a prescient assessment of the business environment and technological opportunities. (Teece, 2014, p. 331)*

In response, this researcher is inclined to ponder which part of the above dynamic capability definition constitutes something that would not in the best-case scenario – or as a current requirement by digitalization – concern the entire organization. While seminal literature does address routines, practices, cross-functional relationships, and intensive communication as central to dynamic capabilities, the focus has remained on managerial action (Eisenhardt & Martin, 2000). However, even the unique managerial orchestration processes could be extended to the employee level, for example, through dialogical leadership practices (Syvänen & Tikkamäki, 2013). It appears that both, managerial-level dynamic capability and employee-level dynamic capability are needed, but that they are likely to manifest differently in different work roles. That way the employee-level would feed bottom-up insight by their sensing, seizing and transforming capability to the management, whereas it would be the management's responsibility to orchestrate the processes and resources in an innovative way by their sensing, seizing, and transforming capability.

Whichever the reach of dynamic capabilities may be, the present dissertation adopts the view by Teece and colleagues (1997) in that dynamic capabilities indeed are focal for the sustained competitive advantage of organizations. However, views in literature exist questioning this line of thinking. Perhaps one of the most well-known ones is the seminal paper by Eisenhardt and Martin (2000). The authors parallel dynamic capabilities with best practices. Thus, they are argued to have less rarity, inimitability and non-substitutability than expected, making them more "homogeneous, fungible, equifinal, and substitutable than is usually assumed" (Eisenhardt & Martin, 2000, p. 1105). This in turn is said to limit their sufficiency to create competitive advantage in organizations. Instead, their power is seen to lie in

the resulting enhanced existing and novel "resource configurations" (Eisenhardt & Martin, 2000, p. 1106). Additionally, in the case of high-velocity markets, the dynamic capabilities driving competitive advantage are argued to be "unstable processes" constituting a significant challenge to their sustainability.

Peteraf et al. (2013, p. 1407) bring these two conflicting views together by suggesting "interlinked dynamic bundles" comprising of both simple and complex routines and mechanisms which as dynamic capabilities can enable companies' sustained competitive advantage – however, under certain conditions. First, in settings with only moderate environmental dynamism, details distinguishing "the effectiveness of best practices" from other similar best practices is suggested to gain focus (Peteraf et al., 2013, p. 1406). Second, in higher-velocity environments, higher-order capabilities creating lower-order rules and processes may play an important role. Third, rules and processes constituting dynamic capabilities may be less or more specific warranting that the less-specific rules may more easily be retained in organizational memory (Peteraf et al., 2013), which would point to their sustainability, and thus the possibility of utilizing them in a systematic way (cf. Salvato & Vassolo, 2018). Finally, the rules and processes may become components of the dynamic bundles enabling sustained competitive advantage (Peteraf et al., 2013). For example, Pavlou and El Sawy (2011, p. 260) conducted empirical validation which indeed showed dynamic capabilities as a valuable capacity in organizations.

Finally, dynamic capabilities are often in particular connected to fast changing highly competitive environments, where the need for dynamism is pronounced for sustaining competitive advantage (Day & Schoemaker, 2016; Steininger et al., 2022). At the same time, the potential utility of dynamic capabilities also in other types of environments than turbulent and hyper competitive ones is recognized (Eisenhardt & Martin, 2000; Pavlou & El Sawy, 2011). This dissertation understands that digitalization creates disruption in many operating environments increasing the need of the capability for dynamisms in organizations. Thus, the assertion of the need to view dynamic capabilities through an integrative approach as interlinked phenomena (Peteraf et al., 2013) appears fitting. The next sections continue the discussion on dynamic capabilities from the perspectives of IS research and digitalization as well as their study in organizations.

2.4 Dynamic Capabilities in the Context of IS Research and Digitalization

In the beginning of the dissertation project, a literature review (Webster & Watson, 2002) on the dynamic capability research within the IS field was conducted (Vartiainen & Hansen, 2019) by aiming for a systematic review process (Boell & Cecez-Kecmanovic, 2015; Rowe, 2014), however, with a limited scope. The literature review resulted in the following four premises grounding the understanding (Vartiainen & Hansen, 2019): 1) capabilities as a research topic is complex by nature; 2) accounts of empirical studies on dynamic capabilities appear relatively scarce as opposed to theorizing papers especially in the strategic IS domain; 3) dynamic capabilities have been conceptualized in multifarious ways, and 4) the managerial perspective is dominant in dynamic capability research. In particular, the apparent scarcity of empirical dynamic capability research with multilevel approaches within the IS field (Vartiainen & Hansen, 2019) encouraged us to pursue this path in the search for further understanding on the diffusion of dynamic capability in organizations.

Overall, the dynamic capability view as an evolutionary approach revolves around organizations' adaption and transformation under changing conditions (Steininger et al., 2022). However, Steininger et al. (2022) recognized several issues with current dynamic capability research in the field of IS. One of the most relevant ones for this dissertation is the noted scarcity of studies other than firm-level investigations, which is said to obscure real-world complexity. Further, studies uncovering emergent effects from lower levels to higher levels would allow more nuanced views on the interdependencies between IT and dynamic capabilities (Steininger et al., 2022), which again could increase the understanding of the unfolding of organizational change. While the authors discuss the issues in the context of dynamics between IT and dynamic capabilities, the present researcher identifies these as issues relevant to dynamic capabilities research also in a broader sense.

Kraus et al. (2022) mapped the thematic evolution of digital transformation research in business and management and suggest a synergistic framework connecting the different areas of digital transformation research. The study finds that dynamic capabilities has been one of the most prominent areas of digital transformation research during the recent years. Particularly, in 2019 and 2020 dynamic capabilities constituted the topmost used keywords in business and management digital transformation research. Along with digital transformation, other prominent areas of research were structural changes and changes in value

creation, the use of digital technologies, consumer behaviour, and strategic responses. Overall, the number of research articles on digital transformation has grown steadily (Hanelt et al., 2021), and especially rapidly since 2018 (Kraus et al., 2022). These findings illustrate the current relevance of the research topic and that understanding dynamic capabilities in connection to digitalization is timely.

Further, dynamic capabilities has been recognized as a viable approach in IS research, and it is proposed a fruitful ground for further insight in the context of digital transformation as well (Vial, 2019). It is suggested that dynamic capabilities have the potential to contribute as a theoretical foundation to study digital transformation. In this thinking, the sensing capability is directed towards sensing *disruptions* invoked by digitalization, seizing them, and transforming the capabilities and the organization accordingly. Further, enabling strategic renewal requires engaging with digital transformation, which in turn is said to require specific mechanisms from organizations. Even if the viability of aiming toward sustained competitive advantages has been questioned in dancing and rugged competitive environments (Tanriverdi et al., 2010), the dynamic capability approach is deemed to fit well with the needs of continuous change caused by digitalization in environments of rapid change, environmental turbulence and intense competition.

Finally, research into the micro processes contributing to the development of dynamic capabilities, and explorations to "the nature of the work performed by actors" supporting the dynamic capabilities have been called for (Schilke et al., 2018, as cited in Vial, 2019, p. 134; Teece, 2007). The study of practices has been suggested a fruitful avenue to gain deeper understanding of the functioning and the mechanisms of dynamic capabilities overall and in the context of digital transformation (Vial, 2019; Wenzel et al., 2021). To sum, as digitalization and digital transformation introduce new opportunities, connections, and uncertainties to organizations, also new understanding on how dynamic capabilities emerge and become diffused across organizational functions is required. In the same vein, the notion of studying the relationships between high-level dynamic capabilities and the real-life practices by organizational actors (Vial, 2019) is relevant to the focus of this dissertation. Studying dynamic capabilities in organizations is discussed next.

2.5 Studying Dynamic Capabilities in Organizations

In the light of the previous discussion and also based on the feedback received during the dissertation process, the dynamic capability framework may show as a

relatively obscure set of various organizational capabilities that are seen as beneficial for organizations' ability to remain nimble and competitive in environments changing at different rates. This admittedly makes their study challenging. In the present dissertation, particularly two compositions of dynamic capabilities were found valuable for understanding their operation in practice, the defined set by Pavlou and El Sawy (2011), and the multi-level framework by Salvato and Vassolo (2018). This understanding has then been accompanied by other recent literature in the field. These perspectives are discussed next.

While significant progress has been made in both empirical dynamic capability research and the definition of the construct in recent years (Schilke et al., 2018), it has been argued that dynamic capabilities have been unclearly defined in IS research leaving "conceptual fuzziness" in the construct (Steininger et al., 2022, p. 451). Likewise, their study in the context of managerial decision-making and turbulent environments has been noted difficult due to the usage of the concepts in an overlapping and mixed manner (Pavlou & El Sawy, 2011). As a response, Pavlou and El Sawy (2011) formed a measurable model of dynamic capabilities in the context of new product development. By synthesizing literature, the authors propose a defined set of dynamic capabilities important for the reconfiguration of the ordinary capabilities of an organization to meet the needs stemming from the environment.

The named dynamic capabilities are *sensing*, *learning*, *integrating*, and *coordinating* which together represent the "identifiable and specific components of" dynamic capabilities (Pavlou & El Sawy, 2011, pp. 242–243). Interestingly, Pavlou and El Sawy (2011) draw from both, Eisenhardt and Martin's (2000), Teece and colleagues' (1997), and Teece's (2007) work on defining the set of identifiable dynamic capabilities. However, alone these dynamic capabilities are noted as insufficient, aligning with the thinking by Eisenhardt and Martin (2000). It also is important to note that these capabilities operate in reciprocal relationships rather than in a sequential logic (Pavlou & El Sawy, 2011).

This set of dynamic capabilities and their examples are summarized in Table 2. In the researcher's view, this set appears as holistic enough to be applicable in different settings, practical enough to be connected to actual organizational life, and nuanced enough to provide understanding of the type of phenomena to identify within the data. Therefore, this set of capabilities was found fitting as a lens, especially in the first case study of the overall doctoral research process (see Chapter 3).

Table 2. Summary of the set of dynamic capabilities, their definitions, and examples (applied from Pavlou & El Sawy, 2011, pp. 243–247).

Dynamic Capability	Definition / focus	Examples from literature
Sensing capability	"[T]he ability to spot, interpret, and pursue opportunities in the environment" based on generating, disseminating, and responding to market intelligence.	Exploration of new opportunities, identification of customer needs, and promotion of product innovation.
Learning capability	"[T]he ability to revamp existing operational capabilities with new knowledge" in a reciprocal relationship with the sensing capability.	Acquiring new knowledge, engaging in innovative problem solving, and driving new initiatives for enhanced creativity and proactivity.
Integrating capability	"[T]he ability to combine individual knowledge into the unit's new operational capabilities" to deploy them as a collective system.	Collecting, combining, and contributing individual input to a group-level, and building shared understanding, interaction, and interrelation for routinizing the new operational capabilities.
Coordinating capability	"[T]he ability to orchestrate and deploy tasks, resources, and activities in the new operational capabilities" supported by the integration capability.	Recognizing, assembling, allocating, assigning, and synchronizing resources, tasks, and activities for the deployment of the new operational capabilities.

It is hypothesized that the long-term quality of ordinary capabilities is dependent on the quality of dynamic capabilities, whereas ordinary capabilities are responsible for the production, and have a direct effect on performance at a given point in time (Pavlou & El Sawy, 2011). It is also concluded that dynamic capabilities influence performance indirectly and positively through the reconfiguration of ordinary capabilities, and that environmental turbulence reinforces this effect. Drawing from Daniel et al.'s analysis (2014, p. 99), these types of dynamic capabilities represent *first-order* dynamic capabilities, which "change resources and ordinary capabilities" in contrast to *second-order* dynamic capabilities, which in turn reconfigure the first-order dynamic capabilities. In these terms, the focus of this dissertation is in the interface and relationship between first-order dynamic capabilities and ordinary capabilities.

The view of dynamic capabilities operating in relationships among themselves and with ordinary capabilities (Daniel et al., 2014; Pavlou & El Sawy, 2011) – or as a combination of "broad organizational capacities and specific actions" (Yeow et al., 2018, p. 44) – lead us to a deeper examination of how and through what kind of processes this may happen. In other words, how dynamic capabilities operate, how they *become* in organizations (Tsoukas & Chia, 2002). For example, Yeow et al. (2018) made the interesting discovery of sensing, seizing and transforming being entangled

with the different phases of the aligning process of a new digital strategy leading to numerous tensions between strategy and resources.

In Vartiainen (2020) and Vartiainen (2023) studying dynamic capabilities was approached through their collaborative and socially accomplished nature drawing from Salvato and Vassolo's (2018) multilevel framework. In the framework, the interpersonal participation and quality of relationships and dialogue in the organization become central in the creation and enactment of dynamic capabilities. Of particular interest in this dissertation is the "interpersonal (meso) level" "dynamic interpersonal capabilities" between the organizational and individual levels (Salvato & Vassolo, 2018, p. 1734). According to the framework, dynamic interpersonal capabilities revolve around interpersonal participation and dialogue with degrees of candor, inclusion, confirmation and presentness (Salvato & Vassolo, 2018, p. 1734). They in turn impact on coordination, learning, and cohesion. If the dialogue is productive, solidarity and constructive opposition are said to result. In contrast, unproductive dialogue is noted to lead to conformism and non-involvement. Through intense participation and interpersonal relationships, the management are then able to advance and accept changes in the organization's resource base.

Other recent literature has also noted the important role of employees beyond the management in capability dynamism (Ghosh & Srivastava, 2022; Wenzel et al., 2021; Wohlgemuth et al., 2019). For example, the employee's role and participation in driving change is seen as a beneficial focus in dynamic capability research where the management are often emphasized (Wenzel et al., 2021). Wohlgemuth et al. (2019) discovered the positive influence of employee participation to dynamic capabilities. Ghosh and Srivastava (2022) showed the focal link between organizational culture with organizational innovation and dynamic capabilities. This implies that the management should invest in organizational culture of "openness and participation, result orientation and constructive dissent and trust" (Ghosh & Srivastava, 2022, p. 967). These in turn can be connected to organizational traits such as organic organizational designs (cf. Courtright et al., 1989), encouragement of social interaction, and formal and informal information sharing, diversity, and inclusiveness (Ghosh & Srivastava, 2022). In sum, the understanding drawn from the literature discussed in this chapter guided the process of the implementation and reporting of this study. The Research Method and Cases are presented next in Chapter 3.

3 RESEARCH METHOD AND CASES

The research approach of this qualitative multiple-case study (Taylor & Søndergaard, 2017; Yin, 2018) is an interpretive one (Klein & Myers, 1999) with the dual aspiration of contributing to answering to real-world problems and creating insight for theory (Mathiassen, 2017). The method applied can be divided into two parts, theoretical and empirical.

The theoretical part consists of two streams. First, reviewing literature in a narrative style to understand the relevant body of knowledge (Boell & Cecez-Kecmanovic, 2015; Rowe, 2014; Webster & Watson, 2002) has been ongoing throughout the dissertation project. Second, to ground the empirical study with a more systematic theoretical understanding, a literature review with a systematic approach (Boell & Cecez-Kecmanovic, 2015; Rowe, 2014; Webster & Watson, 2002) was conducted in the initiation stage of the dissertation project. The latter literature review is accounted for in Publication 1 (Vartiainen & Hansen, 2019) and summarized in Chapter 4 while briefly referred to already in Chapter 2. The empirical part of the study followed a multiple-case study methodology producing the Publications 2–5, and the previously unpublished Case Report. These will also be summarized in Chapter 4.

This chapter focuses on the methodology and cases of the empirical part. The section describes the overall research method of the multiple-case study, introduces the application of the interpretive IS research approach, presents the cases in detail, and discusses the ethical considerations. The Figure 2 provides an overall timeline of the dissertation project from 2017 until 2023. The black lines in the figure denote the overall research phases. The green lines denote the field work and data collection with the case companies. The blue lines denote the research output as is included in this dissertation.

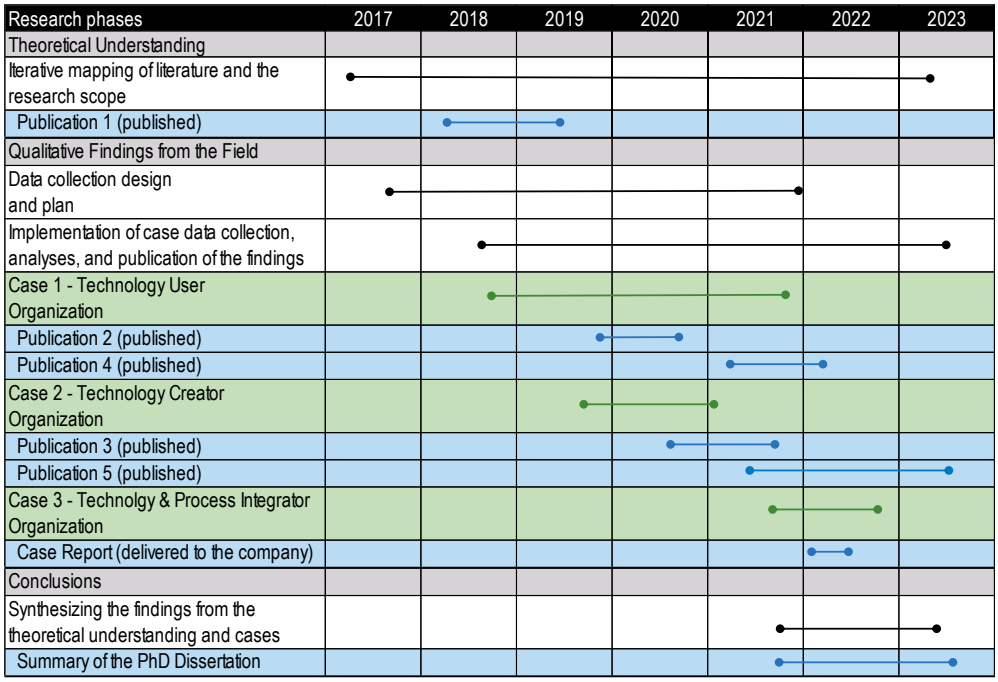

Figure 2. Timeline of the doctoral dissertation project and the research phases in 2017–2023.

3.1 Research Method of Multiple-Case Study

The empirical part of the research was conducted as a qualitative, interpretive multiple-case study (Eisenhardt, 1989; Klein & Myers, 1999; Walsham, 1995; Yin, 2018). Even though Yin has been regarded to implicitly lean towards the positivist tradition (Walsham, 1995), his work was followed as an acknowledged general guideline on how to conduct case study research. The case study method was chosen, especially as this dissertation poses a "how" type of research problem investigating a complex phenomenon which requires in-depth understanding from organizations in order to produce new theoretical and practical insights (Walsham, 1995; Yin, 2018, p. 4).

The empirical part consists of three case studies which together explore the complex topic of dynamic capabilities from different perspectives. The cases represent different industries and types of organizations in the business-to-business sector each of them thus having a different position in relation to technology. Case 1 is a user organization of technology ("Tech User"). They utilize software, IS, and other technologies supplied by external companies in their processes and service

offering. Case 2 is a creator organization of technology ("Tech Creator") with broad operations in software R&D of information and communication technology products. Case 3 is an integrator organization of processes and technology ("Tech Integrator") combining their expertise, own software, and those of other operators to create value for their customers.

Each case study was implemented as an independent but a connected sub-study with the aim to shed light on the puzzle of dynamic capability diffusion in the context of digitalization. Case 1, "Tech User", was implemented with a longitudinal approach focusing on selected and connected functions of the organization. Case 2, "Tech Creator", investigated two different company locations of the same organizational business area. Where Case 2 represents a broad view into the life of a large and globally networked organization, Case 1 can be characterized as a deep and longitudinal dive into a smaller organization with regional networks. Case 3, "Tech Integrator", was implemented as a focused, reflective benchmarking study aiming to enrich the overall findings together with the other cases in one limited interview round. The researcher's position in the case organizations while conducting the research (cf. Walsham, 1995) is addressed in Section 3.5 under each case description.

By this selection and design of the cases, the aim was to explore the research problem from different angles to gain rich insight into the multifaceted problem area. Each case contributed a unique understanding from the different perspectives of digitalization. As will be discussed in more detail, the investigation in Case 1 revolved around digital transformation efforts at an organizational functions' level. Case 2 took place in a technology-intensive operating environment, in which digitalization – availing of it and producing it – can be seen inherent in their entire operation. In this sense, Case 3 as an integrator is positioned in between these two. On the one hand, the company is managing digital transformation efforts at a project and organizational level, and on the other hand, it is enhancing digitalization in the context of their industry.

In relation to the number of cases, Eisenhardt (1989, p. 545) recommends studying from four to ten cases to achieve convincing findings of empirical grounding. While this study encompasses three case organizations, the multiple research cycles, and the resulting publications and report as part of the dissertation, resemble embedded "mini-cases" (Eisenhardt, 1989, p. 545) complementing the overall number of cases. On the contrary to this Eisenhardt's much cited view, Sarker (2021) notes that a small number of cases may be preferable to distinguish case study from survey study and to retain its rigour. With these views, it is contended that the number of cases and research cycles in this dissertation are sufficient. It can be seen

that the individual Publications 2–5 form the single-case analyses (Chapter 4), and the synthesized findings yield the cross-case analyses (Eisenhardt, 1989; Yin, 2018) of the dissertation (Chapter 5).

Finally, Table 3 provides an overview of the cases and the number of interviews. Each case has their unique contexts (cf. Davison & Martinsons, 2016; cf. McLaren & Durepos, 2021) which are introduced in more detail in Section 3.5 after first covering the application of theory and interpretive IS research in this dissertation, and the overall data collection and analyses common to all the three cases.

Table 3. Overview of the cases.

Case	Type	Industry	Scope of operation	Time of data collection	Number of interviews
Case 1: Technology user organization ("Tech User")	Longitudinal with three data collection cycles in two company locations; researcher simultaneously in a separate development project work role within the organization	Logistics and procurement, public sector, business-to-business (B2B)	Regional	2018-2021	Cycle 1) 14 Cycle 2) 14 Cycle 3) 12 In total: 40 interviews with 17 different informants
Case 2: Technology creator organization ("Tech Creator")	Cross-sectional with two locations – India and Finland – of data collection; researcher as an outsider researcher	Software R&D of information and communication technologies (ICT), private sector, B2B	Global	2019-2020	Location 1) 7 Location 2) 8 In total: 15 interviews with 15 different informants
Case 3: Technology and process integrator organization ("Tech Integrator")	Cross-sectional with a single location of data collection; researcher as an outsider researcher	Technology and process consulting, private sector, B2B	National	2021-2022	Cycle 1) 4 interviews with 4 different informants
Total number of interviews and informants across the three cases			59 interviews with 36 informants		

3.2 Application of Theory and Interpretive IS Research

Inspired by Walsham's (1995) description of interpretive case research in the IS field, in reflecting on how theory was used in this dissertation Eisenhardt (1989) is followed. First, theory was used as an "initial guide to design and data collection" (Eisenhardt, 1989, as cited in Walsham, 1995, p. 76) by crafting tentative "a priori specification[s] of constructs" under study (Eisenhardt, 1989, p. 536). However, in contrast to Eisenhardt's goals, this researcher aimed to map and ground the study, rather than achieve accurate measures of constructs. For example, the nature of dynamic capabilities, and the demarcation between digitalization and digital transformation at different levels of the society proved profound to be explored.

Second, theory was utilized iteratively to compare the initial findings with existing theory in order to identify potential familiar patterns and new insights (cf. Eisenhardt, 1989). In contrast to the guidelines provided by Eisenhardt, the present study aimed to shape no hypotheses by iterating with their self-generated theory. Rather, the goal was to identify where the findings align with what is already known, and where something new emerges. In addition to aiming for new theoretical contributions, the goal of familiarizing oneself with theory was to remain aware of the landmarks of the *area of concern* (Mathiassen, 2017), and to remain vigilant against jumping to hasty conclusions (Eisenhardt, 1989), or becoming absorbed in details that are already known in the current contexts. Following Deetz's (1996, p. 191) notion of using dimensions "as a way of focusing attention rather than as means of classification", theory was utilized in a similar way in this dissertation. In this sense, abductive reasoning (Kennedy & Thornberg, 2018; Taylor & Søndergaard, 2017) was employed in creating new insights to existing theory.

In line with the interpretive research tradition, organizations are here perceived primarily as social sites, as communities sharing some characteristics, and people as "active sense makers" (Deetz, 1996, pp. 201–202). Indeed, human and social issues are understood as important in study of IS related phenomena (Walsham, 1995). However, making sense of the conceptual structures of an organization under study may be difficult for a researcher entering the field (Walsham, 1995). Therefore, the thick and rich data obtained by interviews as the primary source of data (Eisenhardt, 1989; Taylor & Søndergaard, 2017; Walsham, 1995) were availed of, which is typical of interpretive research (Walsham, 1995). This helped both to create an understanding of the human and social side of organizational capability development in the context of digitalization and grasp the conceptual structures of the organizations. During the dissertation project, the concepts utilized were reflected

on together with the case organizations. The concepts and the way they were utilized were also adjusted during the research process. These conducts aimed to support the availing and generation of local and emergent knowledge in the creation and reporting of the new insights, in line with Deetz (1996).

Finally, following the thinking by Walsham (1995), the use of some of the case study research literature in this dissertation showed somewhat challenging due to their orientation toward the positivist research tradition. However, the valuable guidelines concerning areas such as the role of theory (Eisenhardt, 1989) and case study design (Yin, 2018) were adopted as applicable. Throughout this study, the Principles for Interpretive Field Research (Klein & Myers, 1999) were utilized in guiding the research path. In the next section, together with the overall data collection and analyses, the use of the principles is described.

3.3 Data Collection and Analyses

In line with the description in the preceding section, the main data collection method was that of qualitative semi-structured interviews. The interviews were coordinated together with the case-company contact persons. The case-company contact persons were managerial level senior professionals with research and development-oriented tasks in the organizations. Managerial level contact persons were important in initiating the participation of each organization, as they had the capacity to evaluate the usefulness and fit of the study with the organization's goals and operation. The contacts helped introduce the research in the organization to the potential interviewees or more broadly in the organization depending on the case. The initial contact persons were identified through the networks of the researcher or the supervisor as potentially suitable collaborators for coordinating the doctoral case-study participation.

After the initial discussions, the contact persons helped to identify further contacts, and suitable interviewees based on the research goals described by the doctoral researcher. The contact persons guided in the selection of the interviewees, and depending on the case, they either made the first contact to the invited informants, or the researcher contacted them directly. The common selection criteria for the interviewees were their knowledgeability and openness to discuss the research topic (cf. Kumar et al., 1993). The aim was to interview organizational members with a variety of perspectives and from different work roles related to organizational

capability development in digitalization. The inviting of the interviewees is described in more detail under each case in the subsequent sections.

Overall, the interviews were designed around central themes to the research topic. The common themes to all the cases were: *changes in the organization and work*, *key competences and capabilities*, and *digitalization and utilization of IT/IS in the organization*. The themes were adjusted to fit each case organization and complemented with additional themes based on the organizational context. Examples of such themes would be *collaboration and knowledge sharing*, *organizational goals and vision*, and *practices of continuous improvement*.

The collected interview material was complemented by planning sessions and email exchanges with the contact persons prior to the interviews. Reporting sessions of the findings after the interviews and analysis of the collected material were, likewise, conducted. These sessions, on the one hand, contributed to the research design and implementation by allowing the researcher to incorporate real-world problems (Mathiassen, 2017) of the organizations to the interview plan. On the other hand, the sessions allowed the findings to be validated, commented, utilized, and elaborated by the practitioners. This way usefulness to practice with scientific rigor (cf. Grover & Niederman, 2021) was aimed for. Later in the research process, the contact persons were also asked to comment on the publishable research output manuscripts.

Data analyses were all conducted as qualitative thematic analysis guided by grounded theory (GT) methodology (Corbin & Strauss, 1990; Urquhart, 2013). The GT methodology was employed as guidelines for the systematic coding process of the qualitative data. GT literature provided a practical and fitting frame for analysing rich qualitative data, and it was especially helpful in the coding process. In most cases, an inductive approach (Urquhart, 2013) was taken first, after which the data were analysed again with an abductive approach (Kennedy & Thornberg, 2018) which has been noted as fitting for case research (Taylor & Søndergaard, 2017). As the tools supporting the data analyses, Atlas.ti and Microsoft Office software were utilized.

In the inductive analyses, the data were taken as the starting point, and the findings were built from "the ground up", from fragments of data towards broader categories and conclusions (Urquhart, 2013, p. 8). In this phase, the data were treated as much as possible without posing concepts, categories, or "outcomes a priori" (Kennedy & Thornberg, 2018, p. 51). Abductive reasoning, then, underlies creative interpretive processes and can be combined with techniques, such as thematic analysis (Taylor & Søndergaard, 2017). Abductive reasoning involves viewing

previous research as an established baseline, which is then viewed by "theoretical sensitivity" to create new understanding on the studied phenomena (Email conversations with Mäkelä, 2013, as cited in Taylor & Søndergaard, 2017, p. 112). In the abductive analyses, fragments of data as well as the initial coded categories were explored in reflection to literature, such as the existing dynamic capability frameworks (e.g., Salvato & Vassolo, 2018), or the theory of normalizing new practices in organizations (May & Finch, 2009, as cited in Carroll & Conboy, 2020).

This way the researcher aimed to gain a complete picture of the data which in part were relatively complex due to their richness and multifaceted nature. This dual approach was deemed in accordance also with the Principles for Interpretive Field Research in IS, including the hermeneutic circle of alternating between examining parts of the data and the whole they form (Klein & Myers, 1999). The next section summarizes the principles and demonstrates how each of them was applied in the dissertation before moving on to describing the cases in this study in detail.

3.4 Principles for Interpretive Field Research and their Application in the Dissertation

In this section, the researcher briefly outlines how the Principles for Interpretive Field Research in IS (Klein & Myers, 1999) were utilized in guiding and conducting the data collection and analysis of this study. In the text, each principle with its description is listed followed by examples of their application in the dissertation. It is noted with interest that the first principle, that of the hermeneutic circle, has similarities with Eisenhardt's (1989, p. 541) "constant comparison between data and constructs". However, it seems that Eisenhardt (1989) compares data with theoretical constructs, whereas Klein and Myers (1999) encourage making comparisons within the data themselves.

1. The Fundamental Principle of the Hermeneutic Circle

- **Description:** "[A]ll human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form" (Klein & Myers, 1999, p. 72).
- **An example of the application in the dissertation:** Throughout the study, the interview data collected were iteratively interpreted as individual fragments coded at a detailed level, and as higher-level

categories formed of several codes as representations of the phenomenon under investigation.

2. **The Principle of Contextualization**
    - **Description:** "[C]ritical reflection of the social and historical background of the research setting, so that the intended audience can see how the current situation under investigation emerged" (Klein & Myers, 1999, p. 72).
    - **An example of the application in the dissertation:** The final and thus the most advanced Publication 5 explicitly discusses and defines the context of the study within the historical context of the industry in question.
3. **The Principle of Interaction Between the Researchers and the Subjects**
    - **Description:** "[C]ritical reflection on how the research materials […] were socially constructed through the interaction between the researchers and participants" (Klein & Myers, 1999, p. 72).
    - **An example of the application in the dissertation:** Throughout the study, the researcher aimed to maintain an open, curious and neutral approach while interacting with the participants. The interaction between the researcher and participants is reflected on in the case descriptions. Additionally, in the final company report of the longitudinal Case 1, "Tech User", a section was devoted to discussing the position of the researcher within the organization.
4. **The Principle of Abstraction and Generalization**
    - **Description:** "[R]elating the idiographic details revealed by the data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social action" (Klein & Myers, 1999, p. 72).
    - **An example of the application in the dissertation:** While the company reports delivered to the case organizations at the end of each research cycle focused on the practical implications, in the publications and dissertation "the idiographic details" of the cases are discussed in reflection to theory and each other explicating their theoretical contribution.

5. **The Principle of Dialogical Reasoning**
    - **Description:** "[S]ensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings […] with subsequent cycles of revision" (Klein & Myers, 1999, p. 72).
    - **An example of the application in the dissertation:** The researcher adjusted the research mindset when it became apparent that by asking interview questions related to capability development directly, the responses by informants provided less insight than when asking interview questions on related topical organizational phenomena, in other words, investigating *around* capability development.
6. **The Principle of Multiple Interpretations**
    - **Description:** "[S]ensitivity to possible differences in interpretations among the participants" (Klein & Myers, 1999, p. 72).
    - **An example of the application in the dissertation:** To address the different interpretations, participants from different work roles were interviewed. Additionally, the potential differences were noted in the company reports stating that the findings are interpretations of the researcher based on the analyses of the data, and that one phenomenon may appear differently and with different emphasis depending on the perspective, including aspect such as the work role, situation at hand, and subjective views.
7. **The Principle of Suspicion**
    - **Description:** "[S]ensitivity to possible "biases" and systematic "distortions" in the narratives collected from the participants" (Klein & Myers, 1999, p. 72).
    - **An example of the application in the dissertation:** The findings were presented to the case organization representatives with the aim to receive critical comments on their reliability. The comments were received in an elaborative manner, and they were considered while finalizing the findings.

3.5 Cases in This Study

The cases in this study and the specific research choices are presented in the following subsequent sections. Each section first describes the case organization, then moves on to the case-specific considerations and, finally, provides summarizing figures of the work conduced with each case.

3.5.1 Case 1: Tech User

Case 1, "Tech User", is a company in the industry of logistics and procurement services, and it operates within the public sector. At the time of the study, its main customers were public sector organizations, such as schools and hospitals. The company operates regionally in Finland, and at the time of the study it had approximately 200–300 employees in three different locations. The company has both operative-intensive and knowledge work-intensive roles. The first cover, for example, purchasing, warehousing and transportation related responsibilities, and the latter concern process design and development as well as managerial duties. Characteristic to the tasks is that most of them lie in the interface of operative and knowledge work, especially due to digitalization of operations.

The company uses a wide array of digital technologies in their operations. During the longitudinal research period of 2018–2021, the organization strongly developed their facilities, processes, and IS landscape. For instance, a new warehouse management system with warehouse automation, and a new webstore were implemented, which meant replacing significant parts of their on-premises Enterprise Resource Planning (ERP) system with cloud-based Software as a Service (SaaS) systems. This implied many new and changing processes, new ways of working, new data points, and new types of collaborations with customers and system suppliers.

During the study, the researcher participated in one of the development projects in a separate work role, and the researcher was familiar with the organization and its operations. The decision was made to treat the researcher and the development project roles as separate as possible. The aim of this conduct was to minimize bias and overlapping responsibilities by aiming to distance oneself from the organization while conducting research activities. In this sense, the researcher moved between the roles of 'researching practitioner' and 'practicing researcher'. Thus, the roles of a development project participant and a doctoral researcher were separate but enacted

by the same person. While conducting the data collection, the researcher aimed to refrain from commenting the development initiatives from a project participant's perspective and to remain as neutrally as possible in the researcher role. This was endorsed by the formal presentation of the research goals and practices with the aim of the informants identifying the interview situation as different from project work situations.

