



# Managing the complexity of digital transformation—How multiple concurrent initiatives foster hybrid ambidexterity

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## Abstract

Incumbent companies are launching digital transformation initiatives (DTIs) to cope with technological changes, challenging competitive environments, increasing customer demands, and other digitalization challenges. The DTI spectrum is broad and covers structural and contextual changes. Companies often launch multiple concurrent DTIs, resulting in considerable organizational complexity. However, there has been very little research into the successful management of the interplay between DTIs. Drawing on five management aspects (strategic alignment, governance, methods/IT, people, and culture) and insights from three case companies, we elucidate DTIs' interplay, illustrating that beneficial DTI interplay management leads to a *complementary duality* instead of a *competing dualism* in organizational ambidexterity. We explicate that multiple concurrent DTIs can foster structural and contextual ambidexterity, which leads to hybrid ambidexterity, concluding that contextual ambidexterity coheres and balances exploration and exploitation efforts. Thereby, we contribute to a better understanding of DTIs, their interplay management, and their roles to foster hybrid ambidexterity.

**Keywords** Digital transformation · Ambidexterity · Hybrid ambidexterity · IT management

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## Introduction

In today's business context, companies must deal with emerging technologies and a dynamic competitive environment, which require appropriate strategic responses (Legner et al., 2017). Thus, incumbent companies often engage in organization-wide digital transformation (DT), which relies on the use of digital technologies to enable changes in value-creation paths (Chanias et al., 2019; Vial, 2019). However, incumbents face the need to push their DT with multiple initiatives to overcome their inertia, develop momentum, and induce change in various places in their large, often intricate organization. Thus, incumbents' DT strategies often comprise various concurrent DT initiatives (DTIs) on different levels, including but not limited to digital labs and units (Holotiuk & Beimborn, 2019; Jöhnk et al., 2017), incubators (Kruft & Kock, 2019), and overarching cultural change programs (Hartl, 2019).

We define DTIs as the ensemble of an incumbent's activities that seek to (re)define value-creation paths (Vial, 2019). Thus, DTIs describe multiple concurrent activities of both strategizing and strategy implementation to explore digital technologies' rich affordances (Gregory et al., 2015; Nambisan et al.,

2017; Zimmer & Niemimaa, 2019). Specifically, incumbents may perceive numerous and uncertain environmental opportunities as well as a gap between their culture and their capabilities concerning these environmental opportunities. Companies' strategic responses may combine both structural (e.g. dedicated digital units) and contextual (e.g. cultural change programs) exploration approaches within DTIs to foster hybrid ambidexterity (Ossenbrink et al., 2019; Jöhnk et al., 2020).

However, launching multiple concurrent DTIs imposes an interplay between DTIs as well as between DTIs and the core organization, since DTIs are neither mutually exclusive nor independent (Jöhnk et al., 2020). Thus, companies face an increasing organizational complexity owing to multiple concurrent DTIs potentially causing competing concerns (Nadkarni & Prügl, 2021; Svahn et al., 2017). Companies must find appropriate responses to these challenges, since they otherwise may stall DT efforts (Soh et al., 2019). Thus, incumbents undertake efforts to manage the dichotomy of organizational ambidexterity (Tushman & O'Reilly, 1996) to explore environmental changes while exploiting current operations to maintain stability within DT (Jöhnk et al., 2019).

So far, research still lacks comprehensive knowledge on how incumbents approach managing the interplay of DTIs and the integration of explorative and exploitative activities (Farjoun, 2010; Tarba et al., 2020). In particular, it has omitted the underlying approaches to balancing exploration and exploitation while coping with a changing business context, for instance, in times of digitalization (Tarba et al., 2020). Nascent research has focused on DTIs and related phenomena from different perspectives. This includes their strategic aims and setups (e.g. Jöhnk et al., 2017; Soto Setzke et al., 2020), their organizational ties with the core organization (e.g. Hafke et al., 2017; Raabe et al., 2020a, b), and their contributions to fostering organizational ambidexterity (Göbeler et al., 2020; e.g. Holotiuk & Beimborn, 2019). However, we still lack a comprehensive understanding of and sufficient guidance on managing the interplay between multiple concurrent DTIs. Thus, organizations tend to mistake the forest (i.e. ensuring DT success) for the trees (i.e. struggling with the complexity of multiple concurrent DTIs). Further, we still lack insights into the interrelationships between structural and contextual ambidexterity and how a combination of the two can foster hybrid ambidexterity (Ossenbrink et al., 2019; Werder & Heckmann, 2019). Thus, the research should elaborate on how various DTIs in companies are managed to enable DT and to foster hybrid ambidexterity. In line with preliminary work in this regard (Jöhnk et al., 2020), we ask:

How do incumbents manage the interplay between multiple concurrent DTIs and how does this foster hybrid ambidexterity?

We used five management aspects from existing research (Fischer et al., 2020; Kerpedzhiev et al., 2020; Stelzl et al.,

2020) to analyze the interplay of ten DTIs at three different case companies. Thus, we combine data from 30 semi-structured interviews and additional sources to elucidate how the three cases managed the *strategic alignment, governance, methods/IT, people, and culture* aspects of multiple concurrent DTIs in their organizational contexts. By analyzing DTIs and describing their interplay management, we contribute to a better understanding of how incumbents can emphasize explorative activities. Interplay management between DTIs helps us to explicate how the structural and contextual DTI approaches foster incumbents' explorative activities, enabling hybrid ambidexterity at the organizational level. Further, for interplay management between DTIs and the core organization regarding research, we conclude that structurally ambidextrous DTIs require contextually ambidextrous DTIs to facilitate the duality of explorative and exploitative activities in companies' approaches to ambidexterity.

## Theoretical foundations

We will now outline our theoretical foundations. Besides positioning our work in the general research into DT, we specifically present findings from the emerging research on DTIs. This helps us to distinguish two major DTI types, which we refer to in the remainder of the paper. Further, we delineate and explain five management aspects from the research that we use to unravel DTIs' interplay. Finally, we briefly introduce research on hybrid ambidexterity and elucidate its roles in DT.

### Digital transformation and digital transformation initiatives

Emerging digital technologies and innovations require companies to cope with continual change (Hinsen et al., 2019). Thus, to remain viable amidst changing markets and competitors as well as to change or explore new value-creation paths (Nambisan et al., 2017), incumbents must consider transforming their business (Bharadwaj et al., 2013; Vial, 2019). Therefore, the formulation of a DT strategy becomes a key concern (Chaniyas et al., 2019).

We distinguish three major research streams that scholars have used to analyze incumbents' transformations: organizational transformation (Greenwood & Hinings, 1993; e.g. Henderson & Clark, 1990), IT-enabled organizational transformation (e.g. Henderson & Venkatraman, 1999; Lyytinen & Newman, 2008), and DT (e.g. Sebastian et al., 2017; Wessel et al., 2021). While the first research stream depicts transformations from a general management perspective, the second initially emerged from studies on the organizational impacts of enterprise resource planning systems (Besson & Rowe, 2012). In contrast, the third research stream considers digital

technologies' impacts on organizations (Yoo et al., 2010, 2012) as well as strategies to adopt these technologies and integrate them in an organization's value proposition (Nambisan et al., 2017). This entails new strategic imperatives (Bharadwaj et al., 2013).

In the nascent literature on DT, the focus has been on the antecedents, the process, and (desired) outcomes, more than on the specific DTIs (Soto Setzke et al., 2020; Vial, 2019). The DT strategy comprises strategic responses (Hess et al., 2016) that imply structural changes (e.g. Haffke et al., 2017) and cultural changes (e.g. Hartl, 2019). To better understand how DT unfolds through dedicated activities, scholars have examined individual DTIs (Hess et al., 2016; Vial, 2019). While the research concurs that launching DTIs comprises new structures, processes, governance mechanisms, and collaboration types, among others (Jöhnk et al., 2019; Legner et al., 2017; Zimmer, 2019), the literature on DTIs' scope and setup is fairly scattered.

Different environmental conditions and the specific organizational context result in different DTI types (Soto Setzke et al., 2020), which have individual advantages and disadvantages (Jöhnk et al., 2017). Considering that DTIs comprise structural changes (e.g. separated units to avoid existing structures and increase speed) and contextual changes (e.g. organization-wide programs to transform behavior patterns in the organization), they differ in their extents of embeddedness in organizational structures (Jöhnk et al., 2020). This reflects in design decisions such as collocation, interdisciplinarity, and/or management practices such as enterprise architecture management (Jöhnk et al., 2017; Legner et al., 2017). In that context, we refer to the core organization as the established organizational functions that DTIs contrast with their specific focus on driving organizations' DT (Raabe et al. 2020a, b). Thus, while DT concerns the entire organization (the core organization and the DTIs), DTIs comprise dedicated activities for DT and their inception is a deliberate way to explore DT's potentials. To structure extant research, we distinguish between two structural types (i.e. innovation-focused and delivery-focused DTIs) and one contextual (i.e. change-focused DTIs) DTI type.

