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Striving for Global Optima in Digital Transformation: A Paradox Theory Approach

Short Paper

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Abstract

Inherent properties of digital technologies offer promising possibilities such as rapid scalability and exponential growth. However, we observe that firms pursuing digital transformation (DT) initiatives face difficulties in realizing these benefits, as they face competing organizational demands (tensions) in the DT context. By considering digital technologies' unique properties and adopting a paradox theory lens, we conducted a qualitative study with 28 interviewees across three companies from which we derive six drivers of tensions and three novel paradoxical tensions within the DT context. We show how these drivers and tensions lead to firms pursuing short-term successes at the cost of strategic benefits that DT offers (what we call "local" instead of "global" optima). We provide scholars and practitioners with a fundamental understanding of how digital technologies define challenges in the DT process so that firms can proactively structure DT initiatives to reach global optima.

Keywords: digital transformation; organizational tensions; paradox theory

Introduction

Digital transformation (DT) has established itself as a prominent phenomenon in information systems (IS) research (Hess et al. 2016; Vial 2019), and firms are enticed by the "lure of the digital": taking advantage of digital technologies' properties such as near-zero marginal costs and potential for exponential growth (McAfee and Brynjolfsson 2014). Hence, many firms have undertaken the process of DT: McKinsey & Company (2018) reports that more than 80% of surveyed firms have claimed to have initiated the DT process in their organizations. However, while the journey might be promising, firms experience significant organizational challenges in their DT efforts due to profound organizational, individual, technological and cultural challenges (Wessel et al. 2021). The nature of challenges brought about by DT is akin to *wicked problems*: complex problems characterized by unclear problem definitions, straddling of organizational and disciplinary boundaries, multi-causality and interconnectivity, and competing agendas (Kane 2019).

Such coordination of DT initiatives has been shown to lead to competing demands, or *organizational tensions*, within firms (Soh et al. 2019; Svahn et al. 2017). An example is exploiting existing products or channels at the expense of exploring new opportunities (Soh et al. 2019). Kodak's demise is an infamous example: the firm created digital photography but focused on generating short-term profits through its

conventional photography: this ignorance of seizing DT came at a price, as Kodak filed for bankruptcy in 2012 (Mui 2012). Thus, within the DT context, stakeholders fail to coordinate DT activities that are necessary to contribute to the *overarching strategic DT goals* of a firm (Hess et al. 2016). In this study, we introduce and use the analogy of *local* and *global optima* throughout: firms' prioritization of "easy" benefits in local departments might lead them to a *local optimum*, but this comes at the expense of reaching a *strategic global optimum* at the firm level. Such tensions are *paradoxical* (Soh et al. 2019; Svahn et al. 2017) in the sense that they seem logical considered in isolation; however, when juxtaposed, they are irrational, inconsistent, and even absurd (Smith and Lewis 2011).

Scholars have looked predominantly to *paradox theory* to understand this paradoxical phenomenon of tensions in the DT context (Gregory et al. 2015; Soh et al. 2019). At its core, paradox theory presumes that tensions are integral to complex systems and that addressing contradictory yet interwoven demands simultaneously can enable sustainability and potential success in the future (Lewis 2000). However, we find that existing studies utilizing paradox theory in the IT or DT domains focus on categorizing tensions and identifying strategies/responses to such tensions (Gregory et al. 2015; Soh et al. 2019; Svahn et al. 2017), but do not explain *what drives or triggers such tensions in the DT context*. As DT has shown to distinguish itself from traditional IT-enabled organizational transformation (Wessel et al. 2021), and as digital technologies have unique properties that distinguish them from physical ones (McAfee and Brynjolfsson 2014; Yoo et al. 2010), we aim to understand in this study how the unique properties of *digital* technologies may impact DT efforts. We thus pose the following research question: *how do the properties of digital technologies impact organizational tensions within the DT context?*