This kind of a researcher position has some benefits and risks for the study (Walsham, 1995). In this case, as the researcher was familiar with the research environment, it was possible that the informants shared more nuanced views than if the researcher were a complete outsider. Similarly, the researcher may more easily identify relevant and in-depth issues to discuss in the interviews. The risks include that both the informant and the researcher assume something from the other one's knowledge or views resulting in false assumptions. This risk was addressed by the researcher asking also about things that seemed self-evident at the outset, as well as asking the informants regularly to elaborate and explain things further. In the mind of the researcher, this conduct appeared to work relatively well. In this case, discussing the findings with the organization and the management was deemed especially important for the validity of the findings.

Overall, the case study was conducted with a collaborative approach in a way that the researcher had the lead role in designing the goals and implementation. The initial list of the potential informants was agreed upon with the contact persons, after which the researcher independently invited and scheduled the interviews with those who wished to participate. The invitations were sent by email and the letter contained a formal description of the doctoral study and the interview session. The goal was to interview the same group of informants in altogether three data collection cycles. The scope of the interviews in the organization was limited to areas related to materials management, procurement, and support functions. While some changes to the group of informants took place during the study, the majority of the participants remained the same allowing continuity in the data collection.

Prior to starting the individual, semi-structured interviews, three group discussions were held with the management and selected supervisors in order to gather initial understanding of the problem domain and its vocabulary. Changes to the interview structure were made according to the feedback received to support the communication between the researcher and the informants, and the relevance of the interview questions to the daily organizational life of the informants. Similarly, the contact persons commented on the research plan and the findings. Additionally, the informants had a chance to comment and review the initial findings. While

commenting, also critical notes were received which challenged the researcher's thinking in a fruitful way. As part of this dissertation, the published findings from the present case in Publications 2 and 4 will be summarized in Chapter 4. Figure 3 provides an overview of the data collection and reporting in Case 1.

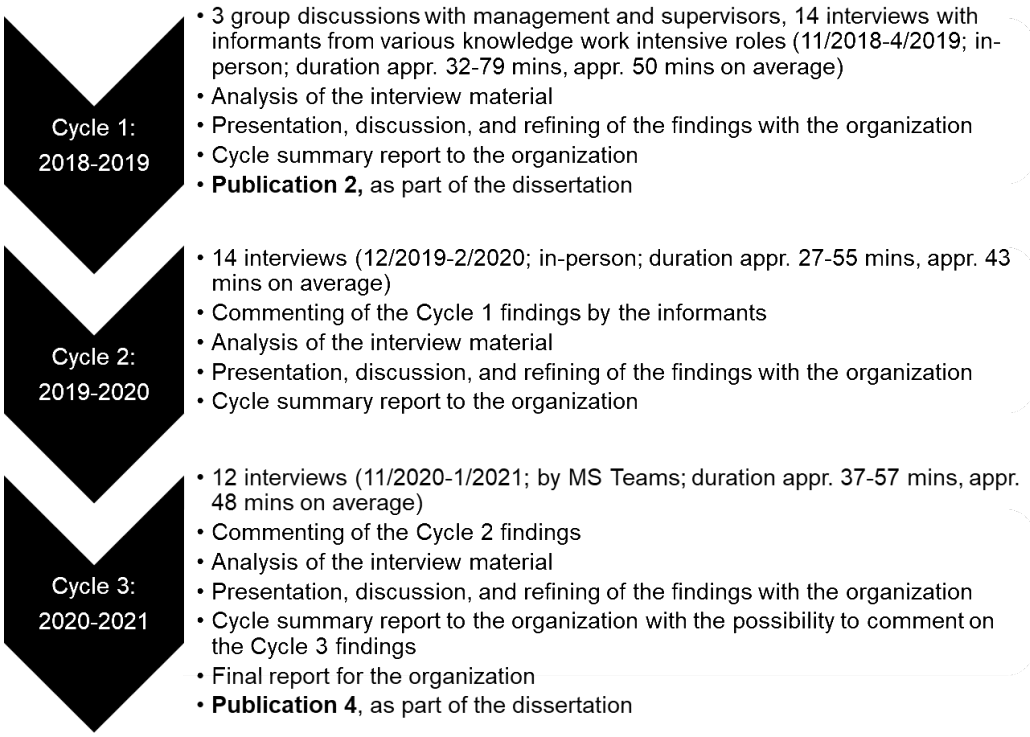

Figure 3. Overview of the longitudinal research implementation with Case 1.

3.5.2 Case 2: Tech Creator

Case 2, "Tech Creator", is a large, globally operating company within the field of complex B2B ICT products. The company operates in more than 100 countries and employs tens of thousands of employees. The case study focused on the software R&D and related functions within the company. Characteristic to the organization is its globally networked, multi-site way of organizing its software R&D activities with combinations of different distributed sourcing strategies (Prikladnicki & Audy, 2012) of work. The organization maintains an advanced set of global software development capabilities and sophisticated R&D processes. The company is used to

working in an environment with collaborators from different backgrounds and cultures, and the organizational members are accustomed to changing work settings. The portfolio of products they produce is technologically highly complex, and so is their operating environment. With this background, this case was found fitting for representing the perspective of a complex environment within this dissertation.

The study was conducted in two interview rounds in two locations of the organization, India, and Finland. Prior to the interviews, planning sessions were held with the company contact persons from both locations. The study scope, interview themes, and the selection of the interviewees were coordinated together with the company contact persons across the two locations. Depending on the location, the contact persons initially informed the potential informants of the invitation-to-come, after which the researcher sent the formal invitation and the description of the doctoral study and the interview session to the interviewees, or the contact persons coordinated the invites and the timings directly with the informants.

In this case, the researcher's position was that of an outsider researcher without a practitioner role (cf. Walsham, 1995). However, the researcher had familiarity with the research topic from previous research endeavors in a similar problem domain, where capabilities, efficiency, and performance of globally distributed software development teams were examined (Kamaja et al., 2016). This was helpful for the understanding of the complex research environment, conducting the study, as well as drawing and evaluating the findings. Additionally, the interviews conducted with Indian participants posed a special condition due to the numerous cultural and language differences at play (Palvia et al., 2020) between the researcher and the expert informants. The researcher's previous in-person experience in the Indian context (Löytty, 2016), and the well-grounded interview situations by the company contact persons from both the Indian and Finnish sites alleviated this condition. Again, the findings were discussed with the contact persons from both of the sites to enable highlighting any criticism and potentially conflicting viewpoints.

The researcher drafted the initial interview structure based on the overall research objectives in the context of globally distributed software R&D work, and previous experience gathered on the similar problem domain (Kamaja et al., 2016; Löytty, 2016). The drafted interview structure was complemented by comments from the organization to attain practical relevance and addressing of the real-world organizational problems (Mathiassen, 2017). After the interviews in each location, the analysis was conducted, and the findings reported to the organization either in remote or physical meeting sessions or by email conversations. The elaborative comments received were incorporated in the findings. After reporting to the

company, the main findings were presented in the Publications 3 and 5, as will be discussed in Chapter 4. Figure 4 provides an overview of the data collection and reporting in Case 2.

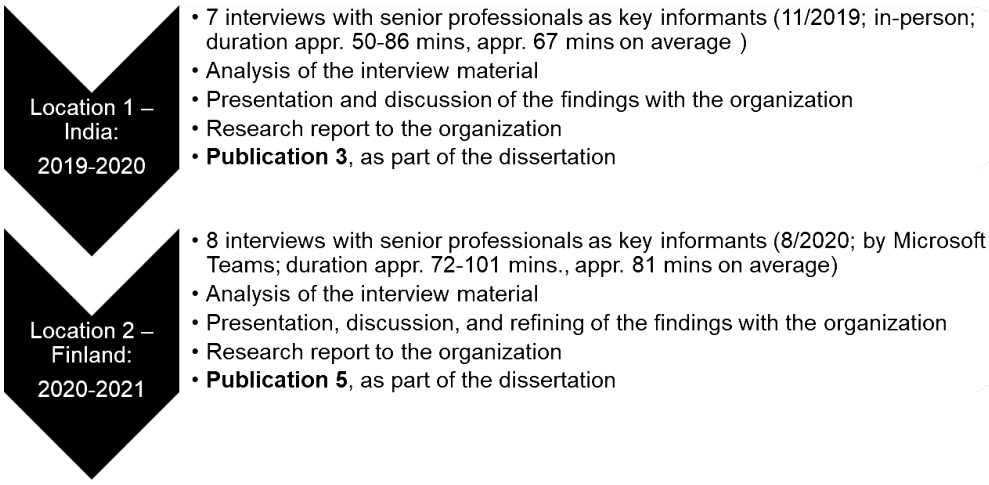

Figure 4. Overview of the research implementation with Case 2.

3.5.3 Case 3: Tech Integrator

Case 3, "Tech Integrator" is a small-to-medium-sized organization operating nationally in Finland in the field of consulting and systems services to organizations, who aim to digitalize their processes. The organization operates in project-oriented industries, such as construction, where project-based work with subcontractor networks is common. While the organization itself is a relatively young operator within its industry, its personnel are experienced in the field. The organization functions as an expert facilitator of organizational digitalization efforts in collaboration with the personnel of its client companies. Characteristic to Case 3 is its operation in the interface of evolving multi-party company networks and ecosystems. The perspective of the case in this dissertation is a complementary and reflective one in relation to the more in-depth investigations in Case 1 and Case 2.

In Case 3, the researcher was an outsider conducting interviews (cf. Walsham, 1995). While the collaboration with the case organization was initiated through the networks of the researcher, the organization itself was relatively new for her. However, the operational domain of the organization was somewhat familiar to the researcher which enabled the use of common concepts and an understanding, for

example, of processes and the potential related challenges. Like with the other cases, the participation to the study and the planning of the interviews were conducted together with the company contact person, which helped the researcher to familiarize herself with the operation model and organizational goals.

Based on the collaborative planning discussions with the company contact person, an initial interview structure was drafted. The interview structure was then refined considering the comments and suggestions received from the contact person. The contact person initially informed the potential informants of the invitation-to-come. After that the researcher sent the formal invitation and the description of the doctoral study and the interview session to the interviewees.

The interviews were conducted over Microsoft Teams, after which the material was analysed, and the findings reported to the company. The findings of the case are discussed in this dissertation in a reflective manner based on the Case Report summary with no publications currently attached. Therefore, this case serves as a reflective benchmarking study with the aim to enrich the overall picture. Figure 5 provides an overview of the data collection and reporting in Case 3.

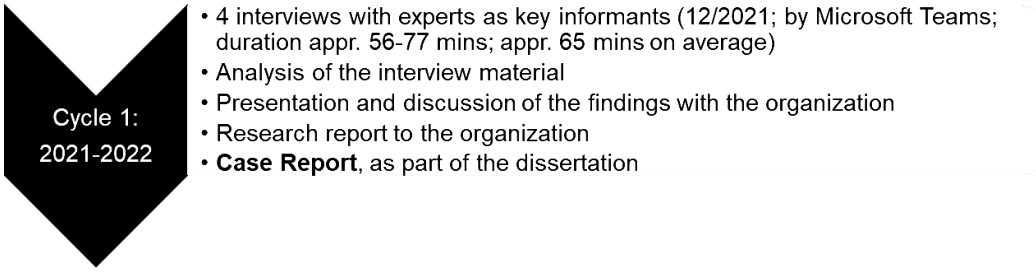

Figure 5. Overview of the research implementation with Case 3.

3.6 Ethical Considerations

Research ethics were considered throughout the dissertation project. The researcher finds ethical issues in research of utmost importance, and the Tampere University Research Ethics study materials were utilized in guiding the conduct in practice. For example, Resnik's (2020), Zahle's (2021), and Bueter's (2022) works were utilized together with the more detailed guidelines, such as the EU General Data Protection Regulation (EU-GDPR) (European Commission, n.d.). Next, the main points of this conduct are briefly summarized.

First, all the research participants were treated by greatly respecting them and the time they were willing to commit to the study. The consent of participation was obtained by email exchange, and it was openly communicated that participation is voluntary during the interview situation. The informants were given the opportunity to interrupt the interview anytime and skip topics they felt they had no knowledge of or which they were otherwise unready to share views about. The researcher also communicated to the participants that the raw interview material and the personal data in the research registry were treated as confidential.

The data handling of the research registry was conducted according to this study's Data Management Plan, as was agreed with the case organizations, and finally as outlined in the research Privacy notice in accordance with the GDPR. The handling of the data, and the utilization of the findings were described to the participants prior to the interviews. The participants were encouraged to ask questions if any arose. In the reporting of the findings, the ethical principles outlined by Resnik (2020) such as honesty, integrity, and carefulness were applied. The ever-present risk of bias (Bueter, 2022; Zahle, 2021) was acknowledged, and measures such as described in the section 3.3 on Data Collection and Analyses, and 6.3 on Reliability, Validation, and Generalization were taken to address the risk.

4 SUMMARIES OF THE PUBLICATIONS AND CASE REPORT

This chapter summarizes the research output in the form of the five publications and the one previously unpublished case report. The chapter is organized by the publications starting with Publication 1, which is a literature review. The chapter then summarizes the publications of Cases 1 and 2, and the report of Case 3. The Publications 2 (Case 1) and 3 (Case 2) highlight challenging areas whereas the Publications 4 (Case 1) and 5 (Case 2) highlight enabling factors. The Case Report (Case 3) moves across from challenging areas to enabling factors. The methods section of each publication is omitted for the purpose of concise presentation. The interested reader can find them in the appendices as part of the original publications. Following Eisenhardt's terms (1989, pp. 539–541), the publications represent within-case analyses, whereas Chapter 5 presents the findings in a cross-case manner in this study.

4.1 Publication 1: Literature Review on Dynamic Capabilities in Strategic IS Research

In search of an understanding of dynamic capabilities and the most fitting approach for their study, a literature review was conducted, and it was first presented in Publication 1, "Dynamic capabilities in information systems research – A literature review" (Vartiainen & Hansen, 2019). The review was conducted with a systematic approach but a limited scope by utilizing the Scopus database. The goal was to attain an informed view of the current state of dynamic capability research in the IS field, and to conceptualize the construct of dynamic capabilities for the purposes of this study and for a wider audience. The primary and secondary research questions guiding the review were: *1) How are dynamic capabilities conceptualized in strategic IS research? 2) To what extent have dynamic capabilities been examined a) empirically, and b) with multilevel perspective within the IS field?*

As the main finding to the primary research question two dimensions of conceptualizations were identified. First, dynamic capabilities can be understood as

relative to an organization's state and environment encompassing an organizational requirement to change. Second, dynamic capabilities *relate to an organization's attributes and actions, such as competences, skills and practices and processes*. Both of the dimensions were identified to simultaneously be utilized as a basis and a contributor to organizational development. This bears resemblance to Pavlou and El Sawy's (2011, 247) critical observation that "dynamic capabilities are often confounded with their effects".

For the secondary research question, it was concluded that empirical multilevel research of dynamic capabilities within the IS field appeared relatively scarce. As a conclusion, it was deemed necessary to pursue more understanding of the functioning of dynamic capabilities in this context. Thus, a multilevel approach of research was anticipated fruitful. The method, analysis, discussion, and findings are accounted for in full detail in Publication 1, which can be found as an appendix at the end of this dissertation.

4.2 Case 1 – Publications

The following publications examine the research problem from the perspective of an organization going through a renewal of their operational landscape, including systems, processes, and facilities to an extent that is here understood as digital transformation. By these publications it was, firstly, uncovered how the members of an organization perceive the many concurrent changes, and secondly, how they faced the sudden shift to a hybrid working mode enforced by an external shock, the Covid-19 pandemic. From these materials, factors hindering and facilitating change capacity in the organization were derived. These issues were discussed respectively in Publications 2 and 4, which are summarized next. The publications highlight the importance of reciprocity and interplay between organizational members in navigating through change and, in the process, fostering dynamic capability in an organization.

4.2.1 Publication 2: The Reciprocal Relationship of Ordinary and Dynamic Capabilities during Transformation

These findings were first presented in Publication 2, "In search of the "how" of dynamic capabilities in digital transformation: Contradictions as a source of

understanding" (Vartiainen, 2020). This sub-study approaches the research problem by asking *how organizations' dynamic capabilities develop in digital transformation*. To answer the question, strengths and pain points having a central role in supporting and hindering change in the case organization were identified and discussed. The strengths and pain points formed three types of contradictory phenomena the organization appeared to be tied with during the transformation process. The transformation included large changes in the organization, its technological landscape, facilities, and processes. Thus, it can be described as significant.

While collecting the data by semi-structured interviews, the organization was at the early stages of the change process. The initial aim was to understand how organizational development, key competencies, capabilities, and technology use were perceived in the organization. The findings were derived with an inductive approach, and systematic coding of the data with the support of grounded theory guidelines (Corbin & Strauss, 1990) and the hermeneutic circle of IS field studies (Klein & Myers, 1999).

The discovered contradictory phenomena appear on three levels, as contradictions in work development, contradictions in organizational development, and contradictions in technological development. In the work development, the strength of *aspiration toward expertise* appeared to be in tension (cf. Yeow et al., 2018) with the challenge of *obtaining room for development in everyday work*. In the organizational development, the *perception of the organization moving forward* appeared as supportive of change. However, *sustaining the manageability of change* was perceived as a simultaneous challenge. Finally, the supporting factor of *openness to utilizing technology and data in new ways* faced the challenge of *utilizing technology to the fullest*. In reflection to the previously discussed literature and Pavlou and El Sawy's (2011) set of dynamic capabilities, the capabilities of sensing, learning, integrating, and coordinating enable reconfiguring the existing ordinary capabilities of an organization in an intertwined manner. In this case, the suggested influence of the identified contradictory phenomena to the dynamic capabilities is summarized in Table 4.

Table 4. Summary of the main findings in Publication 2 (adapted from Vartiainen, 2020).

Contradictions in	Suggested influence on
Work development Aspiration towards expertise vs. Challenge of obtaining room for development in everyday work	Strengthening and diversifying the existing capabilities Learning and integrating new expertise in process areas under transformation Identifying new practices or capability gaps through the existing and renewing processes Primarily related to improving through everyday work (cf. learning, integrating)
Organizational development Perception of the organization moving forward vs. Challenge of sustaining the manageability of change	Creating a deep and shared understanding of changes Making sense of the goals and implications of change Primarily related to changing the processes driven by systematic, project-type development (cf. integrating, coordinating)
Technological development Openness to utilizing technology and data in new ways vs. Challenge of utilizing technology to the fullest	Deepening the understanding of system functionalities and workflows Broad utilization of organizational expertise Identifying novel uses of technology Primarily related to the interaction of system development and organizational development (cf. learning, integrating, coordinating, sensing)

Integral to these findings appears to be the necessity of understanding and participation across an organization. However, it appears that a heightened understanding of the reasons and goals of change, its status, and expectations to employees is required to smoothly adopt initiatives that inflict complex concurrent changes in the existing processes. At this point, the important components of "intense participation" and "productive dialogue" (Salvato & Vassolo, 2018) meet the dynamic capabilities of learning and integrating (Pavlou & El Sawy, 2011). The findings suggest that the former strengthen and help realize the full potential of the latter in the interactions among and between management and other employees.

Further, this kind of a dynamic interpersonal capability (Salvato & Vassolo, 2018) seems to become even more highlighted during transformations, where detecting and voicing out silent signals of both opportunities and threats within the changing processes may be crucial. Understanding of both the "what", that is the goals of the change, and the "how" of reaching the aspired state enables systematic and informed development within the organization. Thus, steps can be taken both incrementally at the everyday-task level and as project-driven initiatives.

In further reflection of Publication 2, the findings point toward a reciprocal relationship of ordinary and dynamic capabilities. In contrast, a lack of this

understanding may result in "sporadic" and "disjointed" activities warned of by Salvato & Vassolo (2018). It is, thus, drawn that dynamic capabilities should indeed be looked at as a multilevel construct which can help drive the organization forward with commonly understood goals. Thus, dynamic capabilities beyond the strategic level in today's digitally transforming world appear essential.

4.2.2 Publication 4: Organizational Interplay as an Enabler of Rapid Learning in an External Shock

These findings were first discussed in Publication 4 "Shifting to a technology-driven work mode: Workplace learning and dynamic capability in the case of a public-sector service organization" (Vartiainen, 2022). The publication examines how the case organization managed in shifting to suddenly forced remote working instigated by the Covid-19 pandemic in 2020–2021. The pandemic caused an unplanned shift to a "tech-driven" (Carroll & Conboy, 2020) remote working mode in any line of work possible. The shift drove organizations to implement new ways of operating enabled by digital means challenging their existing capabilities and technological infrastructures (Herath & Herath, 2020).

This publication aimed to create new understanding of organizational learning processes with the lens of dynamic capability utilization and development under a crisis. The publication asked, *what facilitates organizational learning for developing the capability to operate effectively in an enforced technology-driven work mode during a volatile situation*? Again, qualitative methods with semi-structured interviews were applied as the primary mode of data collection. The data were collected as the company had operated from eight to eleven months in a so-called hybrid working mode. During that time most of the office staff worked remotely and the operative staff worked on-site utilizing special protective measures. The data were analysed in a combination of inductive and abductive approaches (Kennedy & Thornberg, 2018; Urquhart, 2013).

As encouraging findings, a set of facilitators which enabled the organization to learn and manage successfully in the suddenly emerging situation was discovered. The situation both changed the constraints and affordances (Waizenegger et al., 2020) of work and the operational short-term priorities of the company as a supplier of critical materials to health care, schools, and other customers within the public sector. The facilitators were arranged based on their temporal dimension (Ågerfalk et al., 2020) as *immediate* and *evolving facilitators*, and *anticipated long-term organizational*

development. The immediate and evolving facilitators formed the most important findings. The immediate facilitators concerned the organizational response and quick actions in facing the new requirements by the situation (cf. Carroll & Conboy, 2020; cf. Waizenegger et al., 2020). The evolving facilitators concerned organizational learning, as the situation matured. The anticipated long-term organizational development discussed the potential positive effect the learnings may offer the organization in the future.

Figure 6 summarizes the findings as a cycle illustrating the facilitators across time. The hexagons with the double lines denote the immediate facilitators, the hexagons with the dashed lines represent the evolving facilitators, and the hexagon with the dotted lines marks the anticipated long-term development as the learning from the situation grows.

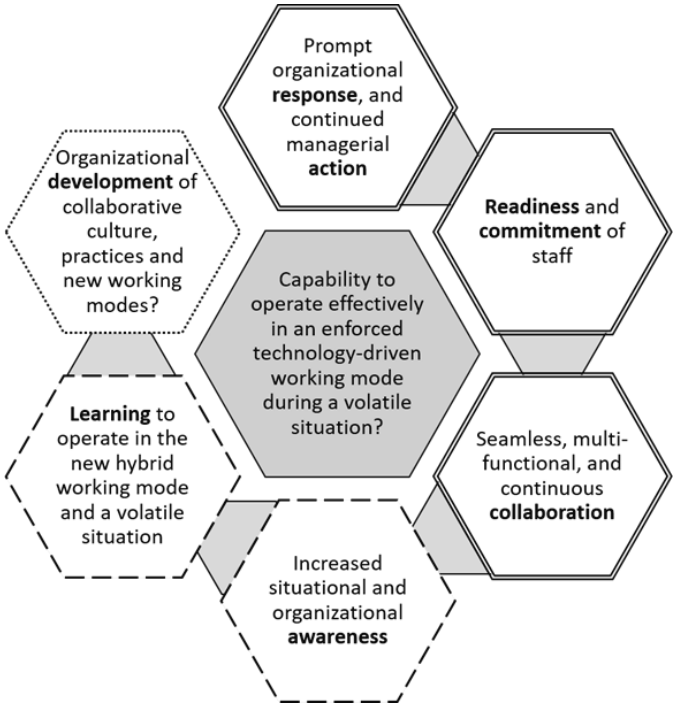

Figure 6. Summary of the main findings in Publication 4 (Vartiainen, 2022).

The most focal findings in practice indicate that the interaction between the prompt organizational and managerial action, continued support, and the commitment and readiness of the staff initiated effective organizational adjustment and learning.

These contributed to the seamless, multifunctional, and continuous collaboration further enabling the increased situational and organizational awareness.

From the theory perspective, it is suggested that the sensing and seizing capabilities (cf. Pavlou & El Sawy, 2011) contributed to the organizational response and managerial action, which then materialized as the integrated and coordinated activity of multifunctional collaboration by the committed and ready staff. The sensing capability was strengthened when the awareness and organizational expertise of the situation grew. The learning of the new hybrid working mode practices over time then supports the development of both the daily operations and the immediate facilitators. This again helps the refined practices to become integrated and coordinated into a longer-term organizational development. This resembles a "virtuous circle" (Salvato & Vassolo, 2018, p. 1745) in connected cycles of quick exploitation and further strengthening of the capabilities where the productive and interpersonal dialogue and input by the employees and management help diffuse the dynamic capability in the organization.

4.3 Case 2 – Publications

The following publications examine the research problem from the perspective of an organization operating in a complex environment, both in the sense of its global operation and in the sense of its complex industry of software R&D. In these publications it was, firstly, uncovered how an organization deals with tensions stemming from such a complex environment, and secondly, how the interpersonal-level dynamic capability appears important and can be supported in such an organization.

These issues were discussed in Publications 3 and 5, which are summarized next. These publications provide understanding from the two related perspectives. First, on and attenuating of tensions influencing collaboration in a contemporary distributed organization (cf. Brooks et al., 2020) which operates in a highly digitalized environment. Second, on what kind of practices may support the diffusion of dynamic capability at the interpersonal level, which is suggested a focal aspect of overall organizational change capacity (cf. Salvato & Vassolo, 2018).

4.3.1 Publication 3: Tensions and Unifying Discourses in a Global Organization

These findings were first discussed in Publication 3 "Exploring tensions and unifying discourses in globally networked R&D work" (Vartiainen, 2021). This publication examines the research problem from the tensions and discourses perspective in a global, technology intensive environment and a large, globally networked organization. In such organizations tensions have been understood as inherent and something that cannot and perhaps even should not be attempted to remove (Brooks et al., 2020). The publication asked, *what kind of tensions appear in globally networked R&D work, beyond typical onshore-offshore oppositions and cultural differences*, and *what kind of unifying and tension attenuating discourses are utilized among senior professionals engaged in global R&D work*. The data were collected by semi-structured interviews with the Indian site of the organization and analyzed by inductive and abductive approaches (Corbin & Strauss, 1990; Kennedy & Thornberg, 2018; Urquhart, 2013). The publication presented the work-context related nature of such tensions, and suggests discourses utilized in the organization with the aim to bridge the gaps.

The findings of this publication are two-fold. Firstly, it was surprising to discover the work-context related nature of the sources of tensions, complementing previous research where the tensions and boundaries are often identified to stem from the differing organizational, cultural and status positions of the employees (Brooks et al., 2020; Cramton & Hinds, 2014; Levina & Vaast, 2008). The sources of tensions were identified, first, to relate to the *differing experience levels among collaborating teams*, some of which junior experts and some of which senior experts. Second, the differing *incentives to share and retain knowledge* which may hinder learning and collaboration. Third, the multifold nature of R&D work with several simultaneous and sometimes rival goals, identified as *multifold goals and priorities in R&D work* which may drive focus away from the optimal direction and, again, hinder collaboration.

The second part of the findings focused on the unifying and tension attenuating (cf. Brooks et al., 2020) discourses identified and employed by the informants. The types of unifying and tension attenuating discourses are as follows:

- Acknowledgement and understanding of inhibitions naturally existing in collaborative work
- Acknowledgement of mutual effort required to facilitate collaboration
- Promoting confidence, rapport, and free knowledge sharing
- Learning-orientation towards challenges

- Experience in working together facilitating smooth collaboration
- Valuing a collaborative approach of sharing, helping, guiding, and understanding one another
- Well-received organizational culture with inclusion, diversity, and respect for one another

The identified types of discourses emphasize learning and understanding rather than highlight the differences or opposing forces between collaborators. Thus, the argument is that the discourses allow and acknowledge the existence of differences and opposing poles (cf. Putnam et al., 2016). At the same time, they help enable mutual learning and acceptance (cf. Ravishankar, 2015). On the other hand, were the environment ridden with unaddressed tensions, given the theoretical background and the findings from the other publications, it appears reasonable to contend that also the diffusion of dynamic capability would be constrained and sporadic (cf. Salvato & Vassolo, 2018).

Therefore, we suggest that these kinds of discourses are a necessary – however, alone not sufficient (cf. Eisenhardt & Martin, 2000) – prerequisite for supporting the diffusion of dynamic capability in organizations. Finally, the findings of Publication 3 contribute not only to the understanding of what kind of tensions may be at play in contemporary technology organizations and how they are addressed, but also to laying the ground for the final Publication 5 (Vartiainen, 2023), where actual practices to help enable interpersonal dynamic capability are suggested.

4.3.2 Publication 5: Enabling Practices of Interpersonal Dynamic Capability

These findings were first discussed in Publication 5 "Enabling interpersonal dynamic capability: Four emerging collaborative practices in globally distributed software development" (Vartiainen, 2023). The aim of this publication is to explore the research problem from the perspective of enablers of interpersonal dynamic capability in a global working environment. The question asked was, *how collaborative practices, as enacted by management and employees, enable interpersonal dynamic capability in the context of global software R&D work*. The data were collected by semi-structured interviews with the Finnish site of the organization and analyzed by inductive and abductive approaches (Corbin & Strauss, 1990; Kennedy & Thornberg, 2018; Klein & Myers, 1999; Urquhart, 2013; Walsham, 1995).

Practice theory (Feldman & Orlikowski, 2011; Nicolini, 2012) was utilized as a lens in the analysis in combination with recent dynamic capability literature. The importance of interpersonal dynamic capabilities, and employee participation in the creation of dynamism and innovativeness in organizations (Ghosh & Srivastava, 2022; Salvato & Vassolo, 2018; Wohlgemuth et al., 2019) were built upon as the starting points of this publication. As findings, four emerging, collaborative practices enabling interpersonal dynamic capability, and their related activities, goals, and challenges were presented in detail and discussed.

As indicated in the previous section, this publication moves towards proposing actual practices for enabling dynamic capability at an interpersonal level in the context of global software R&D work. The reporting of the findings as practices and activities was inspired by Orlikowski's (2002) work on collective knowing in distributed organizing. This publication contributes to the research problem by differentiating the role of the employees in enacting organizational dynamic capabilities, and the role of the management in creating the necessary structures and facilitation.

The practices are here seen as illustrative of such that enable organizational capacity for nimbleness and change in the operation and collaborations of teams, rather than dealing with a particular change initiative, or a specific digitalization project. These findings are suggested to directly contribute to the research problem of supporting the diffusion of dynamic capability in organizations. Table 5 provides a summary of the identified four practices and examples of the roles of managers and other employees in contributing to each practice.

Table 5. Summary of the main findings in Publication 5 (adapted from Vartiainen, 2023).

Practice	Examples of managerial and employee activities
(1) Dialogical Organizational Development: Organizational development in dialogue and with acknowledgement of needs of different organizational levels	Finding a balance and dialogue between organization- and team-level practices (management) Active participation in improvement actions (all employees)
(2) Constructive Working Culture: Fostering a supportive and open organizational culture where mistakes are utilized for learning and improvement	Building a supportive organizational culture (management) Enactment of an organizational culture where making mistakes is allowed (all employees)
(3) Global Open Engagement: Nurturing openness and engagement in global communication and collaboration	Promoting relational engagement among teams (management) Striving for understanding the facts and needs of others in a mutual way (all employees)
(4) Facilitated Shared Learning: Organizational learning and idea cultivation through the management's facilitation and employees' mutual sharing of gained experiences	Ensuring the capacity for learning and moving to the right direction within teams (management) Embracing the role of communication and engagement in idea cultivation (all employees)

What is common to the practices, is their inclusion of social aspects such as communication, dialogue, and mutual understanding. Thus, we can already find commonalities between Case 1, "Tech User", and Case 2 "Tech Creator" when comparing these findings. For example, Publication 4 of Case 1 discussed organizational learning and interplay during a suddenly occurring shift in the working mode.

4.4 Case 3 – Case Report

Finally, the previously unpublished Case Report examines the research problem from the perspective of an organization, which operates as an expert facilitator of organizational digitalization efforts in industries such as those related to construction. By this case, we aimed to uncover explanations for challenges in implementing a change characterized as steps of digital transformation involving a multiparty operational network. These issues were discussed in Case Report delivered to Case 3, the main points of which are summarized here next.

The findings of the report comprise a set of factors influencing the implementation of a digitalization change initiative at a customer company of the case organization. The findings were categorized into *Goals of change*, *Factors challenging the change*, *Factors explaining the challenges*, and *Factors enabling the change*. Such a categorization was chosen with the aim of insight and practical relevance that could

feasibly be translated into managerial propositions and utilized as a tool of discussion in the case organization. This sub-study contributes to the overall research problem by providing a different kind of a case against which the previous findings can be reflected.

The main aim was to uncover new understanding on how to navigate the challenging aspects of implementing a large-scale digitalization effort. That is why challenges were addressed in two of the categories. The latter category aims to look beyond the stated challenges by identifying potential explanations for why adapting to and adopting new ways of operating appeared difficult at times. The goals of change provide context and background for the digitalization initiative, and the factors enabling change account for the factors perceived supportive for implementing the change.

Table 6 presents the main findings with examples. The division of the factors between the strategic and operative level was made based on the context in the interview and analysis by the researcher. However, the division between the challengers and their explanations is indicative. The explanations aim to look beyond the challenges trying to find their underlying influencers.

Table 6. Summary of the main findings in Case Report.

Category	Factors
Goals of change	Strategic/managerial level: • Responding to the changing operating environment • Digitalization of operations • Developing the company's way of doing things
	Operative/employee level: • Digitalizing the work tasks • Improving data utilization • Improving the material and data flows • Improving the process and task pacing
Factors challenging the change	Strategic/managerial level: • Challenges created by the trend of digitalization • The diversity of the industry • Achieving a common acceptance for the changing operating models
	Operative/employee level: • Challenges in the full utilization of IS • Heavy dependencies between IS • Incomplete and increasing amount of data • Managing a complex change • Implementing the intended change into practice

Factors explaining the challenges?	Strategic/managerial level: • A large change influencing multiple actors • Being used to the existing way of operating at the industry level
	Operative/employee level: • Gaps between actors • Visibility of the benefits of the change from the operative perspective? • Changing organization of work
Factors enabling the change	Strategic/managerial level: • Strategic vision and leadership by the management • Support for the changing processes and roles in the organization • Interaction
	Operative/employee level: • Ensuring a visible benefit of the change • Open participation by the stakeholders • Mutual understanding • Implementing the change one step at a time considering the starting point

Interestingly, when the factors were further dissected, it appears that the majority of both the factors explaining the challenges and the factors enabling the change related to process and mode-of-operation questions, including human aspects. At the same time, the goals and challenges had emphasis in the technological and IS issues. When looking at the commonalities between Case 3 and Case 1, "Tech User" and Case 2, "Tech Creator", we can identify, for example, the importance of open participation by stakeholders (cf. Case 1), and the benefit of mutual understanding (cf. Case 2). Similarly, the manageability of complex change and the full utilization of IS were identified as challenges also in Case 1, while gaps between actors can be connected to the tensions identified in Case 2. Thus, it may be drawn that even though the operating environments, organizational settings, and the goals differ between the cases, similar factors appear to play roles in each. Based on these publications and the report, the findings to each RQ will be discussed in the subsequent Chapter 5, Findings.