First, innovation-focused DTIs comprise open as well as closed innovation approaches (Blanka, 2019) and are commonly labeled as accelerators (Cohen et al., 2019; Coletti & Landoni, 2018; Shankar & Shepherd, 2019; Singh et al., 2020), incubators (Hausberg & Korreck, 2020; Krufft & Kock, 2019), or (digital) corporate venture capital activities (Lee et al., 2018; Weiblen & Chesbrough, 2015). Second, delivery-focused DTIs deliberately detach from the core organization so as to bypass existing boundaries and inertia to emphasize explorative activities for the implementation of digital technologies (Hansen et al., 2019; Sebastian et al., 2017). These DTIs are often labeled as hubs (Svahn et al.,

2017), labs (Göbeler et al., 2020; Holotiuk & Beimborn, 2019), or units (Jöhnk et al., 2017). Third, change-focused DTIs are typically programs that span across departments (Singh et al., 2020; Smith & Watson, 2019). Such DTIs seek to build digital capabilities (Dremel et al., 2017; Svahn et al., 2017) or to facilitate cultural change (El Sawy et al., 2016; Hartl, 2019).

Notably, these DTI types only serve us as a modest way to summarize the literature and may exhibit overlaps in their manifestations in practice. In this line, Ossenbrink et al. (2019) showed that DTIs can individually combine structural and contextual changes. Building on this understanding, we are specifically interested in DTIs' organizational embedding and interplay. Thus, our DTI types explicate the emphasis on structural or contextual changes, as acknowledged by Ossenbrink et al. (2019). Even if there is as yet no uniform classification of DTIs that is collectively exhaustive and mutually exclusive, DTIs share the objective to foster companies' explorative activities in order to utilize digital technologies' rich affordances. However, companies who seek to launch a set of multiple concurrent DTIs face the need to manage their interplay.

## The interplay of digital transformation initiatives

The interplay of multiple concurrent DTIs creates complexity and additional interdependencies within incumbent companies. For one thing, each DTI must contribute to the overall strategic vision of DT (Hess et al., 2016). For another thing, incumbents must coordinate DTIs so as to ensure goal-orientation, synchronization, prioritization, efficient structures, and collaboration among all DTIs and with all other activities in the core organization (Matt et al., 2015). However, DTIs' specific foci creates challenges in their organizational embedding and collaboration with the core organization (Andriopoulos & Lewis, 2009; Jöhnk et al., 2019). For instance, DTIs and the core organization may compete for limited resources (Svahn et al., 2017) or must overcome a growing cultural divide (Haffke et al., 2017).

To gain a deeper understanding of DTIs' interplay, we drew on the research, which distinguishes between five management aspects that originate from the business process management (BPM) literature (Kerpedzhiev et al., 2020; Rosemann and Vom Brocke, 2015). This helps us to understand the changes that DTIs imply to companies' established processes and value-creation paths (Mendling et al., 2020). Specifically, we adopted Kerpedzhiev et al.'s (2020) aspects as the most recent comprehensive revision in this well-established literature stream. Further, we used the IT management, DT, and ambidexterity literatures to contextualize the management aspects in light of our research question (for more information, see Table 7 and Table 8 in the Appendix).

The research has emphasized the complementary nature of BPM and DT (Mendling et al., 2020). DTIs seek to achieve deep structure changes that require new BPM logics in organizations (Baiyere et al., 2020; Besson & Rowe, 2012). The five management aspects help to unveil DT's dynamics and their implications for actors, technologies, and the processes that link actors and technologies in organizations (Baiyere et al., 2020). Further, the management aspects are a way to describe DTIs' implementation by explicating the structural and contextual changes induced by DTIs (Fischer et al., 2020; Vial, 2019; Jöhnk et al., 2020). In addition to the DT literature, the research has also applied such management aspects in the context of the ambidexterity literature (Stelzl et al. 2020), which we used as the theoretical lens to better understand DTIs' interplay and their organizational outcomes. In this regard, we consider the management aspects a sound approach to elucidate how organizations combine explorative and exploitative activities (Mendling et al., 2020). We will now describe the five management aspects in some detail.

**Strategic alignment** Strategic alignment seeks to balance the organizational, DT, and DTI goals following the overarching strategic vision (Hess et al., 2016) and the digital business strategy (Bharadwaj et al., 2013). This includes both the strategic fit and functional integration (Henderson & Venkatraman, 1999). Thus, the strategic alignment between business and IT for DT as well as across and between DTIs and the core organization poses challenges (Horlach et al., 2017), and companies and their DTIs should apply different strategies for their DT activities (Chen, 2017).

**Governance** Governance comprises the structures, processes, and leadership of DTIs, including structural, procedural, and relational mechanisms that ensure and foster a company's DT strategy and objectives (Jöhnk et al., 2019). Governance mechanisms regulate the sharing of resources and responsibility for IT (Weill & Ross, 2005). Thus, it seeks to sustain and extend organizations' DT strategy and objectives (De Haes & Van Grembergen, 2009). However, DTIs require specific governance frameworks to reduce organizational barriers and inertia as well as to foster innovative capabilities (Tiwana & Konsynski, 2010; Vejseli et al., 2018).

**Methods/IT** Methods/IT focus on the conjunction of digital infrastructure with the methods and tools to manage it, i.e. "the basic information technologies and organizational structures, along with the related services and facilities necessary for an enterprise or industry to function." (Tilson et al., 2010, p. 748). Methods/IT can be both an enabler of organizational agility and IT innovation (Fischer et al., 2020) or a heavy burden owing to the limitations of existing legacy

systems (Keller et al., 2019). DTIs often serve as a way to escape technical debt by establishing separate methods/IT (e.g. separate IT infrastructure without ties to legacy systems). While this creates relief from technical burdens, it may also result in interfaces and dependencies between the DTIs and the core organization (Jöhnk et al., 2019).

**People** People require a digital skills set to meet the challenges of digitalization (Fischer et al., 2020; Legner et al., 2017). Thus, employees must acquire an "appropriate adaptive skill set and digital know-how" (El Sawy et al., 2016, p. 143) in order to successfully implement digital business strategies. Cross-functional teams help to improve the business-IT collaboration and facilitate continuous change (El Sawy et al., 2016; Legner et al., 2017). Further, organizations may hire new employees to address the lack of existing capabilities in the organization (Tumbas et al., 2018).

**Culture** Organizational culture comprises the patterns of shared values, norms, and practices that distinguish one organization from another (Karimi & Walter, 2015). Employees are at the center of the culture aspect, since they play a crucial role in a successful DT (Philip & McKeown, 2004). Further, social alignment between DTIs and the core organization can facilitate collaboration, abolish obstacles, and reduce costs (Liang et al., 2017) through three major factors: shared language (Preston & Karahanna, 2009), shared knowledge (Chan et al., 2006; Reich & Benbasat, 2000), and shared understanding (Preston & Karahanna, 2009). Especially organizations with a long history may need to let go of the old culture to transform into a digital business (Sebastian et al., 2017; Wessel et al., 2021).

### Hybrid ambidexterity in digital transformation

DTIs seek to change companies' value-creation paths by utilizing digital technologies (Vial, 2019). One way to achieve such advantages from digital innovation while also maintaining business efficiency is IT ambidexterity. Lee et al., (2015, p. 400) defined IT ambidexterity as "a firm's ability to simultaneously pursue exploration and exploitation in their management of IT resources and practices." Thus, a company is striving for long-term innovation through exploration on the one hand and efficiency through exploitation on the other hand (Tushman & O'Reilly, 1996). This dichotomy of ambidexterity can be achieved through multiple approaches. Companies can pursue structural ambidexterity by implementing dual structures, i.e. a traditional IT setup for the exploitation part and an agile IT setup for the exploration part (Haffke et al., 2017; Jöhnk et al., 2017; Tushman & O'Reilly, 1996). Structural ambidexterity provides structural separation between explorative and exploitative activities (Birkinshaw

& Gupta, 2013). In contrast, contextual ambidexterity simultaneously pursues both activities across a business unit or a company without structural separation (Gibson & Birkinshaw, 2004). Thus, contextual ambidexterity balances explorative and exploitative activities in the company by encouraging individuals to decide for themselves how to allocate their time between the activities (De Clercq et al., 2014; Gibson & Birkinshaw, 2004; Sethi & Sethi, 2009). Therefore, structural and contextual ambidexterity differ in the extent of structural separation as well as the specialization and roles of senior managers (Ossenbrink et al., 2019; Raisch & Birkinshaw, 2008). However, companies that apply either structural or contextual ambidexterity are limited in their options, which is why companies must combine the two approaches (Chen, 2017; Ossenbrink et al., 2019). Further, as exploration (change) and exploitation (stability) should constitute an interdependent and mutually enabling duality, companies must manage their DTIs accordingly. Otherwise, exploration and exploitation may form a duality of opposing activities (Farjoun, 2010; Magnusson et al., 2014; Turner et al., 2013).

DTIs involve both strategizing and strategy implementation, which makes them particularly suitable for analyzing their contributions to ambidexterity (Gregory et al., 2015). Yet there have been few insights into how incumbents manage multiple concurrent DTIs and the corresponding changes. Further, we lack a thorough understanding of the complementarity of structural and contextual ambidexterity and how companies combine them to foster hybrid ambidexterity (Ossenbrink et al., 2019). We draw on preliminary work that has shown that DTIs involve both structural and contextual changes against the backdrop of hybrid ambidexterity (Jöhnk et al., 2020). However, our understanding of DTIs' interplay, their interdependencies, and suitable management approaches is still in its infancy. Thus, we seek to explicate the interplay of multiple concurrent DTIs and their contribution to hybrid ambidexterity in companies.