As DT can be characterized as a wicked problem, we approached the research question through a qualitative study by interviewing 28 members of senior management across three companies and industries, that all undertook dedicated DT initiatives at the time of the interview. Through multiple rounds of inductive coding (Gioia et al. 2013) and employing a paradox theory lens, we derived *six drivers of tensions* and *three paradoxical tensions* in the DT context, which are all traceable to the unique properties of digital technologies. We thus show that the inherent properties of digital technologies *enable drivers* of tensions, that these drivers *manifest* in the form of paradoxical tensions, and ultimately, that these paradoxical tensions lead to companies striving or settling for *local* instead of *global optima* in their DT efforts. As part of an ongoing research effort, we provide initial insights into understanding the fundamentals of tension drivers in the DT context and how firms can proactively structure their DT initiatives to reach global optima.

Conceptual Foundation

Unique Properties of Digital Technologies

To derive drivers of paradoxical tensions in the DT context, we consider that digital technologies have key properties that distinguish them from physical ones. Yoo et al. (2010) highlight three such properties: firstly, they are *reprogrammable*, meaning that the semiotic functional logic of a device is separated from its embodiment, enabling the same device to perform a wide variety of tasks. Secondly, their *data is homogenized*, meaning that data can originate from heterogenous sources but can be easily combined with other digital data, dissolving product and industry boundaries. Thirdly, they are *self-referential*, meaning that digital innovation *requires* digital technology, and the diffusion of digital innovation creates positive network externalities that further accelerate digital innovation. McAfee and Brynjolfsson (2014) note similar characteristics, and also emphasize *exponential growth* and *easy reproducibility* of digital goods.

Organizational Tensions and Paradox Theory in the IT and DT Contexts

For the remainder of our conceptual foundation, we consider two concepts with a key boundary condition: *organizational tensions* and *paradox theory*, specifically within the *IT and DT contexts*. Organizational tensions refer to contradictory, competitive demands arising as external environments become more global, fast-paced, and competitive, and as internal organizational processes become more complex (Lewis 2000). Paradox theory is an established approach focused on understanding how such tensions can *simultaneously* be addressed (Smith and Lewis 2011). The paradox perspective rests on the assumption that while choosing among tensions might aid short-term performance, long-term sustainability requires continuous efforts to meet multiple, divergent demands (Lewis 2000). For these concepts, we thus conducted a search for publications containing the strings "paradox*" AND "tension*" (title, abstract or keywords) in the AIS

“Basket of Eight” and Financial Times 50 (FT50) journals, followed by forward and backward searches. While most FT50 publications do not deal with IT or DT directly, this search provided key insights into paradox theory itself. Due to space limitations, we do not provide a detailed literature review, but provide a synthesis of key papers and their theoretical concepts, namely tension (i) drivers, (ii) theoretical categorization, (iii) types, and (iv) responses. Figure 1 shows this synthesis.

Tension types (iii) represent the “observable phenomena” faced by firms. While the investigation of tension types has been well-established in literature well before the current digital era (Adler et al. 1999), its relevance has been shown in modern IT and DT contexts. In the IT context, Gregory et al. (2015) and Toutaoui et al. (2022) identify paradoxical IT tensions such as integration-replacement and standardization-differentiation tensions. In the DT context, Soh et al. (2019), Svahn et al. (2017) and Wimelius et al. (2021) derive tensions, and we see that the identified tensions are *paradoxical*: Soh et al. (2019), for example, identify a B2B-B2C tension, in which newly-developed digital capabilities may attract B2C customers but simultaneously devour profitable B2B revenue streams.

To understand on a theoretical level why such tensions arise, the seminal work by Smith and Lewis (2011) on paradox theory provides four *theoretical categories* (ii) of tensions: *performing* (competing goals), *learning* (“unlearning” the past to create the future), *belonging* (identity-related issues such as different values, roles, and memberships), and *organizing* (organizational structuring issues such as collaboration, direction, and empowerment). In the B2B-B2C example, it is a tension of *performance*: multiple and competing goals arise as stakeholders have different views on where optimal performance may be achieved.