5 FINDINGS

The overall research problem of this dissertation is *how dynamic capability diffuses in organizations in digitalizing operating environments*. The research problem is approached through three research questions, each taking a different angle to digitalization while holding the diffusion of dynamic capabilities in the center. By this, the aim is to create new understanding of the complex area of the development of dynamic capabilities in digitalizing operating environments.

In the subsequent sections 5.1–5.3, the research questions RQ1–RQ3 are provided answers to. The main findings from the Publications and the Case Report are drawn together to respond to each research question. After that, the section 5.4 presents a synthesis providing an answer to the overall research problem. Where the previous Chapter 4 summarized the individual Publications and the Case Report in a within-case manner (cf. Eisenhardt, 1989), this chapter brings the findings together across the cases and publications.

5.1 RQ1: The Diffusion of Dynamic Capability During Organizational Digital Transformation Efforts

RQ1 asks, *what facilitates the diffusion of dynamic capability in an organization during major digital transformation efforts*. The question explores the overall research problem through a perspective where digitalization materializes as organization- or unit-wide transformative initiatives with strategic purposes. Findings from Publication 2 and Case Report are drawn from in answering this research question.

Based on the findings in Publication 2, we draw that the diffusion of dynamic capability happens through the interplay of operative and managerial level capabilities. On the one hand, this manifests in everyday work, and on the other hand, while learning in the areas under transformation. The diffusion of dynamic capability can materialize, for example, in the identification of new fruitful practices or existing capability gaps at any level of the organization. For this to happen, participation is required throughout the organization, by which the necessary deep and shared understanding and sensemaking of the transformation goals and

implications can be created at different levels and in different work roles of an organization. In addition, time and mental space from the daily routines and tasks need to be obtained for the development initiatives to get acquainted with new technologies, develop processes, and identify potential new opportunities, and, likewise, mishaps in the making.

When drawing from the findings of the Case Report, ensuring that all the participants understand and can see the benefit gained from the change appears focal. This, importantly, includes the operative participants, and those who implement the change in practice. Gaining this understanding may, however, be challenging, if the change happens in a different part of operations, the organization, or a partner than where the gain materializes, or if the benefits are differently relevant to different actors.

Publication 2 and Case Report shared the identified challenges of managing complex and concurrent changes and utilizing information technologies to the fullest. Challenges were likewise identified in comprehensively utilizing an organization's expertise in system development endeavours, and in creating an adequate understanding of the change goals to reconfigure the current ordinary capabilities to match the needs of the digitalizing environment and the strategic change objectives. The diffusion of dynamic capability may be expected to become hindered or halted in cases where resistance to and confusion about the change would become stronger than the incentive to change.

Overall, the findings revolve around people and processes, and working together, and creating mutual understanding appear as keys. Table 7 below highlights the main findings of RQ1.

Table 7. Main findings of RQ1.

RQ1: What facilitates the diffusion of dynamic capability in an organization during major digital transformation efforts?
• The diffusion of dynamic capability is facilitated through the interplay of operative and managerial capabilities by addressing emerging contradictions and gaps between actors. • Encouraging genuine participation throughout the organization, creating a deep and shared understanding and sensemaking of the transformation goals (the what) and implications (the how) at different levels and in different work roles. • Ensuring that both the managerial and operative participants understand and can see the benefit gained from the change. • Ensuring there is enough time and mental space for the organizational actors to engage in development activities in addition to their daily work tasks.

5.2 RQ2: The Diffusion of Dynamic Capability During a Shift to Digital Working Practices

RQ2 asks, *what facilitates the diffusion of dynamic capability in an organization during a shift to digital working practices*. This question zooms in from a transformation initiative level to the everyday level of the digitalizing working practices. RQ2 is first viewed through the findings in Publication 4. The publication dealt with a sudden shift to a technology-driven hybrid working mode caused by an external shock, the Covid-19 pandemic, and its resulting new operational requirements. Second, Case Report is reflected on.

Based on the findings in Publication 4, two interconnected loops of dynamic sensing, learning, integrating, and coordinating capability (cf. Pavlou & El Sawy, 2011) were identified. In essence, in the first loop, the existing capabilities were exploited, and in the second loop they were strengthened, as the organization learned more of their daily operation in the new situation. Focal to the diffusion of dynamic capability across the organization through these loops were the productive and interpersonal dialogue (cf. Salvato & Vassolo, 2018) and working together in a seamless and multifunctional way which enabled an increased awareness and further learning.

Where the situation described in Publication 4 required fast action and quick adjustment due to an external environmental shock, in Case Report, the changing practices were planned as part of broader digitalization efforts. While achieving a common acceptance for the changing operating models and implementing the intended change in practice may be challenging, leadership and concrete support for the changing practices and work roles in close interaction with the stakeholders are noted as important facilitators. Implementing the change one step at a time, importantly considering the starting point, helps incremental learning and adjustment, especially from the perspective of the dynamic learning capability. Table 8 below highlights the main findings of RQ2.

Table 8. Main findings of RQ2.

RQ2: What facilitates the diffusion of dynamic capability in an organization during a shift to digital working practices?
• The diffusion of dynamic capability is facilitated through the interconnected loops of capabilities, such as the dynamic sensing, learning, integrating, and coordinating capability. The first loop exploits the current capabilities, and the second loop strengthens them, as the new working practices become more familiar, creating a virtuous circle. • Focal is the productive and interpersonal dialogue and working together in a seamless and multifunctional way enabling increased awareness and further learning while the practices change. • Leadership, and concrete support for the changing practices and work roles in close interaction with the stakeholders together with adequately paced change enable the incremental learning and adjustment.

5.3 RQ3: The Diffusion of Dynamic Capability in Complex Operating Environments

RQ3 asks, *what facilitates the diffusion of dynamic capability in an organization operating in a complex environment*. The question is here examined from the perspective of two types of complex environments. Primarily, the findings are drawn from Publications 3 and 5, where the complexity stems from the global operating network and complex, technology-intensive products. Additionally, Case Report is utilized. There the complexity relates to the multiparty operational network in which the digitalization efforts are being implemented.

Publication 3 contributed to the understanding of work context-related tensions in a globally distributed organization, and how the tensions may be attenuated by organizational actors' unifying discourses of learning and collaboration despite the inevitable tensions. It is, thus, argued that an understanding of the essence of organizational tensions combined with the discourses and approaches enacted to work with them, around them, and perhaps even to utilize them for organizational development (cf. Brooks et al., 2020) enhance the diffusion of dynamic capability across organizational actors and work roles. On the contrary, if tensions escalate and become unsolved or unspoken-of knots of problems, they can be expected to hinder the capacity for dynamism, utilization of ordinary capabilities, and eventually the performance of the organization.

Where Publication 3 laid the ground for understanding tensions and unifying discourses, Publication 5 took steps further to propose a set of four practices for nurturing organizational dynamic capability at the interpersonal level (cf. Salvato & Vassolo, 2018). The practices are, organizational development in dialogue and with acknowledgement of the needs of the different organizational levels; fostering a supportive and open organizational culture, where mistakes are utilized for learning

and improvement; nurturing openness and engagement in global communication and collaboration; and organizational learning and idea cultivation through management's facilitation and mutual sharing of experiences gained. It is seen that these practices contribute to the diffusion of dynamic capability by enhancing them in the interactions of organizational actors.

Finally, as noted, the complexity in Case Report ties with the diversity of the operational multi-party network. Challenges identified in relation to achieving the goals of change, such as digitalization of operations, related to the diversity of the industry and its accustomed ways of doing things. Therefore, especially the integrating and coordinating dynamic capabilities appear challenged if a common view and sense-making are fragmented or dependent on each operator's goals. Therefore, strategic vision by leaders, and active interaction and open participation by stakeholders appear as necessary ways forward. Table 9 below highlights the main findings of RQ3.

Table 9. Main findings of RQ3.

RQ3: What facilitates the diffusion of dynamic capability in an organization operating in a complex environment?
• Understanding of the present organizational tensions combined with discourses and approaches enacted to work with them and around them, even by exploiting them, for organizational development. • With the support of practices of nurturing interpersonal dynamic capabilities, such as organizational development in dialogue and with acknowledgement of the needs of the different organizational levels; fostering a supportive and open organizational culture, where mistakes are utilized for learning and improvement; nurturing openness and engagement in global communication and collaboration; organizational learning and idea cultivation through management's facilitation and mutual sharing of experiences gained. • Active interaction and open participation by stakeholders accompanied by a communicated strategic vision by leaders.

5.4 Synthesis: The Diffusion of Dynamic Capability in Organizations in Digitalizing Operating Environments

This section forms the synthesis of the three research questions, RQ1–RQ3, and by doing that provides an answer to the main research problem of: *How does dynamic capability diffuse in organizations in digitalizing operating environments?* In answering to the main research problem, deriving from the literature review and case studies presented in this dissertation, the first argument is that we need to recognize and embrace the multilevel nature of dynamic capabilities. Influenced by digitalization, it appears crucial that dynamic capabilities are understood as an inherently multilevel

construct. The second argument follows that their multilevel nature has become focal for organizational development for sustained competitive advantage in the age of digitalization. This means not only for changing the organizations today, but also preparing the organizations' readiness for the future change (cf. Salvato & Vassolo, 2018), which appears to become more complex and unpredictable (Hanelt et al., 2021; Tanriverdi et al., 2010).

We further argue that dynamic capabilities are increasingly embedded in the "organizational routines/competences" and "core competences" of organizations (cf. Teece et al., 1997), similarly as IS are increasingly embedded in business strategies of organizations (Bharadwaj et al., 2013; Steininger et al., 2022). For example, in the Case 1 "Tech User" studies, it became apparent that technology introduces new variables, data points and dependencies. Thus, organizational actors need to be alert, and aware of the new and changing processes in order to understand what is happening and, consequently, sense looming erroneous decisions on time and seize opportunities for new, unforeseen gains. Thus, dynamic capabilities are needed on every level of the organization to fare in digitalizing operating environments. Therefore, also their diffusion in organizations happens in a multilevel manner.

It is, thus, emphasized that it is no longer enough to think of dynamic capability primarily as a managerial capacity, or even a capacity that mostly matters on the strategic-level discussion of organizations. Instead, it appears that the dynamic capability enacted by management is different from the dynamic capability enacted by operative employees. Managerial-level dynamic capability often concerns higher, strategic-level issues, whereas employee-level dynamic capability relates to more incremental, operative-level development which may then feed into to the strategic-level issues as important input. We hence distinguish between *managerial dynamic capability* and *operative dynamic capability*. A model illustrating the relationship between the operative employee- and managerial-level dynamic capability in a loop of operative action and strategic action was drawn. The model is presented in Figure 7.

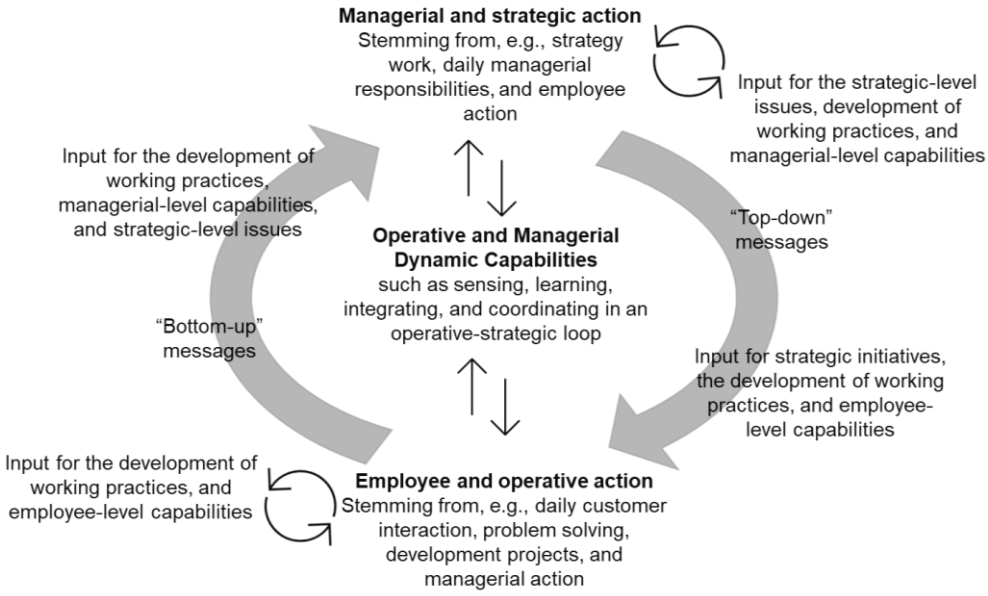

Figure 7. Model of operative and managerial dynamic capabilities.

The researcher acknowledges that models are abstractions, and as such unable to "capture the complexity of dynamic capabilities" in real life (Pavlou & El Sawy, 2011, p. 252). However, the aspiration here is to illustrate the reciprocity of managerial and employee action and their respective ways of enacting dynamic capability in daily work as well as in digitalization initiatives in a way that can both contribute to organizational and strategic development. In the center of the figure is the concept of *dynamic capabilities* as sensing, learning, integrating, and coordinating capabilities following Pavlou and El Sawy (2011). The concept is enhanced by the distinction between the *operative* and *managerial* dynamic capability pointing toward their becoming (cf. Tsoukas & Chia, 2002) in the interactions between the management and employees.

In essence, the figure denotes dynamic capabilities can be a capacity of both management and other employees. *Employee and operative action* is thought to provide input as feedback to the development of working practices and capabilities for both employees themselves and through "bottom-up" messages to the management. *Managerial and strategic action* is thought to yield "top-down" (cf. Courtright et al., 1989) messages, which provide input for the development of working practices and ordinary capabilities. At the same time, managerial action creates input for the development of their own working practices and capabilities as well as strategic action of the organization. Similarly, also the employee-level action can provide input to strategic-level issues, however with lesser emphasis. This answer to the research

problem is further elaborated in the Discussion section by explicating the theoretical contribution and resulting recommendations to practice.

6 DISCUSSION AND CONCLUSION

This chapter finalizes the dissertation and brings together the findings and discussion of this study. The section begins with the theoretical contribution answering the "what's new" and "so what" (Webster & Watson, 2002) questions from the academic perspective. After that, the same is done from the practitioners' perspective as recommendations to practice. In the final part of the chapter, the present study is evaluated by using the criteria of qualitative, interpretive, and case study research. Finally, limitations, and recommendations for further research as well as concluding remarks are presented.

6.1 Theoretical Contribution

The theoretical contribution of the dissertation has, first, brought to light the proposed distinction between *operative dynamic capability* and *managerial dynamic capability*. As was indicated in Publication 2, dynamic capabilities appear differently depending on the work role and organizational position of the actor. The operative dynamic capability and managerial dynamic capability are here noted different from the "first-order" and "second-order" (Daniel et al., 2014) dynamic capabilities in that both operative and managerial dynamic capability can aim to reconfigure ordinary capabilities. On the contrary, the second-order dynamic capabilities are understood to reconfigure first-order dynamic capabilities (Daniel et al., 2014). Further, multilevel dynamic capability is in literature connected to levels such as individual, business, and corporate (Wilden et al., 2016), or individual, interpersonal, and organizational (Salvato & Vassolo, 2018; Schilke et al., 2018). In contrast, operative and managerial dynamic capability here do not distinguish between the reconfiguration capacity of the different level capabilities or the level of the organizational collective entity. Instead, they distinguish between the types of actors and tasks the dynamic capability manifests with.

Second, these notions help contribute to literature where dynamic capabilities are often studied primarily from the managerial perspective. Recently, efforts have been made for a stronger inclusion of employees and their daily activities in the sphere of

dynamic capability research and practice (Ghosh & Srivastava, 2022; Salvato & Vassolo, 2018; Wenzel et al., 2021; Wohlgemuth et al., 2019). This dissertation is argued to complement the multilevel theory of dynamic capabilities (Salvato & Vassolo, 2018) by its interpretive qualitative method and emergent approach. Similarly, the quantitative, survey-based findings by Wohlgemuth and colleagues (2019) and Ghosh and Srivastava (2022) related to the participatory and social aspects of dynamism and innovation in organizations are here complemented by the in-depth, qualitative findings. These findings from the different types of cases show how understanding, participation, engagement, and collaboration can help both enable and strengthen the diffusion of dynamic capabilities in organizations in digitalizing operating environments. This is illustrated throughout the findings in Chapter 5 both in responding to the individual research questions RQ1–RQ3 and in the synthesis. The image of dynamic capabilities functioning as "complex social accomplishments" (Salvato & Vassolo, 2018, p. 1731) is thus enriched.

Third, the findings resonate with Hanelt et al.'s (2021) anticipation of the future. The increased embeddedness of digital technology within organizations' ordinary capabilities may make them more malleable by nature. This could result in the convergence of dynamic and ordinary capabilities, or make the ordinary capabilities more flexible, which could reduce the need of dynamic capabilities in organizations. This dissertation refrains from reaching quite that far, but the findings raise discussion on the dynamic nature of operative capabilities in today's digitalizing operating environments, such as modelled in Figure 7 in the preceding chapter. Thus, these insights also contribute to the utilization of dynamic capabilities as a theoretical basis in studies in the context of digitalization and more specifically digital transformation (Vial, 2019).

Finally, the perspective of this doctoral study was to explore dynamic capabilities as emergent processes rather than, for example, a result of formal organizational learning practices (cf. Tynjälä, 2008). The findings point toward the processes of dynamic capability diffusion which can be tapped into and directed by the management especially in organic organizational settings (cf. Courtright et al., 1989) through reciprocity and working together. These point to traits such as the intense participation and productive dialogue as theorized by Salvato and Vassolo (2018).

While the theoretical contribution here largely connects to organizational and management literature, we believe the findings and insight in this dissertation are of importance to the IS community and contribute to viewing dynamic capabilities from different angles. Following Grover and Niederman's (2021) terms, the perspectives of employees as stakeholders and employee-level action are here

highlighted as focal to the dynamic capability discussion. Thus, the researcher trusts that the findings provide input to new and fruitful research paths with stronger employee involvement and practice perspectives (cf. e.g., Wenzel et al., 2021) in the IS field. Before discussing those in more detail, the recommendations to practice are presented in the next section.

6.2 Recommendations to Practice

In the context of this dissertation, the main intended audience of the recommendations to practice are practitioners operating in managerial and other roles involved in organizational development. The audience may also encompass employees motivated by the opportunities of organizational development efforts, and researchers engaged in organizational research. The findings that dynamic capabilities appear differently in different work roles, and managerial dynamic capability is here argued to be different from operative dynamic capability, support the view that the construct of dynamic capability today is indeed multilevel by nature (Wilden et al., 2016). In practice, this implies that virtually everybody in an organization should be capable of sensing changes in the environment and take action according to each person's role in the organization. The reason for this is here argued to lie in the opportunities and threats created by digitalization.

However, stating this, one needs to be careful not to imply that change should happen all the time, or for the sake of change itself. Strategic directions should be considered, when enacting dynamic capability – be it at an operative or managerial level. The model (Figure 7) sees organizational development as a reciprocal loop between the management and employees. This implies that vigilance of the direction of the development and awareness of activities also at lower levels are necessary. This is to ensure that this kind of an emergent development moves the organization to a beneficial direction in a systematic way in contrast to incidental or temporary problem-solving (cf. Schilke et al., 2018, as cited in Vial, 2019, p. 135). These notions bring us to five propositions of how the diffusion of dynamic capability can be supported in organizations in digitalizing operating environments. The propositions drawn from the findings and the main themes from the different sub-studies are presented in Table 10.

Table 10. Propositions for supporting the diffusion of dynamic capability in organizations in digitalizing operating environments.

The diffusion of dynamic capability in organizations in digitalizing operating environments can be supported by
(1) **Exercising continuous and genuine stakeholder participation** Definition: Continuous and genuine stakeholder participation and collaboration in multifunctional teams in both everyday work and in designing and implementing change initiatives (RQ1 & RQ2). *"Stakeholders" here primarily mean organizational members, but also those of customers, suppliers, and network and project partners. "Genuine" here means actual participation where input is expected and considered by the management, even if not always acted on.*
Compiled examples from the case studies: - Creating a deep and shared understanding of changes - Broad utilization of organizational expertise - Seamless, multifunctional, and continuous collaboration for increased situational and organizational awareness - Interaction by management
(2) **Ensuring clear goals, implications, way to, and benefits of change** Definition: Ensuring the goals, practical implications, benefits of, and how to reach the intended change are visible and understood at the implementing and operative levels, in addition to the management (RQ1)
Compiled examples from the case studies: - Challenge of sustaining the manageability of change / Managing a complex change - Making sense of the goals and implications of change - Visibility of the benefits of change from the operative perspective - Achieving a common acceptance for the changing operating models
(3) **Securing resources for individual development at work** Definition: Allowing time, support, and other resources for different work roles for developing one's skill set and organizational practices amid the existing daily routines and other tasks (RQ2)
Compiled examples from the case studies: - Challenge of obtaining room for development in everyday work - Support for the changing processes and roles in the organization - Tension of multi-fold goals and priorities in work, e.g., time usage pressures between renewal work and task delivery
(4) **Addressing underlying tensions hindering collaboration** Definition: Identifying and addressing collaboration and knowledge sharing tensions that may hinder innovativeness, finding the best solutions, and flowing of information and knowledge between organizational actors, functions, and other stakeholders (RQ3)
Compiled examples from the case studies: - Tension of multi-fold goals and priorities in work, e.g., time usage pressures between renewal work and task delivery - Tension of differing experience levels among collaborating teams potentially contributing to reservations in collaboration between experienced and new teams - Tension of incentives to share and retain knowledge potentially contributing to reservations in knowledge sharing in daily collaboration - Valuing a collaborative approach of sharing, helping, guiding, and understanding one another - Gaps between actors

(5) **Deploying organizational practices enabling interpersonal dynamic capability** Definition: Deploying organizational practices characterized by dialogical organizational development, constructive working culture, open engagement, and facilitated shared learning to nurture multi-level DC (RQ3)
Compiled examples from the case studies: - Finding a balance and dialogue in development between organization- and team-level practices - Enactment of an organizational culture where making mistakes is allowed - Promoting relational engagement among teams - Ensuring the capacity for learning and moving to the right direction within teams - Open participation and mutual understanding by stakeholders

The above propositions are intended to provide practical suggestions on which topics to focus when evaluating and managing dynamic capabilities in a multilevel manner in digitalizing operating environments. While evaluating the utility of the propositions, one should be mindful of the context(s) (Davison & Martinsons, 2016; McLaren & Durepos, 2021) of the stakeholder organizations.

For example, in reflection to the cases in this study, in Case 1 "Tech User" awareness of what is happening in the overall change, and what is expected of different actors in the face of changing processes may become pronounced. Managing a complex change by collaboration and working together could also be one of the useful perspectives when applying the propositions in practice. Similarly, in Case 2 "Tech Creator", the characteristics such as high technical competence, innovativeness, mutual learning, and knowledge sharing across boundaries in a fast paced, complex, and global environment seem like viable lenses through which to view the propositions. In Case 3 "Tech Integrator", conveying the goals and benefit of change in interaction with all involved stakeholders and by ensuring the resources to implement the change in practice appear as relevant viewpoints. These contextual considerations are meant as indicators of ways in which the propositions could be evaluated for deployment in organizations of different expertise, stages of change, present capacities to adapt to digital changes (Vial, 2019), and other situational factors. We refrain from arguing that the set of propositions is "exhaustive or exclusive" (Orlikowski, 2002, p. 257). However, we believe they provide a fruitful ground for evaluating and supporting the development of dynamic capabilities in different organizational contexts.

Further, while promoting the importance of multilevel dynamic capability composed of operative- and managerial-level capacities, the researcher also acknowledges that exercising and availing of them may not be easy in organizations. It depends on matters such as how participation is encouraged and enacted in the organization, how much space operative actors have for development initiatives in their daily work, and what kind of capacity and motivation the different actors have

for operating in such a way. Additionally, it seems reasonable to assume that in some work roles and some situations, it may be desirable to refrain from pushing dynamism, if, for example, operative efficiency (cf. Teece, 2014) is deemed a clear priority. Thus, the requirement for dynamism may be situational and related to, for example, the state of digital innovation, competitive landscape, and industry conditions (Teece et al., 2016; Vial, 2019; Wilden et al., 2016). The potentially changing requirement of such a capability depending on the functional area and the timing of the organization was also noted in Publication 2. However, in today's connected and fast-moving world, it appears that without nurturing dynamic capabilities as multilevel phenomena, a significant proportion of an organization's change and innovative potential may be left un(der)utilized.

Finally, it can be stated that even though the context of this dissertation is that of digitalizing operating environments, human and collaboration related factors gained emphasis in the findings. In a way, a simple explanation for this could be that people execute the change, even when technology is either a driver or an enabler for that change. Therefore, the present study argues that more attention to the human in digitalization is still needed. Perhaps this is not a new thought, but something that these findings maintain. In this context, humans are regarded in action, as active participants in organizations (cf. Tsoukas & Chia, 2002) and creating the necessary operative and managerial dynamic capability to understand the goals, requirements, constraints, and affordances of technological, organizational, and environmental change (cf. Waizenegger et al., 2020). Only then, I believe, can the organization change sustainably with freely interacting employees as important contributors to competitive advantage, and without losing some of its vital competence and knowledge assets.

6.3 Reliability, Validation, and Generalization

The reliability and validity of qualitative research are evaluated differently from quantitative research (Bueter, 2022). These aspects were considered throughout the research process, and in this section, they are discussed from the perspectives considered the most relevant to the present research. It is to be noted, that the application of the Principles for Interpretative Field Research aimed to support the reliability of this study. This section addresses additional features and refrains from repeating the ones covered in Chapter 3, Research Method and Cases.

First, leaning on Yin (2018), *construct validity* describes the extent to which the research constructs, for example, the findings in each publication exemplify the phenomenon under study and not the researcher's subjective view of it. As means to secure construct validity of this study, "the use of multiple sources of evidence" (Yin, 2018, 45) was applied in the sense that several informants from different process and expertise areas were involved. Additionally, the findings were discussed in the case companies with different groups of participants than the informants. These conducts also supported the achieving of rich interview material (Walsham, 1995) from multiple perspectives. The "chain of evidence" (Yin, 2018, p. 45) was established by researcher notes; audio recording of the interviews; memos during the analysis; qualitative coding and categorization; and in the reporting of the research by the publications and case reports. Finally, as recommended by Yin, the drafts of the case study reports were in all cases reviewed by the company contact persons, and in the longitudinal Case 1 "Tech User" also by the informants.

Second, in terms of *reliability* (Yin, 2018) the researcher is inclined to humbly contest the criterion of reaching the same findings if the same study was repeated by following the present methodology. As the research environment is constantly changing, and a study conducted in an organizations may itself influence the understanding in the organization (Walsham, 1995), it seems unfeasible to repeat the *exact* findings. However, to secure the reliability and minimize bias, this study was documented (Yin, 2018) in detail. The documentation of the study consists of the overall doctoral research plan, Data Management Plan, the research Privacy notice, the interview protocol and questions, the record of the collected interview data in written and audio formats, the record of the data analysis supported by Atlas.ti software, and the research reports to the case organizations. Additionally, in each of the publications, the aim was to account for the method in as much as detail as was feasible. Together this documentation forms the *case study protocol* and the *case study database* supporting the "chain of evidence" (Yin, 2018, pp. 43–47).

Third, in terms of evaluating the objectivity of qualitative data sets, an ideal has been suggested (Zahle, 2021, p. 115). This ideal includes *descriptive adequacy*, *reactivity transparency*, *deception transparency*, *relevance*, *balance*, and *sufficiency*. The core question is whether the data set provides sufficient evidence "for a satisfying answer to the research question under study". Table 11 summarizes these features with definitions and conduct in the present study.

Table 11. The evaluation of the objectivity of qualitative data sets (adapted from Zahle, 2021, pp. 107–109).

Feature	Definition	Conduct in the dissertation
Descriptive adequacy	The field data should correctly report of the events and correctly cite the informants.	The interviews were recorded by audio if an informant gave permission. In reporting, each excerpt utilized was confirmed from the audio by the researcher. Additionally, the organizations were given the possibility to comment on the initial findings, case reports, and draft versions of the publications.
Reactivity transparency	The researcher should correctly assume the extent to which they influence the research participants, for example, in an interview situation.	Understanding the relevance, especially of the point 3 of the Principles for Interpretive Field Research (Interaction Between the Researchers and the Subjects, Klein & Myers, 1999). Additionally, the position of the researcher in the case companies (cf. Walsham, 1995, p. 77) was addressed in the case descriptions.
Deception transparency	The researcher should correctly assume the extent to which the informants may have deceived the researcher.	The research assumes no intentional deception. However, it is noted that the phenomena under study likely create different reactions and perceptions in different informants. Therefore, the use of multiple sources of evidence and evaluative thinking in the analysis and reporting of the study are vital. The Principle of Suspicion (Klein & Myers, 1999) also addresses this feature.
Relevance	Data relevant to the phenomena under study is vital for "providing a satisfying answer to the research question" (Zahle, 2021, p. 108).	The cases were carefully selected, and the interview plan was carefully devised based on theoretical understanding of the research area and the input by the practitioners from the case companies and the academia.
Balance	The data should represent all relevant aspects, such as people, viewpoints, and events, of the phenomenon under study to satisfactorily answer the research question.	The inclusion of multiple cases and multiple types of informants aims to address the requirement of balance. The research environment and scope are described at the beginning of the dissertation, and the limitations are described in the subsequent section.
Sufficiency	The data set should be sufficient in terms of its size.	The overall study contains multiple rounds of interviews with multiple informants. The interview length varied depending on the time available by the informant and the flow of conversation. The researcher feels that the interviews sufficiently covered the designed interview themes.

Next, in terms of generalizing the findings, we claim no statistical or cross-population generalization (Tsang & Williams, 2012; Yin, 2018). Instead, the type of generalization is theory-expanding (Yin, 2018) where the aim is to create new insight by "leveraging existing knowledge" and viewing the phenomena under study from new perspectives (Grover & Niederman, 2021, p. 1755), as has been discussed in the preceding sections 6.1 and 6.2.

Generalization is here explicated by utilizing Walsham's (1995, pp. 79–80) four types of generalization from IS case studies: *Development of concepts* can be seen in the enhancement of the concept of dynamic capability by distinguishing between and modelling the processes of managerial dynamic capability and operative dynamic capability. *Drawing of specific implications* here, firstly, relates to the answering to each research question, the synthesis, and the recommendations to practice which can be utilized in managerial action. Secondly, the theoretical contributions are hoped to inspire new avenues for research with a more nuanced view of dynamic capabilities in digitalization. *Contribution of rich insight* perhaps best manifests in the individual case study output as well as in Publications 1–5. Inspired by Walsham's description (1995, p. 80), it seems viable to assume that the accounts of the sub-studies provide richer insight than can be portrayed by summarizing the overall findings. Closing the circle, while we claim no *generation of theory* in full, we contend that the present dissertation contributes to the enhancing the dynamic capability theory in the ways described in the findings and the discussion. In the next sections, the limitations, and recommendations for further research are presented.

6.4 Limitations

As with all research, this study has limitations. Let us start with the context of the findings. The diversity of the case organizations presents both an opportunity of rich findings, and a challenge of addressing multiple contexts (Davison & Martinsons, 2016; McLaren & Durepos, 2021). While we trust the model of operative and managerial dynamic capabilities (Figure 7) is applicable in different contexts, the organizational setting should be carefully considered in the application of the recommendations to practice. In particular, the degree of organic and mechanistic characteristics in the organizational form (Courtright et al., 1989) warrants attention. Additionally, characteristics such as the maturity of the organization, and the industry it operates in may be meaningful factors. In the researcher's view, the findings are most applicable in contexts where knowledge-work intensive tasks are conducted in organic organizational forms enabled by digital tools and digital working environments, and where the collaborators are somehow organizationally or geographically dispersed.

While the generalization scope of this qualitative case study was discussed in the preceding section, some additional considerations on the research method and scope are raised here. First, the data collection and analyses were largely conducted by a

single researcher which inevitably limits the capacity of multiple views in the process. This limitation was addressed by seeking advice from senior academics and supervisors as well as seeking for comments on the interview design and the findings from the case organizations. Additionally, in most instances more than one rounds of analysis took place in drawing the findings from the interview material.

Second, the time and resources available for the dissertation set the limits of the overall research design and depth. Additionally, it is acknowledged that especially with the Case 3, "Tech Integrator", the number of informants was low. To address this limitation, the researcher has aimed to transparently describe the process, the findings, and their scope in order to show how and in which contexts the findings are applicable and generalizable. The limited scope may also be extended in the potential further studies building on the present findings.

Third, Eisenhardt's (1989, p. 536) remark about the ease of becoming overwhelmed by the large amount of data without a clearly defined research focus rings a bell when looking back at the research journey. While the intention from the beginning was a holistic examination of organizational capability development, the broad research focus introduces a challenge. Where the present study has produced a versatile examination to the diffusion of dynamic capability from different perspectives, the risk was that the findings become overly fragmented, or too focused on idiosyncratic case findings (Eisenhardt, 1989, p. 547). Reviewing the entity presented in the dissertation, it can be suggested that the findings, however, form a coherent entity with a balance of a holistic picture (the model in Figure 7) and more detailed findings (the cases, and the recommendations to practice in Table 11).

The role of IT in the study is discussed here as the final limitation we wish to highlight. The detailed characteristics of IT in the case organizations were deliberately excluded from the in-depth examination of the dissertation. Instead, the focus was on the characteristics around IT, such as the way in which development initiatives are managed and communicated to organizational stakeholders. This was a choice by the researcher, as the aim was not to focus on IT as an artifact (cf. Steininger et al., 2022) but rather on how organizations operate surrounded by digitalization. Therefore, we refrain from examining how successful or unsuccessful certain IT implementations may be or problematizing the potential positive and negative effects of IT on dynamic capabilities or organizational outcomes (cf. Steininger et al., 2022, p. 463).

6.5 Future Research

With the increased awareness of the role of the employees in the domain of dynamic capabilities, and the reciprocity between the operative and managerial dynamic capabilities, several avenues for further research appear. While the managerial perspective of dynamic capabilities has been broadly studied, diving deeper into the characteristics of the operative-level dynamic capabilities could offer new understanding valuable in the digitalizing, many ways distributed, and fast-changing operational environments we are currently experiencing.

Inspired by the comments received from senior academics, one promising route of further study could be more nuanced investigations into the suggested distinction between managerial and operative dynamic capability. In particular, how the latter appears in relation to organizational characteristics, such as agility. For example, in the recent conceptualization of digital agility in the context of digital firms, accessible external actors as well as internal employees are seen as important enablers of agility alongside ambidextrous management and adaptive structures (Salmela et al., 2022). It could, therefore, be beneficial to investigate how this kind of agility relates to the suggested operative dynamic capability, or how effectively diffused dynamic capability and digital agility may contribute to each other in various types of organizations in our digital era.