## Method

To investigate the interplay of multiple concurrent DTIs against the backdrop of hybrid ambidexterity, we chose a qualitative-empirical research approach. Generally, qualitative-empirical research helps to develop a more in-depth understanding, generating new insights into emerging phenomena (Bettis et al., 2015). We conducted a multiple-case study with three cases that engage in DT by establishing multiple concurrent DTIs (Eisenhardt 1989; Yin, 2009), investigating the cases' intricate real-world settings and triangulate our findings with evidence from different sources. In the following, we describe our data collection and analysis as well as the cases' general settings to familiarize the

reader with the companies' contexts, overarching challenges, and their general approach to DT.

## Data collection and analysis

Following a purposive sampling approach, we selected and contacted cases that engaged in DT (Bhattacharjee, 2012). Specifically, we sought out companies that were reporting considerable complexity owing to their various DT activities (i.e. multiple concurrent DTIs) and links to the deep structures of their core organization (i.e. incumbents). Accessibility to case material (e.g. facilitated by previous cooperation or personal contact with executives) was another decision criterion to provide sufficient data for in-depth analysis. We organized data collection sequentially for the three cases to account for the emerging understanding of DTIs and their interplays during our research process (Carroll & Swatman, 2000). Data collection for case 1 took place in 2018, with cases 2 and 3 following in 2019 and 2020, respectively. This allowed us to gradually sharpen the focus of our research question, data collection, and theorizing. For instance, in line with prior research (Göbeler et al., 2020; Jöhnk et al., 2017, 2019; Ossenbrink et al., 2019), ambidexterity emerged as an appropriate theoretical lens during the data collection and analysis of case 1, which helped us to focalize data collection in the two later cases (Jöhnk et al., 2020). We conducted 30 semi-structured interviews until we had reached data saturation per case (Saunders et al., 2018) and gathered additional data from other sources (field observations, internal presentations and documents, and publicly available media information) to triangulate our findings (Myers & Newman, 2007). Our semi-structured interviews covered three major blocks: (1) a brief introduction, (2) interviewees' understandings of DT activities, and (3) the interplay of multiple concurrent DTIs. The questions in block 1 addressed each interviewee's position, role, experience, and career path. In block 2, we probed each interviewee's involvement in and attitude to the organizational DT activities. For instance, we asked the interviewees to provide a general overview over the DT strategy and to place their role and responsibility into a bigger picture. As another example, we asked for the foci and scopes of the DTI(s) that the interviewees were involved in. In block 3, we sought to understand how the case company managed its DTIs, their interplay, and their links to the core organization. For instance, we asked to what extent the DTI(s) depend on the core organization as well as whether and how DTI outcomes are integrated into the core organization. During the interviews, we adapted the questions to shift the interviews' focus depending on the interviewees' knowledge and de facto expertise (Myers & Newman, 2007). With one exception, we recorded all the interviews with their permission, and transcribed and analyzed 1,601 interview minutes.

For data analysis, we used qualitative content analysis techniques and analyzed our data in MAXQDA (Mayring, 2014), jointly developing a literature-based categorial coding scheme that reflected both our initial insights from data collection and their theoretical underpinnings (see the theoretical foundations and Table 8 in the Appendix). The first three authors then systematically analyzed the interviews word-for-word by assigning interviewee statements to our categorial coding scheme. We made use of annotations (code comments) and theoretical memoing to preserve emerging explanations or coherences (Saldaña, 2021). To deeply immerse in the data and to identify with the case context, the three coding authors each analyzed one case. During data analysis, all authors discussed the coding approach, eventual ambiguities, and preliminary findings in joint coding sessions. The first three authors would advocate for their specific case and challenge the approach of the other coders, while the fourth author took an observer role to abstract findings across the cases from an outside perspective. During these discussions, we also involved the additional data so as to broaden our understanding of the case companies and to contextualize the interviewees' statements. For instance, board presentations provided the necessary strategic background for interviewees' assessments of a DTI's focus. This process led us to 525 codified statements from our 30 interviews, organized into three categories and 11 subcategories. Finally, we synthesized our findings in tabular form and juxtaposed the cases to conclusively discuss our findings.

## Case settings

AutoCo (anonymized company name) is one of the world's largest premium car manufacturers. The current digitalization trends are changing the automotive industry both in terms of customer demands and general mobility concepts. Thus, competitive pressure increases and induces the need for DT. Eager to exploit these new opportunities, AutoCo has begun to adapt digital technologies to resolve individual consumer needs. It initiated a digital business strategy to aim for 'digital championship' in its industry, a strategy implemented through

multiple concurrent DTIs. For one thing, this includes activities in automotive connectivity, autonomous driving, carsharing, and electric car-based services. For another thing, this includes an overall cultural change within the company.

FoodCo (anonymized company name) is one of the world's largest players in its fast-moving consumer goods category. It is driven by digital technologies and end-consumers' behavior changes, including an increasing demand for digital services around the daily use of FoodCo's products. Further, born-digital players, especially digital platforms, are increasingly impacting on the industry's sales channels and may take over the future (digital) touchpoints with end-consumers. Thus, FoodCo initiated a digital business strategy to aim to build a 'digital food ecosystem' in which it could explore digital business models. To accelerate speed, this involved parallel activities to drive digital strategy, reshape existing structures, test multiple digital opportunities, and cultivate cultural change.

MedCo (anonymized company name) is a family-owned manufacturer of medical aids. Since its inception, it has experienced rapid growth, and has become a world-leading provider of medical aids and care concepts. This growth entailed significant challenges to its organizational structure and IT setup. MedCo has also recently recognized the need for digital-enabled solutions to take care of an individual's health. Thus, it placed a DT roadmap at the top of its priority list and aims to become the 'digital industry benchmark' among its competitors. Thus, business and IT are driving separate DTIs to account for the emergence of digital technologies and the associated shift in customer behaviors.

Table 1 below and Table 6 in the Appendix provide details on the cases, the interviews per case, and the interviewees.

Overall, all three cases engaged in DT by establishing multiple concurrent DTIs. Further, as incumbents with a long legacy, they exhibit an interesting context on how established companies seek to foster explorative activities to cope with DT challenges and new organizational demands. Yet, the three cases differed concerning their size, business, and specific approaches to implementing and managing their DTIs.

**Table 1** Overview over the collected case data

Case	Case 1 – AutoCo	Case 2 – FoodCo	Case 3 – MedCo
<i>Industry</i>	Automotive	Food and beverages	Medical aids
<i>Employees</i>	~300,000	~10,000	~3,000
<i>Years in business</i>	>130	>120	>100
<i>Claimed DT focus</i>	Establishing digital championship to resolve individual mobility consumers' needs	Building a digital food ecosystem to explore digital business model opportunities	Becoming the industry benchmark for digital-enabled individual health solutions
<i>Data</i>	8 interviews Field observations, internal presentations, documents, and publicly available media information	10 interviews	12 interviews

## Findings

Analyzing the DTIs and their interplay, we found different approaches to both organizing and managing DTIs. We will structure our findings by first describing the specific DTIs found per case and explicating their embedding in the cases' contexts. We will focus on the DTIs' purpose, their organizational anchoring, and interdependencies between DTIs and between the DTIs and the core organization. Next, we will describe the five DTI management aspects for the three cases, the challenges resulting from multiple concurrent DTIs, and approaches to interplay management to overcome the challenges. Finally, by synthesizing our findings across all three cases, we shed light on how our three cases cope with multiple concurrent DTIs, enabling us to theorize on their contributions to foster hybrid ambidexterity in the discussion.

### Digital transformation initiatives in our three cases

For all three case companies, velocity, flexibility, and customer focus are key success factors, which is why they pursue transformation activities in focus areas around the customers, data, value propositions, the organization, operations, and the transformation management. However, all three cases are longstanding players that have grown over many years in industries where capabilities for cost-efficient and premium manufacturing are critical. Thus, they must manage a fairly large number of existing legacy systems, while lacking relevant DT capabilities. Further, organizational inertia and resistance threaten DT success. Thus, all three cases had launched dedicated DTIs for a successful DT. Besides anonymization, we directly inherited the DTI denotations from the cases. Yet, the observed DTIs corroborated the descriptions of specific DTIs in previous work (see 3). In the subsequent analysis, we will focus on all our cases' DTIs that were apparent during the data collection. While we made no selections or restrictions, our data may still not represent an exhaustive collection of all DTIs per case. This is unsurprising, given the cases' size and the need to concentrate our data collection efforts to collect sufficient information on the DTIs' interplay. However, the observed DTIs still pose considerable complexity in the cases and thus constitute a fertile source of insights to answer our research question.

AutoCo is eager to make use of the opportunities promised by DT and had recently begun to innovate in mobility services. However, AutoCo also has a great number of legacy systems to manage. It faces the overall challenge to combine automotive manufacturing with novel digital services and the various DTIs. Thus, AutoCo has initiated a dedicated digital business strategy that advances three different DTI types, comprising a digital unit as *delivery-focused DTI* (DTI1-1), an incubator as *innovation-focused DTI* (DTI1-2), and a cultural change program as *change-focused DTI* (DTI1-3) (see Table 2).

