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Embarking on the Digital Transformation Journey Toward a Data-Driven Organization: Empirical Insights Into Transformation Starting Points

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EMBARKING ON THE DIGITAL TRANSFORMATION JOURNEY TOWARD A DATA-DRIVEN ORGANIZATION: EMPIRICAL INSIGHTS INTO TRANSFORMATION STARTING POINTS

Research Paper

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Abstract

Organizations are increasingly initiating and expanding their digital transformation initiatives to become more data-driven. Given that such digital transformations are highly complex and idiosyncratic endeavors, organizations striving to become a data-driven organization (DDO) have many options on where to start. To better understand such transformation starting points, we analyzed 13 companies of various industries and sizes currently undertaking DDO transformations. On this empirical basis, we find that top managers embark on transformation journeys by either focusing on the transformation foundations (asset-driven, workforce-driven), or on the outcome (exploitative use case-driven, explorative use case-driven), with each starting point showing different DDO dimensions being addressed first. Our data suggest that the selection of a specific starting point is mainly based on managers' understandings of a DDO and the motivation to become such an organization. Finally, our work points to advantages and disadvantages of the respective starting points. Contributions and practical implications are discussed.

Keywords: Data-driven Organization (DDO), Digital transformation, Transformation starting points, Top managers.

1 Introduction

In today's data-centric era, organizations are increasingly striving to become data-driven organizations (DDOs), thereby reevaluating and transforming their operating models, business models and offerings (Davenport and Bean, 2018; Hartmann et al., 2016; Mueller, 2022). Here, practitioner-oriented studies suggest that such transformations, if successful, increase the EBIT on average by 21%, improve corporate capabilities by 82% (on a one to ten scale), and lead to 120% more targets met on time (BCG, 2020, 2021). This is due to the fact that DDOs show more innovative business models and new, data-enabled products, improved processes (Sivarajah et al., 2017), and better decision-making overall (McAfee and Brynjolfsson, 2012; Svensson et al., 2019), leading to significant competitive advantages (Berndtsson et al., 2018; Constantiou and Kallinikos, 2015). Relatedly, recent reports find that nine out of ten organizations are engaged in some form of digital transformation (Gartner, 2020), with increasing investments in data and AI (NewVantage Partners, 2022). This trend has been reinforced by the COVID-19 pandemic, as executives are reporting that the pandemic has accelerated their transformation plans or initiatives on average by three to four years (McKinsey, 2020).

Generally, the digital transformation of an organization is a highly complex and encompassing endeavor, in which "psychological, socio-cognitive, socio-technical, economic and political considerations intertwine" (Besson and Rowe, 2012, p. 105). Due to the scope and depth of this change, it is top

managers who play a decisive role in shaping the transformation journey by understanding the implications of digitalization to their organization, setting the context for the required transformation and leading the actual change (Wrede et al., 2020; cf. Fernandez-Vidal et al., 2022; Singh and Hess, 2020). In practice however, the multitude of required considerations tends to overwhelm both organizations as well as their top managers (Singh and Hess, 2020), leading to almost seven out of eight digital transformation initiatives failing (Wade and Shan, 2020) and only 27% of all organizations reporting that they have reached their goal of being data-driven (Bean, 2022).

To deal with this challenge, organizations often embark on their transformations by focusing on a particular starting point at the beginning, such as the implementation of technological innovations (cf. Berndtsson et al., 2018; Mueller, 2022). The importance of carefully selected transformation starting points is, for example, highlighted by Siebel (2019), who argues that the further path and destination of digital transformations are almost impossible to define from the outset due to the volatility in the digital age. Nonetheless, existing literature in academia is primarily focusing on the overall process and nature of such transformations (cf. Li, 2020; Morakanyane et al., 2017; Teichert, 2019; Wessel et al., 2021), leaving a gap in addressing the practical challenge of where to start a digital transformation into a DDO. (Berndtsson et al., 2018).

To address both, the practical challenge for top managers, as well as the existing gap in literature, our study sets forth to answer the following research questions: (RQ1) *What are different starting points for the transformation journey toward a DDO* and (RQ2) *why do top managers deliberately choose one of these starting points?* To address these two questions, we draw on the emerging DDO literature and studied 13 organizations of various sizes and industries that are currently undertaking transformations toward becoming a DDO. Thereby, we contribute to DDO and organizational transformation literature by surfacing patterns regarding starting points in the field of highly complex and idiosyncratic transformation processes and by shedding light on the underlying considerations of top managers. Additionally, our study points to positive and negative implications of choosing particular starting points on the further course of the transformation, that emerged in our cases. Regarding practical implications, our study helps practitioners understand the options they have and reflect on their priorities when embarking on a digital transformation journey toward a DDO themselves. Finally, the indicated implications of certain starting points also help practitioners weigh the respective advantages and drawbacks and anticipate challenges down the road.