Similarly, further considerations on the context of the organizations would help strengthen the applicability of the present findings. Deeper investigations into organizations at different stages of their digital transformation efforts, maneuvering under different market conditions, or operating with different degrees of complexity could help shed light on how the managerial and operative dynamic capability would be desirable in various situations. With a practitioner emphasis, investigating how the five propositions for supporting the diffusion of dynamic capability could be implemented in practice, and how they influence dynamic capability development in organizations could be fruitful next steps building on the present findings. Further, the perceptions of the employees and the management both in their daily work in the changing operating environments, and in readiness to adopt and drive change initiatives appear important. This way, the organic, emergent, social, and collaborative view on dynamic capabilities is in the focus.

To engage in these research directions, mixed-methods approaches (Schilke et al., 2018) appear particularly useful. In the selection of the appropriate methodologies (Galliers & Land, 1987), the here-chosen interpretive, qualitative approach could be completement with more structured and quantitative methods to specify measurable

constructs for study (cf. Eisenhardt, 1989). For example, synthesized evidence from previous studies (Schilke et al., 2018), surveys drawing out configurations of multi-level constructs (Salvato & Vassolo, 2018), and observational methods of practices in action (Nicolini, 2012) could be utilized. Moreover, with longitudinal approaches, researchers could aim to track how the potential changes in the perceptions influence the actual organizational outcomes on different metrics. Especially the more limited examinations within this study could be extended by more engaged (Mathiassen, 2017) and practice-oriented (e.g., Wenzel et al., 2021) research in the organizations.

Finally, the notion that the present dissertation largely connects to organizational and management literature may indicate a fruitful area of future research – or even a present gap in research – within the field of IS. For example, this notion seems to support the opportunity to reach new understanding by longitudinal research and more strongly embedding IT/IS in the future research designs on dynamic capabilities (cf. Steininger et al., 2022; cf. Wessel et al., 2021).

6.6 Conclusion

This dissertation presented a qualitative multiple-case study with an interpretive approach investigating *the diffusion of dynamic capability in organizations in digitalizing operating environments*. The objective of the study was to create new understanding on dynamic capability diffusion in the context of digitalization with the perspective of emergent processes. The findings drawn from the three case companies, four qualitative empirical publications, and the case report resulted in a model highlighting the reciprocity of managerial and operative action in organizational development distinguished as *operative dynamic capabilities* and *managerial dynamic capabilities*. It is seen that these capacities contribute to organizational dynamism differently based on the work role and scope of action by the organizational actor. The first one primarily stemming from the daily and operative activities and the second one from the managerial and strategic level activities.

These theoretical insights, first, contribute to the stream of literature exploring the role of participation, and the daily activities and practices by the employees and management in connection to organizational dynamism (Ghosh & Srivastava, 2022; Salvato & Vassolo, 2018; Wenzel et al., 2021; Wohlgemuth et al., 2019). Second, the findings contribute to the understanding of the importance and processes of the diffusion of dynamic capability with a multilevel emphasis (Salvato & Vassolo, 2018; Wilden et al., 2016) in the face of the ongoing digitalization and turbulence of many

operating environments (Hanelt et al., 2021; Kraus et al., 2022; Steininger et al., 2022; Vial, 2019). As practical contributions, the dissertation presented a set of propositions for supporting the diffusion of dynamic capability in organizations in digitalizing operating environments: (1) *exercising continuous and genuine stakeholder participation*, (2) *ensuring clear goals, implications, way to, and benefits of change*, (3) *securing resources for individual development at work*, (4) *addressing underlying tensions hindering collaboration*; and (5) *deploying organizational practices enabling interpersonal dynamic capability*. The propositions can be utilized by the management and development-oriented employees in organizations when evaluating and managing the capability for dynamism and adaptation.

Finally, the simultaneously limited scope and the broad approach of the problem setting presented challenges discussed in the preceding section. The limited focus on IT/IS as an artifact can be regarded both as a limitation of the present study and an opportunity for further research. Other fruitful avenues of research appear in deeper examinations on the essence of the operative-level dynamic capability, and the influence of different organizational contextual factors on the functioning of managerial and operative dynamic capabilities. Similarly, longitudinal studies and those focusing on implementing practices, such as the propositions, for supporting the diffusion of dynamic capability in organizations are expected to yield new understandings. It is recommended that future research on dynamic capabilities includes both perceptions of the management and the employees as well as mixed methods approaches. In closing, the researcher trusts this study has brought to light new insights on the diffusion of dynamic capability in organizations with an emergent, collaborative, and multilevel perspective. The journey and findings presented in this dissertation are hoped to be beneficial for research and practice dealing with the current and future digitalizing operating environments.

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Dynamic Capabilities in Information Systems Research – A Literature Review

Katriina Vartiainen
University of Tampere, katriina.vartiainen@tuni.fi

Lars Kristian Hansen
Aarhus University, lkh@mgmt.au.dk

Dynamic Capabilities in Information Systems Research – A Literature Review

Katriina Vartiainen[1] and Lars Kristian Hansen[2]

[1]University of Tampere, Faculty of Natural Sciences, FI-33014 University of Tampere, Finland
katriina.vartiainen@uta.fi

[2]Aarhus University, School of Business and Social Sciences, Department of Management, Fuglesangs Allé 4, DK-8210 Aarhus V, Denmark
lkh@mgmt.au.dk

Abstract. Information systems (IS) and digital business strategies are increasingly focal to companies navigating the changing modes of working, collaborating and operating in various networked business settings. Dynamic capabilities (DCs) are often asserted as a key for companies' attaining sustainable competitive advantage in turbulent and uncertain environments. However, the construct of DCs is utilized in multifarious ways and often researched primarily from a managerial perspective. This makes comprehensive, empirical study of DC development in organizations amorphous and difficult. To address this issue, based on a semi-structured literature review, this paper investigates how DCs are conceptualized in strategic IS literature. Further, the aim is to understand to what extent they have been studied empirically with a multilevel perspective. Firstly, the findings suggest terminology used in defining and explaining DCs is interlaced and tangled. Secondly, the findings point that the suspected gap in multilevel research on DCs within the IS field exists.

Keywords: Dynamic Capabilities, Strategic Information Systems, Digital Business Strategy, Literature Review, Conceptualization, Multilevel Research.

1 Background

It is well known that diverse and profound changes have taken and do take place in organizations' operational environments. The continued evolution and disruption driven by technological advancements create digital business infrastructures and novel connections "among products, processes and services". Traditional business strategies are increasingly pushed towards "modular, distributed, cross-functional, and global" forms exposed to global competition. [1, pp. 471-472] Therefore, the motivation and background for this literature review lie in the aspiration to understand how organizations can develop their capabilities for more nimble and competitive business strategies in the digital age (cf. [1]).

The "ways of working, communicating" and collaborating transform (cf. [2, p. 149]), as knowledge intensive work is conducted over temporal, physical and functional

boundaries within dynamic partnerships and sourcing strategies [3] [4] [5] [6]. Capabilities are no longer utilized and developed within company boundaries but across inter-firm networks [1] [7] [4]. These changes create new organizational capability requirements for information systems (IS) strategizing and utilization to attain sustainable competitive advantage (cf. [8] [9]). New demands for agility and performance unfold involving the management of critical capabilities, resources and relationships for both setting strategic directions and implementing actions to align with a moving target [6] [10]. The dynamic capabilities (DCs) approach together with an IS strategy perspective seems particularly appropriate a lens to investigate this problem domain [11] [1] in the intersection of IS, organization and strategic management research. In this review, the main contribution is aimed at the IS literature.

Today IS and digital operations are pervasive in organizations. Organizational capabilities and capability requirements, such as realizing changing customer needs and responding with new services, are influenced by and shape IS strategizing and utilization, central to sustainable competitive advantage. [8] [9] In this light, it is essential to understand organizational capability development processes [12] across multiple organizational levels, such as operational/strategic, team/organization or across units, to support competitive digital business/IS strategy work. [1] [13]

The existing IS strategy and competitive advantage research are distinguished. However, based on initial literature scoping, four premises emerged. Firstly, capabilities are overall "messy" to study [9, p. 5]. Secondly, they thus far comprise relatively little empirical research [9]. Thirdly, DCs in pursuit of competitive advantage, performance and agility are conceptualized in multifarious ways (e.g. [11] [14] [15]). Lastly, DCs are commonly examined from the managerial perspective. [10] [9] [6] Based on these premises, the following primary and secondary research questions we set:

1) How are DCs conceptualized in strategic IS research?
2) To what extent have DCs been examined a) empirically, and b) with multilevel perspective within the IS field?

The dual-goal of the review is to provide a view to the current state of DC research within the IS field, and help to conceptualize DCs for an upcoming empirical research on organizational capability development processes in the context of digital business strategies [16]. The review was conducted in a semi-structured way aiming at a systematic process (cf. [17] [16] [18]) by utilizing the Scopus database. As findings, two dimensions of conceptualization are firstly presented: *Dynamic Capabilities Relative to Organizations' State and Environment* and *Dynamic Capabilities as Organizations' Attributes and Actions*. Secondly, the perceptible scarcity of empirical multilevel studies will be discussed.

Section 2 elaborates on the concepts of *IS strategy* and *DCs* as well as the claimed need for multilevel research. Section 3 describes the method and analysis process. Section 4 presents the findings as tables and figures. Section 5 discusses the findings, and finally, Section 6 concludes with contributions, implications, limitations and further research.

2 Theoretical Basis

Means of attaining sustainable competitive advantage, which is often IS-enabled today, have been of interest and in the center of debate within strategic management field for a long time (e.g. [19]). Sustainable competitive advantage is also chosen as the umbrella perspective for this study, as it covers overarching elements from IS, organization and strategic management in a multidisciplinary way (e.g. [11] [14] [9]).

Within strategic IS research, the related concepts of *IS strategy*, *strategizing* and *aligning* [9] [10] are central to our problem domain. IS strategy is here understood as "the developmental path […] to achieve the business objectives related to IS", whereas strategizing refers to the process of strategic planning [8, p. 66.21]. Aligning constitutes organizational (strategic) adjusting "in various dimensions and […] levels" [10, p. 137]. Ongoing convergence of business and IT strategies is noted by adopting the term *digital business strategy* [1].

Further, *IS capability* is asserted to have a significant impact on organizational performance [20] and defined as the "ability to acquire, deploy, and leverage [a firm's] IT resources to shape and support its business strategies and value chain activities" [8, p. 66.21]. We appreciate IS capability as pervasive (cf. [1] [8]), and interwoven with other key capabilities shaped of the resources and competencies at the disposal of an organization [20]. Therefore, the decision to adopt a holistic understanding of DCs was taken, instead of limiting the examination to *IS capability* per se.

The resource-based view (RBV) [21] is often seen as a predecessor of the DCs approach [Teece et al., 1997 in [14]; [22]]. Even though vaunted as a driver for sustainable competitive advantage, its empirical investigations have been limited [9, p. 5]. RBV considers organizations' internal, "firm-owned resources" as the main source of value creation and the key factor of performance and competitive advantage [22], which has evoked critique. The view assumes "relatively stable" industrial set-ups with defined industry boundaries. Therefore, RBV alone seems a limited lens for the current rapidly changing technology-enabled business environment. [22, p. 19]

The DC approach, on the other hand, addresses turbulent environments requiring constant assessing and realigning of strategic direction in order to sustain competitive advantage. Ordinary and dynamic capabilities are distinguished between: Ordinary capabilities consist of operational and administrative processes and practices. DCs are about sensing and seizing new business opportunities and transforming those into sustained competitive advantage. [23] More specifically, in Teece and colleagues' latest work [11], DCs are said to mold "internal and external competences to address changing business environments". The *sensing* capability assesses and identifies opportunities and threats in relation to customer needs. *Seizing* mobilizes resources to "address the needs and opportunities and capture value". Finally, *transforming* refers to "continued renewal". [11, p. 18]. *Ambidexterity* comes close to DCs. It is defined as a "capability to simultaneously explore knowledge to identify new opportunities, to identify new market opportunities and exploit knowledge, to capitalize on firms' existing niches" [9, p. 6]. In this light, the aforementioned *IS capability* can represent either ordinary or dynamic type of capabilities.

On the contrary, Eisenhardt and Martin [14] have argued that DCs are actually 'best practices' and as such, easily imitable across organizations and incapable of yielding sustainable competitive advantage. The "resource configurations" enabled by DCs may

provide competitive advantage, but not "the capabilities themselves". Therefore, "dynamic capabilities are necessary, but not sufficient, conditions for competitive advantage". [14, p. 1106.]

Moving on to the multilevel issue, we draw from IS and organization research asserting organizations as complex systems (e.g. [24]). Organizations can be viewed on a continuum from "static, simple and predictable" to "dynamic and/or complex" (Volberda, 1996 in [25, p. 6]). Organizations are "open, non-linear systems, composed of many […] partially connected components that interact with each other through a diversity of feedback loops". Complexity arises from asymmetric temporal and physical interconnectivity and interdependence of entities, such as groups or organizations, within the system. Non-linearity stems from the relationships of the system elements networked in a way that "small changes in one location" may result in large changes within the overall system. [24, p. 133]

These complexity perspectives assume organizations in "a state of constant change", "organizing [as] mutually interdependent process" and "actions and events non proportional" [26, p. 528]. As organizations are all but a "stable equilibrium" and behaviors in organizations rarely linear, systemic processes conducted by independent, correlating elements, such as organizational units or individuals [26, p. 528], research analyzing one organizational entity at a time may offer skewed results. Therefore, we suggest that studying capability development processes should not be disjointed by organizational sections, and that multilevel approach is endogenously appropriate, albeit challenging [27].

Finally, Figure 1 from the field of network research within manufacturing industry brings clarity to the relationship between resources, routines and capabilities of a company [Vuorinen, 2005 in [28]]. Even though the figure presents solidity in company boundaries as is typical of RBV, it effectively depicts a hierarchy between resource and capability related concepts. This presentation was found helpful and it will be referred back to when discussing the findings.

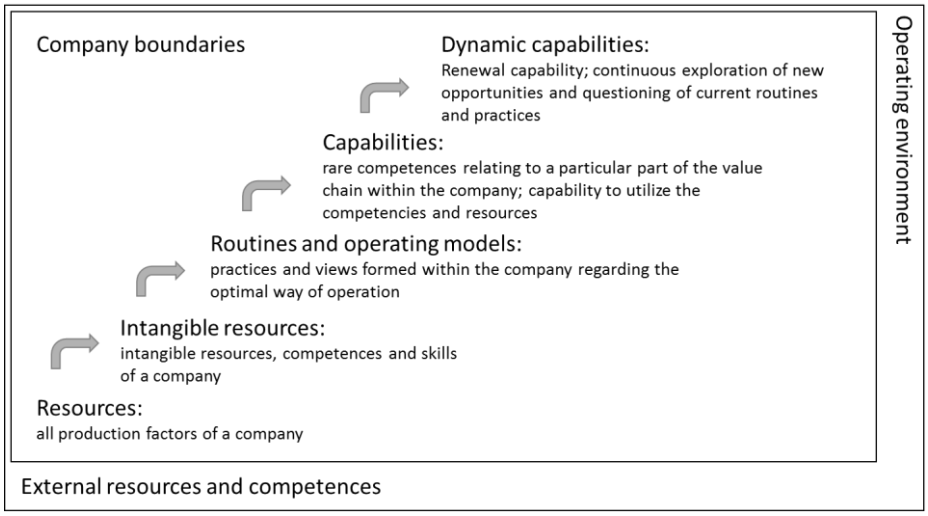

Fig. 1. Hierarchy between resource and capability attributes in organizations according to RBV [Adapted from Vuorinen, 2005 in [28]]

3 Method and Analysis

Even though a full-fledged systematic literature review [18] was beyond our limited scope, a systematic method, which is here called semi-structured, was aimed at. As guiding principles, the literature searches were constructed carefully and iteratively and each action was recorded in a search log (Appendix 1) in order to support repeatability and validity of the study. [29] [16] [17]

To achieve a viable enough result in balance with the resources available, the well-established Scopus abstract and reference database was chosen as the primary source. The initial plan was examine the 10 highest cited studies resulting from the following search:

```
TITLE-ABS-KEY ("information system* strategy" AND
"dynamic capabilities" AND "multi-level")
```

The supposition was that this would provide a view to solid and most utilized prior research in the problem domain (cf. [30]). Instead, the search failed to return adequate results. Consequently, a more thorough scanning of appropriate search terms was executed. After several iterations, the central search string proved to be:

```
TITLE-ABS-KEY (("information system*" OR technolog*
OR digital*) AND strateg* AND ("dynamic capabilit*"
OR ambidext* OR "absorptive capacity"))
```

The search yielded 819 results by 30 March 2018. Alternative terms of *technology*, *digital*, *ambidexterity* and *absorptive capacity* were included to ensure articles from neighboring studies to IS, such as technology intensive production research or supply chain management, were accounted for. The terms *multi* and *multi-level* were considered unsuitable, as the latter failed to give relevant results and the first was too broad. After pre-scanning the above-described set and results from similar searches, the findings started to saturate. Articles in the same special issues, by the same authors and articles previously read began to appear.

The search results were first skimmed based on titles and abstracts. Depending on the size of a particular result set, either the most relevant ones of all, or the most relevant ones of the top 100 cited and most relevant of the newest records were imported for further analysis in Mendeley reference library. After removing duplicate hits from Mendeley, 69 articles were left in total. Finally, those were studied more closely to identify the most relevant ones for deeper analysis containing the aspects of 1) information systems or related areas, such as technology implementation, 2) strategy and 3) dynamic capabilities or related areas, such as ambidexterity.

The number of articles to be selected for deeper analysis in this review was set at a minimum of 10, but in the end, 13 were included based on relevance. The judgement of whether to include an article or not, was based on the title and abstract, or, in case of uncertainty, the overall quality of the publication and journal. Articles previously utilized in the Background and Theoretical Basis sections were omitted, as the aim was specifically to provide further insights on the topic from the IS perspective.

The selected 13 articles were analyzed and their central elements, the journal, area of concern, motivation/premise, research problem, type and method, contributions,

conclusions and number of citations, were identified [16]. Additionally, it was confirmed that all the articles had an IS or related focus. Next, the articles' conceptualizations of DCs and possible multilevel focus were extracted. Finally, Atlas.ti-software was utilized to code inductively [31] the extracted conceptualizations of DCs for easier aggregation. Codes were assigned by analyzing each of the extracts, and identifying their central, defining terms. The codes were then categorized in an open manner in the aim to synthesize the analysis. The following section summarizes the findings as tables and figures.

4 Findings

Presentation of the findings begins by summarizing the reference, study context and the number of citations of each article in the sample (Table 1). The number of citations is included to depict the current recognition of the article within the scientific community.

Table 1. Summary of analyzed literature.

No.	Ref.	Study context	Citations
1	[32]	Role of ITs as a platform for organizational (dynamic) capabilities and strategic processes.	1299
2	[33]	How the effective use of IT functionalities by business units helps build competitive advantage.	555
3	[34]	Relationship between IT and firm innovation in the light of absorptive capacity.	143
4	[35]	Review of absorptive capacity literature in IS.	135
5	[36]	Digital ecodynamics as interactions of environmental turbulence, dynamic capabilities, and IT.	122
6	[37]	How IT investments enable dynamic supply chain collaboration capability and influence firm performance.	108
7	[38]	Sources and interrelationships of flexibility and their relation to IT value.	86
8	[39]	IT activities' roles and performance implications in functional- and business-level strategies.	69
9	[40]	How process management practices affect organizational response to technological change through new product development.	52
10	[41]	Alignment between IT and business strategies; intended and implemented strategic IT alignment.	50
11	[42]	Presents an aligning process model viewing organizational aligning actions as dynamic capacities.	0 (recent study)
12	[43]	How IT application orchestration as a dynamic capability impacts firm performance.	0 (recent study)
13	[44]	The role of dynamic capabilities theory and performance measurement approaches in alignment between business and technology strategies and operational routines and practices.	0 (recent study)

The first research question, of how DCs are conceptualized in strategic IS research, is addressed in Table 2 by summarizing the extracted conceptualizations from each article (cf. presentation by [17] and [35]).

Table 2. Conceptualizations of DCs in the sample literature.

#	Conceptualization excerpts (Sources used in an alphabetical order, see Appendix 2)
1	Capability building mechanisms; "[…] firms' ability to integrate, build, and reconfigure internal and external resources in creating the higher-order capabilities […] embedded in […] social, structural, and cultural context" (Eisenhardt and Martin, 2000; Grant, 1995; Teece et al., 1997) [32]
2	"[S]trategic processes […] to shape functional competencies". "[A]bility to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments"; "strategic options, which allow firms to shape their existing functional competencies […]"; "reconfiguring ineffective functional competencies and shaping more promising ones that better match the environment, better, faster, and cheaper than the competition." (Eisenhardt and Martin, 2000; Kogut and Zander, 1996; Teece et al., 1997) [33]
3	An antecedent for absorptive capacity: "[…] organizational routines and processes by which firms acquire, assimilate, transform, and exploit knowledge can produce dynamic capabilities". (Cohen and Levinthal, 1990; Mowery and Oxley, 1995; Kim, 1997a, b; Zahra and George 2002) [34]
4	"[T]he capacity of an organization to purposefully create, extend, or modify its resource base." "When conceptualized as a dynamic capability, a firm's absorptive capacity affects its ability to reconfigure its existing substantive capabilities." (Helfat et al., 2007; Lichtenthaler, 2009; Pavlou and El Sawy, 2006) [35]
5	By dimensions of sensemaking, responding and pro-acting, and learning capabilities (in Online Appendix A). (Cohen and Levinthal, 1990; Covin and Slevin, 1990; Ferrier et al., 1999; Grewal and Tansuhaj, 2001; Im and Rai, 2008; Jaworski and Kohli, 1993; Kogut and Zander, 1992; Malhotra et al., 2007; Overby et al., 2006; Pavlou and El Sawy, 2010; Sambamurthy et al., 2003; Sull, 2009Weick, 1999) [36]
6	An approach within the resource-based view: "[…] emphasizes the need to transform […] resources into a dynamic capability […] to achieve superior performance in a rapidly changing environment. [Can support achieving] high levels of competitive advantage." (Zhu and Kraemer, 2002) [37]
7	An extension of resource based view. "Change-oriented capabilities allow firms to re-configure and redeploy their resources to meet demands. […] a firm can reallocate its existing capabilities and underlying resources to support a new set of business requirements". (Teece et al., 1997) [38]
8	"[…] acquiring, integrating, reconfiguring, and/or releasing resources that produce a "first-order change" in the organization to match or create market change." "[T]he flexibility to focus on rapidly changing opportunities or to abandon losing initiatives […]". "[…] act on other existing competences to layer, align, and manage the firm's abilities to adapt to change in the marketplace". (Amit and Schoemaker, 1993; Drnevich and Kriauciunas, 2011; Eisenhardt and Martin, 2000; Galunic and Rodan, 1998; Teece et al., 1997; Winter, 2003) [39]
9	"[…] patterned, collective activities systematically focused on improving operating processes and routines". "A dynamic capability is often defined ex ante as a higher-order systematic organizational practice [to improve] routines and capabilities." However, asserts that "codification and routinization are not dynamic capabilities" in themselves. (Dosi et al., 2000; Eisenhardt and Martin, 2000; Levinthal, 2000; Teece et al., 1997; Winter, 2003; Zollo and Winter, 2002) [40]

10	"[…] critical for the creation and strength of IT resources, positively influence the alignment process and its future implementation success". "[…] limited by a firm's existing resources and is shaped by its current market position and history of developing past resources." "[…] emphasizes the capacity to renew competences to achieve congruence with changing environments. […] further defined as a set of specific and identifiable processes, […] the antecedent organizational and strategic routines to create, adapt and combine other resources into new sources of competitive advantage." (Bhatt and Grover, 2005; Eisenhardt and Martin, 2000; Grant, 1996; Montealegre, 2002; Teece et al., 1997; Winter, 2003; Zollo and Winter, 2002) [41]
11	"[…] actions taken by organizations to change their resources […] to adapt to changing environments", includes "sensing, seizing, and transforming dynamic capacities […]". "[…] concerned with strategic change" and "processes by which organizations […] change their resources and routines [and] products and services [for] changing environment." "[…] broad organizational capacities and specific actions that work together […]." (Daniel et al., 2014; Di Stefano et al. 2014; Eisenhardt and Martin, 2000; Helfat et al., 2007; Helfat and Peteraf, 2009; Koch, 2010; Peteraf et al., 2013; Smith and Lewis, 2011; Teece et al., 1997; Teece, 2007, 2014) [42]
12	Viewed through IT application orchestration dynamic capability. Linked to agility, dexterity, adaptation and renewal. However, the paper refrains from explicitly defining dynamic capabilities. (Sirmon and Hitt, 2009; Sirmon et al., 2007; Teece, 2007; Wang et al., 2012) [43]
13	"[…] is developed from a nexus of the Resource-based View and organizational learning theory […]." "[O]rganisational routines" for dynamic alignment, resources reconfiguration to respond to changes. Categories: leveraging, learning, reconfiguration, integration within the dimensions of renewal and incremental. (Ambrosini et al., 2009; Barreto, 2010; Helfat and Winter, 2011; Janssen et al., 2016; Teece et al., 1997) [44]

Further, findings by the analysis conducted with Atlas.ti software are shown in Figures 2-5: Altogether, 37 codes grouped into 18 categories were identified. Each code was assigned to a paper once to avoid skewing the results by duplicate hits, but each code can appear in multiple categories. The high number of categories illustrates that this is still early work, as a more concise categorization would be beneficial for better synthetization (cf. [31] [45]). However, already in this analysis, two dimensions of conceptualizations emerged:

1) Dynamic Capabilities as Relative to Organizations' State and Environment, and
2) Dynamic Capabilities as Organizations' Attributes and Measures.

Figures 2 and 3 summarize the findings in the first dimension, and Figures 4 and 5 in the second.

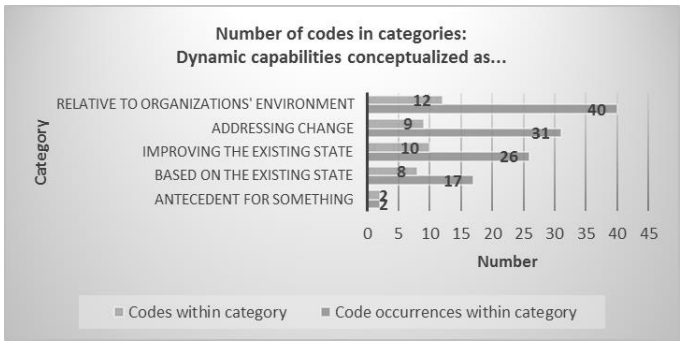

Fig. 2. Number of codes in categories: The dimension of 'Dynamic Capabilities as Relative to Organizations' State and Environment'.

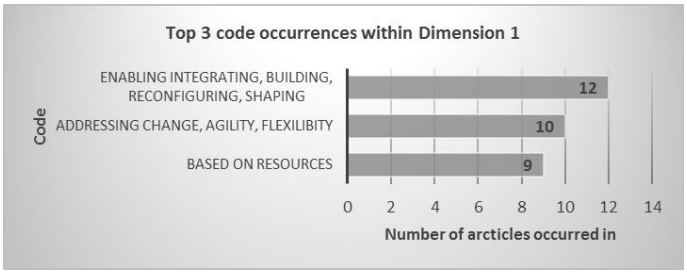

Fig. 3. Top 3 most occurred codes: The dimension of 'Dynamic Capabilities as Relative to Organizations' State and Environment'.

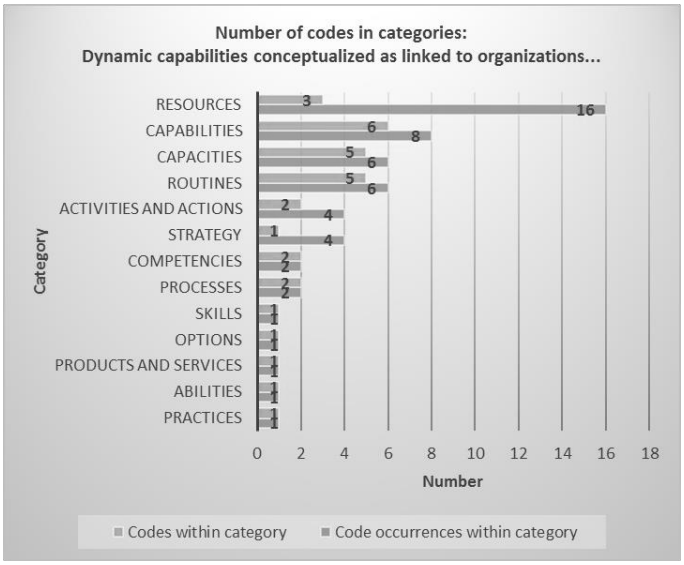

Fig. 4. Number of codes in categories: the dimension of 'Dynamic Capabilities as Organizations' Attributes and Measures'.

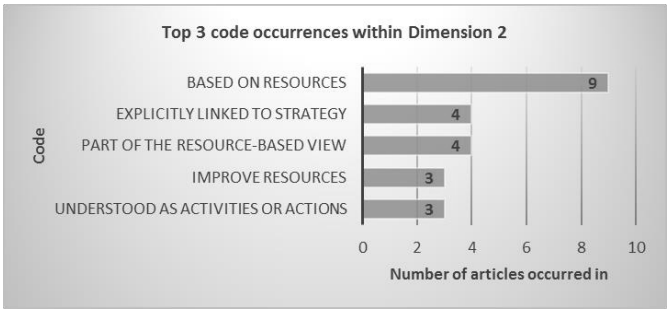

Fig. 5. Top 3 most occurred codes: the dimension of 'Dynamic capabilities as linked to organizations' attributes and measures'.

Turning towards our secondary research question, of to what extent DCs have been studied empirically with a multilevel perspective, our sample is in line with the supposition based on the initial literature scoping: Few empirical multilevel studies were identified within the sample. Even though quantitative conclusions cannot be drawn from such a qualitative and limited data, for transparency, some figures are presented to support the claim: Nine (9) out of thirteen (13) papers in the analyzed material represent some form of empirical research (as opposed to theorizing) with collected data, such as case study, survey or field experiment. Of those nine, five (5) acknowledge or discuss their research topic as an issue touching multiple organizational levels, three (3) of which represent the latest research from 2017-2018. However, only one (1) of the papers discusses multiple level issues explicitly within research objectives and design. These findings and their implications will be further discussed next.

5 Discussion

The findings presented in Figures 2-5 show that the articles fairly unanimously conceptualize dynamic capabilities as based on organizations' resources and as enabling, integrating, building, reconfiguring or shaping the organization and addressing change. Several further observations are discussed in the following paragraphs.

Addressing the first research question, in defining the construct of DCs authors interlace multiple concepts firstly relating to attributes that a firm *possesses*, such as skills, competencies, abilities, capacities, capabilities and options. These are used both as the basis of DCs and as object of development as a result or by the means of DCs. Secondly, dynamic capabilities are seen as something that a firm *does*: actions and activities, practices, processes and routines. Similarly, these either act a part in forming DCs, or are improved through or with DCs. Most of the analyzed papers (9) took the stance that DCs are based on organizational resources.

Some authors link DCs to the RBV or otherwise firm-specific resources. However, only four (4) papers explicitly linked them to strategy or strategic routines, whereas most analyzed papers (10) did link them to change: the requirement of pro-activity, agility or flexibility of the company to integrate, build, reconfigure, shape or otherwise adjust (12 papers). Even though less than half (6 papers) mentioned the goal of beating

competition, addressing the need of change and readjusting already implies that organizations' environment is a prevalent motivator for the DC approach, which is also perceptible in Figure 2.

Most cited works by the authors in the sample were Teece et al., 1997 [46] (8 papers), Eisenhardt and Martin, 2000 [14] (6 papers) and Winter, 2003 [47] (3 papers). Overall, Teece was cited in 11 instances including his later works from 2007 [19] (2 papers) and 2014 [23] (1 paper) making him the most cited author in the sample. Two interesting points are here to note: First, Teece has continuously published on DCs with the notion of developing the theory. Yet, some authors refer to his older work, which may contain views that have later been updated. For instance, in Teece and colleagues latest work DCs have been defined through sensing, seizing and transforming [11]. In this sample, only one (1) paper explicitly adopts this view. Second, Teece [23] [19] and Eisenhardt and Martin [14] have engaged in a debate about the nature of DCs and whether they in fact create sustainable competitive advantage. On the one hand, it may seem contradictory to include both views in a conceptualization. On the other hand, inclusion of diverting views can make a definition more robust and applicable to multiple perspectives of organizational research.

The main deductions drawn from the analysis deal with the various concepts used to address what companies possess (such as skills, competencies, capacities), and what measures they take (such as actions, activities, routines). Looking back at the repertoire of terms associated with DCs it seems either that the field is unsure about the meaning of the concept, or that the term is so rich in meaning that multiple, overlapping, even conflicting, constructs are required to explain it. In this sense, this analysis fell short in solving the research problem of uncovering how DCs are conceptualized in IS research.

With regard to our secondary question, the limited findings of multilevel research may be interpreted as an indication that explicit multilevel examination is of low relevance in studying DCs in strategic IS. At the same time, based on the discussion in the section Theoretical Basis (organizations as non-linear, complex systems), to understand the mechanisms and processes of capability development across organizational levels and across units seems of significant importance. This angle has recently been promoted theoretically in management studies (e.g. [13]) even though our initial searches failed to provide viable results. Thus, this review suggests that a gap exists in multilevel DC research in the field of strategic IS.

To sum, our discussion confirms that dynamic capabilities are indeed a foggy research area and further work on understanding them is required within strategic IS. For instance, explicating the kinds of relationships presented in Figure 1 seems to be lacking in this sample. Thus, the definition of DCs remains ambiguous. Perhaps it is this kind of hierarchy that we should clarify upon entering empirical data collection also in IS research (cf. [15]), especially as information systems by nature are complex and multilevel constructs within other complex and multilevel constructs, organizations.

6 Conclusions

To address the most common questions posed by reviewers, "what's new?" and "so what?" [17, p. xxi], we conclude by summarizing two main contributions and their related implications. Firstly, the concepts used for defining dynamic capabilities are manifold, interlinked and interlaced. An implication of this is a need to provide conceptual clarity in further work. For instance, we could examine which kind of conceptualizations are most useful in which type of research, as has been pointed out. Moreover, when designing empirical work, it is vital to be aware of this conceptual multiplicity, even confusion. Secondly, it appears IS field would benefit from further multilevel research in the area of DC development to support strategic IS work in organizations.

As for the limitations, this is clearly an early literature review. Therefore, the categorization of the findings would benefit from further work to synthesize the conceptualizations as a more concise entity. The current categorization appears somewhat fragmented to gain a unified view to the findings, and some of the codes appear overlapping. Secondly, the presentation mode should be improved to depict more clearly, which concepts were central in which article. [17] (cf. also [35])

The other noted limitation deals with the methods. Thus far, the findings rely on Scopus, but additional databases, such as ScienceDirect, Web of Science and Business Source Complete, are in scope. Secondly, a single researcher conducted the literature selection and analysis process. To strengthen the validity and reliability [29] of the findings, the choices should be reviewed by another researcher. Finally, backward and forward reviews of citations from the selected articles [17, p. xvi] were omitted due to scope and should be commenced as further work.