FoodCo faces two main challenges regarding its targeted exploration of new value propositions. First, it lacks crucial capabilities, for instance, swift prototype validation, process flexibility, and consumer centricity. Second, FoodCo is organized decentrally compared to industry competitors. Local countries partly operate own value chains, produce their own products, and make independent decisions regarding their value propositions. Although this has enabled market growth for years, the structure had reached its limits. To resolve both challenges, the CEO had initiated four DTIs: A digital strategy unit as *delivery-focused DTI* (DTI2-1) whose early outcomes led to an innovation process unit as another *delivery-focused DTI* (DTI2-2), a new business model unit as *innovation-focused DTI* (DTI2-3), and a cultural change program as *change-focused DTI* (DTI2-4) (see Table 3).

MedCo's concentrated DT efforts began with the hiring of a new CIO for the vacant position. As the CIO was also held responsible for all digitalization efforts in the IT department, he was thus put in a combined CIO/CDO role. As one of his first measures, the CIO/CDO developed a digital roadmap to get a clear vision for the imminent transformation. From this, MedCo has established three DTIs: Digital projects as *delivery-focused DTI* (DTI3-1), an innovation lab as *innovation-focused DTI* (DTI3-2), and a cultural change program as *change-focused DTI* (DTI3-3) (see Table 4).

### Analysis of the five digital transformation initiative management aspects

We will now use the five management aspects to provide details of how our three cases managed their multiple concurrent DTIs within their organizational context.

#### Strategic alignment

Within AutoCo, strategic alignment comprises not only the alignment of DTIs with the digital business strategy, but the alignment across the separate business units as well via a top-down strategy alignment process. Each department has its own strategy, which it derives from the business strategy. "There is a corporate strategy, [...] then there is the IT strategy, then there is the one from our management, [...] and of course we also have an e-commerce strategy. [...] our management has ensured that the company's existing strategies are incorporated into our strategy." (A4). The DTIs emphasize a shared understanding of the strategy and the objectives. "Every six weeks, we lock ourselves in for two days and work out our overall strategy, [...], the how, what, and who. We not only work it out together, but we also manifest it together." (A7). However, we observed that structural separation of DTIs may lead to uncertainty in the company

**Table 2** Overview over the digital transformation initiatives at AutoCo

DTI	Description	Exemplary quotes
DTI1-1 Delivery- focused DTI	<ul style="list-style-type: none"> <li>• A legally separated digital unit for marketing and sales</li> <li>• Responsible for innovative projects and digital services at AutoCo</li> <li>• Touchpoints to corporate departments, but only partially bound to corporate structures, standards, and processes</li> </ul>	<p>“[...] and because it is a legal entity, we can implement a few things that would otherwise not work within the group.” (A3)</p>
DTI1-2 Innovation- focused DTI	<ul style="list-style-type: none"> <li>• A self-sufficient legal entity that reports directly to AutoCo's CIO</li> <li>• Builds entirely new business models and services for the external market</li> <li>• Corporate employees are seconded on a project-by-project basis and are suspended legally and disciplinarily during the project duration</li> </ul>	<p>“[...] the greatest possible freedom that a subsidiary can have in order to make our decisions 'faster, higher, and further.' Therefore, we have our own HR, our own recruiter, our own purchasing processes, so that we can act and work completely detached from corporate processes.” (A7)</p>
DTI1-3 Change- focused DTI	<ul style="list-style-type: none"> <li>• An organization-wide digital vision and cultural change program</li> <li>• Promotes all related cultural aspects and a shared understanding of DTIs</li> <li>• Different organizational strategies for disparate regions and business units</li> </ul>	<p>“The art is to formulate your vision and strategy so simply that everyone understands it. And everyone understands our vision. So, everyone can work with it.” (A8)</p>

concerning the strategic alignment and goals of the DTIs. “I am not clear about the goals of DTI1-1. Is it a delivery unit? How are they measured afterwards?” (A4).

Within FoodCo, owing to the historical decentral structures, strategic alignment between DTIs and the core organization in local countries remains challenging. Further, the core organization lacks capabilities and incentives to realign its day-to-day priorities for aligning to the DTIs' top-down strategy. “We have the problem of decentralization [...] countries can actually act and decide fairly autonomously, and whether they have implemented this now, nobody has actually taken proper ownership of it [...]” (F7). Also, uncertainty concerning DTIs' strategy is arising in a bottom-up way: “I don't have a feeling like 'okay these are the topics, this is our strategy.' [...] There's a crack, I would say, in the company.” (F10). In response, DTIs adapt their strategic alignment to “credos such as 'as international as possible and as local as needed'.” (I7). Thus, they provide top-down guidance: “[...] say exactly which brands, [...] new business model [...], innovation [...] have a growth strategy that I can apply internationally [...] quantified, measurable, backed up with KPIs.” (F7). In addition, DTIs train agents in the core business organization to push DTI strategy in a bottom-up way: “[...] enable the people who are there as local activators, who can then act on themselves.” (F8).

Within MedCo, the digital roadmap aligns its DTI3-1. “The digital strategy depicts where MedCo wants to be in the future, and the roadmap shows the important topics with its prioritization for the next years.” (M5). Further, the other DTIs seek to contribute to one or several of MedCo's strategic pillars of digital business strategy. “Our strategic pillars are DT, increase innovativeness, launch new products, establish e-commerce, and enable our people.” (M4). Thus, the strategic alignment of MedCo's DTIs is mainly ensured by overarching strategic directives and close top management involvement. “I have the feeling that [the CIO/CDO] supports us and moves things forward to find solutions.” (M6). Despite all alignment efforts for individual DTIs and apparent interdependencies between DTIs, there is a lack of alignment across DTIs, which hampers or even inhibits potentials from DTIs' collaboration. “[DTI3-1] and [DTI3-2] are not close, although they have similar ideas. This is also why there is some hostility. [...] It could be a fruitful partnership if you respect one another.” (M4).

## Governance

We found that AutoCo's DTI1-1 has different and more urgent demands than the core organization. “In fact, the organization is unable to simply approve the purchasing of these apps. I have to do a test order, which takes four weeks with legal and costs money, and by then I've lost a month, when I could already have installed the tool.”

**Table 3** Overview over the digital transformation initiatives at FoodCo

DTI	Description	Exemplary quotes
DTI2-1 Delivery- focused DTI	<ul style="list-style-type: none"> <li>• A separate unit led by corporate strategy that reports directly to the CEO</li> <li>• Crafting and iterating an overarching DT strategy while supervising a decentralized DT program in the core organization</li> <li>• Working closely with the core organization, the unit is integrated into structures, standards, and processes</li> </ul>	<p>“[...] we've done twelve projects in the digital transformation area and we've initiated and led the digital transformation office [...] where over fifty-five projects in the organization have been involved [...].” (F6)</p>
DTI2-2 Delivery- focused DTI	<ul style="list-style-type: none"> <li>• Based in the international marketing department, a first-line report to the CEO</li> <li>• Harmonizing and digitalizing decentral, local innovation processes</li> <li>• Implement and train users on a digital innovation process tool, to support FoodCo in exploring new customer-centric value propositions</li> </ul>	<p>“[...] to find one harmonized way to work together inside the entire organization. [...] The operational guys that need it to work didn't know what to do (before).” (F9)</p>
DTI2-3 Innovation- focused DTI	<ul style="list-style-type: none"> <li>• Based in the international marketing department, but most projects have direct CEO visibility</li> <li>• Develop and validate prototypes, then pursue partnerships for scale</li> <li>• Legally integrated, but projects are decoupled from the core organization, and work with the core organization only for critical resources (e.g. expert input)</li> </ul>	<p>“[...] to have a kind of lean startup [...] to avoid the whole overhead that you normally have in a large static-acting organization to try new things quickly. [...] learn and to go into the next [...].” (F4)</p>
DTI2-4 Change- focused DTI	<ul style="list-style-type: none"> <li>• An organization-wide program to promote all cultural aspects related to the DT</li> <li>• Focusing on for instance developing capabilities for partnerships' openness or agility with the core organization's employees</li> <li>• Located in the international HR department, which is a first-line report to the CEO</li> </ul>	<p>“[...] behind it were clearly the agile values with more freedom, more trust, more willingness to take risks, pragmatism [...] We are trying to establish new ways of working, new approaches, new ways of thinking.” (F10)</p>