Through another level of abstraction – and a core level of analysis in this study – *drivers/triggers* (i) can explain the origins of theoretical paradoxical tension categories and ultimately the tensions themselves. Again, Smith and Lewis (2011) provide a categorization of tension drivers: *plurality*, *change*, and *scarcity*. *Plurality* denotes a multiplicity of views in contexts of diffuse power, expansion of uncertainty, and surfacing of competing goals and inconsistent processes (Denis et al. 2007). *Change* refers to actors’ grappling with new opportunities and their sensemaking regarding conflicting short- and long-term needs (Lüscher and Lewis 2008). Lastly, *scarcity* involves resource limitations that exacerbate tensions between opposing and interdependent alternatives as leaders must choose how to allocate temporal, financial, or human resources (Smith and Tushman 2005). In the B2B-B2C example, plurality can refer to the different options which can be pursued (e.g., B2B, B2C, both), change to new opportunities themselves, and scarcity to the limited resources which can be allocated to pursue a particular option/direction.

Lastly, *managerial responses* (iv) – which aim to give guidance on resolving tensions – also form a key part of paradox theory literature. However, we do not review responses in detail as our study primarily focuses on the drivers of tensions in the DT context. Nevertheless, as our study forms part of ongoing research, we aim to explore managerial responses in the future as well.

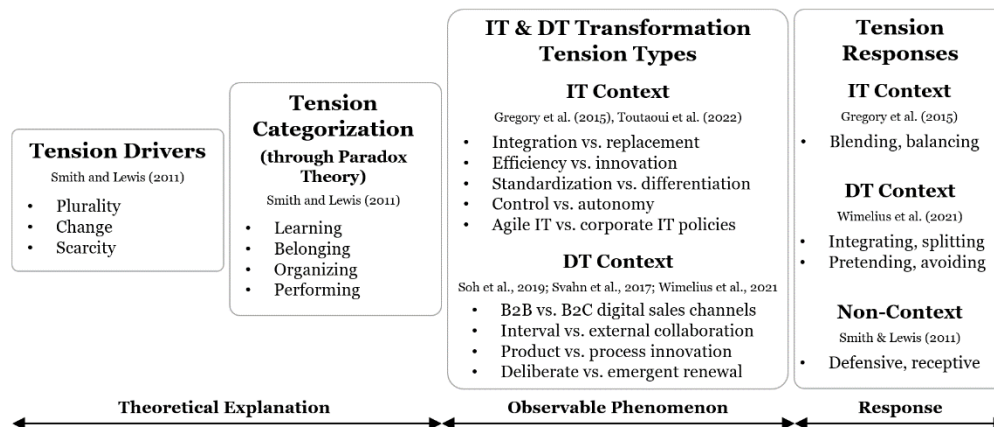


Figure 1: Synthesis of Selected Literature on Paradoxical Tensions in the IT & DT Context

Research Design

As our study's goal is to better understand the phenomenon of tensions in a DT context – a wicked problem – a qualitative research approach enabled us to collect rich data on the phenomenon of interest (Schultz

and Avital 2011). Through an interpretivist lens (Goldkuhl 2012), we collected data through semi-structured interviews, and subsequently followed a primarily inductive approach for coding and interpreting the data (Gioia et al. 2013). For our study, we followed the theoretical sampling considerations of Urquhart et al. (2010) and subsequently identified three key sampling criteria that our interview partners had to meet. Firstly, as extant literature on organizational tensions focused on larger firms (Svahn et al. 2017), we selected similar firms for our study. Selecting this criterion not only enhances the comparability of our research results with extant literature, but such larger firms may also particularly experience tensions due to their many actors and distributed nature. Secondly, in line with previous research on the topic (Soh et al. 2019; Svahn et al. 2017), we selected our interview partners to be on senior management or corporate level. We acknowledge that tensions can exist within/between different levels of analyses (Smith and Lewis 2011), but as this is the start of our research efforts on the topic, we followed guidelines from extant literature, and our high level of analysis provided a thorough “bird’s-eye view” of tensions between functional areas. Lastly, we required firms to have undertaken a dedicated DT initiative at the time of data collection.