As concluding remarks, while acknowledging the limitations, it can be said that the work conducted thus far contributes to understanding DCs within IS research. It provides informed grounds to build an empirical research case, which aims to distinguish between the different capability and resources attributes in an organization, and evaluate their linkages to and the development of DCs on multiple organizational levels. Therefore, while mainly contributing to theory as a pre-empirical paper, this review serves as a tread in pursuit of results of practical relevance [9] for organizations. Alongside empirical work, making sense of DCs within strategic IS will be continued by more advanced reviewing and analysis of literature.

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Appendix 1: Summary of search strings used in Scopus

	Search string	Fields	Limitations set	Records
1	"information system* strategy" AND "dynamic capabilities" AND "multi-level"	T, A, K		0
2	"IS strategy" AND "dynamic capabilities" AND "multi-level"	T, A, K		7
3	"IS strategy" AND "dynamic capability" AND "multi-level"	T, A, K		7
4	"information system strategy" AND "dynamic capability" AND "multi"	T, A, K		0
5	"IS strategy" AND "dynamic capabilities" AND "multi"	T, A, K		7
6	"information system strategy" AND "dynamic capability" AND "multi"	T, A, K		0
7	("information system strategy" OR "IS strategy") AND "dynamic capability" AND "multi level"	All	Exclude "conference reviews"	67
8	("information system strategy" OR "IS strategy") AND "dynamic capability"	T, A, K	Exclude "conference reviews"	9
9	("information system" OR digital) AND strategy AND "dynamic capability"	T, A, K	Exclude "conference reviews"	70
10	("information system" OR digital) AND strateg* AND "dynamic capability"	T, A, K	Exclude "conference reviews"	117
11	("information system" OR digital) AND strateg* AND "dynamic capability" AND multi*	T, A, K	Exclude "conference reviews"	23
12	strateg* AND "dynamic capability" AND multi*	T, A, K	Exclude "conference reviews"	211
13	("information system*" OR technolog* OR digital*) AND strateg* AND "dynamic capabilit*" AND multi*	T, A, K	Exclude "conference reviews"	73
14	("information system*" OR technolog* OR digital*) AND strateg* AND "dynamic capabilit*" AND "multi level"	T, A, K		8
15	("information system*" OR technolog* OR digital*) AND strateg* AND ("dynamic capabilit*" OR ambidext*)	T, A, K	Exclude "conference reviews"; "book chapters"; other languages than English;	507
16	("information system*" OR technolog* OR digital*) AND strateg* AND ("dynamic capabilit*" OR ambidext*)	T, A, K	English reviews only	10
17	("information system*" OR technolog* OR digital*) AND ("dynamic capabilit*" OR ambidext*)	T, A, K	English reviews only	33
18	("information system*" OR technolog* OR digital*) AND strateg* AND ("dynamic capabilit*" OR ambidext* OR "absorptive capacity")	T, A, K	Exclude "conference reviews"; "book chapters"; other languages than English	n/a
19	("information system*" OR technolog* OR digital*) AND strateg* AND ("dynamic capabilit*" OR ambidext* OR "absorptive capacity") AND "multi level"	T, A, K	Exclude "conference reviews"	3
23	("information system*" OR technolog* OR digital*) AND strateg* AND ("dynamic capabilit*" OR ambidext* OR "absorptive capacity")	T, A, K		819
24	("information system*" OR technolog* OR digital*) AND ("dynamic capabilit*" OR ambidext* OR "absorptive capacity")	T, A, K	English reviews only	63

Appendix 2: Full sources in Table 2

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PUBLICATION 2

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In Search of the “How” of Dynamic Capabilities in Digital Transformation: Contradictions as a Source of Understanding

Katriina Vartiainen
Tampere University, katriina.vartiainen@tuni.fi

In Search of the "How" of Dynamic Capabilities in Digital Transformation: Contradictions as a Source of Understanding

Emergent Research Forum (ERF)

Katriina Vartiainen
Tampere University
katriina.vartiainen@tuni.fi

Abstract

Digital transformation (DT) of the society causes companies to face complex changes and uncertainties. New technologies enable novel forms of operation, but they also inflict new organizational capability requirements. Dynamic capabilities (DCs), the organizations' ability to sense and seize opportunities and to transform, are often seen as a key to remaining competitive in the constantly changing environment. However, further empirical understanding on how DCs develop in organizations particularly in the context of DT is required. This ongoing qualitative longitudinal case study aims to address this need. As findings, the paper presents three types of contradictory phenomenon between supporting and hindering change during a transformation process in a case company. The contradictions illustrate how dynamic and operational capabilities may evolve together with change across the organization. The findings indicate the DC to be a multi-level construct and propose new empirical insight into DC development in digital transformation.

Keywords

Digital transformation, dynamic and operational capabilities, contradictions, case study, multi-level.

Introduction

Organizations today face complex changes and uncertainties caused by disruptive technologies. New "digital resources" enable novel business and operation models characterized by data utilization, connectivity, and digitization of products and services. (Bharadwaj et al. 2013) As part of this *digital transformation* (DT), organizations aim to strategically respond to the disruptions to capture and create new avenues of value creation. This often involves profoundly transforming businesses and utilizing combinations of digital technologies, also inflicting new capability requirements. (Vial 2019) Many related streams in information systems (IS) and management research address the question of remaining competitive in environments of varying levels of turbulence, including aligning strategic business and information technology (IT) (Karpovsky and Galliers 2015), co-evolving with the competitive landscape (Tanriverdi et al. 2010), IT-enabled organizational agility (Tallon et al. 2019), and developing digital business strategies (Bharadwaj et al. 2013). *Dynamic capabilities* (DCs), organizations' capability to sense and seize opportunities and to transform accordingly, are regarded as essential enablers of competitive advantage in the constantly changing environment (Teece et al. 2016). Despite distinguished prevailing DC research, especially from managerial and theorizing perspectives (e.g., Teece et al. 2016), the literature indicates important unknown areas remain. A recent empirical study encourages searching for new understanding on how DCs operate in different industry and transformation settings (Yeow et al. 2018). Moreover, longitudinal DC research (Daniel et al. 2014) and how DCs contribute to digital transformation (Vial 2019), as well as studies investigating the multiple levels of organizations (Salvato and Vassolo 2018) have been called for. We address the identified need by asking *How do organizations' dynamic capabilities develop in digital transformation?*

The paper reports initial findings of the first phase of an ongoing, qualitative longitudinal case study. The study explores the capability development of an organization undergoing major changes characteristic of

DT. Initial findings suggest three types of emerging contradictory phenomenon (cf. Fairhurst and Putnam 2019) between supporting and hindering the desired change. We propose that, together, they provide insight into how organizational capabilities may evolve as interplay between operational capabilities (Pavlou and El Sawy 2011) and DCs through participation and productive dialogue (Salvato and Vassolo 2018). By this we contribute to understanding how the reconfiguration of operational capabilities (Pavlou and El Sawy 2011) can be supported by managerial DCs, particularly in situations of intensive change. When successful, managerial DCs may alter operational capabilities, which in turn have the potential to enrich cross-organizational DCs. This would point towards the problematization of the "in-house assumption" (Alvesson and Sandberg 2011) of viewing DCs chiefly as managerial capabilities. On the contrary, the findings indicate the DC to be a multi-level construct (Salvato and Vassolo 2018), manifesting differently with job responsibilities.

Theoretical Underpinnings

IS capability, the "ability to acquire, deploy, and leverage [a firm's] IT resources to shape and support its business strategies and value chain activities" (Bharadwaj et al. 2002 in Karpovsky et al. 2014), has a significant impact on organizational performance. However, in today's technology-intensive environment, IS capability, like IS itself, is understood as pervasive, interwoven with other key capabilities formed of the resources and competencies at the disposal of organizations. (Peppard and Ward 2004) For instance, IT units require understanding of business functions and strategic goals, and in turn, business functions need advanced technological understanding (Vial 2019). Resources are required to execute capabilities, and the use of resources depends on the quality of capabilities (Daniel et al. 2014). This indicates that capabilities co-evolve together with an organization's actions, resources and environment (cf. Tanriverdi et al. 2010). Thus, we explore capabilities through a comprehensive lens, namely, that of DCs.

DCs evolved from the resource-based view (Barney et al. 2001) of turbulent environments requiring constant realignment of strategic directions for competitive advantage (Teece et al. 2016). In literature, DCs are much debated and varyingly parsed making their empirical research challenging (Peteraf et al. 2013). While operational capabilities enable daily business activities (Pavlou and El Sawy 2011), DCs alter "internal and external competences" (Teece et al. 2016). They are also seen as a "learned and stable pattern of collective activity" to create operating routines for "improved effectiveness" (Zollo and Winter 2002). A contrasting view regards them as "best practices" and, as such, "necessary, but not sufficient, conditions for competitive advantage" (Eisenhardt and Martin 2000). While acknowledging this debate, we adopt two nuanced views fit for cross-organizational enquiry. The first models DCs through a central management objective of reconfiguring operational capabilities for a changing environment. The four interacting DCs are *sensing* "to spot, interpret and pursue opportunities in the environment", *learning* "to revamp existing operational capabilities with new knowledge", *integrating* "to combine individual knowledge into the unit's new operational capabilities" "by creating a shared understanding and collective sense-making", and *coordinating* "to orchestrate and deploy tasks, resources, and activities in the new operational capabilities". (Pavlou and El Sawy 2011) The second view complements the extant theories by asserting that DCs emerge and operate through productive dialogue and interpersonal participation rather than stemming from skills of "a few … top executives" or being "abstract, firm-level entities". Employees "connected through high-quality relationships" and empowered for "innovative potential" are suggested as the essence of developing DCs. (Salvato and Vassolo 2018) Finally, the relationship of DCs to organizational learning (e.g. Levinthal and March 1993) and change management (e.g. Burnes 2004) theories remain to be assessed as a refinement of the current theoretical frame.

Case Description and Method

We initiated a longitudinal, interpretive case study (Yin 2018) to understand complex organizational capability development processes. The case company operates within public sector materials and services procurement and logistics in a Nordic country. The company employs approximately 240 people in three locations. The data were collected between November 2018 and May 2019 by three qualitative semi-structured group discussions and 14 individual interviews among management and staff from different functional areas. During data collection, significant organizational, technological and process changes influencing both internal and customer-facing functions were under implementation. The overall change was at an early stage. The first two group discussions were held with the executive team to understand the vocabulary and

topical issues, and to collect feedback for ensuring that participants were able to relate to the questions. The final interview themes included organizational change and development, the goals and vision of the organization, key competencies and capabilities, and technology use and its effects on work. All sessions were recorded as audio and in researcher notes. Session durations varied from 40-90 minutes. Audio capture excluded the introducing of research objectives, the addressing of questions from participants, and the concluding of session. Recordings thus range from 32-54 minutes in the individual interviews and from 76-79 minutes in the group discussions with an average duration of 50 minutes. While addressing the semi-structured themes, participants were encouraged to discuss their views in addition to answering interview questions. The initial findings were derived inductively by listening to and taking notes from the recordings as well as drawing a map of initial codes and categories depicting items and phenomena relevant to capability development. The findings were validated by our presenting and discussing them with the organization's management and research participants. Systematic coding of data (Corbin and Strauss 1990) is in progress and remains to be presented as subsequent work. Throughout the analysis, the hermeneutic circle is utilized as a guideline (Klein and Myers 1999).

Initial Findings

Three types of contradictory phenomenon, contradictions in *work development, organizational development,* and *technological development*, between supporting change and hindering change emerged from the data. They are presented in Table 1 with exemplars. The left side illustrates strengths supporting change, and the right side represents pain points hindering change.

Exemplars of strengths supporting change	**Exemplars of pain points hindering change**
1: Contradictions in work development	
Aspiration toward expertise, such as learning, developing end-to-end understanding, and customer orientation. *"[The staff] take the customer into consideration in different ways, and carry out a lot of conversation with them, engage them. … They give good ideas of how to develop things."*	**Challenge of obtaining room for development in everyday work**, such as availability of resources, and accessibility of training. *"This is just a worrying situation now at the moment, as we work almost like a production line through these processes …, and we don't have time to put our hearts into self-development that much."*
2: Contradictions in organizational development	
Perception of the organization's moving forward, such as innovative approach by management, investment in development initiatives, and management of change by development projects. *"[W]e are even very innovative with the development projects. … [W]e think a little bit outside the box and dare to do. … [O]ne should courageously think about what is new."*	**Challenge of sustaining manageability of change**, such as involving the stakeholders, retaining clarity of the renewing processes, and creating real understanding of change implications among parties. *"I would probably come again to training and … finding the right people. … [T]hat people would really know what is coming and where we are going. … [W]e should get an even deeper [understanding] of what we are doing."*
3: Contradictions in technological development	
Openness to utilizing technology and data in new ways, such as appreciating the importance and potential of data and management by information, and expectations of gaining advantages by new technology. *"[A pilot program for a new technology is] very welcome. For instance, we have certain reports, so it is quite handy that it can generate them with certain criteria."*	**Challenge of utilizing technology to the fullest**, such as seamless data flow, interoperability of systems, increasing understanding of system functionalities and workflows, and availing of expertise from different functions. *"[T]o involve broadly enough those people who are experts in the work. To give insight and understanding on the topic. [Without utilizing experts] it is hard to reach the same level."*

Table 1. Contradictory Phenomena Between Supporting and Hindering Change

We propose that the contradictions illustrate the interplay of operational capabilities and DCs. To demonstrate this, we will next discuss the relationship of the contradictions with *sensing, learning, integrating* and *coordinating capability* following Pavlou and El Sawy (2011). We suggest that the *contradictions in work development* influence the ability to adjust operational capabilities at primarily the everyday work level. First, in strengthening and diversifying the existing capabilities in daily processes. Second, in learning

and integrating new expertise in process areas under transformation. Finally, in identifying new practices or capability gaps on all levels of the organization through both existing processes and those under renewal. Thus, this contradiction is seen to influence both learning and integrating capabilities. The *contradictions in organizational development* reflect in changes conducted as systematic, project-type undertakings, such as implementing a new system with new processes. Where the first contradictions primarily touch everyday learning, the second manifest particularly during transformation. Here, integrating capability, creating deep and shared understanding, and making sense of the goals and implications of changes becomes pronounced. Coordinating capability is illustrated especially in the exemplar of retaining clarity of the renewing processes. Lastly, while the exemplars in the *contradictions in technological development* may be familiar as traditional system development challenges, the last two concern how the understanding of system functionalities and workflows can be deepened, and organizational expertise utilized broadly in system development. These relate to learning, integrating and coordinating capabilities. Particularly, seamless data flow and interoperability of systems would link to integrating and coordinating capabilities, while availing of expertise from different business and support functions would manifest as integrating capability. Utilizing technology to the fullest would show traits of sensing capability, such as in identifying novel uses of technology.

Discussion and Conclusions

We seek to understand how dynamic capabilities of organizations develop in digital transformation. Many of the findings relate to understanding and participation across an organization. Especially the second contradiction resonates with the proposition that "productive dialogue will improve the rates of … mutual learning, and cohesion among employees engaged in change initiatives" (Salvato and Vassolo 2018). It seems that complex concurrent changes require a heightened understanding by employees of why the change is being made, the status of the change, and what is expected of them in order smoothly to adopt its initiatives. It may be that by intensive dialogue and participation learning and integrating capabilities (Pavlou and El Sawy 2011) in particular could be strengthened and utilized to their full potential. The findings also indicate that dynamic inter-personal capability extends not only to management–management (cf. Salvato and Vassolo 2018) but also to management–employee and employee–employee interactions. We thus suggest DCs to be multi-level constructs, particularly so in areas undergoing major transformation. The required intensity of such capability may depend on both functional area and timing. As processes and the digital landscape change, for an organization to respond and evolve requires sensing, seizing and transforming capability (Teece et al. 2016) at all levels. This may show as ability to detect the silent signals of processes not working as intended, unforeseen opportunities and consequences of new systems being implemented, or neglected areas of development. For instance, new uses for systems resulting in more agile data utilization may emerge, as DCs are encouraged and exercised throughout the organization.

Additionally, the three presented types of contradictory phenomenon could be seen as tensions between *what* and *how*. The *what* seems to be supportive of change in everyday work, organizational direction, and technology utilization. The identified pain points of the *how* appear as contradictory forces, hindering the change by challenges such as creating space for everyday development, or gaining unified understanding of complexities introduced by more technology-intensive operating models. (cf. Fairhurst and Putnam, 2019) We propose that these contradictions could be addressed especially by learning, integrating and coordinating capabilities (Pavlou and El Sawy 2011) through productive dialogue and intensive participation (Salvato and Vassolo 2018). These capabilities may become more important as technology use intensifies creating requirements for rethinking processes, more numerous data points, and interdependencies and constraints among systems. We, therefore, propose that the study also complements Yeow et al. (2018) regarding tensions and contradictions, including their discovery that "sensing, seizing and transforming actions occurred throughout the aligning process, albeit in different proportions". Finally, the primary limitation concerns the current lack of discussion from the organizational learning (Levinthal and March 1993) and change management (Burnes 2004) perspectives, which remain to be addressed during further data collection and analysis cycles. We also recognize the generalizability challenge of a single-case study, and thus our primary aim of generalization is theory expanding (Yin 2018). To conclude, through rich data and systematic analysis, we anticipate empirically grounded understanding on how dynamic and operational capabilities evolve together with change across organizational levels. As a result, we expect practical implications to managing these capabilities, and a contribution to theory as new insight into dynamic capability development in digital transformation.

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Exploring tensions and unifying discourses in globally networked R&D work

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Exploring Tensions and Unifying Discourses in Globally Networked R&D Work

Katriina Vartiainen
Tampere University, katriina.vartiainen@tuni.fi

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Completed Research

Katriina Vartiainen
Tampere University
katriina.vartiainen@tuni.fi

Abstract

Organizing software research and development (R&D) in different globally distributed work (GDW) settings is common today. GDW often involves collaboration challenges and tensions related to cultural differences, asymmetric organizational positions, and other boundaries. Previous research has provided exceptional insight into tensions between onshore and offshore actors, and cross-cultural issues in GDW. However, less is known about what kind of tensions and collaborative discourses appear in globally networked organizations with accrued experience of GDW. This qualitative case study with software R&D professionals in India explores tensions and unifying discourses in a networked GDW setting. The findings indicate three sources of tensions, which appear work context-related rather than arising from onshore-offshore oppositions, and several types of unifying discourses reflecting collaborative approaches and mutual learning in a global environment. The paper contributes to theory and practice in understanding manifestation and evolution of tensions, and how they may be greeted in different GDW settings.

Keywords

Globally distributed work, tensions, discourses, R&D, networked, collaboration.

Introduction

Today, knowledge intensive operations, such as business process services, software and information systems (IS) projects, and research, development and innovation activities, are often conducted as globally distributed work (GDW) (Brooks et al. 2020; Cramton and Hinds 2014; Levina and Vaast 2008; Ravishankar 2015). For years, boundaries and other conditions enabling and hindering effective global collaboration have been discussed in research (Gibbs 2009; Kotlarsky and Oshri 2005; Levina and Vaast 2008). It is known that GDW offers a fruitful ground for organizational tensions related to conditions, such as onshore-offshore positions (Brooks et al. 2020), cultural differences (Cramton and Hinds 2014; Ravishankar 2015), the quality of social ties and knowledge sharing (Kotlarsky and Oshri 2005), and other complex contextual boundaries (Levina and Vaast 2008) between collaborators. Despite the challenges, the global way of working is common, largely influenced by the globalizing nature of our world (Kotlarsky and Oshri 2005), where digital technologies have diluted organizational, geographical, and functional boundaries (Bharadwaj et al. 2013).

Among distinguished GDW research, we identify two related yet distinct approaches to examining tensions and boundaries influencing effective collaboration. The first explores the differing and asymmetric positions of onshore and offshore actors (Brooks et al. 2020; Gibbs 2009; Levina and Vaast 2008). The second focuses on cross-cultural differences, and how they are faced and managed (Cramton and Hinds 2014; Ravishankar 2015). More research has been called for to understand tensions in different types of GDW arrangements (Brooks et al. 2020). Recent research also points to the need of more work on understanding culture as a "discursive resource" in diverse information technology (IT) offshoring organizations. Additionally, exploration of other possible explanations than cultural differences in relation to challenges in global collaboration appears necessary. (Ravishankar 2015) Much work has been done to understand effective collaboration, coordination, communication, and productivity and performance (e.g. Bosch-Sijtsema et al. 2009; Kotlarsky and Oshri 2005; Levina and Vaast 2008) in GDW. At the same time,

organizational learning, and dynamic learning capability within and across organizational boundaries are noted among key factors of competitive advantage (Dyer and Nobeoka 2000; Levinthal and March 1993). However, to our knowledge, the influence of the described challenges in GDW on organizational learning and capability development appears scarcely attended to in IS research.

Against this background, and as GDW practices have matured over the years, we address these intriguing gaps and aim to extend the discussion from the onshore-offshore premise where offshore teams mainly focus on routine back-office activities (Brooks et al. 2020). Our study explores a case of globally distributed R&D work, which involves complex IT products, a dynamically networked organizational structure, and global teams responsible for the software R&D efforts with a high level of competency. The interlinked research questions are: *1) What kind of tensions appear in globally networked R&D work, beyond typical onshore-offshore oppositions and cultural differences? 2) What kind of unifying and tension attenuating discourses are utilized among senior professionals engaged in global R&D work?* The paper presents a qualitative case study (Yin 2018) conducted with a global IT company and their software R&D professionals located in India, one of the vibrant locations of global innovation today (Mittal 2012). The research method comprises data collection by seven qualitative semi-structured interviews, and inductive and abductive data analyses (Kennedy 2018; Urquhart 2013). The paper contributes to answering the research questions with the perspective of senior R&D professionals located in India. The study is the first independent part of a research project encompassing a similar exploration in three locations of the case company.

As findings, we, first, present three sources of work-context related tensions in globally networked R&D work: differing experience levels among collaborating teams, incentives to share and retain knowledge, and multifold goals and priorities in R&D work. Second, we present several types of unifying and tension attenuating (Brooks et al. 2020) discourses, ways of talking (Putnam et al. 2016) about collaboration. The paper contributes to the area of GDW in IS research, and more specifically to theoretical insight and practical understanding (Mathiassen, 2017) on how tensions may manifest, and be greeted in day-to-day, networked global R&D work. We build on previous distinguished research on how tensions appear to evolve in GDW settings (Brooks et al. 2020) and, finally, extend the discussion to organizational learning capability development (Dyer and Nobeoka 2000; Levinthal and March 1993) in global organizations. Next, the theoretical underpinnings are discussed, including definitions for GDW, organizational tensions and discourses, and previous related GDW research from two perspectives. Then, the case description and method are presented followed by the findings with practical examples. Finally, the paper is completed by discussion, implications, limitations, suggestions for further research, and conclusions.

Theoretical Underpinnings

This section first defines GDW, and organizational tensions and discourses. After that, tensions in GDW are examined from the onshore-offshore positions (Brooks et al. 2020; Levina and Vaast 2008) and cultural differences perspectives (Cramton and Hinds 2014; Ravishankar 2015) based on four high-quality, in-depth studies. These studies will be further reflected on when presenting and discussing the findings.

Defining Globally Distributed Work

GDW is here understood as a setting, where teams dispersed geographically across different countries work to achieve a common goal (Bosch-Sijtsema et al. 2009). The goal may be a project deliverable to be integrated into a larger entity, such as a software program composed of input by multiple teams. The aim of GDW has traditionally related to availing of global opportunities, including skilled workforce, flexibility, competitive advantage, and cost reduction (Prikladnicki and Audy 2012). Common business models in GDW can be broadly divided into offshore outsourcing and internal offshoring. The first model entails partnering with an external service provider sited in another country, whereas the second model involves wholly owned subsidiaries, similarly located abroad. (Prikladnicki and Audy 2012)

In this paper, the setting resembles the latter model, and we refer to the different software development centers (Prikladnicki and Audy 2012) as locations. A meaningful elaboration to frame the case is that work is conducted globally in a networked manner where team collaborations, compositions, and dispersion may vary from one project to another. These compositions may evolve and change over time. This brings a dynamic attribute to our GDW case (cf. Putnam et al. 2016).

Organizational Tensions and Discourses

As new digital technologies emerge, new types of partnerships, changing business models, organizational structures, and capability requirements are formed (Bharadwaj et al. 2013). This creates flux inflicting dynamic, recurring, and reforming *tensions* in organizations as a part of their everyday life (Putnam et al. 2016). Organizational tensions are here understood as *oppositions*, "the clashing, push-pull dynamics of organizational life" (Fairhurst and Putnam 2019). Tensions comprise "feeling states" associated with difficult emotions, such as stress, anxiety, frustration, and uncertainty. The concept grounds other forms of organizational oppositions, such as contradictions and paradoxes. (Putnam et al. 2016) Oppositions have the potential to "create inertia" but also "spawn creative energy" (Fairhurst and Putnam 2019), for example for improving practices and processes. Therefore, following previous research (Brooks et al. 2020; Gibbs 2009), we view tensions not as hardship to be eliminated, but as something that exists, should be addressed, and could be exploited for productive action and organizational development.

Conflicts are frequently referred to in connection to organizational oppositions (Putnam et al. 2016). In this paper, we understand conflicts as organizational occurrences, where two or more parties have clashing or disagreeing views of things, such as communication or operational goals (cf. Brooks et al. 2020; Putnam et al. 2016; Ravishankar 2015). *Discourses* are understood as ways of talking (Putnam et al. 2016), and people positioning themselves and other parties in relation to a potential tension. They also relate to management strategies of tensions, which can be explored by the language used and may include "different ways of reacting to, dealing with, or responding to organizational oppositions". (Fairhurst and Putnam 2019) When these discourses convey "interactive, and collaborative behaviors" (Brooks et al. 2020), they are identified as unifying (cf. Gibbs 2009), and tension attenuating (cf. Brooks et al. 2020), and supportive of rewarding collaboration in GDW (Ravishankar 2015). Finally, organizational tensions can be studied from different angles, such as strategic decision making, cross-sector collaboration, leadership practices, and everyday discourses (Smith et al. 2017). In this case, we identified GDW as the most fitting frame and a specific area of concern (Mathiassen 2017). Thus, we will explore the research questions in relation to previous research on tensions in GDW, as is described next.

Onshore-Offshore Positions and Tensions in GDW

Team processes, such as communication, coordination and trust are identified among enablers of effective distributed work (Kotlarsky and Oshri 2005). At the same time, tensions in GDW are noted as understudied phenomena, although they constitute a significant source of conflicts and issues in communication and coordination (Brooks et al. 2020). It appears that particularly the relationships between onshore and offshore actors are focal in research of GDW tensions. Typically, in such cases, a local, onshore, organization sources work from a subsidiary or a third-party subcontractor located abroad, offshore (Brooks et al. 2020; Levina and Vaast 2008; Prikladnicki and Audy 2012).

A recent study synthesizes that *knowledge asymmetries*, *power asymmetries* and *identity threats* constitute the key sources of tensions among onshore and offshore teams. Knowledge asymmetries occur when the knowledge and experience levels are perceived imbalanced between participants. Examples of such are business and domain knowledge possessed by onshore teams but unavailable to offshore teams, or a lack of understanding of offshore activities by the onshore teams. Power asymmetries refer to a gap in accessing resources and decision-making power between onshore and offshore parties. Identity threats have been identified on both sides. The offshore teams may feel they are regarded as less important, while the onshore teams may feel threatened professionally, if their tasks are migrated to offshore locations. Thus, both sides feel their organizational identities are under threat. (Brooks et al. 2020) Similarly, it is argued that separation caused by "multiple and overlapping boundaries" as well as differences in the country and organizational contexts among onshore and offshore participants may create contextual status differences inhibiting collaboration effectiveness. The difference in accumulation of capitals, including economic, intellectual, social, and symbolic, was discovered to inflict these boundaries in global IS development projects. (Levina and Vaast 2008)

As tensions are said to be embedded in the nature of the GDW, their elimination may not be feasible. However, tensions have been discovered to develop in a phasal manner from suppression and amplification to accommodation and attenuation, as defensive organizational tendencies evolve towards interactive and collaborative behaviors with the support of management's formal and informal actions. (Brooks et al. 2020)

Further, leveling perceived status differences, creating mutual capability to share and listen to each other's ideas, contributing to joint projects, and facilitating shared practices have been found supportive of effective global collaboration (Levina and Vaast 2008). Importantly, effective collaboration has been noted to be accomplished over time (Brooks et al. 2020; Levina and Vaast 2008).

Cultural Differences and Tensions in GDW

Cultural differences embedded in various "local norms, institutions and conditions" have been identified to create persistent adaption challenges in globally collaborating teams (Cramton and Hinds 2014). In a similar vein as in research on onshore-offshore tensions (Brooks et al. 2020; Levina and Vaast 2008), these culturally embedded contradictions arise dynamically from work-related issues and our surrounding worlds. The differences are found to lead to a continuous, complex adaptation process for resolving incompatible systems and contradictions in many areas of work, including approaches to organizational control, communication styles, and knowledge utilization and problem solving. Cultural adaptation in such cases happens iteratively in recurring phases through talking and learning, when competing pressures originating from local factors and practices collide in global work. (Cramton and Hinds 2014)

Further, conflicting perceptions of situations, "frame disputes", may take place, when global collaborators make sense of an activity in clashing ways. For example, what one views as inability of independent task handling, the other may view as turning down valid assistance requests. Similarly, what may show to one as lack of transparency, could be experienced as poor communication by the other. These kinds of gaps may amplify tensions and have a detrimental influence on relationships. Therefore, managing, reconciliating and realigning these task-, outcomes-, organizational boundary- and commitment-related disputes is important. (Ravishankar 2015)

Perhaps paradoxically, employing cultural, even stereotypical, beliefs of the other was found to help make sense of the tensions in a way that enabled reframing the dispute and mentally reconcile it. At the same time, this approach could cause perpetuation of the stereotypes hampering learning and the development of team relationships. Instead, seeking for resolutions to conflicts other than explanations by cultural differences was found important in supporting continuous learning and more effective global team interaction. (Ravishankar 2015) Finally, diluting of the perceived status differences between onshore and offshore participants over time (cf. Brooks et al. 2020) is anticipated to render cultural discourses less necessary. Instead, approaches, such as open and free communication, may be adopted. It is anticipated that adoption of strong, "universally recognizable" organizational cultures could also help reduce the intensity of disputes. (Ravishankar 2015)

Case Description and Method

A qualitative, interpretive case study (Klein and Myers 1999; Yin 2018) was initiated to examine the complex factors impacting GDW. The aim was first to understand current challenges, dynamics, and supportive factors of globally networked R&D in the industry of complex IT products. The case company operating in a business-to-business environment is an established, large operator in its field with several locations globally. It is accustomed to working in a globally distributed networked model composed of teams participating in software R&D efforts with a high level of technical competency and advanced processes for developing and maintaining a range of products in different life cycle stages. This study includes participants from one section of the organization, and it is the first independent part of a larger research project including three locations globally from the same organization.

The data collection was conducted in November 2019 by qualitative, semi-structured interviews with seven senior professionals located in India at different organizational levels and work roles in R&D and related functions. The interview participants were coordinated by the organization's contact persons with the main criteria that the participants had experience in global software R&D work from different perspectives. The number of interviewees was based on the scope of the larger research project, where the aim is to interview a similar number of professionals from the different locations. Prior to the interviews, two planning sessions were held with managerial level contact persons to identify topical areas of inquiry to complement the interview themes defined by the researchers. Additionally, the interviewing researcher got acquainted with high-level company documentation to understand the company structure and current focus areas. The researcher also participated as an observer in two staff training sessions to gain practical understanding of

the day-to-day operation. This approach is in accordance with engaged scholarship, where the aim is to find solutions to real-world problems while creating new theoretical insight (Mathiassen 2017).

The interviews were recorded in researcher notes and, additionally, as audio if a participant gave permission. Five out of seven interviews were audio recorded. The length of the sessions ranged from approximately 60 to 95 minutes. The length of the audio recordings ranged from approximately 50 to 86 minutes with an average duration of 66 minutes. The recordings excluded introduction to the research, addressing questions from the participants, and concluding the session. In addition to answering interview questions, the participants were encouraged to openly discuss their views around the interview themes. The overall aim was to identify important factors of effective collaboration and capability development, and related challenges in global software R&D work.

The first findings were derived by listening to and taking notes from the recordings to identify initial codes and categories depicting items and phenomena relevant to effective collaboration and capability development. This phase was conducted as inductively as possible, and therefore no tension lenses were utilized at that point. In the next phase, the audio recordings were transcribed, and the data were analyzed in a qualitative, inductive manner by systematic coding and categorization. The goal was to test and validate the initial findings and to identify potentially new items and connections between the phenomena. The codes were then categorized two-dimensionally to strengths, challenges, strategies, states, and desired factors by the categories. (Corbin and Strauss 1990; Urquhart 2013) The categories were formulated as a combination of the academic research problem and the case company research goals. The analysis was conducted by the primary researcher during the spring 2020 in consultation with academics familiar with the work. Atlas.ti qualitative data analysis software was utilized to support the process. These findings were validated by presenting and discussing them with the organization's contact persons, including a senior professional from the Indian and a European location, during the analysis. A report containing the identified challenging and supportive aspects in different categories was provided to the company for review, further validation, and practical utilization.

After that, we returned to the data from a theoretical perspective, as is described in this paper, and started to abductively (Kennedy 2018) identify what kind of tensions appear within the categorized data, and how collaboration was talked about by the participants. Particularly in this phase, the principle of moving between detailed parts of the data and the entity it forms, was enforced (Klein and Myers 1999). At this stage, literature on GDW tensions was included in the reflection, as will be seen further in the paper. The tensions were identified among the challenging aspects and the unifying discourses among the supportive aspects. Prior to submission, the paper was reviewed by two senior professionals from a European location of the company for further reflection and validation of the findings. The findings were perceived as relevant and identifiable, while some elaborative notes were made. The elaborative notes were recorded as further research, as they presented no conflict with the existing findings. The findings based on the interviews and the described process are examined next.

Findings

We first present three categories as identified sources of tensions (cf. Brooks et al. 2020) in globally networked R&D work suggesting that they may influence activities, such as collaboration, knowledge sharing, issue resolution and engaging in learning and renewal. Rather than primarily originating from the onshore-offshore positions of teams, the identified tensions appear to result from every-day work context-related factors (cf. Cramton and Hinds 2014; Levina and Vaast 2008). The last part of the findings focuses on discourses present when addressing collaboration in a global organization. Those we identified as unifying and tension attenuating rather than as polarizing or dividing (cf. Brooks et al. 2020; Ravishankar 2015). Throughout the findings, we reflect them against the cited literature.

Differing Experience Levels Among Collaborating Teams

Based on the interview material, the first source of tensions we identify as *differing experience levels among collaborating teams*. When work is divided across several locations, collaboration often happens between more experienced and newer teams. This creates *"a gradient"* in the teams' competency and capability to take responsibility. This difference may manifest as potential tensions between new and experienced teams in interlinked ways, as is illustrated next. Often, new teams start with small tasks and gradually take on

more demanding duties to ensure that the required competency has been built. However, challenges may occur, if the new teams are very soon expected to be on par with the more experienced ones creating *a gap between expectations for and capability of new teams*. This kind of a situation may create inhibitions in cross-team collaboration. First, the inhibition may reside in the more experienced teams, if they have concerns about how the new teams will fare. Second, new teams may experience reservations due to concerns of how the more seasoned teams will view their questions. These combined, we identify as *reservations in collaboration between experienced and new teams*. Finally, the different timeslots teams enter work and the differing experience levels of the teams may create a *power difference between experienced and new teams*. Table 1 summarizes these findings with examples.