**Table 4** Overview over the digital transformation initiatives at MedCo

DTI	Description	Exemplary quotes
DTI3-1 Delivery- focused DTI	<ul style="list-style-type: none"> <li>• A virtual project team led by the CIO/CDO</li> <li>• Responsible for both the comprehensive transformation of MedCo's legacy IT landscape and innovative projects (e.g. a digital workplace, customer-facing apps)</li> </ul>	<p>“So many projects are running that were somehow very dispersed and not coordinated with one another. [...] Thus, this virtual organizational unit convenes employees [...] the goal is that all topics converge somewhere, and a small circle of employees holds all the reins to control the projects and coordinate them better.” (M5)</p>
DTI3-2 Innovation- focused DTI	<ul style="list-style-type: none"> <li>• Follow the digital roadmap, providing a strategic vision for MedCo's DT</li> <li>• A separate unit led by the CMO</li> <li>• Focusing on generating new business ideas across MedCo's business units; however, it is not compulsory that innovations comprise digital technologies</li> <li>• Deliberately detached structures and procedures so as to enable innovative thinking</li> </ul>	<p>“Our Innovation Lab brings people, skills, and technologies together to develop great ideas into market-ready concepts. It builds on a culture of openness, transparency, and interdisciplinary exchange – it embodies the courage to experiment, to question, and to think completely differently.” (the company's homepage)</p>
DTI3-3 Change- focused DTI	<ul style="list-style-type: none"> <li>• The HR department is mainly responsible</li> <li>• Overarching program bundling efforts to redefine and proactively design work and collaboration at MedCo</li> <li>• Topics are the future of work, increasing employees' participation, engagement, and satisfaction, as well as occupational health management</li> </ul>	<p>“(related to DT) [...] what will be the future working models, the places of work, and then accordingly the new workplaces. The project has given rise to many, many information events, which the employees are very enthusiastic about, because this is the first time in the company's history that information is really actively provided [...].” (M10)</p>

(A2). This leads to frustration within DTI1-1, which finds workarounds for a faster process. “We usually go through the standard processes, but that takes too long. Then, we have to escalate again, so that our process gets picked out, and gets faster treatment.” (A2). Further, AutoCo has overall measures for success that don't fit a digital business model. “Nobody asked how many more customers we actually have on our platform as a result of the release.” (A4). Thus, as A4 stated, “today we measure the wrong things.”

At FoodCo, the DTIs are developing in parallel to the existing governance. Since the CEO sponsors the DTIs directly from his budget, the DTIs have high freedom concerning budget use and how they approach their focus area. The DTIs decide that, the less relevant the core organization is for the DTI's focus area, the more they decouple themselves from FoodCo's governance: “[...] give this team freedom that they wouldn't have in the normal FoodCo structure. [...] the possibility for us to decouple ourselves from existing processes and organizational structures.” (F2). However, this approach to DTI governance leads to organizational barriers to the core organization: “Everybody hated the platform. Because we were suddenly allowed to do everything we wanted, we could do everything differently.” (F5). Ultimately, this led to a situation where the core organization worked together with a DTI only to please FoodCo politics, without any interest in adapting the DTIs' approaches: “What was dangerous was that [...] some countries went political and started using [DTI approaches] just for the sake of making us happy.” (F9).

While all three DTIs at MedCo broke free from the common organizational governance chassis, their specific implementations differed. For instance, DTI3-2 is a new unit, while DTI3-1 comprises virtual teams for individual projects with few permanent employees: “Virtual teams should centralize the efforts and take over responsibility. [...] It involves employees only for the duration of the project, besides a small team that holds the reins.” (M5). Further, MedCo initiated new meetings and formats to account for DTIs' new strategic directions and cross- functionality. “We have different meetings, for example, a digital committee that involves the executive directors, CIO/CDO, the head of core IT, and [several business unit managers] to discuss the digital projects.” (M12). Besides the structural separation and new decision-making processes, MedCo also established a structured IT service management at the interface between the DTIs and the core IT. This helped especially DTI3-1 and DTI3-2 in requesting core IT services (e.g. infrastructure provision). “It is important that we get transparency on what must be done. [...] Then we can evaluate (all requests).” (M11).

**Methods/IT**

At AutoCo, we noted that the DTIs' methods and infrastructures differed in their dependency on the core IT. On the one

hand, DTI1-1 was closely linked to the infrastructure. “We have very tight interfaces to the IT infrastructure. [...] we couldn’t do everything by ourselves [...]. However, the processes are still too slow for what we would need.” (A4). On the other hand, DTI1-2 acted largely independently. “We [...] are completely detached from all the group processes there.” (A7). However, this is only possible as DTI1-2 designs products and services for the external market. “There is a completely standalone business [...] because we will also position it on the external market.” (A7). Therefore, there was no need to ensure compatibility between the services and AutoCo’s IT.

At FoodCo, we noted that DTIs have interfaces to the core IT depending on the closeness of a DTI’s focus areas to the core organization: “The internal IT is an infrastructure IT. [...] the problem is simply speed. [...] get to the market in time [...] means as lean as possible, which also means not touching any of FoodCo’s complex structures.” (F5). More closely linked DTIs suffered from a slowdown owing to old legacy systems: “We could only involve most of the countries [...] because some countries [...] can’t even access our software.” (F9). However, whenever they pushed to implement new tools and methods inside FoodCo, the DTIs felt a uniting, shared purpose among one another and with the existing core organization: “what is applicable in many, almost all teams, are a few agile methods or new tools and methods [...] this brings transparency, clarity, focus.” (F10).

MedCo’s DTIs generally depend on the core IT and its services. For IT provision, MedCo did not differentiate or discriminate across the DTIs or against other requests. Also, the ongoing transformation of MedCo’s legacy IT landscape with various historically grown applications ties up scarce resources. Thus, the core IT often struggles to adhere to the DTIs’ ad hoc demands. “We rely on the [core IT] to support us. I must keep after them, they are so involved in day-to-day operations. [...] Something must suffer, either the daily business or our projects.”

(M3). Thus, MedCo also considers external service provision for its DTIs, for instance, to develop new customer-facing apps faster. “We face the challenge to get more and more independent from our internal infrastructure. [...] In the past, it was forbidden to utilize external resources, but we must leave this behind now.” (M9). Tools introduced by the DTIs are typically shared, providing value to the core IT and across the company. “Our digital workplace project covers various topics for the business units that wish to become digital. Meetings often unveil that we have existing solutions that are not yet being used.” (M10).

## People

DTIs deal with continuous change, which requires interdisciplinary skills. “IT and business must work as closely as possible, [...] In such a product development with so many short-lived or quick decisions, this doesn’t work if

the departments are too far apart.” (A1). This is why DTIs combine skills from both business and IT to get the necessary know-how for decision-making. “We need people who understand the overall context of the infrastructure for the customer process, and they must have very broad cross-sectional knowledge.” (A6). However, AutoCo was having a hard time attracting high-potential staff with digital capabilities, since they prefer to work for digital firms. Nonetheless, AutoCo needs these capabilities so as to remain competitive. “At the moment, there are very few people who are really good [...] and we want to have the best [...] to build the best products in the market.” (A2).

At FoodCo, leveraging talent with the necessary interdisciplinary and digital skills is challenging for DTIs that focus on transforming the core organization: “[...] employees who have many more digital connections with technologies [...] cannot be used to their full potential in the existing organizational structure [...]” (F4). Further, such talent remains scarce and challenging to attract, which is why FoodCo situationally shares talents across multiple DTIs: “There are another ten people or so [...] who are for instance product designers and [...] who work on [this DTI] [...] partly full-time and partly as a shared service.” (F3). Regarding its existing workforce, FoodCo is struggling to lever employees for collaboration with DTIs or DTIs directly: “At one time we had hired all these over twelve-thousand employees [...] because they were and are good people. But still, we find it difficult to realize this potential [in our transformation].” (F10).

Considering the flaws in MedCo’s business-IT collaboration to date, the DTIs deliberately involve cross-functional teams and collaboration. “My project team comprises representatives from sales and marketing as well as a business intelligence expert and an administrator.” (M3). Thus, the DTIs understand that they are business partners instead of mere service providers. “The business units were used to throwing a business problem at us and getting it solved, or not.” (M11). Further, despite the deficiencies in strategic alignment of the different DTIs, individual employees seek informal knowledge exchange and collaboration. “Personally, I am quite closely networked with [DTI3-2].” (M4). However, the collaboration between DTIs and the core IT lacks a shared understanding. Thus, the CIO/CDO and DTI3-3 co-located the core IT and DTI3-1 in an open-plan office so as to foster collaboration. “I am very much looking forward to it. It suits our way of working, but I know that not everyone is excited. It’s going to be an experiment. I expect to have more collaboration [...].” (M9).

## Culture

Communication and a shared culture can enable better collaboration in a company. However, we observed an emerging cultural drift resulting from frustration between the structurally separated DTIs and the core organization. “If

*we have to win a race, but I always put the Trabbi [an old, slow car] in there [...] then, that's not what a Formula 1 driver likes to do in order to take part in the race.”* (A2). In this comparison, DTI1-1 sees itself as a Formula 1 driver whose performance is hindered by poor conditions. Further, cultural differences between traditional and agile IT setups remain. *“Agile projects often have a higher visibility or are just easier to sell than a traditional project, so you have to be careful that everyone is recognized.”* (A6).

DTI2-4 experienced cultural differences between DTIs and FoodCo's core organization, which led to frustration: *“[...] when you say, ‘let's try something,’ someone immediately says, ‘but then we make mistakes.’”* (F10). Further, DTI2-2 acknowledged a lack of adequate DTI communication with the core organization: *“We don't communicate enough [...]. We should explain it to colleagues [...] and then implement it, not the other way round.”* (F10). To solve both issues, DTI2-3 explicitly coupled 'new' and 'old' values and proactively communicated it: *“[...]with these five values, we [...] dock onto the brand. [...]. Two brand values come from FoodCo and three brand values come from the new concept.”* (F2). Further, DTI2-1 was able to break up existing decentral structures and bring the decentralized local countries of FoodCo closer to one another: *“[...] roll out [...] via local multipliers. [Local countries] felt for the first time [...] that they belonged here and were appreciated.”* (F8). Overall, DTI2-2 sees all DTIs as transformers of the organizational culture: *“We are catalysts of change [...]. There was a new collaboration on both sides.”* (F9).