The paper at hand is structured as follows: In the next section we first review the relevant conceptual foundations of DDOs as well as organizational transformations. Subsequently, we introduce the 13 organizations we studied and describe how we analyzed them. We then present our findings in two steps. Firstly, we present the transformation starting points that emerged from our data. Secondly, we describe the underlying rationales that lead transformation leaders to choose certain starting points. Relatedly, we also point out advantages and challenges in the further course of the transformations in our cases that resulted from choosing specific starting points. We conclude with discussing our findings and their implications as well as limitations and associated directions for future research.

2 Conceptual Foundations

To understand organization's transformation journeys toward becoming a DDO, both the aspired target state as well as the process to get there are of particular relevance. Consequently, in the following section we will first introduce the concept of the DDO, thereby building on a recently introduced conceptual DDO framework (Fischer et al., 2022) and subsequently elaborate on the notion of digital transformation on the organizational level.

2.1 Data-driven Organization

With organizations increasingly undertaking digital transformations to become more data-driven (Davenport and Bean, 2018; Hartmann et al., 2016), the notion of the "data-driven organization" has gained growing interest in the academic and practitioner literature (Fischer et al., 2022). In extant

literature, there are currently widely different understandings of the DDO phenomenon, varying in terms of richness and elaboration. On one end of this spectrum, there are rather simplistic, one-dimensional understandings. Schüritz (2017) and Berndtsson et al. (2018) rely on the single characteristic of having data-driven decision making when describing their DDO understanding, stating "a data driven company is […] an organization that heavily relies on data to make decisions and take actions" (Schüritz, 2017, p. 394). Others such as Lee (2017) point to big data capabilities as the single key characteristic of a DDO. On the other end of this spectrum, authors like Kearny et al. (2016), Anderson (2015) or Thusoo and Sarma (2017) refer to multiple characteristics including data culture, technology, data assets, capabilities and value creation mechanisms to describe their DDO understanding. For example, Thusoo and Sarma (2017) demand that a DDO should demonstrate "a culture in which everyone buys into the idea of using data to make business decisions, an organizational structure that supports a data-driven culture, [and] technology that supports a data-driven culture and makes data self-service" (p. 43). In a similar vein, Anderson (2015) states that being data-driven as an organization is "about building tools, abilities, and, most crucially, a culture that acts on data." (p. 1). Kearny et al. argues that "data-driven enterprises enjoy advantages over their competitors because of the insights provided by data management and analytics" (p. 4606).

Drawing on a literature review, Fischer et al. (2022) develop an updated and extended conceptual DDO framework that builds on Choo's (1996) concept of the knowing organization and integrates existing DDO understandings (see Table 1). According to their framework, a DDO demonstrates five key elements or dimensions: (1) it systematically acquires and purposefully interprets and integrates data; (2) it has access to data capabilities including tools, talent, and infrastructure to gain insights from data; (3) it has a data-driven culture enabling and inspiring organizational members on all levels to embrace data as the backbone of their actions and decisions; and (4) its organizational members consequently make rational decisions backed by data-driven insights with the intent to (5) create data-driven value.

Based on this conceptual DDO framework, the notion of the DDO can also be distinguished from adjacent concepts such as that of the data-driven business model (DDBM; cf. Wiener et al., 2020). Both concepts share data-driven value creation as a central dimension and one could argue that some DDBMs require an underlying DDO with all its dimensions (e.g., when offering data-enabled services). However, Wiener et al. (2020) also refer to the sale or facilitation of data as DDBM. For those two types of DDBM, we argue that an underlying DDO with e.g., a data-driven culture is not necessarily required.