Source of tension	**Between**	**Manifests if…**
Differing experience levels among collaborating teams	New and experienced teams	…a gap between expectations for and capability of new teams
		…reservations in collaboration between experienced and new teams
		…power differences between experienced and new teams
Examples from the interviews *"[M]aybe [a project] expects some things to come very early, where of course the new team would not be in a position to do it."* *"[I] think, we still see that sort of reservations. -- Maybe the development guys -- feel, if I put such a question to them, do they feel 'oh they don't know this'."* *"So, whoever enters first, they get to call the shots, you can say."*		

Table 1. Summary of Differing Experience Levels Among Collaborating Teams

In reflection to literature, it appears that this difference in team maturities could involve all, knowledge and power asymmetries and identity threats (cf. Brooks et al. 2020). However, our interview material indicates that rather than tensions caused by onshore-offshore positions (cf. Brooks et al. 2020; Levina and Vaast 2008), central appears to be the potentially challenging dynamics between teams with differing experience levels, particularly in fresh collaborative relationships.

Incentives to Share and Retain Knowledge

Like in previous research (e.g. Kotlarsky and Oshri 2005), our interview material indicates that managing knowledge is no straightforward endeavor in GDW. Insecurities and inhibitions may be present in knowledge sharing, which may hinder increasing efficiency, solving technical issues, and developing competence of new team members. Perhaps in seemingly the most easy-to-pinpoint situations, knowledge sharing can be difficult when work is transferred from a location to another location. This often involves changes in work, which may hinder readiness to freely share knowledge. This we identify as *a gap in knowledge transfer incentives between locations*. The tensions may also appear more subtle and, therefore, more difficult to explicate. In developing competence and increasing the competence of junior professionals, support and practical experience sharing from experts are important contributors. However, sometimes it may not be *"easy for anybody to just let go"* of their knowledge. One reason for this could tie with uncertainties in knowledge sharing which may stem from various context-dependent and sensitive reasons (cf. Cramton and Hinds 2014; Levina and Vaast 2008) and potentially lead to a thought-model where free knowledge sharing becomes halted. This we identify as *reservations in knowledge sharing in daily collaboration*. Table 2 summarizes these findings.

Source of tension	**Between**	**Manifests if…**
Incentives to share and retain knowledge	Knowledge transfer giving and receiving teams	…a gap in knowledge transfer incentives between locations
	Collaborators with differing knowledge levels	…reservations in knowledge sharing in daily collaboration
Examples from the interviews *"[I]t depends on the motivation of that team, which is giving out the work --."* *"[A]ll those insecurities create an environment in which knowledge is not shared --."*		

Table 2. Summary of Incentives to Share and Retain Knowledge

Again, these reservations in knowledge sharing resonate with the knowledge, power, and identity dynamics discussed in literature (cf. Brooks et al. 2020), not dismissing the potential influence of the region, proximity, or cultural differences (cf. Ravishankar 2015). However, similarly, as in the preceding section, the interview material indicates that rather than primarily being an onshore-offshore challenge, it appears more like a situational, contextual question of whether it is perceived safe and desirable to share one's knowledge with others, or not.

Multifold Goals and Priorities in R&D Work

This section views tensions from a multifold organizational, team, and individual goals perspective as identified in the interview material. As is common in large organizations, key performance indicators (KPIs) and metrics are actively used for monitoring and steering performance. First, it appears that if teams adopt KPIs as intrinsic and their own, they constitute a motivational factor contributing to common alignment and ownership. However, if metrics are perceived to come from the outside, they may create a strain factor limiting collaboration. This tension we identify to manifest if *metrics are perceived to overly originate from the outside*. Second, metrics may create multifold priorities at an inter-team level, where teams' focus may steer towards meeting the metric rather than on the most efficient way of, for example, cross-team issue resolution. This, in turn, may hinder collaboration with tensions manifesting, if *team actions become driven by organizational metrics over collaboration effectiveness*. Finally, individuals may encounter competing time usage incentives in daily work. For example, learning, improving, and innovative thinking are encouraged and appreciated. However, these goals may contest with daily tasks and targets. This could create a tension to concurrently meet organizational goals and individual expectations. This we identify to manifest as *competing time usage pressures between renewal and task delivery*. In sum, we identified multifold goals and priorities in R&D work that may influence team strain, inter-team collaboration and individual time usage together with meeting organizational goals. Table 3 summarizes these findings.

Source of tension	**Between**	**Manifests if…**
Multifold goals and priorities in R&D work	KPIs constituting a motivational and a strain factor	…metrics perceived to overly originate from the outside
	Organizational metrics and action perceived most effective locally	…team actions driven by organizational metrics over collaboration effectiveness
	Software development work and renewal	…competing time usage pressures between renewal and task delivery
Examples from the interviews *"[T]hat is where -- the issues keep transferring -- sometimes. Because of this sometimes, this collaboration slightly has a bit of hindrance."* *"They might also find really some challenges to get that [time], because at one end we say push innovation, bring new things, do continuous improvement, do your day-to-day work, [and] learn something new."*		

Table 3. Summary of Multifold Goals and Priorities in R&D Work

It appears that this section includes tensions stemming from relatively tangible factors, as goals, metrics, and organizational needs originate from formal structures and policies (cf. Brooks et al. 2020). Therefore, we expect similar kinds of tensions to appear also in other knowledge work organizations (cf. Levina and Vaast 2008).

Unifying and Tension Attenuating Discourses

This section describes, based on the interview material, the collaborative way of talking, here called unifying and tension attenuating discourses, utilized when addressing collaboration-related aspects in a global organization. First, it is acknowledged that inhibitions in new collaborations are natural and to be expected as a *"human tendency"*. To overcome them, mutual effort from both sides is needed: The more experienced team should show confidence towards the new team and include the new colleagues in the collaborative effort. At the same time, it is perceived the responsibility of the new team to take up the challenge and deliver according to expectations. Sometimes, knowledge transfer situations may be sensitive, and they are

acknowledged to require solutions, where locations are not made compete against one another. Rather, confidence and rapport (cf. Kotlarsky and Oshri 2005) should be promoted. In the discourse, understanding for the situation of different teams is present. The assumption that *"knowledge is power"* is questioned, and instead the potential of free knowledge sharing is encouraged.

Further, it is appreciated that global collaboration enables learning from other teams' work, perspectives, and different communication styles. Similarly, the approach towards challenges is learning-oriented. Mutual links and helping between locations are valued and needed for sharing work, not only in technical but also in other work-related matters. Understanding of the other locations and their capabilities is important. The interview material also supports the notion that team maturity and experience in working together facilitate smooth collaboration and free-flowing information among teams (cf. Brooks et al. 2020). It seems to relate to knowing how and with whom to interact in a global setting. Finally, when examining perceptions on organizational culture, we found indications of the culture being well-received among teams. This shows, for example, in valuing respect for one another, the perceived absence of politics, accountability in one's work as well as inclusion and diversity in the organization. Table 4 summarizes these findings.

Types of unifying and tension attenuating discourses
Acknowledgement and understanding of inhibitions naturally existing in collaborative work
Acknowledgement of mutual effort required to facilitate collaboration
Promoting confidence, rapport, and free knowledge sharing
Learning orientation towards challenges
Experience in working together facilitating smooth collaboration
Valuing a collaborative approach of sharing, helping, guiding, and understanding one another
Well-received organizational culture with inclusion, diversity, and respect for one another
Examples from the interviews *"[Y]ou need to have a communication link both technical and workwise with other sites in which the other parts of the same [work] can be shared, divided, talked and understood. -- the understanding of these different sites, their capabilities and how do we get help, and what are the things where we can help, and we get information --."* *"[I]f it is something, which I am not aware, and I need help, I approach that person. So, either [s/he] shares [their] inputs, or [s/he] guides me to the right contact to get the needed details, so it's free-flowing information."* *"[I]t's really good, and they really value [the culture], and then we also respect each other. So that's very important when we are working as a team."* *"I have seen respect is very high, and people respect other teams, and so other teams also do respect us."*

Table 4. Summary of Unifying and Tension Attenuating Discourses

In sum, we identified several types of unifying and tension attenuating discourses, which emphasize learning and understanding rather than highlighting the differences or oppositions in globally networked R&D work. We argue that the discourses allow and acknowledge the existence of differences and opposing poles (cf. Putnam et al. 2016), while enabling mutual learning and acceptance (cf. Ravishankar 2015).

Discussion and Conclusions

In this paper, we explored 1) *what kind of tensions appear in globally networked R&D work, beyond typical onshore-offshore oppositions and cultural differences,* and 2) *what kind of unifying and tension attenuating discourses are utilized among senior professionals engaged in global R&D work*. First, we identified three sources of tensions: differing experience levels among collaborating teams, incentives to share and retain knowledge, and multifold goals and priorities in R&D work. Second, we uncovered several types of unifying discourses, such as acknowledging and understanding for others, the approach of valuing learning and collaboration, and a well-received organizational culture.

In terms of theoretical contributions, while the findings resonate with previous research, they also indicate how tensions may appear differently in a dynamically networked and established GDW setting. Rather than

being caused by onshore-offshore oppositions, we propose that the identified tensions are work-context related. As such, they seem to represent recurring issues playing a role above the potentially deeper-rooted tensions, such as local identities and contexts (cf. Brooks et al. 2020; Levina and Vaast 2008) and cross-cultural differences (cf. Cramton and Hinds 2014; Ravishankar 2015). The presented discourses convey interactive and collaborative behaviors, sense-making, and empathy, which have been identified to alleviate potential tensions in the more mature phases of GDW (Brooks et al. 2020). Thus, the latter findings empirically support and complement those from previous research.

From a more practical perspective, the dualistic onshore-offshore relationships seem to have diluted in this case, potentially due to years of experience of global work and by the influence of a "universally recognizable" organizational culture (Ravishankar 2015). While aspects, such as cultural differences will hardly disappear, perhaps people learn to manage them as collaboration matures, and with the support of formal and informal managerial means (Brooks et al. 2020). These means could include designing metrics that help teams operate as one and promoting discourses of open communication (cf. Ravishankar 2015). Complementing the phasal model of GDW tensions (Brooks et al. 2020), we propose that also in a networked environment where work allocations can change based on resources, competency, technology requirements, and other factors, these tensions may be recurring (cf. Brooks et al. 2020). We, further, suggest that this could happen until an organization has enough accumulated capability to proactively acknowledge, address, and capitalize on the potential tensions (cf. Gibbs 2009), as changes take place.

Finally, locations such as India today, are important contributors to innovation globally (Mittal 2012). Therefore, while viewing GDW through an onshore–offshore lens is relevant, it may provide a somewhat partial picture. To complement the view, we would like to propose moving towards reframing the question of GDW tensions to actively involve the development of organizational learning (Levinthal and March 1993) capabilities in mutual relationships among teams distributed across the world and operating as one organization. Each location has their own characteristics, challenges, and capabilities, but they are working for a common goal. In the end, identifying "with a larger collective" appears as a key to effective knowledge generation, utilization, and transfer by members of a network (Dyer and Nobeoka 2000). Therefore, as further research, it could be fruitful to explore, how tensions in GDW appear in broader organizational and work-related contexts, such as organizational learning (Levinthal and March 1993), or innovation and change (Smith et al. 2017).

As the main limitations, we wish to highlight two aspects. First, the paper explores the research problem from the perspective of senior professionals of a single location of the company in India. In the scope of the study, it was possible to address the limitation of a single location by discussing the findings for validation also with representatives from another company location in Europe. Second, the analysis was primarily conducted by the interviewing researcher. This limitation was addressed by the iterative analysis in collaboration with the company representatives and academics, as described in the method section. Our subsequent steps include data collection in additional company locations, cross-case analyses between data sets (Yin 2018) in collaboration with practitioners and researchers, and, thereby, providing a richer picture of the research problem for further theoretical and practical contributions.

In conclusion, this paper presented three sources of work context-related tensions and several unifying discourses with the perspective of senior professionals engaged in globally networked R&D work in India. By the networked organizational setting, the study complements the onshore-offshore positions view of GDW. The findings contribute to research and practice in understanding and managing GDW tensions beyond onshore-offshore oppositions and cross-cultural differences in networked and continually changing operating environments. While limitations exist, we believe these insights are valuable for learning and development of GDW practices. Finally, the we wish the findings encourage further exploration of organizational oppositions in GDW from perspectives, such as organizational learning capability.

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PUBLICATION 4

Shifting to a technology-driven work mode: Workplace learning and dynamic capability in the case of a public-sector service organisation

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Shifting to a Technology-Driven Work Mode: Workplace Learning and Dynamic Capability in the Case of a Public-Sector Service Organisation

Katriina Vartiainen(✉)

Tampere University, Tampere, Finland
katriina.vartiainen@tuni.fi

Abstract. Learning to operate in technology-driven working modes is topical in many organisations today due to the COVID-19 pandemic crisis. The pandemic has forced especially knowledge-work organisations to quickly shift to remote or hybrid working modes, where all or some of the staff are operating and collaborating via digital tools. The aim of this qualitative case study is to explore and explicate a learning story of an organisation within the public sector transitioning quickly to a technology-driven hybrid working mode during the crisis. As findings, the paper presents the identified immediate and evolving facilitators that point to the organisation's learning to develop capabilities for operating effectively in the enforced and volatile conditions. Additionally, the potential long-term organisational development effects stemming from the situation are considered. In the findings, social aspects of work, such as open communication, collaboration, and awareness gained emphasis, while digital technology is one of the ground enablers. We apply a frame of dynamic capabilities together with workplace learning and aim to provide new insights into their development processes with a cross-organisational approach. In terms of practical implications, we suggest new understandings for the management on how organisations may learn and fare under uncertainty, volatility, and transitioning to digital collaboration.

Keywords: Dynamic capabilities · Workplace learning · Remote working · Hybrid · Facilitators · Qualitative · Case study

1 Introduction

The COVID-19 pandemic has had significant effects around the globe since the turn of the year 2019–2020. From an organisational perspective, it has forced many organisations to suddenly move to a vast remote working mode, and, consequently, to "technology-driven" [1, p. 1] collaboration enabled by digital technologies. [1–3] To successfully manage in the new working conditions, organisations need to learn, and they need to learn fast. Topical research on the effects on workplaces and organisations has already been conducted (e.g. [2, 4, 5]). However, more understanding of organisational learning mechanisms is required, both as the current crisis unfolds and as digitally enabled operating modes keep transforming work in different ways [3, 6, 7].

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In addressing this need, we identify a confluence of two research streams. First, dynamic capabilities research relates to organisational agility and the capability to quickly adapt to changing conditions in operational environments. The conditions may include changing markets, competition, disruptive technologies, and other factors that make organisations' environments turbulent. [7–9] Second, the workplace learning perspective and particularly learning organisations appear relevant in the contexts of increasing technology use in working life and the changing contents of work [10, p. 131]. This motivation appears yet more topical in the current conditions and future anticipated digitalisation of work [6].

Against this background, we apply dynamic capability [9, 11] and workplace learning [6, 10] as lenses for studying organisational learning and capability development in suddenly changing conditions, where digital technologies play a key role in effective operation [1]. We ask, *what facilitates organisational learning for developing the capability to operate effectively in an enforced technology-driven work mode during a volatile situation?* In addressing the question, the paper covers a qualitative case study [12] exploring organisational learning and capability development in the case company, which operates within the public sector in the Nordic region. The data were collected by twelve semi-structured interviews [12] conducted during the pandemic restrictions with professionals from the case company. The interview material was analysed by a combination of abductive [13] and inductive approaches [14].

As findings, we present a set of organisational phenomena, which we suggest facilitate learning and capability development in the case organisation. The facilitators encompass *organisational response and managerial action*; *staff readiness and commitment*; *multi-functional, continuous collaboration*; *increased awareness*; *learning new practices*; and *anticipated long-term organisational development*. The facilitators appear to progress temporally [3] from immediate and evolving to longer-term development, as the pandemic situation and the new working mode become familiar. The findings point towards interrelated cycles of dynamic capabilities of sensing, learning, integrating, and coordinating [9] manifesting across the organisation [11] as the facilitators evolve. Finally, social aspects of work [6], such as open communication, collaboration, and awareness (cf. [10]), gained emphasis in the findings, while digital technology is one of the ground enablers.

This paper aims to contribute to the understanding of organisational learning and capability development in an interdisciplinary manner [10] in the context of a suddenly enforced technology-driven work mode [1, 2]. We primarily build on information systems (IS) and management literature while reaching to the related field of workplace learning. Next, the background and theoretical underpinnings are discussed in Sect. 2, followed by the case description and methodology in Sect. 3. The qualitative findings are presented with examples in Sect. 4. The theoretical and practical discussion is carried out in Sect. 5, and the limitations, suggestions for further research, and concluding remarks are found in Sect. 6.

2 Background and Theoretical Underpinnings

The COVID-19 pandemic started to shake the world at the end of 2019 and reached Northern Europe in early 2020. In the wake of the pandemic, virtually all organisations capable of conducting their tasks in a remote working mode were suddenly forced to do

so, which transformed collaboration from an on-site, face-to-face mode to a largely virtual one [1, 2]. Recent research has uncovered many effects of the situation on working and organisations, such as technology issues in different industries [5], changes in the means and affordances of knowledge-work teams' collaborations [2], the impact of the situation on IS management [4], and assessments of adopting new practices in organisations [1].

Two notable aspects emerge from the literature. First, managing in the situation seems not only to be about the technology itself (cf. [6]). Remote working practices appear to play an important role in organisations' success in these circumstances [1, 2, 5]. As the means and affordances of collaboration shift from an office environment to a home environment, both positive and negative effects on collaboration have been seen. Technologies enable continued collaboration to meet business goals, but they also introduce challenges to traditional ways of collaboration [2]. Second, time seems to be a central variable [3]. It becomes a scarce resource and organisations are under time pressure when moving to the new technology-driven ways of working [1]. The faster an organisation managed to operate as business-as-usual, the sooner it was found to recover to normal operations [4], which highlights the importance of organisational agility [7, 15].

While organisations aim to sustain their business as usual under the new circumstances (cf. [2, 4]), quick adaptation and learning on many levels are required. On the one hand, many organisations had no existing strategies, practices, or infrastructures in place to accommodate such a sudden, large-scale shift. On the other hand, not all individuals and teams were used to operating in a virtual mode [1, 2]. The situation underscores the necessity of quick, "continuous learning" in the workplace [10, p. 131]. In developing "digital workplaces," technologies and systems, and their use, have gained importance, while an understanding of work practices, creating a common goal, and a view of the whole have been found necessary from a learning perspective [6, p. 11–12]. Learning as an organisation revolves around the organisation's and its members' capacity for change and increased effectiveness. Open communication, empowerment, and collaborative culture are identified as requirements. In the context of this study, we identify learning in the workplace as an informal, emerging, and participative process of creating and learning new modes of operation, practices, and knowledge at the organisational level. [10]

Next, dynamic capabilities [9, 11] are identified as fitting lenses to explore learning and capability development in a turbulent, digital technology-intensive environment [7] where organisations operate under time pressure [1]. Dynamic capabilities have been defined in several ways [16]. A high-level core definition names three main organisational capacities, sensing opportunities and threats in the environment, seising the identified opportunities, and continually renewing, or transforming, the organisation [8]. In this paper, we utilise a somewhat more detailed model including *sensing*, as "the ability to spot, interpret, and pursue opportunities in the environment," *learning* "to revamp existing operational capabilities with new knowledge," *integrating* "to embed new knowledge into the new operational capabilities by creating a shared understanding and collective sense-making," and *coordinating* capability "to orchestrate and deploy tasks, resources, and activities in the new operational capabilities" [9, p. 247]. Following [11], and in line with learning as a participative process [10], we explore

dynamic capabilities as multi-level constructs, where experts in different roles, also beyond the management, are connected by productive and interpersonal dialogue for adapting to a changing environment [11].

3 Case Description and Methodology

This study is an independent part of a longitudinal, interpretive case study [12, 17] initiated in the fall of 2018 to explore organisational capability development in the context of digital transformation [18]. The case company from the Nordic region operates within the public sector and provides professional procurement and logistics services to its customers. The company employs close to 300 people in three locations. This paper reports findings from the third and final round of the overall study. The data were collected by twelve individual qualitative semi-structured interviews [12] between November 2020 and January 2021.

At the time of the interviews, the company had operated from eight to eleven months in a working mode where most of the office staff worked remotely, while the operative staff worked on-site with special protective measures. This mode we call *hybrid*, where part of the staff collaborates in a face-to-face mode and part via digital technologies. Therefore, the overall collaboration among teams is often at least partly enabled by digital tools. Prior to the pandemic, the organisation had digitalised most of its operations, and it largely functions with the support of advanced IS and technology-driven [1] tools. The transition to vast remote working by a large part of the staff required learning in terms of the new hybrid working mode practices and the active utilisation of remote collaboration tools, such as Microsoft Teams. During the pandemic, the organisation's functioning became crucial in procuring and delivering supplies to its customers, including protective gear for health care.

3.1 Data Collection

The interviews were conducted over Microsoft Teams with interviewees from both managerial and non-managerial positions. Their tasks involved knowledge-intensive work with a mix of operative-oriented and planning and coordination-oriented responsibilities. The overall goal of the interviews was to gain an understanding of how the organisation had developed during the past year.

The interview themes included topics, such as change and developing operations, IS and their utilisation, and key competencies and capabilities. In addition to answering questions according to the interview themes, the participants were encouraged to share their views also outside the themes. Due to the COVID-19 pandemic, a new theme examining the impact of the situation was introduced. This paper reports the findings related to that theme and the new hybrid mode of working. During the interviews, it became apparent that the pandemic situation was intertwined with the organisation's activities, including the hybrid working mode and the changing emphasis of core operations, so that it reflected in many of the responses in different interview themes.

The interviews were recorded by audio and researcher notes, as permitted by the participants. The recording length varied from approximately 37 min to 57 min, with an

average duration of approximately 48 min. Introducing the research, addressing questions from the participants, discussing the findings from the previous interview rounds at the end of the session, and closing the session were excluded from the recordings.

3.2 Data Analysis

For the analysis, which was conducted in March 2021, the audio recordings were listened to and freely transcribed into text. The transcription was conducted as detailed notes from the recordings aiming to capture the essential responses for prompt reporting (cf. [3]). This process amounted to approximately 65 pages and 22,000 words of transcribed interview material.

The transcribed material was coded and categorised with the support of Atlas.ti qualitative data analysis software depicting items and phenomena related to the COVID-19 situation and the resulting hybrid working mode. Challenges, strategies, facilitators, and outcomes of managing the critical, prolonged situation were identified and coded as inductively as possible. [14, 19] Next, the codes were categorised in two ways. First, following Carroll and Conboy [1], normalisation process theory (NPT, May and Finch, 2009 in [1]) was utilised, as it provided a lens to understand how the new practices may have been perceived, internalised, implemented, and evaluated in the organisation. The value of NPT was in guiding us through the nuances of the data in a structured, abductive way [13]. After this way gaining an understanding of the data by their parts and the whole [17], we commenced the second round of categorisation, extracting emerging themes from the data.

The findings presented in the next section were derived from this second categorisation. They reflect the practical life and learning of the organisation in the face of 1) a critical situation affecting the society and the organisation's operations, and 2) a hybrid working mode involving new heavily technology-driven [1] collaboration and other operational practices. Finally, during writing this paper, the findings were discussed with the organisation's representatives for validation. The findings were perceived as identifiable and relevant, while some remarks were made for deepening them.

4 Findings

In this section, we present facilitators of learning to develop capabilities for functioning effectively in the technology-driven, hybrid working mode and volatile situation. The facilitators appear to manifest as immediate and evolving phenomena, and they are further divided into five different categories. In the final section of the findings, we will anticipate some long-term effects based on the interview material.

4.1 Immediate Facilitators

The *immediate facilitators* we identify as phenomena and action that were initiated soon after the COVID-19 situation escalated and the new hybrid working mode was

enforced. We further describe this as *an organisational response to the situation*, including three categories of facilitators.

First, as grounding facilitators, we suggest *prompt organisational response and continued managerial action*, which refer to organisational actors anticipating and preparing for the situation, and management providing quick input and guidance to their teams. Further, management working close to the teams also in operative questions and rewarding staff under pressure were perceived as supportive measures. Importantly, open information sharing by the management enabled team members to take adequate and timely action in tackling emerging challenges in daily operations, or to provide accurate status information.

The second grounding facilitator appears to be the *readiness and commitment of staff* in the face of a critical situation. Examples of such are commitment to handle the increased, fast-paced workload and completing tasks with a high sense of responsibility. Willingness to transfer between tasks to cover resource shortages in the organisation was perceived of as helpful, while operating according to one's best knowledge as essential.

Finally, and according to the interview material crucially, *seamless, multifunctional, and continuous collaboration* appears to enable successful operations in an atypical situation. Close collaboration and information sharing with teams and customers was emphasised. Communicating, interacting, and working toward a common goal as one team as well as helping one another across organisational borders were found as keys to managing well in the situation. Table 1 summarises these findings with examples.

Table 1. Summary of the immediate facilitators with examples.

Immediate facilitators (an organisational response to the situation)		
Facilitators	*Examples*	*Interview excerpts*
Prompt organisational response and continued managerial action	Anticipating and preparing; providing quick input and guidance; working with the team; rewarding staff under pressure; engaging and sharing information openly	"[W]e pulled such a team together really quickly –" "[M]anagers have been – very close to practice –"
Readiness and commitment of staff	Commitment of personnel in the face of a challenging situation; readiness to bear responsibility; readiness to operate according to one's best knowledge	"[P]eople have – an excellent sense of responsibility –"
Seamless, multi-functional, and continuous collaboration	Close collaboration and continuous information sharing within the organisation and with stakeholders; communication, interaction and working for a common goal as a team; mutual assistance across borders	"[T]hat close collaboration was probably key –" "[Collaboration] has, indeed, enabled it –"

4.2 Evolving Facilitators

Next, by *evolving facilitators* we mean phenomena and actions that are forming as the new situation matures. These could be seen as manifestations of *organisational learning*, as the immediate factors of prompt organisational response, continued managerial action, the readiness and commitment of staff, and close, continuous collaboration are enacted.

First, the interview material indicates *increased situational and organisational awareness* resulting from the situation and focus on collaboration. It appears as a two-way street of listening to and sharing information. On the one hand, the customers are listened to carefully to identify potential sources of disruption in the supply chain. On the other hand, colleagues are internally kept updated with special care that the message is understood. Additionally, it was perceived that the awareness of the effectiveness and expertise within and of the organisation was also heightened due to the measures taken to address the unusual situation.

Second, and closely tied to the technology-driven working practices, is *learning to operate in a new hybrid working mode and volatile situation.* It appears that forming a new remote working culture and practices takes place over time, and, in this case, mostly as an organic process. Remote working is becoming part of the normal mode in the organisation in contrast to the conditions prior to the situation. Multimodal information sharing practices are implemented, also pro-actively by teams themselves, and trust in remote working practices and tools is increasing. Finally, it appears that reliable remote working tools and connections are prerequisites. Table 2 summarises these findings with examples.

Table 2. Summary of the evolving facilitators with examples.

Evolving facilitators (organisational learning as the situation matures)		
Facilitators	*Examples*	*Interview excerpts*
Increased situational and organisational awareness	Listening to the customers carefully; keeping colleagues updated; increased understanding of the big picture and effectiveness of work; increased awareness of expertise within the organisation	"[W]e keep each other on the ball all the time of surrounding events –" "[I]t is good that you have learned – what my knowledge [base] is, or someone else's knowledge [base]"
Learning to operate in a new hybrid working mode and a volatile situation	Forming of new remote working practices; multimodal information sharing; trust on remote working practices and tools; remote working mode perceived to become part of the normal	"[We] are already used to [a hybrid work mode], and practices have become routinised, and it works better" "Somehow, [remote working] has even increased collaboration"

4.3 Anticipating Long-Term Organisational Development

As the last and the temporally most far-reaching component of the findings, we briefly anticipate the long-term opportunities that the immediate and evolving facilitators may create. As the situation still unfolds while we are writing this paper, the materialised evidence of such development remains for subsequent research.

However, already at this point, we can discuss the potential *long-term organisational development* and the expected *organisational evolution stemming from the experience gained* grounded on the interview material. For instance, it would be beneficial to consider the fruitful multifunctional collaboration and utilisation of the understanding gained from the distributed collaborative practices in the future, when the enforced hybrid working mode has ceased. Table 3 summarises these findings with examples.

Table 3. Summary of the anticipated long-term development with examples.

Long-term development (organisational evolution from the experiences gained)		
Facilitators	*Examples*	*Interview excerpts*
Organisational development of collaborative culture, practices, and new working modes?	Utilising the understanding gained for the best information sharing channels; adopting new, more flexible working modes; an increased understanding of distributed collaboration	"I believe – that the [multi-functional collaboration] will continue from here on too –"

5 Discussion

In this paper, we set out to better understand *what facilitates organisational learning for developing the capability to operate effectively in an enforced technology-driven work mode during a volatile situation.* As a response, we propose a set of immediate and evolving facilitators, as well as the anticipated long-term effects that appeared in the organisation as it navigated through the sudden move to a hybrid working mode amid the COVID-19 pandemic. It appears that in this case and in the context of events, such capability forms as a result of 1) contextual base factors, such as the advanced digitalisation of operations, digital collaboration tools, and the existing expertise in the operational domain; and 2) the facilitators described in the preceding sections. The facilitators are summarised in Fig. 1.

We propose that the learning and capability development were initiated as the interaction of prompt organisational and managerial action and continued support, and the commitment and readiness of staff to operate effectively in the situation. For example, open information sharing by the management and the readiness to act with high commitment by the employees seem to have contributed to effective operations,

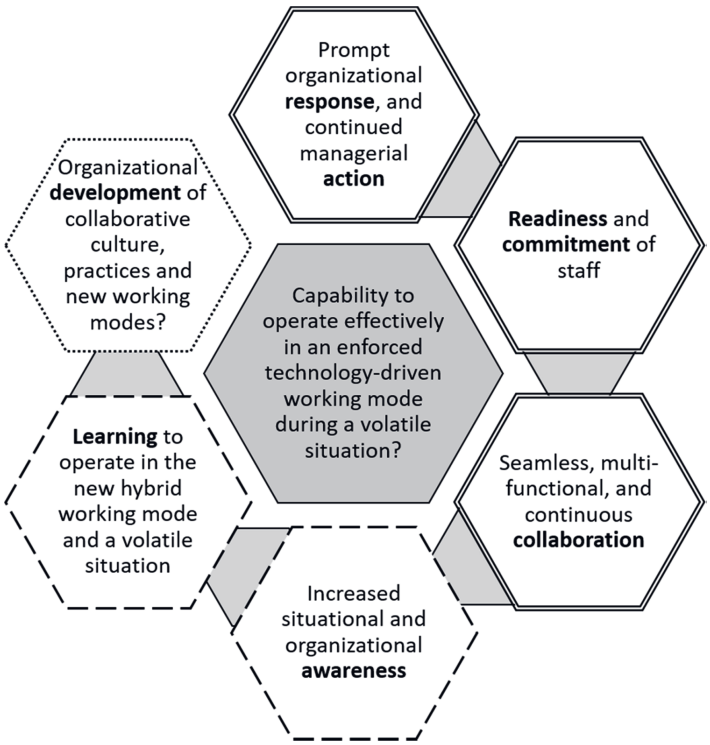

Fig. 1. Summary of the findings, including the proposed immediate and evolving facilitators and the anticipated long-term development. The first three hexagons from the top (with double lines) denote the immediate facilitators, the fourth and fifth hexagons (with dashed lines) represent the evolving facilitators, and the final hexagon (with dotted lines) marks the anticipated long-term development, as learning is accrued from the situation.

and moreover, to seamless, multifunctional, and continuous collaboration. It also appears that this combination may enable an increased situational and organisational awareness, which aligns with the learning outcomes categorised in previous research (Eraut, 2004b in [10]).

Further, it seems that as the new mode of working had been in place for some time, organisational members had learned to operate by utilising digital tools for collaboration and addressing the requirements stemming from the situation. Finally, as the long-term facilitating effect, it is anticipated that the learning gained from operating in such conditions will contribute to organisational development in terms of adopting new practices and promoting a collaborative culture. It could be asked whether, as the immediate facilitators unfold toward the evolving ones and long-term development, organisational learning could also transform from the informal toward the more structured and formal [10]. As a whole, the facilitators seem to place more emphasis on social rather than technological aspects of learning in the workplace [6].

From the dynamic capability perspective, applying the model by Pavlou and El Sawy [9], we suggest that the organisational response and managerial action stem from the capability to *sense* changes in the operating environment and act accordingly. The response and action are then translated by committed and ready staff into *integrated* and *coordinated* activity, multifunctional collaboration. As the situation was volatile with sudden changes both in the mode of collaboration and task priorities, we suggest that *learning* happens iteratively around the immediate facilitators. In terms of the evolving facilitators, as awareness of the situation and organisational expertise increases, it appears that the *sensing* capability is strengthened. We further suggest that in time, new hybrid working mode practices are *learnt*, which both feeds back into daily operations and the immediate facilitators, enabling the *integration* and *coordination* of refined practices as longer-term organisational development.

Finally, we may see these processes as two connected cycles of dynamic sensing, learning, integrating, and coordinating capabilities [9]. In the immediate facilitators, the capabilities are exploited for quick action, and in the evolving facilitators and long-term effects, they are strengthened to enable the further refined practices. This could lead to a "virtuous circle" [11, p. 1745], where through the productive and interpersonal dialogue of employees in different roles, the input of individuals accumulates into an organisational dynamic capability [11], enabling effective response to environmental change (cf. [7]).

6 Conclusions

The paper presented the findings of a qualitative case study, the immediate and evolving facilitators of organisational learning to develop capabilities for operating effectively in an enforced, technology-driven working mode and a volatile situation imposed by the COVID-19 pandemic. The paper explicated the findings theoretically from multi-level dynamic capability [9, 11] and workplace learning [6, 10] perspectives.

As limitations of the study, we wish to highlight two main aspects. First, even though we discuss how learning and capability development may have happened in this case, events have likely taken place in an interlinked, emerging [10, 11] manner. Thus, we refrain from claiming causal relationships. Second, the handling of risks and challenges was excluded from the paper due to space constraints. The risks and challenges, and their potential impact, should be addressed in subsequent work. For example, the endurance of staff, ability to drive new development activities, and induction of new team members may pose challenges if the enforced situation is prolonged.