Furthermore, we did not limit our cases to a certain DT maturity level or specific technologies. C1 stood at the beginning of their DT journey, and as their DT focus was exclusively internal (i.e., no external customer), they were interested in generating insights from “unutilized” data with technologies such as artificial intelligence and machine learning (AI/ML) to optimize production. C2 and C3’s DT efforts included customer-facing offerings as well, and both firms were already underway in their journey. C2’s aim was broadly to improve data management and was thus interested in different enabling technologies for this goal, such as databases and cloud computing. C3 focused on a specific technology, namely exploring and employing augmented and virtual reality (AR/VR). In total, we conducted a total of 28 interviews primarily with senior stakeholders involved in DT initiatives. The interview details are summarized in Table 1.

Industry	Firm Size	No. of Interviews	Code	Average Interview Length	DT Maturity Level
Automotive	Multinational	11	C1	1 h	Beginning
Pharmaceutical	Mid-size	9	C2	36 min	Middle
Energy	Multinational	8	C3	1 h 10 min	Mid-advanced

Table 1. Company Interview Partners

Our attention throughout the data analysis process was on identifying tensions occurring during the DT process – stated either explicitly by the interview partners or noted implicitly. We started with a purely inductive approach (Gioia et al. 2013) by open coding the raw interview data and creating 647 codes. Thereafter, through axial coding, we identified 38 subcategories describing abstracted manifestation of tensions in DT initiatives. Finally, as a key aim was to identify drivers of tensions within the DT context, we introduced a deductive approach by applying a paradox theory lens (Smith and Lewis 2011) and synthesized the subcategories into 10 categories that describe drivers of paradoxical tensions in the digital context (6), paradoxical tensions in the digital context themselves (3), and the problem definition of DT (1).

Preliminary Findings

Our insights are clustered into two overarching groups: *tension drivers* and the *paradoxical tensions* in the DT context, respectively. The traditional tension drivers as per Smith and Lewis (2011), as well as the additional tension drivers in the DT context identified in this study, are both enabled by the properties of digital technologies. These tension drivers exacerbate paradoxical tensions that, in turn, influence if firms strive for local instead of global optima. Moreover, our results show that there is uncertainty and variance in what is understood under the term “digital transformation”, as well as how a “problem should be digitally approached.” Figure 2 shows an overview and synthesis of the preliminary findings of the study.

Tension Drivers in the Digital Context

The *plurality*, *scarcity*, and *change* drivers leading to paradoxical tensions as identified by Smith and Lewis (2011) are also relevant in the digital context, and our findings show that the unique properties of digital technologies augment these drivers. In addition, we revealed *interpretative flexibility*, *intangibility*, and *data ownership & privacy* as novel tension drivers in the DT context.