DDO dimension	Short description
Data sourcing & sensemaking	Provision of relevant, contextualized, and harmonized information to the organization
Data capabilities	Abilities of an organization to use its infrastructure, tools, and talent to purposefully manage data
Data-driven culture	Organization-wide belief and value system that fosters the understanding, management, and use of data
Data-driven decision making	The act of making rational decisions based on data instead of intuition
Data-driven value creation	An organization's actions with the ambition to create value through data (e.g., service improvements or new products)

Table 1. Dimensions of a DDO (Fischer et al., 2022)

As this conceptual DDO framework describes the dimensions of a DDO in its ideal form and thus the target state of a digital transformation toward a DDO, we refer to it as a basis for our research. However, we acknowledge that not all these dimensions can be addressed simultaneously at the beginning of the transformation journey and thus be in the focus of the respective transformation starting point.

2.2   Digital Transformation at the Organizational Level

Generally, the term organizational transformation refers to "a process that engenders a qualitatively different organization" (Besson and Rowe, 2012, p. 103) that can impact strategy, structure (Matt et al., 2015) and distribution of power (Wischnevsky and Damanpour, 2006). This impact can be of varying magnitude: In this regard, Levy and Merry (1986) suggest that there are two main types of organizational change. What they call first-order change refers to minor improvements and adjustments that do not change the system's core (Levy and Merry, 1986), as fundamental assumptions underlying the internal structure are not questioned (Grabow and Heskin, 1973). In contrast, second-order change describes a "multidimensional, multi-level, qualitative, discontinuous, radical organizational change involving a paradigmatic shift" (Levy and Merry, 1986, p. 5). This distinction becomes particularly evident in the context of IS research. Starting in the 1990s, Information Systems (IS) scholars mainly researched first-order organizational change, arguing that organizations primarily embark on transformations in order to align their information technology with their business functions (cf. Brown and Magill, 1994; Chan et al., 1997), thus coining the term *IT-enabled organizational transformation*.

Nowadays however, digital technologies are increasingly reshaping business strategies (Bharadwaj et al., 2013) and organizations (Yoo et al., 2012), thereby (re-)defining the organization's value proposition and identity (Wessel et al., 2021). This becomes especially evident in the context of DDOs, in which whole business models, organizational values and decision-making principles are redefined to be data-driven. Such a second-order organizational change, widely referred to as *digital transformation* (Vial, 2019; Wessel et al., 2021) can be defined as „an ongoing process of adoption to a significantly changing digital landscape in order to meet the digital expectations of customers, employees and partners" (Teichert, 2019, p. 1674). In this process, digital capabilities and technologies are leveraged to create new "business models, operational processes and customer experiences to create value" (Morakanyane et al., 2017, p. 9). Due to the depth and scope of the organizational change, digital transformations represent a highly complex and encompassing endeavor, in which "psychological, socio-cognitive, socio-technical, economic and political considerations intertwine" (Besson and Rowe, 2012, p. 105). Furthermore, the volatile and uncertain environment in the digital age makes it very difficult to define the path and destination of a digital transformation from the outset (Siebel, 2019). Consequently, in particularly top level managers play a decisive role in shaping the digital transformation, as they "define the firm's strategic direction, and provide the context within which digitalization efforts may unfold" (Wrede et al., 2020, p. 1564).

In consideration of both the complexity and the uncertainty of the transformation process, it becomes apparent that organizations should place a special emphasis on choosing an opportune starting point to embark on their digital transformations toward a DDO. This argument is, for example, supported by Mueller (2022) who suggests that organizations should first map out the aspects necessary for change, subsequently identify key aspects to focus on and then begin to gradually develop the required changes. At the same time, he highlights potential ripple effects that might result from interdependencies between these aspects and therefore emphasizes the importance of understanding the business implications of choosing a certain starting point (Mueller, 2022).

In conclusion, for many organizations, becoming a DDO presents a second-order organizational change, which is referred to as digital transformation in IS research. To cope with the associated complexity and uncertainty, researchers found organizations and in particular their top managers to embark on digital transformations by carefully selecting a starting point and then deriving further activities from there.

3   Research Approach

To answer our research questions, we studied a total of 13 organizations that are in the course of transforming themselves into DDOs. As such, our study can be described as a multiple case study, which is a common method in IS research (Palvia et al., 2015). This case study method is especially beneficial to answer "how" and "why" questions regarding "a contemporary phenomenon within its real life context, especially when the boundaries between a phenomenon and context are not clear and the

researcher has little control over the phenomenon and context" (Yin, 2003, p. 13), as it is the case in our study. In line with Eisenhardt (1989) and Yin (2003) we have deliberately decided to opt for a multiple case design in order to strengthen the replication logic and surface cross-case patterns instead of performing an in-depth investigation into a single case. To conduct our study, we followed the process proposed by Eisenhardt (1989), containing the eight steps *getting started, selecting cases, crafting instruments and protocols, entering the field, analyzing data, shaping hypotheses, enfolding literature,* and *reaching closure*, which can be grouped into three main steps (case selection, data collection, and data analysis). In the following, we will describe our procedure along these three steps.