MedCo's DTIs require and involve a new mindset and cultural change to shift previously shared beliefs in the company. *“It's not just about changing some platform, it's about changing the mindset [...] I think many are struggling to find the meaning in this, and say ‘you and your digital fuss, that's not important’.”* (M11). For instance, this comprises positive error culture and open communication. *“There is sometimes the feeling that errors are punished. I see it more as an opportunity to learn and communicate learnings to others.”* (M6). The DTIs see themselves as trailblazers in this cultural change. *“Our team consists of many young colleagues, and we are basically the lighthouse project for these innovative topics. [...] trying to exemplify how we imagine the future.”* (M10). Where employees stubbornly resist change, MedCo does not refrain from taking drastic measures. *“[Some core IT employees] were obstructing a lot, ignoring e-mails and deadlines [...] so, in the end, the CIO/CDO linked topics and projects to their bonus payments to get some kind of lever.”* (M5). However, the overarching cultural change program (DTI3-3) achieved overall high engagement and backing for MedCo's DT. *“[DTI3-3] has many extensive measures; for example, change partners or information and training for managers to discuss all upcoming issues early on.”* (M12).

## Cross-case synthesis of digital transformation initiatives' interplay management

Despite the different organizational contexts and DTI manifestations, our cases faced similar challenges to interplay management; these are rooted in interdependencies that arise either between DTIs or between DTIs and the core organization. This comprises inter-temporal (i.e. logical and technical dependencies that manifest over time owing to interrelated activities and outcomes) and intra-temporal (i.e. resource and structural dependencies that result from simultaneous activities and that manifest immediately) interdependencies (Beer et al., 2015; see also Table 8 in the Appendix). For instance, DTIs and the core organization may have interdependent strategic focus areas, so that the core organization utilizes DTIs' outcomes (inter-temporal interdependency), or DTIs may compete for the same scarce resources (intra-temporal interdependency). Also, we observed interdependencies relating to the IT infrastructure, especially as new digital services may build on existing legacy systems. Such interdependencies bear the risk of redundancies, incongruent goals, and conflicting activities between DTIs or between DTIs and the core organization. Thus, effective interplay management is crucial to achieving a beneficial duality of exploration in DTIs and exploitation in the core organization. Based on the rich empirical observations and insights, we summarize challenges and approaches to the interplay management between DTIs as well as between DTIs and the core organization (see Table 5), so as to find commonalities in the cases' management of multiple concurrent DTIs, which help us to elucidate their contributions to hybrid ambidexterity. For each management aspect, we describe the main challenges our cases faced, i.e. what aggravated the interplay management. Further, we summarize common approaches to interplay management across our cases from the previous sections, i.e. measures that were visible across all three cases to improve the interplays between DTIs (the left-hand column) as well as between DTIs and the core organization (the right-hand column).

The approaches to manage the interplays between DTIs and between DTIs and the core organization differ depending on a DTI's focus. Structurally separated initiatives still form part or emerge out of the company's digital business strategy. However, our cases deliberately detached especially innovation-focused DTIs from the core organization so as to foster innovation without being hindered by the core organization. Further, we found that change-focused DTIs such as cultural change programs act as the contextual glue to hold the structurally separated DTIs and the core organization together. Thus, change-focused DTIs particularly include the core organization and foster a shared, customer-centric mindset across the company so as to prevent drift or fracturing between DTIs and the core organization.

**Table 5** Summary of the observed challenges and approaches to interplay management in our three cases

Dimension	Interplay management between DTIs	Interplay management between DTIs and the core organization
Strategic alignment	<p><i>Observed main challenges to interplay management:</i></p> <ul style="list-style-type: none"> <li>• Aligning the individual strategies and roadmaps of DTIs and the core organization</li> <li>• Ensuring transparency of goals and actions across DTIs and the core organization</li> </ul> <p><i>Observed approaches to interplay management:</i></p> <ul style="list-style-type: none"> <li>• DTIs originate from a digital business strategy that guides all explorative activities</li> <li>• DTIs subsequently define their own strategies and roadmaps with little interdependence</li> <li>• High top-level involvement fosters strategic alignment (e.g. dedicated C-level responsibility for each DTI)</li> <li>• DTIs work on interrelated topics (purposefully) accepting strategic redundancies to foster speed, spillover effects, and internal cooperation</li> </ul>	<ul style="list-style-type: none"> <li>• Customer-centricity becomes the unifying strategic imperative for both DTIs and the core organization</li> <li>• High top-level involvement fosters strategic alignment (e.g. CEO attention on the alignment of explorative and exploitative activities)</li> <li>• Decentral 'transformation agents' (as a formal or an informal role) convey and transfer DTI goals and actions to facilitate the diffusion of their results within the core organization</li> </ul>
Governance	<p><i>Observed main challenges to interplay management:</i></p> <ul style="list-style-type: none"> <li>• Each DTI has its own success measures that reflect the specific foci of its explorative activities</li> <li>• New meeting formats facilitate exchanges between DTIs (e.g. a digital committee)</li> </ul> <p><i>Observed approaches to interplay management:</i></p> <ul style="list-style-type: none"> <li>• Balancing DTIs' structural separation and interfaces with the core organization</li> <li>• Finding appropriate new governance mechanisms (e.g. success measures or meetings)</li> </ul>	<ul style="list-style-type: none"> <li>• DTIs have a 'hall pass' to pursue their explorative focus in the company without current boundaries (e.g. reduced reporting)</li> <li>• If possible, DTIs detach from core organization processes via workarounds or building own solutions as to avoid slowing down their activities</li> <li>• Structured interfaces help DTIs to request services from the core organization (e.g. IT service management or dedicated contact persons for tax, legal, or HR)</li> </ul>
Methods/IT	<p><i>Observed main challenges to interplay management:</i></p> <ul style="list-style-type: none"> <li>• Facilitating the integration of DTIs' products and services into the core organization</li> <li>• Levering infrastructure synergies between DTIs' explorative activities</li> </ul> <p><i>Observed approaches to interplay management:</i></p> <ul style="list-style-type: none"> <li>• Pushing new tools and methods for the company is a uniting, shared purpose between DTIs</li> <li>• While DTIs (incidentally) share methods, they accept lacking synergies (or even redundancies) for tools to remain unbound</li> <li>• DTIs deliberately avoid any IT dependencies with one another to limit the complexity</li> </ul>	<ul style="list-style-type: none"> <li>• Integration within the core organization's infrastructure depends on the DTI' strategy, for instance:                             <ol style="list-style-type: none"> <li>a) full integration</li> <li>b) core IT as service provider</li> <li>c) no integration at all</li> </ol> </li> <li>• DTIs deliberately build on the core IT to infuse legacy transformation</li> <li>• DTIs offer to transfer new tools and methods into the core organization</li> </ul>
People	<p><i>Observed main challenges to interplay management:</i></p> <ul style="list-style-type: none"> <li>• Providing different skill sets than currently available in the core organization</li> <li>• Attracting digital talent instead of traditional industry personnel</li> <li>• Fostering exchanges between DTIs over limited skills in the company</li> </ul> <p><i>Observed approaches to interplay management:</i></p> <ul style="list-style-type: none"> <li>• DTIs empower employees to have high freedom in their competencies and to use them to their full advantage</li> <li>• DTIs provide room and opportunities for informal skill exchanges (e.g. via personal contact/affiliations to the members of another DTI)</li> <li>• Scarce talent and limited skills support multiple DTI use cases</li> </ul>	<ul style="list-style-type: none"> <li>• DTIs emphasize communication and pre-transformation in collaboration with the core organization to ensure backing, support, and acceptance</li> <li>• Integration and collaboration between DTIs and the core organization depends on the DTI's strategy; for instance:                             <ol style="list-style-type: none"> <li>a) creating cross-functional teams involving employees of both DTIs and the core organization, often co-located</li> <li>b) explicitly detach DTIs from the core organization's personnel to work openly-mindedly and free from legacy thoughts</li> </ol> </li> </ul>

Table 5 (continued)

Dimension	Interplay management between DTIs	Interplay management between DTIs and the core organization
Culture	<p><i>Observed main challenges to interplay management:</i></p> <ul style="list-style-type: none"> <li>• Avoiding cultural drift between DTIs and the core organization owing to DTIs' different mindsets</li> <li>• Establishing a shared vision across the explorative and the exploitative activities</li> </ul> <p><i>Observed approaches to interplay management:</i></p> <ul style="list-style-type: none"> <li>• Overarching digital business strategy provides DTIs with a similar cultural mind-set</li> <li>• Levering a set of shared values and beliefs to spur internal cooperation across DTIs without cultural clashes</li> <li>• DTIs differentiate from one another by defining and explicating their individual subcultures</li> </ul>	<ul style="list-style-type: none"> <li>• DTIs actively realize the need and implement measures to transform the culture and mindset of the overall company</li> <li>• In every interaction with the core organization, DTIs tend to, at least incrementally, transform the organizational culture (irrespective of the DTI's de facto focus)</li> <li>• Change incentives of blocking employees in the core organization so as to foster collaboration with the DTIs</li> </ul>

For our cases, we conclude that the management aspects reflect the notion that structurally separated DTIs focus more on driving DT through explorative activities, while overarching change programs seek to integrate these explorative activities and facilitate the core organization by fostering contextual decisions between explorative and exploitative activities. We will now discuss this notion against the backdrop of hybrid ambidexterity.