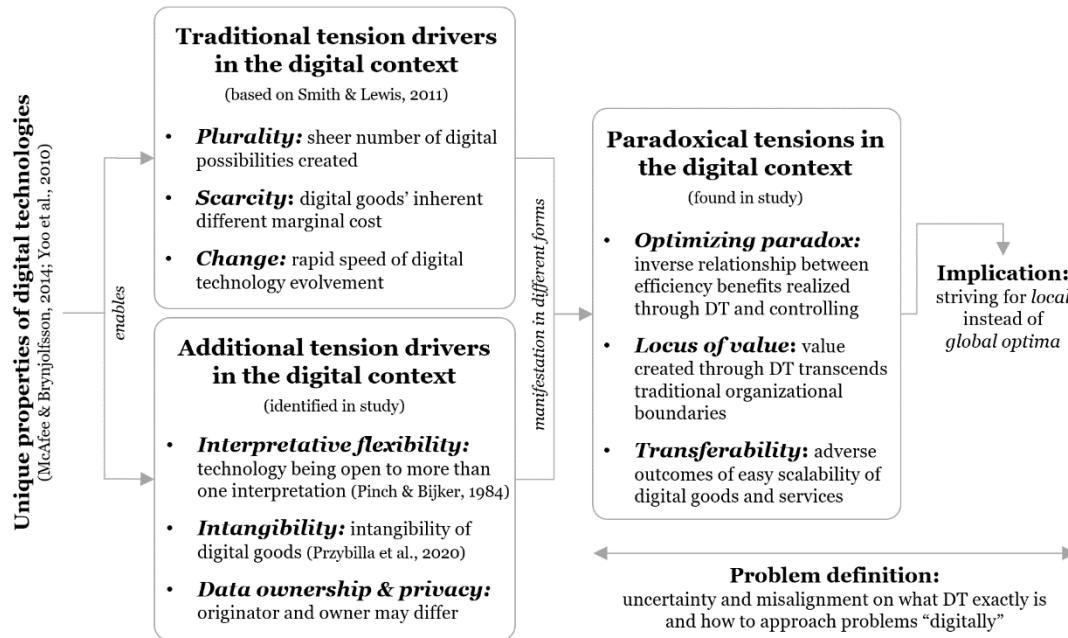


Figure 2. Paradoxical tensions and its drivers in the digital context

Traditional Tension Drivers

Firstly, the sheer **number of possibilities (plurality)** created in digital form can be a double-edged sword. In a positive sense, C2 noted that the pharmaceutical industry requires significant “explaining”: for pharmaceutical firms, DT can be used to explore intricate relationships between substances; for patients, to provide understandable information. C3, however, highlighted the downside of plurality: with their AR/VR technology, they identified an overwhelming 50-60 potential use cases, not knowing which ones to enumerate or pursue. Plurality can thus manifest positively in *technical* (establishing connections between components not possible for humans) and *social* (reducing complexity for understanding subject matter) forms, or negatively in *social/financial* form (selecting the best options to pursue).

Scarcity, or rather the lack thereof, is another key driver of paradoxical tensions. As the marginal cost of digital goods is near zero, traditional thinking about the distribution of goods and services is upended (McAfee and Brynjolfsson 2014). While scarcity was not mentioned explicitly by our interview partners, it is a clear driver when one considers the paradoxical tensions. In a positive sense, lack of scarcity means that digital goods can disseminate rapidly throughout the firm and be put to use by different departments despite being only “developed once” (e.g., C3’s AR/VR technology). However, financial managers still treat digital goods as physical ones (see *locus of value*) with a “my department, my asset” mindset. In a negative sense, non-scarcity can also adversely affect the perceived value of goods, such as in the case of C2 where doctors (the firm’s customers) don’t open emails any more as their perceived value decreases as the quantity of emails increases (see *transferability*). Scarcity is thus mainly observable in *financial/economic* form.

The **change** driver is a key consideration for DT: hardware, programming languages, frameworks, etc., are constantly updated, endangering future relevance and interoperability. C3 proactively addressed this challenge by basing its AR/VR technology on game engines such as Unity and Unreal which are likely to keep enjoying widespread industry support in the future. C2 noted that for smaller companies like themselves, there is a fear to commit to DT initiatives in environments with long decision cycles (e.g., the pharmaceutical industry). This then results in inertia: companies recruit external partners to “talk about solutions”; however, competitors implement solutions more quickly, and by the time an internal decision is reached, the solution is already outdated. Lastly, C1 and C2 also noted that there is often the expectation that DT should provide immediate benefits, without considering that “digital products are never in a steady state” (C2). Change can thus drive tensions observable in *technical* (technology interoperability) and *financial* (fear of commitment and expectation of immediate benefits) forms.