While we can see the linkages of organisational learning and capability development, further research would be required for a more solid understanding of the antecedents of such agility and the role of digital technologies in it [15]. For example, do the antecedents lie in the previous experiences of the organisation or the existing knowledge the organisation has harnessed in a new situation? Next, what about collaboration as a facilitator; is it immediate or evolving? Here it was categorised as immediate, as it was perceived of as key, and it initiated quickly. Further, longitudinal

research is required to uncover how the anticipated long-term effects grow in the aftermath of the situation. Additionally, a more elaborate analysis with learning typologies, such as discussed by Tynjälä [10], should be incorporated. Finally, while the NPT frame [1] was utilised in the early stage of the qualitative analysis, it turned out that an inductive approach provided a more practice-oriented insight into our interview material. However, NPT appears as a viable model and its utilisation should be further explored. It seems likely that it would yield more understanding on the mechanisms of adopting new practices in organisations.

By connecting the research streams of workplace learning [6, 10] and dynamic capabilities [9, 11], we explored the effects of a sudden and enforced transition to a technology-driven work mode [1, 2] in an organisation. With this, we wish to contribute to research on organisational learning and capability development processes in technology-intensive and volatile operating conditions, which require the capacity of organisations to learn and adjust rapidly [7]. As implications for practice, we propose a new understanding for management in navigating through such situations. While further work is still required, we believe this case will inspire discussion in the scientific community regarding organisational learning.

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Enabling interpersonal dynamic capability: Four emerging collaborative practices in globally distributed software development

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Enabling Interpersonal Dynamic Capability: Four Emerging Collaborative Practices in Globally Distributed Software Development

Katriina Vartiainen

Tampere University, Tampere, Finland

ABSTRACT

Dynamic capabilities (DCs) are noted drivers of organizations' competitive advantage in fast-changing, digitalizing operating environments. However, research has reached no consensus on the essence of DCs, and the focus has shifted from managerial excellence to employee involvement and participation. The interpersonal view of DCs is suggested as crucial in enabling organizations' change capacity. At the same time, globally distributed work is a common operating model today but often hindered by tensions and collaborative challenges. In this qualitative single-case study, we explore the collaborative practices enabling interpersonal DC in globally distributed software research and development (R&D). By semi-structured interviews with senior key informants from a northern European site of a case organization, inductive and abductive analyses, and the practice perspective, we identified four emerging practices nurturing organizational dynamism in global software work: dialogical organizational development, constructive working culture, global open engagement, and facilitated shared learning. The findings highlight the role of employees and create a new understanding of the influence of collaborative practices in generating DCs in a global R&D working environment. Finally, the paper proposes a dynamic model for evaluating the development of such practices and suggests a stronger adoption of the practice perspective in further study of DCs.

Introduction

Globally distributed work (GDW) is a widely utilized model of organizing business process services, software and information systems (IS) projects, research, development, and innovation activities, and other such operations today (Brooks et al., 2020; Kotlarsky & Oshri, 2005; Levina & Vaast, 2008). The adoption of GDW operating models has been influenced by the developments where digital technologies, such as improved connectivity and the decreasing cost of data transfer continue to dilute organizational and functional

CONTACT Katriina Vartiainen katriina.vartiainen@tuni.fi Computing Sciences, Faculty of Information Technology and Communication Sciences (ITC), Tampere University, Kalevantie 4, Tampere 33100, Finland

boundaries globally (Bharadwaj et al., 2013). However, GDW settings are often complex, and various organizational, operational, and cultural tensions hinder effective global collaboration (Brooks et al., 2020; Cramton & Hinds, 2014; Ravishankar, 2015).

At the same time, influenced by the trends of digitalization organizational capability for continuous change, agility and transformation (Tallon et al., 2019; Vial, 2019; Wessel et al., 2021) is ever more important. As a response to these requirements, dynamic capabilities (DCs) are, by their very definition, understood as enabling organizations to be nimble and capable of change, that is, dynamic. The core argument is that companies seek to capture and offer new value to remain competitive amid fast changing technologies and uncertain environments by the DCs of *sensing* and *seizing* opportunities and threats, and *transforming*, renewing their business models, resource bases, and capabilities accordingly (Day & Schoemaker, 2016; Tallon et al., 2019; Teece et al., 2016; Vial, 2019). DCs have thus been of interest to IS, management, and organization scholars for a long time (e.g., Queiros et al., 2018; Salvato & Vassolo, 2018; Teece, 2007). Questions such as what constitutes DCs (Eisenhardt & Martin, 2000), how they interact with learning in organizations (Zollo & Winter, 2002), how to apply them for organizational agility and performance (Chakrabarti & Mukherjee, 2022; Queiros et al., 2018), and how to best study them (Wenzel et al., 2021) have been explored.

However, many unanswered questions on the acclaimed dynamism of DCs remain (Salvato & Vassolo, 2018; Wenzel et al., 2021). First, the paradoxical nature of DCs baffles theorists. The paradox here refers to DCs simultaneously being both understood as enablers of change and being tied to organizational routines: Routines are often seen as relatively slow to change and "path-dependent," that is, dependent on the organization's past developments, which appears counter-intuitive to dynamism (Salvato & Vassolo, 2018; Wenzel et al., 2021). Second, the scope of DCs has raised questions. While DCs were originally framed as managerial-level strategic capacities (Teece, 2007), calls have been made to understand their creation, enactment and nurturance encompassing the role of employees (Salvato & Vassolo, 2018; Wenzel et al., 2021; Wohlgemuth et al., 2019). Recently, an answer has been sought from interpersonal relationships, participation, and routines as enablers of change in organizations (Salvato & Vassolo, 2018; Wenzel et al., 2021; Wohlgemuth et al., 2019). In particular, collaborative social phenomena, such as interpersonal participation, appear focal in the creation of DCs, which are even seen as "effortful social accomplishment[s]" (Salvato & Vassolo, 2018, 1728, 1734). Finally, to the best of our knowledge, the formation of DCs in the context of GDW in the information technology (IT) field has largely remained outside the focus of research.

Practice theory revolves around "dynamics, relations, and enactment" in studying organizational phenomena in today's complex environments

(Feldman & Orlikowski, 2011, p. 1240). The practice perspective has been found fitting, for example, in the research of the dynamics of organizational routines, stability and change in organizations (Wenzel et al., 2021), and the complexities of GDW (Levina & Vaast, 2008). In this paper, we aim to advance knowledge in the problem area of globally distributed software research and development (R&D) work by utilizing the conceptual framing of DCs as organizational collaborative phenomena and drawing from practice theoretical concepts to guide our analysis (Mathiassen, 2017). Our research question is this: *how do collaborative practices, as enacted by management and employees, enable interpersonal dynamic capability in the context of global software R&D work?*

We explore the research question by a qualitative, interpretive (Klein & Myers, 1999) single-case case study (Yin, 2018). The case company is a large, global operator in the industry of complex information and communication technology (ICT) products in the business-to-business sector. The data were collected by eight semi-structured interviews with senior professionals as key informants from a northern European site of the company. The data were analyzed thematically through inductive (Urquhart, 2013) and abductive approaches (Kennedy & Thornberg, 2018). As findings, we present and discuss four emerging, collaborative practices suggested to enable DCs at the interpersonal level of global software R&D work. The practices are dialogical organizational development, constructive working culture, global open engagement, and facilitated shared learning.

The study contributes to the understanding of the complexities of GDW in the context of software R&D (cf. Brooks et al., 2020; Cramton & Hinds, 2014; Levina & Vaast, 2008) and the DC theory by investigating phenomena close to an organization's practical life, beyond managerial roles and on the interpersonal level (cf. Salvato & Vassolo, 2018; Wenzel et al., 2021; Wohlgemuth et al., 2019). To complement the recent theorizing in the field (e.g., Salvato & Vassolo, 2018; Wenzel et al., 2021), our study attempts to advance the empirical and practical understanding of the functioning of DCs through the practice lens (Feldman & Orlikowski, 2011).

This study is a part of a research project involving three case-companies and in total multiple cycles of data collection. The overall aim of the project is to create a new understanding of the relationships of dynamic and operational capability development in interactions between the employees and management in digitalizing operating environments. This paper reports one part, a sub-study, of the project in order to reach the desired depth of discussion in this individual case (Sarker, 2021) and timely reporting of research findings for discussion, utilization, and further development (Ågerfalk et al., 2020).

The remainder of the paper is organized as follows. Next, the theoretical framing of dynamic capabilities is presented. The section introduces the debated nature of DCs, discusses them as collaborative social

accomplishments, and connects the related areas of organizational learning, culture, and innovativeness to DC development. After that, we describe the case of globally distributed software work and the rationale of the research design. The latter part of the section considers the plural contexts (McLaren & Durepos, 2021) of GDW in reflection to the case. After that, we move to the qualitative method, including the application of practice theory and data collection and analysis. The findings are then presented in a narrative form illustrated by interview examples and summarizing figures. In the discussion section, a dynamic model for assessing the practices as well as theoretical and practical contributions are presented. We close the paper by addressing the limitations, making recommendations for further research, and providing concluding remarks. The key concepts will be presented in their respective sections, and Table A1 in the Appendix provides a brief overview.

Theoretical framing by dynamic capabilities

In this section, we describe our understanding of the current knowledge on DCs. We more closely examine the "inter-personal (meso) level" DCs as the suggested driver of dynamism in organizations (Salvato & Vassolo, 2018), and integrate understanding from the areas of organizational culture, learning, innovativeness, and dialogic leadership. Overall, as a theoretical premise, we follow the emergent perspective where change emerges from "complex social interactions" and "the interaction of people and events" (Markus & Robey, 1988, p. 583, 588). The theoretical aspirations resemble the logical structure of process theory with a mixed level of analysis (Markus & Robey, 1988).

Dynamic capabilities as collaborative social accomplishments

DCs are a much studied and debated area by many IS, organizational, and management researchers (e.g., Eisenhardt & Martin, 2000; Peteraf et al., 2013; Queiros et al., 2018; Salvato & Vassolo, 2018; Wenzel et al., 2021). At the core of the DC theory is the view that a company capable of employing its DCs of sensing, seizing, and transforming in the right proportions is equipped to remain competitive in fast-changing, turbulent environments (Teece et al., 2016) that require the constant aligning and realigning of resources, capabilities, and value propositions (Marabelli & Galliers, 2017; Vial, 2019).

However, recent literature indicates that the field has yet to reach consensus on the essence of DCs (e.g., Wenzel et al., 2021). In particular, we find two points compelling. First, exploring the meso-level organizational influencers in DCs seems to offer avenues for creating new knowledge (Salvato & Vassolo, 2018). Second, the employees' role and a fruitful organizational climate in creating, pursuing, and nurturing DCs appear to require more attention in research

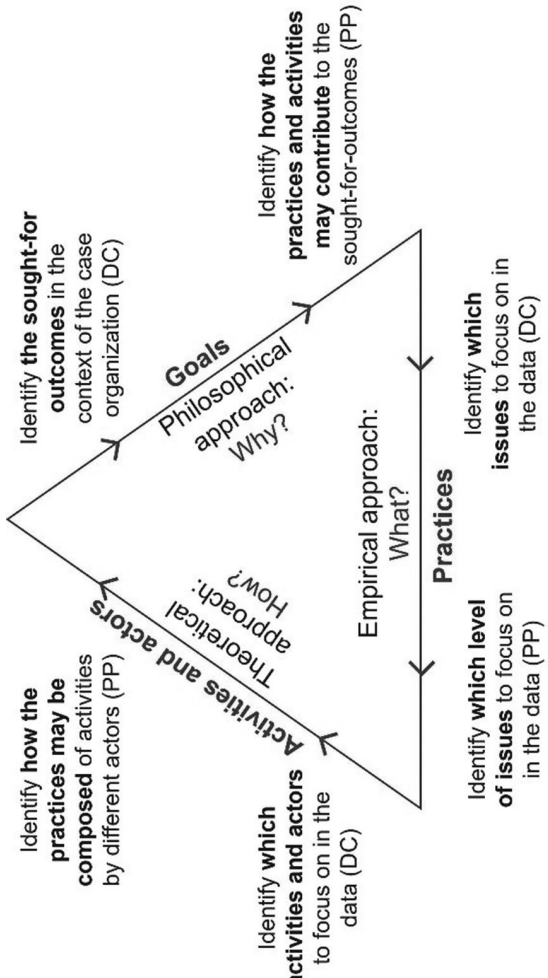

Figure 1. The analytical lens utilizing the DC theory and practice perspective (PP).

(Ghosh & Srivastava, 2022; Wenzel et al., 2021; Wohlgemuth et al., 2019). In these efforts, Salvato and Vassolo (2018) dissected the interpersonal, meso level of DCs in their multi-level framework, which we conceptually utilize in this paper, and which is visited next.

The meso-level DCs, dynamic interpersonal capabilities, revolve around the mechanisms of interpersonal participation and appear to be influenced by the organization's "quality of relationships and dialogue" (Salvato & Vassolo, 2018, pp. 1733–1734). If dialogue is "productive" it is said to result in solidarity and constructive opposition, and to yield intense participation and interpersonal relationships enabling change (Salvato & Vassolo, 2018, 1734, 1742). On the contrary, the authors argue, "unproductive" dialogue may lead to conformism and noninvolvement, hindering change.

In the framework, interpersonal relationships are a particularly important component. Employees' collective relationships and interaction characterized by "relational engagement and productive dialogue" are even identified as the locus of DC emergence (Salvato & Vassolo, 2018, 1736, 1737). Candor, inclusion, confirmation, and presentness in interaction are characters of relational engagement, which entails change-oriented "cooperative behavior" despite "conflicting viewpoints and opinions" (Berkovich, 2014 as cited in Salvato & Vassolo, 2018, 1738). Thus, collaboration that builds on genuinely being interested in the other nurtures productive dialogue (Salvato & Vassolo, 2018). Dialogue is termed the "glue" connecting the different levels of individuals, teams, and organizations, enabling "shared consensus and commitment" even in demanding change initiatives (Salvato & Vassolo, 2018, 1739). Productive dialogue supports creating and transferring knowledge, improves cohesion among employees, and transforms learning from an individual effort into participation in mutual interactions (Salvato & Vassolo, 2018).

Cohesion helps increase the likelihood of employees engaging in change proposals (Salvato & Vassolo, 2018). It is noted as being critical in environments requiring a high level of work synchronization and recycling (Yli-Renko et al., 2001 as cited in Salvato & Vassolo, 2018), such as in global software R&D. It bears a resemblance to the capability of "collective knowing" in distributed and complex work environments (Orlikowski, 2002).

Participation, then, is viewed as the "ultimate meso-level outcome" entailing the management and employees acting together toward organizational goals (Salvato & Vassolo, 2018, 1742) and warranting a research focus in the context of DCs (Wenzel et al., 2021; see also Wohlgemuth et al., 2019). Employees are recognized as important actors in the development of DCs (Salvato & Vassolo, 2018; Wenzel et al., 2021) and

discovered positively to impact the DCs of an organization (Wohlgemuth et al., 2019).

Recent studies also indicate the importance of other collaborative aspects in the development of DCs. Wohlgemuth et al. (2019) addressed the framework (Salvato & Vassolo, 2018) by looking at the impact of managerial trust and informal control. Trust and informal control were discovered to facilitate employee participation, which in turn has a positive effect on the enactment of DCs (Wohlgemuth et al., 2019). Trust is noted as "trust by managers" (Wohlgemuth et al., 2019, p. 760), while trust and rapport among collaborators are found generally important for successful collaboration and knowledge sharing in distributed environments (Kotlarsky & Oshri, 2005; see also Orlikowski, 2002). Finally, the inclusion of employees within the DC framework may result in better informed decisions, faster adjustment, and a more efficient transformation process (Wohlgemuth et al., 2019). As Wohlgemuth et al. (2019) summarize, "involving employees help firms unleash the strategic value of dynamic capabilities" (p. 768).

The roles of organizational learning, culture and innovativeness

First, organizational learning is understood as central to DCs (Ghosh & Srivastava, 2022; Salvato & Vassolo, 2018; Zollo & Winter, 2002). Organizational learning can be attributed to the mechanisms of "experiential" and "deliberate" learning, contributing to both the everyday organizational activities (operating routines) and the modification of those routines (DCs) (Zollo & Winter, 2002, p. 340). Learning to execute and modify the routines can also be connected to the "exploitation" and "exploration" sides of organizational learning as utilizing existing competences, and as creating new knowledge (Levinthal & March, 1993).

Experiential learning appears to have similarities with relational engagement and productive dialogue (Salvato & Vassolo, 2018). Collective reflective processes together with social, cognitive, and operational ones lie at the core of experiential learning in a work organization (Järvinen & Poikela, 2001). They "follow, influence and shape each other in a process of continuous learning" (Järvinen & Poikela, 2001, p. 286). In contrast to understanding individuals, groups, and organizations as different levels, they can be seen as "flows and processes" binding the different actors together into an "organizational entity" (Järvinen & Poikela, 2001, p. 286).

Next, organizational culture influences both organizations' learning and their ability to innovate, and it has been found to have a crucial role in building capability dynamism (Ghosh & Srivastava, 2022). This discovery has resulted in recommendations to invest in strengthening openness, participation, results orientation, trust, and "constructive dissent" in organizations (Ghosh & Srivastava, 2022, p. 967). It is further

proposed that openness and participation contribute to "behavioral innovativeness," which could be supported by flat organizational designs, the encouragement of social interaction and information sharing by communication, collaboration, and coordination systems, as well as participation, inclusion, and diversity starting from the policy level. Overall, organizational culture can influence whether it is considered pro- or "countercultural" to share knowledge (Feldman & Orlikowski, 2011, p. 1247).

Further, productive dialogue (Salvato & Vassolo, 2018) appears philosophically rather close to the dialogic leadership paradigm. Dialogue supports active participation, commitment, and learning with the discovery and acceptance of new and different ideas, views, and opinions (Syvänen & Loppela, 2013; Ahonen & Pohjanheimo, 2000 as cited in Syvänen & Loppela, 2013). For example, in development dialogs, principles such as the democratic approach, reflective thinking as well as the aspects of learning, listening, voicing, and respecting have been found as requirements for successful organizational development processes (Syvänen & Loppela, 2013). Dialogic leadership may support the competitiveness of organizations, as it fosters the capacity for renewal, innovativeness, and skill and capability development (Syvänen & Tikkamäki, 2013). It has also been found that dialogic leadership can facilitate participation, knowing (cf. Orlikowski, 2002), interaction, and reflection all of which enable the potential for learning (Syvänen & Tikkamäki, 2013).

Moreover, admitting and learning from failure is promoted as fruitful for innovation (Danneels & Vestal, 2020). However, bringing up errors for discussion may be a delicate matter, and for it to be successful, an organizational climate allowing "constructive conflict" and frank discussion is required (Danneels & Vestal, 2020). Especially when the aim is to learn from mistakes for improved innovativeness, deliberate and collective reflection is important (Danneels & Vestal, 2020; cf. also; Järvinen & Poikela, 2001).

An important distinction has been made between tolerating and analyzing failure (Danneels & Vestal, 2020). The distinction can be illustrated by the difference between accepting failure "as an inevitable byproduct of taking a lot of initiatives" and "openly analyz[ing] past mistakes" (Danneels & Vestal, 2020, p. 16). Only tolerating failure appears not to benefit innovation. Instead, past failure should be explicitly analyzed, and the accurate and complete lessons learnt extracted, which requires a suitable organizational culture and managerial attention among other resources. These discoveries by Danneels and Vestal (2020) have a common note with the constructive dissent by Ghosh and Srivastava (2022), and constructive opposition by Salvato and Vassolo (2018). Based on the literature discussed here, it can be concluded that an organizational culture of openness and diversity of opinion benefits organizational dynamism and the capability for innovation.

The case of globally distributed software work and its contexts in the study

This section describes the setting of GDW, and the case explored by this study. While presenting the case, the rationale behind the research design choices is discussed. In the latter part of the section, the multiple contexts influencing the study are considered with reflection to the present case.

We understand GDW as a setting where teams are located in different countries and work toward a common goal (Bosch-Sijtsema et al., 2009) often relating to IT, business processes, or software R&D work. In this study context, the goal can, for example, be a piece software or code integrated into a larger project entity constructed by the input of multiple teams. When reflecting the present case against general global software development models, we highlight the categories of *offshore outsourcing* and *internal offshoring* (Prikladnicki & Audy, 2012). Prikladnicki and Audy (2012, p. 216) define that in the first, a company partners by contractual means with a service provider or a subcontractor located in another country. The second model utilizes wholly owned subsidiaries or company units likewise located abroad. In this paper, the research setting resembles the context of internal offshoring, where work is organized in a globally networked manner. The type and reach of team collaborations, team compositions, and work dispersion may change across time and across different projects.

Traditionally, the aim of distributing software work has related to reaching for global opportunities, such as skilled workforce, flexibility, competitive advantage, and cost reductions (Prikladnicki & Audy, 2012). Similarly, drivers related to financial motivators, competences and capabilities, quality improvements, and business transformation efforts have been identified in connection to IT outsourcing (ITO) (Obwegeser et al., 2020). Several variations in sourcing strategies exist (Oshri et al., 2015), and different forms of globally distributed and virtual work are common as enabled by technological development (Toiviainen et al., 2022). While the more traditional objectives of cost and efficiency gains are still recognized (Brooks et al., 2020), today the goals may involve areas such as strategic innovation (Oshri et al., 2015) and the distributed tasks include complex and high-end activities (Sayed & Agndal, 2022). Innovativeness and the innovation capacity of distributed teams can be seen as strong factors also in this case.

While capability-oriented research has been conducted in IT outsourcing (ITO) settings (e.g., Karimi-Alaghehband & Rivard, 2020; Koo et al., 2019), in the context of globally distributed teams it appears scarce. We also note that in outsourcing relationships, different regularities apply, as organizational boundaries are often more pronounced, collaborations are defined by contractual means (Obwegeser et al., 2020; Oshri et al., 2015), and organizational goals are based on each company's strategy. Thus, we understand ITO as

a distinct field from GDW research, where we explore the topic from the perspective of global teams operating within a common organization under common goals.

Collaboration is noted in many ways as essential to the success of GDW, and similarly, many of the challenges seem to revolve around it. Recent work on globally distributed teams explored the "intrinsic and entrenched nature of tensions" stemming from the perceived gaps in knowledge, power, and identity among collaborating participants (Brooks et al., 2020). In addressing these tensions, both informal and formal organizational solutions supporting collaboration have been found necessary (Brooks et al., 2020). Clashes created by the differing expectations and conditions surrounding global collaborators are noted to create complex dynamics, which require constant and manifold adaption by teams (Cramton & Hinds, 2014).

Cultural assumptions and held beliefs of the other were found both helpful in navigating difficult situations and potentially hindering in the development of collaborative relationships (Ravishankar, 2015). The research body of knowledge notes factors – such as effective knowledge sharing and the quality of social ties (Kotlarsky & Oshri, 2005) and the role of management in spanning the various boundaries (Levina & Vaast, 2008) – that are important in enabling global collaboration. In a recent exploration of GDW tensions, the previous findings (cf. e.g., Brooks et al., 2020) were complemented by the work context-related nature of tensions among collaborating teams, and the utilization of unifying and tension attenuating discourses in promoting learning-oriented everyday collaboration (Vartiainen, 2021). These findings provide an understanding to ground the present study and the new insights to which it contributes.

Case description and rationale

The case company is a large global organization operating in the field of complex business-to-business ICT products. The company is headquartered in Northern Europe, and it operates in more than 100 countries employing tens of thousands of employees. It has a revenue of over 20 billion EUR. The company exercises advanced, broadly utilized software R&D processes and has a high level of expertise in their portfolio of products in different life cycle stages. The company is also experienced at operating in GDW models.

The key informants of the study as the selected interviewees (cf. Kumar et al., 1993) include eight senior professionals from different work roles in software R&D and related functions in a northern European site of the company. The main selection criterion was that the informants had expertise in the different aspects of global software R&D work, such as software development, innovation, competence management, team management, testing,

and quality control in a globally distributed working environment. In other words, their roles were "closely associated with the phenomena under study" (Kumar et al., 1993, 1635). The selection of the key informants was coordinated together with the case organization representatives, who were knowledgeable about each participant's competence area and their openness to communicate about the research topic (Kumar et al., 1993). The aim of the multiple key informants was to obtain rich qualitative insight of the phenomena under investigation (Walsham, 1995, 79–80) while minimizing single-informant bias (Kumar et al., 1993). The number of participants was aligned with the broader multi-case research project with the aim of a balanced number of interviews in the different cases (Sarker, 2021).

Due to the limited availability of participant locations within the timeframe of the research and the travel restrictions in place due to COVID-19 pandemic, it was decided that this study would focus on one location only. While the scope of the study is limited in this regard, we follow the views of Ågerfalk et al. (2020) in our aim for the timely reporting of research findings and their prompt opening for scientific discourse. Additionally, the present scope makes way for the sought-for "thick description[s]" of the interpretive research tradition (Walsham, 1995, p. 75) and "actionable insights" (Grover & Niederman, 2021, 1774), which are expected to provide value "in the future in other organizations and contexts" (Walsham, 1995, p. 79).

Consideration of the multiple GDW contexts in reflection to the case

In our attempt to address the research context, we identify multiple relevant contexts within the complex environment of GDW (Davison & Martinsons, 2016; McLaren & Durepos, 2021). While "to a point, [we are] using context as a container," we aim to explicitly acknowledge the plurality and fluidity of different contexts rather than relying on assumptions (McLaren & Durepos, 2021, pp. 81–82). Essentially, GDW environments are known to be influenced by and create "multiple and overlapping boundaries" (Levina & Vaast, 2008, p. 307) fueled by factors, such as cross-cultural differences (Cramton & Hinds, 2014) and various other tensions (Brooks et al., 2020). These boundaries and tensions may also be reflected in our findings, for example, when later discussing openness and engagement in global communication. Similarly, in connection to organizational development initiatives, the perspective of the informant is likely to influence how the initiatives are perceived. In these regards, the principle of multiple informants is essential.

Moreover, when considering the present case of study (cf. Davison & Martinsons, 2016), it should be emphasized that the findings concern senior professionals' perspectives in northern Europe. Findings from the perspective of junior engineers in east Asia, for example, may portray a differing set of practices and activities (cf. Hosack, 2021; Palvia et al., 2020). Therefore, the

present study opens avenues for the further exploration of such contexts. Moreover, the networked structure of the case organization probably shows, for example, in discussing the development efforts across the different levels of the organization. We can also identify the context of a global organization with advanced competence in its field and a relatively flat corporate culture. These notes are likely to show in the findings relating to working culture, which would likely appear differently in a small start-up or in a more traditional industry, such as manufacturing.

In acknowledgment of the critique raised of often failing to consider and differentiate between the different contexts of a research environment (Davison & Martinsons, 2016; McLaren & Durepos, 2021), we note the handling of the contexts here is inevitably limited. For example, we choose to omit the societal developments from the early days of GDW (cf. e.g., Kotlarsky & Oshri, 2005; Orlikowski, 2002) from the analysis. Thus, we remain within the boundaries of the organization as it stands today as part of its industry, which could be described as rapidly changing (Day & Schoemaker, 2016), and exclude its historical development from the analysis. However, we note that by this case of GDW, we study a context of an experienced organization both in the area of software R&D and operating in a globally distributed manner. It is also an environment where the organizational members are used to changing work settings. These final notes are expected to be reflected in the findings related to organizational learning, working culture, and the style of global communication. These considerations aim to illustrate the importance of acknowledging the context of study in its reporting (Davison & Martinsons, 2016).

The qualitative method

The study was conducted as a qualitative, interpretive (Klein & Myers, 1999; Walsham, 1995) single-case study (Yin, 2018). This section first describes the application of the practice perspective as an analytical tool within the study, and then accounts for the qualitative data collection and analysis method in detail.

Application of the practice perspective

Studying "messy" areas of organizational life, such as compositions of competences and capabilities requires "get[ing] in deep into understanding the social processes of organization and the human and cognitive dimension" (Peppard et al., 2014, p. 5). In seeking an understanding of how DCs work and are accomplished in practice, it is recommended that research should by qualitative methods aim for "sociologically-informed, practice-based" knowledge

(Wenzel et al., 2021, p. 400). Attention should be directed to actors and change potential "beyond managerial intent" (Wenzel et al., 2021, p. 400).

The practice perspective has been successfully applied to both theorizing around DCs (Wenzel et al., 2021) and empirically in the context of GDW (Levina & Vaast, 2008) as well as in IS strategizing and strategy-as-practice research (Marabelli & Galliers, 2017; Peppard et al., 2014). Therefore, the lens offered by the practice theory appears fit for exploring the software R&D case. Practice itself can be defined in many ways, and here we adopt a broad definition of practices being "configurations of actions which carry a specific meaning" (Nicolini, 2012, p. 10).

It appears that "practicing" (Feldman & Orlikowski, 2011) the practice perspective can be understood differently influencing its application. First, we understand the practice perspective to imply that practices and the practitioner view are the most relevant sources of knowledge (Peppard et al., 2014) in organizational research. Further, it seems that actions within practices actually form the reality (Feldman & Orlikowski, 2011, p. 1241). In other words, all would be tied to actors and their activities. In a sense, this view appears to go beyond the ontological notion that world and phenomena are socially constructed (cf. McLaren & Durepos, 2021) and to convey that reality is constructed by actions in social relations.

The second understanding involves the "strong programme" of practice theory with a methodological argument that taking the practice approach requires studying practice "as it happens" (Nicolini, 2012, p. 14; see also Feldman & Orlikowski, 2011, p. 1249). While Peppard et al. (2014) acknowledge the suitability of methods such as grounded theory and action research over quantitative ones, Nicolini (2012) calls for observational methods in practice research. Optimally, research should be conducted deep in organizations and with a longitudinal approach (Peppard et al., 2014). Even though our method is somewhat limited in these regards, we believe the rich qualitative data (cf. Salvato & Vassolo, 2018) warrants exploration into the "complexity," "ambiguity," and "the everyday realities of organizational life" (Feldman & Orlikowski, 2011, p. 1249) in studying DCs, also ridden with complexities and ambiguities.

Finally, according to Feldman and Orlikowski (2011), practice theory encompasses three approaches forming a triad of foci in practice research (pp. 1240–1241). The investigator may choose the emphasis in which one or more of them are used. First, the *empirical* approach focuses on everyday activity in organizations answering "the what" question. People's actions and practices are seen as central to organizational outcomes. Second, the *theoretical* approach explicitly applies the practice theory in the aim to explain "the dynamics of everyday activity." Thus, this side addresses "the how" question focusing on the generation and operation of activities. Finally, the

philosophical approach concerns "the why" and grounds on the premise that everyday activity creates – brings "into being" – the social world.

Drawing from these understandings, Figure 1 describes the analytical lens formed based on the DC and practice perspectives. In essence, the DC theory is here utilized to guide what phenomena to seek, and the practice perspective is used to identify the correct "units of analysis" (Nicolini, 2012, p. 9) within the case. With these lenses, we aim to contribute to both theoretical generalization and practical relevance (Feldman & Orlikowski, 2011; Peppard et al., 2014; Walsham, 1995) in the problem area (Mathiassen, 2017) of globally distributed software R&D work.

Data collection and analysis

The data were collected in August 2020 by eight individual, qualitative, semi-structured interviews (Walsham, 1995) with the key informants. Due to the COVID-19 pandemic restrictions in 2020, the interviews were conducted remotely via Microsoft Teams. Before conducting the interviews, several interactions of planning took place with the organization.

The recording of the interviews was done by researcher notes and as audio with the participants' permission (Walsham, 1995). Audio recording was used in seven out of eight interviews. The interview duration was from approximately 72 minutes to 101 minutes, which excludes the introduction of the research at the beginning of the session. While addressing the interview questions, discussion on views and topics also around the interview themes was encouraged (Walsham, 1995). The overall objective was to understand the factors and phenomena of importance in global software R&D work, such as effective collaboration, capability development, and potential challenges.

The analysis process was informed by interpretive and grounded theory methods (Corbin & Strauss, 1990; Klein & Myers, 1999; Urquhart, 2013; Walsham, 1995). Atlas.ti qualitative data analysis software was utilized as the main tool of the analysis with the support of Microsoft Visio software, as is described next. The audio material was first transcribed verbatim and after that the transcribed material was read thoroughly. Factors and phenomena perceived important and/or challenging and/or supportive in relation to globally distributed software R&D work were identified. These factors, phenomena, and their relations were first mapped into a Microsoft Visio drawing. This resulted in a complex map of well-functioning and desired states, challenges, risks, and their relations within the case.

After gaining this overall picture of the material, consciously also leaving room for "intuitive paths" (Yin, 1993, p. 5 as cited in Sarker, 2021, p. 251) of inductive discovery, the analyst returned to the transcribed material and systematically coded it by utilizing Atlas.ti. In the process, the data were first coded at a low level and then the codes were thematically categorized. The

thematic categories resembled areas of the organizational life. For example, the initial category of organizational learning and competence development contained codes, such as "mutual, frequent knowledge and learnings sharing among teams," and "emphasizing and encouraging open sharing of mistakes for learning." Another initial category of effective collaboration contained codes such as "motivating and engaging people toward a common goal, vision," and "acknowledgment of succeeding or failing as one team."

Both the Visio drawing and the Atlas.ti coding and categorization were conducted with an inductive approach (Kennedy & Thornberg, 2018; Urquhart, 2013). As the result of these analyses, a report with an explication of the identified challenging and supportive phenomena was prepared for the company to validate the findings and utilize them in practice. After delivering the report, e-mail exchange was carried out with the company representatives to comment on and discuss the report. Elaborative remarks were made, but no conflicting views on the results were identified.

The overall feel of these rich data was that areas such as operating together, dialogue for understanding, and mutual learning were prominent. Also, collaboration in different compositions of software R&D work, the relationship of organizational and local practices, and questions of learning and competence management appeared topical. Inspired by this impression, we returned to the data and started abductively (Kennedy & Thornberg, 2018) to explore how the data would respond to calls to pay more attention to meso-level issues, such as participation, productive dialogue (Salvato & Vassolo, 2018), and the employees' role (Wohlgemuth et al., 2019) in nurturing and building organizational DCs. It soon became apparent that "the social world" of organizational actors, in a way the social enactment of the organizational reality (Feldman & Orlikowski, 2011, p. 1241), such as communicating globally or engaging in the organizational development through improvement activities, was deeply entangled with the findings. At this point, the analytical lens of Figure 1 presented in the previous section started to form.

In this phase, the analyst systematically reviewed the list of codes by category and selected those that most directly related to the key concepts of relational engagement, productive dialogue, cohesion, participation, and interpersonal relationships (Salvato & Vassolo, 2018). In other words, the focus at this stage was on collaborative, socially influenced practices. Based on the previous coding work, the identified codes were first divided into enablers and challengers. To portray the level of detail in the data, of the 491 codes in total 137 were identified as resembling enablers, and 58 as resembling challengers, amounting to 195 codes. The total number of codes is high for two reasons: First, the analyst chose not to remove duplicate codes from the material but instead handle them as bundles. Second, the analyst wanted to break down the data, which could then be aggregated back into more

meaningful and connected entities. This was to ensure an adequate understanding of the interview material from a complex organization had been reached.

The selected 195 codes were further aggregated into the emerging practices and activities with descriptions of related goals and challenges as identified based on the analysis. The findings were then organized utilizing the analytical lens of Figure 1 and sent for a final review by the case organization. The elaborative comments from this review are incorporated as notes within the findings, which are presented next.