## Discussion

Regarding *DTIs' contributions and organizational embedding*, the broad range of DTIs we observed in our cases enabled us to better understand two aspects. First, despite their differences in scope and setup, all DTIs contribute to the companies' explorative activities. They either emphasize structural (DTI1-1I1-2, DTI2-1I2-2I2-3, DTI3-1I3-2) or contextual changes (DTI1-3, DTI2-4, DTI3-3) to foster incumbents' ambidexterity (Göbeler et al., 2020). They directly emerged from organization-wide digital business and DT strategies and are therefore a focal element of strategizing and strategy implementation (Gregory et al., 2015). Second, addressing different aspects of companies' strategic goals and objectives, DTIs may have different focus areas (Hafke et al., 2017; Hartl, 2019; Soto Setzke et al., 2020). This comprises both their internal setup as well as their embedding in and contributions to the core organization. While the nascent research has provided some insights into DTIs' internal setups and the combinations of structural and contextual ambidexterity therein (see Section D4igital Transformation and Digital Transformation Initiatives), we have extended this reasoning to DTIs' organizational interplays (Ossenbrink et al., 2019).

Regarding the *interplay between DTIs*, multiple concurrent DTIs co-exist within incumbents to keep them manageable in size and scope. This is to preserve their flexibility, speed, and determination – as direly needed to overcome inertia and induce change (Jöhnk et al., 2020). However, this implies various interdependencies between DTIs which, if not managed accordingly, may even result in DTIs competing against rather than complementing one another (Nadkarni & Prügl, 2021). Across our cases, we posit common challenges that explicate how DTIs' interplays may become subject redundancies or competing concerns. Thus, it is crucial to manage the interplays between DTIs to not only enable their co-existence, but also purposeful and fruitful collaboration toward the company's overarching strategic vision (Matt et al., 2015).

Similarly, regarding the *interplay between DTIs and the core organization*, we posit that multiple concurrent DTIs and the core organization are intertwined elements that create considerable organizational complexity. DTIs' different setups further aggravate this complexity. For instance, some

structurally ambidextrous DTIs (e.g. DTI1-2, DTI2-3, and DTI3-2) seek to largely decouple from the core organization (Keller et al., 2019). Thus, such DTIs may have their own IS infrastructure, governance mechanisms, and distinct culture (Jöhnk et al., 2019). This may result in considerable challenges for the conjunction of explorative and exploitative activities. For instance, strategic and cultural drift may hamper the integration of DTI outcomes into the core organization. In contrast, other structurally ambidextrous DTIs have stronger ties to the core organization, and contextually ambidextrous DTIs (i.e. DTI1-3, DTI2-4, and DTI3-3) even focus on directly engaging the core organization. Instead of mere co-existence, interplay management must overcome the seemingly opposing scopes and setups of DTIs and the core organization. This emphasizes the complementarity of exploration and exploitation activities as mutually enabling elements within a shared strategic vision (Farjoun, 2010).

Regarding the *interplay management between DTIs and between DTIs and the core organization*, the five management aspects (i.e. strategic alignment, governance, methods/IT, people, and culture) may provide a comprehensive conceptual frame to develop prescriptive measures for companies to master the complexity of their DTIs. We posit that, to enable a duality of explorative and exploitative activities, incumbents require sensible interplay management. For one thing, companies must decide on the extents of freedom for their structurally ambidextrous DTIs. They may align them with the core organization to facilitate the integration of explorative outcomes, or they may decouple them to allow for a stronger emphasis on explorative activities (Birkinshaw & Gupta, 2013). Choices on this continuum are contingent on the environmental characteristics and the resulting DTI focus (Ossenbrink et al., 2019). For another thing, contextually ambidextrous DTIs ‘glue’ together explorative and exploitative activities. They bundle the scattered explorative activities across DTIs and provide an overarching theme for companies’ DT. Next, they focus on the core organization to overcome inertia and transfer explorative outcomes, methods and tools, as well as a conducive mindset. So far, we cannot provide generalizable recommendations on how to manage the interplays between DTIs and between DTIs and the core organization. However, the interplay management approaches we observed in our cases demonstrate that multiple concurrent DTIs may indeed foster hybrid ambidexterity in incumbents. The case companies were able to achieve better outcomes from explorative and exploitative activities by combining structurally and contextually ambidextrous DTIs.

As explorative activities are not unique to DTIs alone, we argue that our findings regarding hybrid ambidexterity may be transferable to other organizational entities that also focus on explorative activities. Yet, accounting for digital technologies’ increasing importance and pervasiveness, this distinction between digital and nondigital explorative

activities will likely fade in the future (Baskerville et al., 2020).

In sum, interplay management between DTIs helps incumbent organizations to avoid drift, competition, and redundancies between DTIs. Thus, explorative activities can unfold their individual strategies while still functioning as a whole that implements a company’s DT. Consequently, while structural ambidexterity allows for a clear division between explorative and exploitative activities, contextual ambidexterity facilitates the integration of and flexibility between the two activities. Also, interplay management between DTIs and the core organization lays the foundation for integrating the outcomes of DTIs’ explorative activities in the core organization.

### Theoretical contributions

Our paper’s theoretical contribution is threefold. First, we have contributed to a better understanding of multiple concurrent DTIs as manifestations of DT and the complexity of their interplays. While the DTIs in our cases differed significantly regarding their scope and implementation, the analysis across the five management aspects helped to delineate their common characteristics as explorative activities in incumbents’ DT. Thus, we have added to the nascent literature on different DTI types (Fuchs et al., 2019; Jöhnk et al., 2017; Soto Setzke et al. 2020). Second, we have contributed to the work on hybrid ambidexterity (Ossenbrink et al., 2019). Specifically, our findings have responded to calls for research into the complementarities and combinations of structural and contextual ambidexterity (Ossenbrink et al., 2019; Raisch & Birkinshaw, 2008). Drawing on our examples from ten DTIs, we posit that contextual ambidexterity is the integrative element to align the different structural ambidextrous DTIs with the core organization. Our finding that companies’ DT consists of multiple concurrent DTIs, some seeking to foster structural ambidexterity, aggravates their combination and requires effective approaches across the management aspects on their interplays so as to achieve hybrid ambidexterity (Jöhnk et al. 2019). Third, we contribute to the theorizing on incumbents’ DT process and how multiple concurrent DTIs may foster hybrid ambidexterity in conjunction with the core organization (Vial, 2019). Effective interplay management of the DTIs and the core organization is a prerequisite to enabling new value-creation paths and to achieving a duality of exploration and exploitation (Farjoun, 2010). Thus, we advance the literature, which has often described DT by means of an overarching DT strategy or DT programs, considering DTIs as a more in-depth unit of analysis comprising the explorative activities that induce continuous organizational changes (Baiyere et al., 2020; Matt et al., 2015).

## Practical implications

Regarding practical implications, our findings have yielded important insights for incumbents that engage in DT. First, we have explicated how DTIs are a way to strategize and implement an organization-wide DT.

Specifically, our findings emphasize the need for an overarching framework and communication across multiple concurrent DTIs. For a comprehensive DT, our cases went beyond digital business strategies and levered change-focused DTIs as the contextual glue between DTIs as well as between DTIs and the core organization. Second, we have shown that multiple concurrent DTIs, while being more manageable in size and scope, entail considerable complexity and require effective approaches for managing their interplays. Otherwise, DTIs bear the risk of becoming subject to redundancies or competing concerns. Practitioners may draw on the five management aspects to consider the approaches used by our cases for interplay management between the DTIs and between the DTIs and the core organization (see Table 5). This will provide a baseline for designing individual approaches that consider the specific organizational context. Thus, our findings provide, in each management aspect, empirical evidence of exemplary approaches (e.g. defining individual success measures for DTIs that reflect the specific focus in their explorative activities), but also common challenges (e.g. cultural drift between the DTIs and the core organization owing to the DTIs' different mindsets) that companies must consider when managing multiple concurrent DTIs. Finally, practitioners can transfer these approaches while considering their own company's situation to foster hybrid ambidexterity by combining structural ambidexterity and contextual ambidexterity. It is only through effective DTI interplay management that organizations can ensure a duality of exploration and exploitation across multiple concurrent DTIs instead of allowing them to drift further and further away from the core organization.