Additional Digital Tension Drivers

We inductively identified three novel drivers of paradoxical tensions in the DT context and afterwards identified extant literature providing a theoretical foundation for these drivers. Firstly, in our interviews, we observed that digital offerings' "fluid form" impact paradoxical tensions. In the case of C3, it was noted that its AR/VR technology *itself* – while being scalable and offering dozens of potential use cases to the company – cannot be sold to customers as is, as customers perceive the AR/VR offerings only to be useful if "new types of information, insider solutions and value-creating insights can be transferred with the help of AR/VR." Thus, regardless of whether the underlying technology might be powerful, if users *cannot comprehend the value* created by the technology, the perceived value is adversely affected. This tension driver we thus identify as **interpretative flexibility** as per Engert et al. (2021): how the specificity of a technological solution (i.e., the degree to which it is customized) affects the value for the creator and the value potential for the user. While interpretative flexibility is not new (Sahay and Robey 1996), we find that digital offerings are inherently susceptible to it due to their "fluid form." A paradox of *focusing on underlying infrastructure which can potentially scale versus specific applicability* is thus created and manifests primarily in a *social* sense as it relates to perception.

Secondly, interviewees noted that DT transformation is strongly associated with the presentation or visualization of digital goods and services. In an extreme case, C2 noted that DT has been associated with "how the homepage looks like," meaning that DT is perceived purely based on its presentation. As opposed to hardware, software (and other digital offerings) can easily transcend organizational boundaries (see *locus of value*), but its lack of tangibility affects perceptions of its definition and value. Software is the result of "pure knowledge work" and is thus intangible (Faraj and Sproull 2000; Przybilla et al. 2020). Thus, in line with extant literature, we establish **intangibility** as a driver in the digital context. As this is strongly related to perception, we observed intangibility primarily in a *social* sense.

Finally, we also saw **data ownership and privacy** raising tensions in the DT context. C2 noted that in the pharmaceutical industry, data ownership always remains a key challenge: the actor *generating* the data (e.g., the patient) might not necessarily *own* the data (again, see *locus of value*). In terms of privacy and sharing, despite data being able to be transferred at lightning speed – which makes technologies like cloud computing feasible and viable – interview partners noted challenges to use such technologies. For example, C3 noted that its high-profile clients with large sets of sensitive data strongly objected to using cloud solutions for data storage and processing as they did not wish their data to leave the premises. They also highlighted the differences in terms of data sharing expectations: while customers expect strict privacy of their data, they expect "increasingly more" data and insights from the provider (e.g., performance curves, technical drawings, parts lists, etc.). While data ownership and privacy are not unique to digital technologies (e.g., company trade secrets), we observed that the unique properties of digital technologies undoubtedly accelerate challenges firms face in a *technical* and *regulatory* (data ownership) sense, as well as in a *social* sense (privacy and sharing).

Paradoxical Tensions in the Digital Transformation Context

Fuelled by the six drivers, we identify three types of paradoxical tensions in the DT context, summarized in Table 2. For each example discussed hereafter, selected exacerbating drivers are noted in brackets.

Paradoxical Tension	Poles of Paradoxical Tension	Observed Sense
Optimizing paradox	Efficiency benefits of DT vs. controlling impact	Financial, social
Locus of Value	Scaling benefits of DT vs. DT initiative ownership	Financial, social
Transferability	Scaling benefits of DT vs. perceived worth of DT	Regulatory, social

Table 2: Summary of Identified Tensions

Firstly, the **optimizing paradox** shows that striving for efficiency in DT and controlling such efforts are paradoxical. In a *financial* sense, C1 and C3 both highlighted challenges here. C1, with a focus on production where efficiency is key, noted that the "more successfully one digitizes, the less one's budget becomes" (*scarcity*). In other words, the more one optimizes, the more one is controlled/supervised. C2 showed the same paradox, albeit in a *social* sense: sales representatives in the field can be better supervised through digital means (e.g., data validation techniques resulting in accurate data entry), but this can decrease morale as they feel they are constantly monitored (*interpretative flexibility; data ownership and privacy*).