Four Emerging Practices Enabling Dynamic Interpersonal Capability

The findings are here presented in a narrative form organized under the four emerging collaborative practices, which we suggest help enable the dynamic interpersonal capability in globally distributed software R&D work. The practices and their descriptions are, in the order of discussion:

- **Dialogical Organizational Development**: Organizational development in dialogue and with acknowledgment of the needs of the different organizational levels Figure 2,

- **Constructive Working Culture**: Fostering a supportive and open organizational culture, where mistakes are utilized for learning and improvement Figure 3

- **Global Open Engagement**: Nurturing openness and engagement in global communication and collaboration Figure 4, and

- **Facilitated Shared Learning**: Organizational learning and idea cultivation through the management's facilitation and mutual sharing of experiences gained Figure 5.

According to the analysis, these four practices represent focal areas of the case organization's everyday life. In our reporting of the findings by practices and activities, we are inspired by the seminal paper of Orlikowski (2002), which qualitatively "explore[d] a possible explanation" of constituents of effective distributed organizing discovering the role of "collective knowing" (Orlikowski, 2002, p. 249). We are further encouraged by the recent qualitative study on "practical examples of challenges, barriers and enablers" of organizational change (Bojesson & Fundin, 2021).

The findings sections go hand in hand, and they are not intended as exhaustive (cf. Orlikowski, 2002). Instead, we find them illustrative of the power of collaborative practices, where both the management and employees

make a difference by acting in an organization (Feldman & Orlikowski, 2011; Salvato & Vassolo, 2018; Wohlgemuth et al., 2019). Next, the findings related to dialogical organizational development are presented and grounded with examples from the interviews.

Dialogical organizational development

According to the analysis, *common organizational practices, processes, tools, and policies* enable effective collaboration among people from different backgrounds; provide a common language and terminology for a shared understanding of roles, tasks, and requirements; and facilitate product and software quality in a large organization. Thus, they could be characterized as a desired backbone of global software R&D work, as is illustrated in the below excerpt.

> [I]f we don't understand each other at all – then it is very difficult to start a conversation and dialogue –. So, as these issues are complex, – this is a large organization, and because of that, it is important that we would have a common operations model. It is easier to communicate. It is not only the language, or even the time difference –.

However, it is not always easy to fit organization-level (process) changes into the diverse sub-organizations, units, and teams. Simultaneously understanding the common ways of operating and having room for area- and team-specific variation (cf. Wenzel et al., 2021) appears desirable. Thus, *understanding the impact of changes across the chain and at different process levels* seems important. Our data indicate that this understanding can be gained by reaching across organizational levels and carefully analyzing suggested process changes to ensure their feasibility at all levels. In doing so, it is important to listen to the feedback from all the levels of the process, which the below sample exemplifies.

> It is important to listen to – the lowest level in the process. – [W]ill some change cause a problem, or can it be taken without problems –? [P]roblems can be caused there, if it is just stated that everybody will implement this – without listening to the feedback –.

Situational consideration of teams' circumstances in evaluating different improvement requirements is valued. Thus, *finding a balance and dialogue between organization- and team-level practices* by mutual conversation seems key. It entails making it possible to adjust the practices and processes as perceived adequate, understanding the organizational policies and their impact, and learning the existing practices before introducing changes. This ties in with *mindfulness in taking improvement action*. Considering the impact of improvement actions on the implementing teams is focal, and it includes an understanding of the consequences, reasons, and potential problems of the actions and their implementation. Gaining such an understanding requires

time, knowledgeability, and the analysis of metrics, information from the team, and visibility to the feasibility of improvements in practice.

Further, all employees' *active participation in ideating improvements* is reflective of productive dialogue (cf. Salvato & Vassolo, 2018), and the finding by Wohlgemuth et al. (2019) that inclusion of employees may result in better decisions and faster change. Indeed, being able to influence things, such as performance metrics, is considered a motivational factor, which could also increase participation and prevent noninvolvement (cf. Salvato & Vassolo, 2018). As noted by an informant, "at least I'm motivated by being able to influence things." Otherwise, a risk of changes being perceived to come from the outside, without clarity of the need in practice, arises. Importantly, improvement activities can be utilized for *challenging the teams' thinking in a constructive way* and preventing them from becoming locked in how things have previously been done, as is remarked next.

> [I]n a way it also challenges it. So that you don't go too much into "this is how it has always been done, and here this is how it is done," and when you have that in a right quantity, it is good.

In sum, the interview material illustrates how dialogue influences organizational practice and process development efforts. Dialogue supports participation and helps the making of better-informed decisions by directing the operation in a way that the risk of unintended hindering consequences in different sub-organizations is diminished. As importantly noted by the case company while reviewing the findings, *balance* is indeed essential, since too much team-specific diversion from harmonized processes could tip the scales and hamper the goal of the common operations model. *Dialogue* seems equally important as a means for the management to affect how teams perceive change without losing their sense of being able to influence things, even if the requirement originates from the organizational level.

Figure 2 compiles the findings from the practice of *dialogical organizational development* as organizational development in dialogue and with acknowledgment of the needs of different organizational levels. The figure explicates the goals (the why approach), the practice contributing to the goals (the what approach), and the activities and actors contributing to the practice (the how approach) based on the analysis.

Constructive working culture

Based on the analysis, *creating, adopting, and enacting a common organizational culture with shared values* appears desirable in a global, complex and distributed organization. It is acknowledged that a diverse organization will likely have diverse cultures, which points toward inclusion (cf. Salvato &

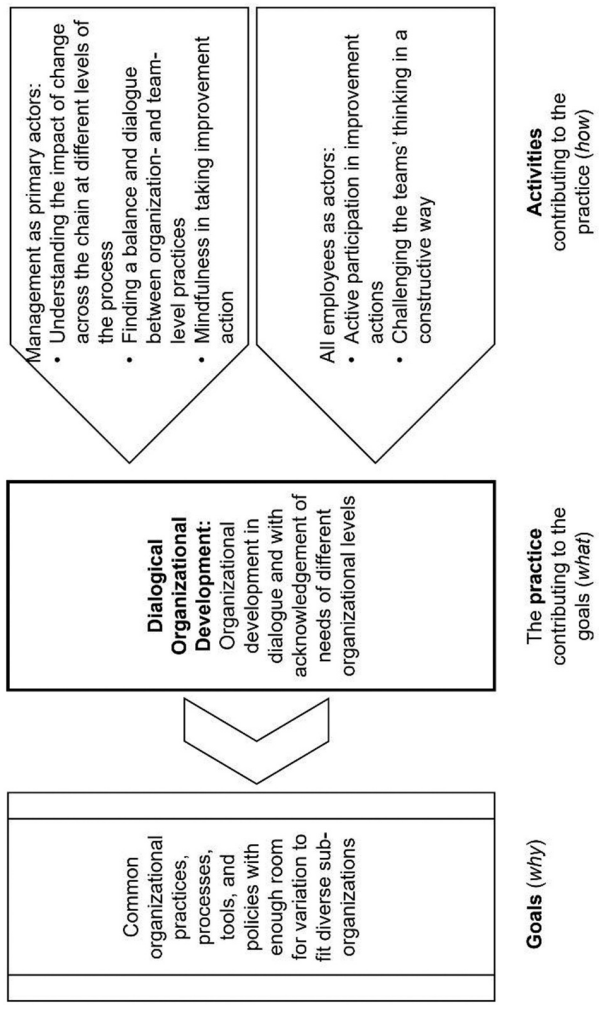

Figure 2. A summary of the findings in the dialogical organizational development.

Vassolo, 2018): "There are different cultures and acting in different cultures is a little bit different, but still a company can have common values and a common operations model."

The management's role in building a supportive organizational culture can manifest as an overall visibility and emphasis of the culture and values within the organization, including management communication. It can also show as a drive for building common organizational values, fostering the openness of the culture, and aiming to fix problematic areas.

However, it is noted that gaps in internalizing and absorbing the common culture may hinder fruitful collaboration and integrating organizational cultures across global teams may pose a challenge. Site politics, weak adoption of the common culture, and conflicts caused by cultural or power differences are identified as risks. For example, a culture of blaming could drive toward creating overly safe plans to buffer against failure, which can be seen as harmful for nurturing the dynamic capacity of teams. As pointed out, blaming "for sure does not improve the operation, and at the worst it could be so that some of the – issues are then hidden and filtered out –."

On the contrary, it is apparent that *the enactment of an organizational culture where making mistakes is allowed* is valued as supportive of open collaboration and innovativeness. As the next excerpt notes, acknowledging that mistakes are part of the innovation process, and that they could be learned from rather than feared, opens way for creating new things.

> [One can] minimize mistakes, but – if you want to innovate, usually you need to try something you have never tried before, and then there is a possibility to make a mistake. That is how the new is created and making mistakes must be allowed.

A perceived supportive organizational culture is here identified as casual, flat, and open featuring a good working spirit. Acting according to organizational values, even under pressure and during difficult times, is appreciated. As described, "corporate culture – generally happy that – you can say openly – we do things at least relatively openly. It has always been an advantage."

Therefore, the influence of the organizational culture on innovativeness and collaboration is reflected particularly through enacting common values, transparency, and a mutual blame-free culture that has room also for making mistakes. Figure 3 summarizes the findings from the practice of *constructive working culture* as fostering a supportive and open organizational culture where mistakes are utilized for learning and improvement. The figure includes the goals, practice, and activity and actors in a similar manner as in the previous section.

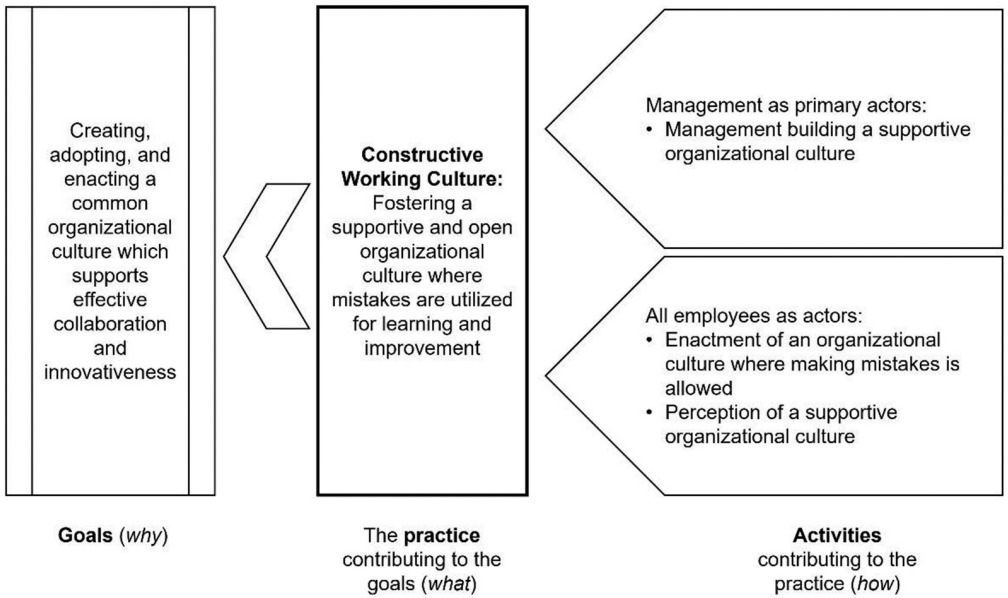

Figure 3. A summary of the findings in constructive working culture.

Global open engagement

The theme of openness flows over from the organizational culture to the communication and collaboration practices of the global organization. We identify this as the goal of *an open, communicative and collaborative way of working around the R&D pipeline, including goal setting and issue resolution across cultural, team and organizational boundaries*. The clarity and communication of goal setting, early inclusion of experts in problem solving, and the uncovering and improving of bottlenecks throughout the process are examples of such a practice.

Challenges may occur, if there are breaks in communication and limited openness or visibility in inter-team and inter-organizational collaboration. As summarized, "[i]n communication, it can be called a challenge, if you don't get that conversation. If you don't become understood –." These could also be situations where mishaps have occurred in cross-cultural communication. Further, limited openness may cause misconceptions of a team's performance or schedule, leading to bottlenecks in the process and conflicts in collaboration. An informant explains that "if there is no openness in terms of – information sharing, then your starting point is – an incorrect assumption –."

We suggest these challenges influence participation and productive dialogue (cf. Salvato & Vassolo, 2018) in both everyday activity and organizational development efforts. *The management promoting relational engagement among teams* presents a counterforce to such challenges. Management is thus considered to have an important role in enabling cohesion among teams. According to the interview material, this means avoiding situations where teams end up competing against one another, providing support in solving conflicting messages, encouraging the asking of questions, and ensuring no one is left alone. Moreover, as noted while reviewing the findings, designing the performance metrics of teams in a way that promotes inter-team collaboration instead of competition helps contribute to the creation of an efficient software R&D pipeline.

Further, *nurturing trust and information sharing* are valued. Based on the interviews, achieving mutual trust requires openness, transparency, accountability, and bearing responsibility. The importance of information and knowledge sharing becomes emphasized in global collaboration influencing not only the daily collaboration but also common learning:

> [I]t needs to be emphasized, the importance of [building trust], because if we don't trust each other, we won't necessarily share all the information with each other nor necessarily talk about some slip-ups we have made, so that others would learn –.

Engaging in mutual conversation with adequate respect and humbleness means tactfulness in giving feedback, encouraging the open and timely

communication of issues, and ensuring an approach of respect toward one another despite potential decision-making power. It materializes as "try-[ing] to – find a common note –." Similarly, finding solutions together and engaging in mutual conversation by asking, listening, and responding are appreciated. More specifically, *striving for understanding the facts and the needs of others in a mutual way* facilitates effective collaboration, conversation, and action: "always mutual, to understand the need of the others." Mutual understanding helps create a sustainable basis for collaboration and is highlighted especially in collaborations without a manager-employee relationship.

Finally, the approach of *operating as a team* gained emphasis. The approach includes acknowledging needing and supporting one another; being willing to succeed, fail, and find a way forward as one team; sharing mistakes for learning as a team; aiming for a common goal; and looking at things as one team of teams across borders. As an informant crystallizes it, "the will for common success –. [T]hat it's not only this our team that could make [it], but perhaps a little like a band –."

Overall, these aspects resemble the relational engagement and productive dialogue called for by Salvato and Vassolo (2018). Nurturing openness and engagement in a global work community contributes to flowing collaboration in the software R&D pipeline with a clear goal setting and effective issue resolution across cultural and organizational boundaries. Figure 4 summarizes the findings from the practice of *global open engagement* as nurturing openness and engagement in global communication and collaboration. While the management set the stage for engagement among teams, following Feldman and Orlikowski (2011), we suggest that only the everyday actions of all employees create the practice. The figure is organized in a similar manner as in the previous sections.

Facilitated shared learning

Organizational learning is deeply entangled with the DCs of an organization (e.g., Ghosh & Srivastava, 2022). In this context, it can be identified to have at least two distinct goals, *organizational learning for effective day-to-day operation and innovative solutions*. In the latter, the concept of modifying organizational routines by DCs (cf. Zollo & Winter, 2002) is here extended to emphasize the even more explorative (cf. e.g., Levinthal & March, 1993) aspects of not only modifying but also looking beyond the existing routines for new, creative solutions.

A continuous challenge in a complex, fast-changing operation appears to be the balance of simultaneously gaining and maintaining a broad and deep understanding of the environment and problem space. First, this relates to

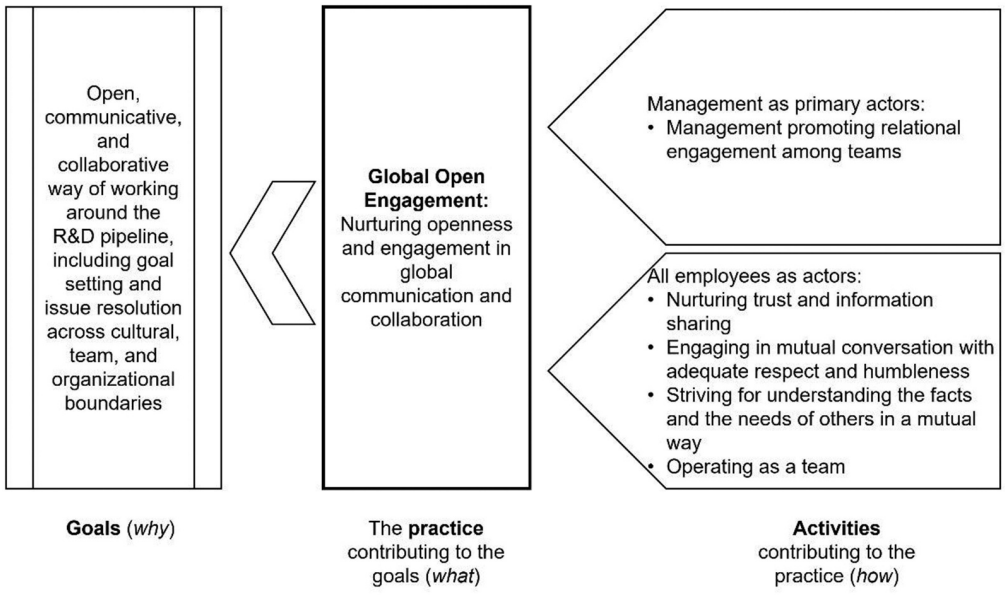

Figure 4. A summary of the findings in global open engagement.

the ability to create innovative solutions. Giving exposure to a wider space is perceived to facilitate creativeness. While wide understanding of the problem space enables new solutions with a broader perspective, increasing the visibility and understanding of the current environment is required to make future visions executable. In other words, "you need to know – your problem space, – you need to find the necessity, – you need to know as wide problems as possible."

Second, in the daily software R&D work, the challenge appears to relate to the axis of stability and the dynamism of tasks and responsibilities. On the one hand, while stability enables effective, streamlined processes with clear responsibility and accumulated expertise, it may introduce the risk of becoming overly stable, particularly in terms of continuous organizational learning. On the other hand, if the task and domain repertoire in which the experts are engaged is very dynamic with continuously changing responsibilities and a highly distributed task allocation, it may help in achieving a broad range of competences. At the same time, a risk of fragmentation of competence and collaboration seems real. Therefore, *supporting a balance between stable and dynamic scope of responsibilities, and in building broad and deep expertise* seems to help organizational learning in this context. "[P]erhaps, to an extent, here as well, the middle ground can be a good approach –," one informant said.

Similarly, to enable learning, there needs to be a sufficient *capacity for learning and moving in the right direction within teams*. In the end, it is the management's responsibility to ensure there are enough people at the core with good learning skills and the capability to understand the entity. Moreover, it is important to identify and enable such people: "– to observe and understand that these kinds of persons exist, and – let them, and perhaps pursue them a little, to develop and take – different kinds of roles."

Whichever mode of learning is in question, it appears that, again, *the role of communication and engagement* should be *embraced in global work and idea cultivation*. As summarized, "[t]here should be freedom of space for others to engage, to communicate, to share, because the more you share the – better your idea gets in the evolution." These issues become tied to both innovativeness and sharing of learnings.

When *striving for understanding and learning through sharing of learnings*, mutual, frequent knowledge and learning sharing among teams is appreciated. Similarly, as in the findings on organizational culture, the open sharing of mistakes is emphasized and encouraged for learning and improvement, as is highlighted below.

> [T]o learn from mistakes and share mistakes. – That when you make a mistake, it is a very good practice to also learn, and for that we have also encouraged to share those mistakes also with other teams, so we could learn from them –.

> [E]very time we release a product, we should have a lessons-learnt to the next release that what [we] did, what did go well, and what did not go well from the previous release, so that we do not repeat the same mistake again.

Finally, silos in knowledge and learning sharing could hinder gaining a broad understanding, for example, if one's focus remains solely on one's own product. Therefore, *systematic utilization of mechanisms and processes of knowledge and learning sharing* is identified as supportive in a complex and large organization.

Many of the aspects discussed in this section relate to the preceding sections of organizational culture and openness of communication. However, highlighting the perspective of organizational learning as its own entity illustrates that while organizational culture can be seen as an enabler, or even as a prerequisite, organizational learning, then, could be seen as one result of such a culture. Further, in reflection of the literature, we see qualities of both "tolerance for failure" and the practice of "failure analysis," where mistakes are not only regarded as opportunities for learning but are also openly analyzed and examined for lessons learned (cf. Danneels & Vestal, 2020). Figure 5 summarizes the findings from the practice of *facilitated shared learning* as organizational learning and idea cultivation through the management's facilitation and mutual sharing of gained experiences.

Discussion

In this paper, we set out to better understand *how collaborative practices, as enacted by management and employees, enable interpersonal DC in the context of global software R&D work*. As findings, we identified four collaborative emerging practices, actors and activities influencing the practices, and the goals contributed to by the practices. The findings denote the three approaches, the what, the how, and the why, of practice theory (Feldman & Orlikowski, 2011).

From the DC perspective, it can first be suggested that these empirical findings support the multi-level framework by Salvato and Vassolo (2018) in terms of the "interpersonal (meso) level" mechanisms of DC creation in a global software R&D organization. Second, the findings underline the importance of the inclusion of all employees in the enactment and creation of DCs in such a work environment. We believe this strengthens the view of how DCs should be considered as social processes crossing organizational layers (cf. Salvato & Vassolo, 2018) rather than primarily managerial capacities.

However, the scope of this argument depends on the context (McLaren & Durepos, 2021) and the lenses. If we adopt the view of DCs as strictly strategic capabilities where the management sets goals, directions, and

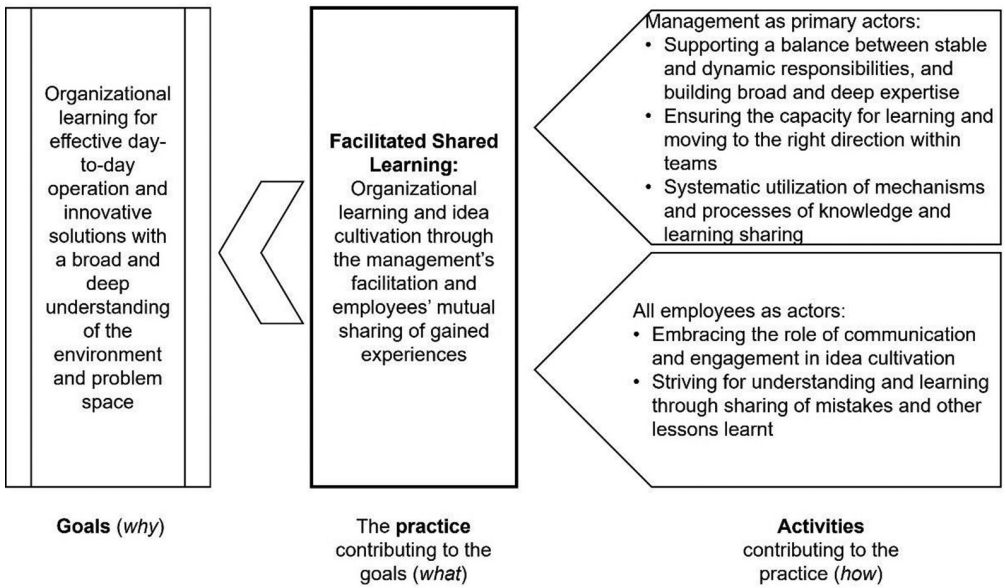

Figure 5. A summary of the findings in facilitated shared learning.

structures for employees to follow, then yes, DCs appear primarily as a managerial capability. If we view DCs with a broader, more practice theory-oriented lenses (Feldman & Orlikowski, 2011; Nicolini, 2012), seeing the world as connected, emergent webs of actions, we almost inherently need to put more focus on the expertise across the organization. In today's complex, dynamic, and in many ways connected world, we might go even as far as to suggest that limiting the DCs to the management ends up ignoring the full potential of an organization, not only in becoming more ready for change but also in driving it (cf. Wenzel et al., 2021).

Even though the practices *per se* can quite easily be connected back to the various contexts of GDW, such as the importance of effective communication and collaboration (Kotlarsky & Oshri, 2005), or tensions relating to differing cultures (Cramton & Hinds, 2014), the most interesting part to us here lies elsewhere. It is in how the aspects of dialogue, participation, inclusion, and striving for understanding reappear in each of the practices, tying them together into social and collaborative accomplishments (cf. Salvato & Vassolo, 2018).

When looking at the goals in Figures 2-5, it seems that they have the potential to support the dynamic capacity of the organization in a number of ways. On the one hand, common organizational practices, processes, tools, and policies (Figure 2) create a stable ground. On the other hand, allowing enough room for variation according to the needs of the diverse sub-organizations supports dynamism, nimbleness, and routines' capability to adjust as needed (cf. Tallon et al., 2019; Wenzel et al., 2021). This could help prevent overly rigid organizational structures. The goals of a common supportive organizational culture (Figure 3) and smooth collaboration across the software R&D pipeline (Figure 4) promote organizational cohesion and inclusion, as well as the high quality of interpersonal relationships as part of the interpersonal level of DCs. Further, where the goals in Figure 2 addressed the balance of simultaneous dynamism and stability through a dialogic approach to organizational development, the goals of organizational learning in Figure 5 pose a dual, ambidextrous ambition of learning for both day-to-day operations and for new innovative solutions (cf. Marabelli & Galliers, 2017). In that sense, these goals address tensional or paradoxical phenomena (cf. Brooks et al., 2020; Wenzel et al., 2021). Finally, in some of the identified practices, *actions* appear more prominent, while in some others, *structures* dominate. For example, in facilitated shared learning, management providing the structures for collaborative learning seems paramount both from the perspectives of work allocation and facilitating learning forums. In constructive working culture, then, the enactment and perceptions of the culture by employees appear in the foreground.

These findings make the role of employees in generating DCs in a global software R&D organization visible and hopefully more concrete by explicating the activities in which the employees are engaged in terms of the identified practices. The findings also shed light on the enabling practices in an organization, when exploring the multi-level DC framework (Salvato & Vassolo, 2018) from an interpersonal, meso-level perspective. Thus, the findings tie the collaborative practices to organizational development in a global software work environment with the DC link. These notions apply from the practical perspective as implications to management, and on how the DC theory could be expanded to concern the role of all organizational participants (cf. Feldman & Orlikowski, 2011) more comprehensively. It could be seen that while the management facilitates the structures, all employees realize and generate the practices enabling dynamic interpersonal capability in an organization (cf. Giddens's structuration theory in Feldman & Orlikowski, 2011). Illustrative of this is the practitioner note that the best ideas and the culture of continuously improving starts from motivated teams who feel they can make a difference.

We further suggest that the identified practices can be evaluated in an organization in different dimensions. Figure 6 illustrates the four practices across two dimensions, the *reach* and *type* of organizational activity. The dimension of reach encompasses considerations, such as local vs. global, team vs. organizational level, and deep vs. broad scope. The dimension of type differentiates between exploitative (utilizing existing capacities) and explorative (developing new capacities) activity (Levinthal & March, 1993). The activities can be, for example, new competence development, process enhancements, or the sharing of learnings. The arrows and dashed circles in the figure exemplify how the emphasis of the practices may shift dynamically between the dimensions influenced by time, emerging situations, and organizational goals. For example, deep explorative learning may shift or be driven toward broad explorative learning, or local efforts of knowledge sharing culture expanded to cross team boundaries. The model could be utilized to reflect on and evaluate the different conditions and their sufficiency at different times in an organization, thus encompassing the aspects of temporality and dynamism of organizational development according to a process theoretical approach (Markus & Robey, 1988).

The study has limitations and contextual considerations that need to be discussed to position the findings in the body of DC and GDW knowledge (cf. Davison & Martinsons, 2016; McLaren & Durepos, 2021). First, the study could be judged to represent "the weak programme" of practice theory, where theory is utilized as a tool to identify the correct level of analysis rather than applied as "the strong programme" diving deep into the daily practices by methods such, as observation "of practice as it happens" (Nicolini, 2012, pp. 12–14). We identify this as a methodological issue, as we utilized interviews as the primary method of data collection, which Nicolini (2012)

Figure 6. A dynamic model exemplifying the four practices in two dimensions.

criticizes. However, we follow our understanding of Peppard et al. (2014) and Feldman and Orlikowski's (2011) perhaps more philosophically oriented approaches and utilize practice theory primarily as a lens. Additionally, the study could have benefited from a stronger organizational learning lens (Järvinen & Poikela, 2001; Levinthal & March, 1993). Nevertheless, we found the practice perspective most fitting considering the "complex, dynamic, distributed" environment heavily loaded with social processes (Feldman & Orlikowski, 2011, p. 1240).

Second, the number of interviewees is limited to eight in our study, which is close to the lower end of six informants of published qualitative IS research (Sarker, 2021). However, here we follow Sarker's (2021) notion of emphasizing the rich quality of the interviews and the selection criteria of the interviewees. To address this limitation, the findings were also validated by review and comments from the case organization representatives providing additional voices beyond the key informants.

Third, the study focuses on a northern European site of a large GDW company which presents a limitation in terms of generalizability of the findings. However, given the common organizational software processes, high experience of the organization in the GDW model, and the versatile work roles of the informants close to the GDW phenomena, we argue the findings provide insight into the enhancement of DC theory, especially in similar contexts of GDW. Examples of such contexts include the senior professionals' perspective, distributed organizations with common software processes, distributed organizations with high expertise across multiple locations, and culturally similar country contexts as in the present study. At the same time, we suggest the findings also provide value as input in the exploration of differing contexts of GDW, for example in comparing and contrasting the different findings. In sum, instead of aiming to generalize to a population or across different contexts (Tsang & Williams, 2012), we believe the paper makes a meaningful "contribution of rich insight" as an interpretive IS case study (Walsham, 1995, p. 79) in understanding how interpersonal-level DCs can operate beneficially in global software R&D work.

Conclusions

The paper presented a qualitative, interpretive single-case study exploring the research question of *how collaborative practices, as enacted by management and employees, enable interpersonal DC in the context of global software R&D work*. Based on the inductive and abductive analyses, we identified four collaborative, emerging practices: *dialogical organizational development*, *constructive working culture, global open engagement*, and *facilitated shared learning*. The paper discussed the findings against recent DCs and GDW research by utilizing the practice

theory as an analytical tool. The paper also suggested a dynamic model for assessing the identified practices in the dimensions of type and reach of organizational activity. A common thread through the findings was the emphasis on social aspects, such as common understanding, sharing, and openness.

As implications for practice, the paper contributes to a new understanding for management of the practices supportive of organizational dynamic capability in the context of GDW. The importance of the different work roles of employees and the management was highlighted in terms of the facilitation and enactment of the practices. The paper links these collaborative practices to organizational development and provides pointers for their reflection and evaluation. The study encourages a stronger inclusion of employees in DC considerations in organizations in order to fully avail of an organization's dynamic potential. We anticipate that practices such as those discussed here will become even more relevant in the future (cf. McLaren & Durepos, 2021), as digitalization takes new shapes and forms, adding complexity to our worlds.

As theoretical contributions, the findings provide a further empirical grounding to the multi-level and participatory views of DCs in organizations (e.g., Salvato & Vassolo, 2018; Wohlgemuth et al., 2019), enhancing the previous theorizing and research with new insights on the emerging practices. Additionally, the paper provides a case of how the practice perspective can be utilized as an analytical lens in qualitative, empirical DC research.

Even with the limitations discussed in the preceding section, we believe these findings are useful in cases of global and complex operation, such as software R&D and other IT intensive activities. As further research, we suggest a move toward the strong practice research programme (Nicolini, 2012) in studying collaborative practices in the context of interpersonal DCs in globally distributed software R&D work. While the findings were accomplished by analyzing interview material, we could increase the understanding and further put it to the test by applying the tool kit suggested by Nicolini (2012). This would include applying observational techniques to a chosen set of practices in real time in an organization. It would also be beneficial to include several locations or units from a case organization to gain a more complete picture, for example, to help identify similarities, differences, and potential conflicts among the practices. Overall, these findings encourage including employees more closely into DC research in the future.

To conclude, by applying the practice lens, we studied practices enabling interpersonal-level DC in a global software R&D organization. With this study, we wish to contribute to the understanding of the collaborative nature of DCs crossing organizational layers, both in theory and management practice, and how the practice theory can be used as an analytical lens in organizational IS research. While the study has its limitations, we believe it contributes to the scholarly and managerial discussion on the development of dynamic

capabilities through collaborative activities engaged in by different actors in global software R&D work.

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Notes on contributor

Katriina Vartiainen is a Doctoral researcher in the field of Information and Systems in Tampere University, Finland. Her research interests are in organizational development, digitalization, and the related changes in work. She has worked in practitioner and research projects on e-procurement, enterprise systems, and global software development. Her current PhD project explores the changing capabilities of organizations in digitalizing operating environments.

ORCID

Katriina Vartiainen http://orcid.org/0000-0003-4310-0055

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Appendix

Table A1. Overview of key concepts.

Concept	Definition in the Context of the Study
Dynamic Capabilities	The core definition understands dynamic capabilities as an organization's capability to *sense* and *seize* opportunities and threats in the environment, and to *transform*, renew the organization, such as its business models, resources base, and capabilities to achieve a sustained competitive advantage in a changing environment (Teece et al., 2016). In this paper, the collaborative and social dimension of interpersonal dynamic capability, including aspects such as the quality of relationships, relational engagement, and productive dialogue in the organization, are emphasized and explored in connection to creating and nurturing organizational capability for dynamism (Salvato & Vassolo, 2018).
Globally Distributed Work (GDW)	While many forms of GDW exists, such as "offshore outsourcing" and "internal offshoring" (Prikladnicki & Audy, 2012), essentially GDW means a setting where teams are located in different countries and work toward a common goal (Bosch-Sijtsema et al., 2009), such as a functioning piece of software. While GDW is common today, typical challenges still exist in collaboration, such as overlapping and sometimes clashing boundaries of work, and tensions stemming from cultural differences (Brooks et al., 2020; Cramton & Hinds, 2014; Kotlarsky & Oshri, 2005). This paper is set in the context of the internal offshoring type of GDW.
Practice Theory	Practice theory explores the "dynamics, relations, and enactment" of organizational phenomena (Feldman & Orlikowski, 2011, p. 1240). Practices are defined as "configurations of actions which carry a specific meaning" (Nicolini, 2012, p. 10). Practices and the practitioner view are understood as relevant sources of knowledge (Peppard et al., 2014). In this paper, practice theory is utilized together with the dynamic capabilities framing to form the analytical lens (Figure 1), where the practice perspective guides the identification of the correct "units of analysis" (Nicolini, 2012, p. 9) and dynamic capabilities the phenomena to seek in the data.
Inductive and Abductive Approaches of Data Analysis	This paper utilizes a combination of inductive and abductive approaches in data analysis. The inductive approach was first initiated to analyze the data without "pre-supposing [concepts, categories, or] such outcomes *a priori*" (Kennedy & Thornberg, 2018, p. 3). Based on the findings of the inductive phase of analysis, the researcher returned to the data and started abductively (Kennedy & Thornberg, 2018) to explore how they would respond to the calls of required investigations identified in recent literature (e.g., Salvato & Vassolo, 2018; Wohlgemuth et al., 2019). In the inductive phase, the data were used as the starting point without a pre-conceived analytical lens. In the abductive phase, the analytical lens of Figure 1 was formed and utilized to guide the analysis.