## Limitations and further research

Our research is subject to limitations, which stimulate further research. First, although we drew on a multiple-case study, our findings are bound to incumbents as well as the cases' contexts, our interviewees' perspectives, and the selection of observable DTIs. Specifically, all companies are based in Germany and have a production or manufacturing background, and management aspects such as DTI governance or culture may be specific to German or European business culture. Thus, we recommend that researchers collect data in other contexts (e.g. from a North American business culture or from other industries). Second, despite unpacking the complexity of multiple concurrent DTIs' interplays at an organizational level, we neither derived a

taxonomy nor conceptualized DTI archetypes, which may add to our understanding of DTIs' constituting differences. Specifically, we challenge researchers to examine how the approaches to interplay management are contingent on the DTI type and other (company-external) influences. Third, our contribution to hybrid ambidexterity is limited to a focus on DTI interplay management at the organizational level, whereas DTIs may also foster hybrid ambidexterity at the unit, department, team, or individual levels. Further, DTIs may engage within business ecosystems, where collaboration and interplay management is even more complex and critical (Raabe et al. 2021). Fourth, concerning our study's explorative and descriptive nature, we have not yet provided prescriptive actionable guidelines for practitioners.

Despite these limitations, our findings form a foundation for future research that may benefit from a better understanding of DTI interplay management and how it fosters hybrid ambidexterity. Thus, we recommend that researchers explore other companies' situations to reveal their implementation of DTIs and potential contingency factors. Thus, other levels of abstraction such as dynamic ambidexterity (Birkinshaw & Gupta, 2013; Chen 2017) as well as other theoretical lenses on DTI interplay management such as synergies and tensions (Soh et al., 2019) constitute interesting future research topics.

## Conclusion

Multiple concurrent DTIs are a manifestation of strategic responses to drive incumbents' DT. Generally, they induce a combination of structural and contextual changes that seek to foster hybrid ambidexterity. However, DTIs cause additional organizational complexity. Thus, companies require adequate approaches to interplay management between multiple concurrent DTIs as well as between the DTIs and the core organization. Thereby, explorative and exploitative activities in hybrid ambidexterity become a duality by following their individual imperatives but also mutually enabling each other.

Drawing on data from a multiple-case study, we have derived DTI management aspects and have illustrated how these may foster hybrid ambidexterity. We collated our findings on the interplay of DTIs with the organizational and the IS literatures. Thus, we posit that effective DTI interplay management requires contextually ambidextrous DTIs that both balance and integrate the outcomes of structurally ambidextrous DTIs.

We call for future research into DTIs as an enabler of hybrid ambidexterity, their implementation, and their interplays. We have contributed to the growing literature on multiple concurrent DTIs so that researchers and practitioners can build on our results to successfully manage the interplay of DTs in a company's digital transformation.

## Appendix

**Table 6** Overview over the interviews and the interviewees

Case company	Interviewee	Interviewee's role	Experience (years)	Type	Duration
Case 1 AutoCo (automotive)	A1	Manager, Back-End & Apps: R&D	> 10	Personal	31 min
	A2	Product Development: Marketing & IT	5 to 10	Phone	43 min
	A3	Head, Department: Marketing & IT	> 10	Personal	38 min
	A4	Manager, E-commerce: Marketing & IT	> 10	Personal	50 min
	A5	Manager, IT Architecture, IT Security: IT	> 10	Personal	32 min
	A6	Manager, IT Infrastructure: IT	> 10	Personal	44 min
	A7	CEO, Incubator	> 10	Personal	33 min
	A8	Manager, Marketing Aftersales: IT	> 10	Personal	49 min
Case 2 FoodCo (food and beverages)	F1	Management, New Business DTI	> 10	Video call	90 min
	F2	Management, New Business DTI	> 10	Personal	72 min
	F3	Management, New Business DTI	> 10	Video call	69 min
	F4	New Business DTI	< 5	Personal	65 min
	F5	New Business DTI	< 5	Personal	52 min
	F6	Head, DT Strategy	> 10	Video call	45 min
	F7	DT Strategy	5 to 10	Personal	65 min
	F8	DT Strategy	5 to 10	Personal	55 min
	F9	Head, Digital Process DTI	> 10	Personal	56 min
	F10	Head, Cultural Change DTI	> 10	Personal	56 min
Case 3 MedCo (medical aids)	M1	Team Infrastructure	> 10	Personal	64 min
	M2	Team Software	> 10	Personal	42 min
	M3	Digital Projects	5 to 10	Personal	67 min
	M4	Digital Projects	5 to 10	Phone	57 min
	M5	External Consultant	< 5	Phone	68 min
	M6	Digital Projects	< 5	Personal	58 min
	M7	Team Software (Co-Lead)	> 10	Personal	48 min
	M8	Digital Projects	> 10	Personal	Notes
	M9	Head, Team Internet	> 10	Personal	64 min
	M10	Digital Projects	5 to 10	Personal	64 min
	M11	Head, Core IT	> 10	Personal	59 min
	M12	CIO/CDO	> 10	Personal	65 min

**Table 7** Overview over previous conceptualizations of the management aspects in the literature

Reference	Focus	Conceptualization					
Rosemann and Vom Brocke (2015)	Comprehensive overview over capability areas to decompose the complexity of BPM	<i>Strategic alignment</i> Refers to the tight linkage or synchronization with organizational priorities	<i>Governance</i> Refers to roles, responsibilities, and decision-making processes	<i>Methods</i> Refers to tools and techniques that support and enable activities along the process lifecycle	<i>IT</i> Refers to IT-based solutions that facilitate BPM initiatives	<i>People</i> Refers to individuals' and groups' skills and knowledge	<i>Culture</i> Refers to an environment that complements the various BPM initiatives
Fischer et al. (2020)	Applying the framework of Rosemann and Vom Brocke (2015) to describe capabilities for successful DTIs using BPM	<i>Strategic alignment</i> Fischer et al. (2020) refer to Rosemann and Vom Brocke (2015) definitions	<i>Governance</i>	<i>Methods</i>	<i>IT</i>	<i>People</i>	<i>Culture</i>
Stelzl et al. (2020)	Developing an organizational ambidexterity maturity model with actionable practices in five capability areas drawing on Cleven et al. (2014)	<i>Strategy</i> Refers to the vision and mission concerning how an organization operates	<i>Structure</i> Refers to organizational units, activities, and information flows	<i>Routines</i> Refers to the methods, processes, project management activities, governance mechanisms, decision-making processes, and roles and responsibilities	<i>IT</i> Refers to the technical solutions that support and enable the design, implementation, execution, and control of activities	<i>Culture</i> Refers to the collective values, beliefs, and behaviors of individuals and teams, along with leadership-related practices	
Kerpedzhev et al. (2020) <sup>1</sup>	Revising the framework of Rosemann and Vom Brocke (2015) to account for the socio-technical changes induced by digitalization	<i>Strategic alignment</i> Stressing the importance of value orientation, benefits realization, and dependencies in intra- and inter-organizational process networks	<i>Governance</i> Stressing the simultaneity and contextual complexity of standards, cross-organizational collaboration, and new actors (e.g. software agents); adding data governance	<i>Methods/IT</i> Stressing the need for dealing with unexpected changes and for constructive compliance; distinguishing transformational process redesign and agile process improvement; adding methods for data analysis as well as methods and tools for automation	<i>People</i> Adding data, innovation, customer, and digital literacy	<i>Culture</i> Stressing the need for continual change; adding evidence-, customer-, and employee-centricity	

<sup>1</sup>Explanations of the dimensions comprise the main differences compared to the original capability areas from Rosemann and Vom Brocke (2015).

**Table 8** Categorical coding scheme

Category and subcategory		Description	Leading sources
Demographics	Interviewee	Statements about the interviewee (e.g. personal information, career path, current role and responsibilities)	-
	Company	Statements about the company (e.g. size, industry, history, departments, structure)	-
DTI interplay	Action fields	The DTIs' specific focus areas and their goals (i.e. customer, value proposition, operations, data, organization, transformation management)	Gimpel et al., 2018
	Organizational impacts	The dynamic capabilities that the DTIs develop or enhance in the DT process and that contribute to the company's success	Teece, 2007 Yeow et al., 2018
	Tensions	The paradoxical tensions that stem from DT's competing demands and that companies need to resolve in order to successfully continue DT	Svahn et al., 2017 Soh et al., 2019
	Interdependencies	The contingencies and coordination mechanisms between actors, tasks, activities, resources (tangible and intangible), and goals (expectations, intentions, and outcomes) from different DTIs as well as between DTIs and the rest of the organization	Brosius et al., 2016 Beer et al., 2015 Crowston 2003
	Strategic alignment	The strategy definition and implementation as well as its external fit and internal integration to ensure that the DTIs' value propositions contribute to the company's strategic vision	Bharadwaj et al., 2013 Henderson and Venkatraman 1999 Matt et al., 2015
DTI management aspects (following Fischer et al. (2020))	Governance	The structural, procedural, and relational governance mechanisms that ensure and foster a company's DT strategy and objectives	Brown, 1999 De Haes and Van Grembergen 2009 Peterson et al., 2000 Weill & Ross, 2004
	Methods/IT	The methods, tools, infrastructure, architecture, standards, and services to manage workplace hardware, network components, platforms, applications, and data in organizations' DT	Nwankpa and Roumani 2016 Ross et al., 1996 Tilson et al., 2010 Weill & Vitale, 2002
	People	The management actions to ensure the necessary support of all the employees involved as well as new social exchanges across DTIs and opportunities for inter-organizational collaboration offered by digital technologies	Chanas et al., 2019 Gal et al., 2014
	Culture	The patterns of shared values, norms, and practices that distinguish one organization from another and that form its organizational identity as well as its change in DT	Karimi & Walter, 2015 Sebastian et al., 2017 Wessel et al., 2021

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