Secondly, value created through DT can easily transcend traditional organizational boundaries, and we coin the paradoxical consequences of this transcendence the **locus of value**. In the *financial sense*, as digital goods, services and data may be generated in one department, but the value derived from its utilization may be used in another, determining the responsible funder for such DT initiatives can be challenging as in distributed firms like C1 and C3 (*plurality, scarcity*). In addition to *who* funds DT, *how* it is funded is also a concern. C1 and C2 noted that the financial manager always wants to see a concrete business case for DT initiatives, but noted that DT “doesn’t work like that” as one cannot calculate the benefits in the same manner as traditional “physical” projects (*interpretative flexibility, tangibility*). As C1, mentioned, “how does one calculate the business case for 5G?” The target group of the DT initiative also played a role in defining the business case: C1, whose DT focus was not on external customers, mentioned more challenges in envisioning longer-term strategic benefits as money cannot be made internally, only saved. Furthermore, in the *social sense*, we see a misaligned “traditional” sense of ownership (*scarcity*): C2 noted that their AR/VR technology was obtained through a start-up acquisition, and even though the technology can easily transfer across the organization, engineers showed resistance as the technology “was not developed here.”

Lastly, we identify **transferability**: despite the benefits that digital technologies’ easy reproducibility enables, easy reproducibility can also lead to adverse effects. C2 noted that with differing regulation and data privacy laws across countries, a single mistake (on a website, for example) can easily transcend geographical borders and instantly become a significant problem (*plurality, data ownership & privacy*). C2 also mentioned that easy reproducibility can *decrease the perceived value* of a digital good or service: for example, if marketing emails sent to doctors are not personalized enough or are sent too frequently, this may deter the doctor from opening emails in future (*interpretative flexibility, scarcity*).

Problem Definition and Striving for Global Optima

In all three firms, we found that interviewees had an unclear understanding and framing of DT, as well as what it entails to solve problems “digitally.” Interviewees noted that “digital native” firms such as Google or Amazon have approached their challenges “digitally” from the outset and thus have more experience in this sense. This is, for example, in contrast to C2’s case (pharmaceutical industry), where actors such as doctors and pharmacists have long followed analog pen-and-paper approaches. Another indication showing lacking understanding in driving DT is that companies tend to start with a technical solution and then try to find the problem. C3 showed this phenomenon in its purest form, as they had developed AR/VR technology, but were undecided on which use cases made sense from desirability, viability, and feasibility standpoints. This approach is understandable considering the *interpretative flexibility* and *tangibility* drivers.

We find that paradoxical tensions in the DT context ultimately result in firms striving/settling for *local optima* and not *global optima*. For example, the *optimizing paradox* shows how management can be short-sighted by “punishing” employees or departments who successfully implement DT initiatives and save costs. This may inhibit their long-term motivation to drive DT projects which have the potential to result in greater benefits to the firm in future. The same holds true for increased monitoring capabilities of employees through digital technologies – while this can increase control, it can harm long-term motivation. The *locus of value* tension shows similar implications: if the old-fashioned approach is taken where business cases are based on traditional valuation methods, or value generation is deemed to be limited to a specific department, firms fail to create future options to draw the benefits of digital technologies’ organizational boundary-transcending opportunities. Lastly, *transferability* also highlights this danger of local optima. The easy reproducibility of digital offerings may lead to quantity over quality: while it may be easy to create digital goods at no or little cost, the risk arises that the perceived value of those goods decreases.

Contribution, Conclusion, and Future Research

Our study contributes to literature in four key areas, summarized in Table 3. The first two contributions pertain to paradoxical tension *drivers*, which to our knowledge, have not yet been investigated in the DT context. Our first contribution entails that traditional drivers of paradoxical tensions are very applicable to extend within the DT context, while our second contribution highlights newly identified drivers in the DT context. The remaining contributions relate to *tensions* themselves: we highlight how tensions in the DT context are more intertwined with the technology as opposed to a pure IT transformation context, and also show how extant literature on paradoxical tensions in the DT context either treats such tensions similarly to IT tensions, or do not generalize such tensions to the extent that we do.

	Extant Literature	Contribution
<i>Traditional drivers of paradoxical tensions</i>	Plurality, scarcity, and change as drivers can explain <i>any</i> organizational paradoxical tension (Smith and Lewis 2011)	Plurality, scarcity, and change are especially relevant in the <i>DT context</i> as digital technologies' unique properties <i>exacerbate</i> these drivers
<i>Additional tension drivers in the DT context</i>	Drivers in IT transformation have been identified (Gregory et al. 2015), but are not digital-specific: e.g., grouped broadly as <i>environmental turbulence (external)</i> and <i>business dynamics (internal)</i>	Identification of interpretative flexibility, intangibility, and data ownership and privacy as drivers provides a deeper understanding of why <i>digital technologies</i> can lead to tensions
<i>IT vs. DT Tensions</i>	The extent to which IT transformation tensions (e.g, program control vs. project autonomy, standardization vs. differentiation; Gregory et al. 2015) can be <i>ascribed to the technology itself</i> is limited	Tensions identified in this study <i>strongly intertwine</i> with the <i>properties of digital technologies</i> (e.g., transferability exacerbated by easy reproducibility of digital goods)
<i>Paradoxical Tension in Extant DT Literature</i>	Extant literature in the DT context either shows similar limitations as IT tensions described above (e.g., B2B-B2C tensions; Soh, 2019), or does not generalize observed tensions (e.g., information sharing across the organization; Wimelius et al., 2020)	Tensions identified are shown to be both <i>strongly intertwined</i> with the <i>properties of digital technologies</i> , as well as generalized for the DT context (e.g. <i>locus of value</i> generalizes tensions observed from information sharing)

Table 3: Comparison of Derived Drivers & Tensions with Extant Literature

In our study, two key notions determined our focus and should be considered to place our findings in perspective. Firstly, we echoed the call of Wessel et al. (2021) that DT is more comprehensive and should be distinguished from traditional IT transformation, and thus specifically placed our focus on *digital technologies*. Secondly, we were specifically interested in *exploring the theoretical underpinnings* of tensions in the DT context, rather than the responses to such tensions. We fully acknowledge that managerial responses to tensions in the DT context are important for both practitioners and scholars, and we plan to incorporate this in future research as well. However, we believe that addressing the research gap of *why* tensions in the DT occur in the first place will inform the rigorous investigation of such responses.

Moreover, we show that companies strive for local instead of global optima in the DT context, which aligns very well with the basic notion of the paradox perspective: while choosing among tensions might aid short-term performance, long-term sustainability requires continuous efforts to meet multiple, divergent demands (Lewis 2000). Thus, through paradox theory we emphasize that to reach global optima, firms must not choose one side of the paradox, but rather find ways to meet these multiple demands. As noted, we will investigate such responses in future research.

Furthermore, while we have already conducted many interviews, we acknowledge that our data derives from only three companies. Hence, we will collect more data to further develop and validate the drivers and tensions in a DT context. In our research so far, we have seen certain factors surface which affect perceptions on tensions (e.g., industry type, internal company vs. external customer focus, size of the firm, etc.) which we believe are promising to investigate. We believe that investigating the latency and saliency of paradoxical tensions in the DT context may yield interesting results, as well as investigating different levels of analyses. Lastly, we plan to conduct empirical cross-case analyses to further explore and validate our findings on paradoxical tensions in the DT context.

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