3.1 Case selection

Selecting cases is a crucial step in theory building using case studies (Eisenhardt, 1989; Yin, 2003). Given the nature of our research, our approach relies on theoretical replication. In line with other case studies with multiple cases (Gersick, 1988; cf. Harris and Sutton, 1986; Pettigrew, 1990), we have carefully selected diverse organizations from a broad spectrum of industries and company sizes to gather insights applicable across organizational types. Furthermore, we deliberately chose companies with various transformation statuses, as in particular advanced cases allow to derive challenges and other implications of the chosen starting point for the further course of the transformation. At the same time, to ensure case comparability, we deliberately focused on organizations with an annual revenue over one billion Euro, global presence and the transformation going on for at least one year. Table 2 provides an overview of the industry, staff number, and revenue of the 13 selected cases. Additionally, the table indicates whether the digital transformation toward a DDO was just initiated or if it is already at an advanced stage, i.e., the organization already works to a considerable extent data-driven.

Case company	Staff 2021 [thousand]	Revenue 2021 [billion EUR]	DDO transformation status
Automotive	>100	>100	Advanced
Banking	50–100	10-50	Initiated
Consumer 1	>100	10-50	Initiated
Consumer 2	50–100	10-50	Initiated
Consumer 3	>100	10-50	Initiated
Energy	10-50	10-50	Advanced
Engineering	10-50	1-10	Advanced
Insurance	>100	>100	Advanced
Logistics	>100	50-100	Advanced
Pharma 1	50–100	10-50	Advanced
Pharma 2	>100	10-50	Advanced
Pharma 3	10-50	10-50	Initiated
Sports	50–100	10-50	Initiated

Table 2. Overview of analyzed organizations

3.2 Data collection

Building on our case selection, we prepared our data collection by *crafting our instruments and protocols.* In this step, we decided which type of data sources to include and mapped out appropriate data collection methods. In line with Eisenhardt (1989), we combined multiple types of sources such as contextual information (e.g., external reports and evaluations, press reports and financial statements), organization-internal documents provided by key informants (e.g., DDO maturity models) and, most importantly, interviews with key informants. Given that our research is focused on top manager considerations, we deliberately identified senior managers in our cases who shape and oversee the digital transformation, having roles such as Vice President Data Transformation, Head of Digital

Transformation, or Tech Transformation Lead. As discussed in Eisenhardt's (1989) process of building theory from case studies, this step of crafting instruments and protocols is highly iterative, as findings from the first cases were taken into account for the investigation of further cases. In particular, field notes we reviewed frequently as well as an iteratively developed interview guide helped us sharpening the questions to our key informants and focus on emerging patterns during the process. Finally, these reflections also helped us determining when to conclude the data collection due to theoretical saturation (Glaser and Strauss, 1998), which is referred to by Eisenhardt (1989) as reaching closure.

To *enter the field* and actually collect the case data, we first performed extensive online research on our cases to collect the above-mentioned contextual information. Subsequently, we contacted the identified key informants via email and LinkedIn and conducted a 30-to-80-minute video call with one informant per organization, resulting in ca. 100 pages of interview transcripts plus additional handwritten notes in the one case where the informant did not consent to a recording. As all interviews were conducted in German, we translated relevant sections in English for further processing. Finally, in four cases we were provided with further documents by the organization, such as DDO maturity models and frameworks.

3.3 Data analysis

As our third step, we analyzed our data using a combination of deductive and inductive coding. On one hand, we *unfolded literature* and compared our data to the DDO dimensions included in the above-introduced conceptual DDO framework (Fischer et al., 2022), thereby performing a first deductive concept coding. On the other hand, we inductively enhanced and extended these categories based on the patterns that surfaced during an open coding (cf. Saldaña, 2013) of our case data. Table 3 shows the final categories as well as illustrative quotes.

DDO dimensions (Fischer et al, 2022)	Inductively detailed out categories	Illustrative quotes
Data Sourcing & Sensemaking	**Data Availability**	"The internal transparency of our data landscape has been greatly improved in the last 1-2 years. Today, most people know how to get the curated data they need" *(Managing Director Data & Analytics, Consumer 2)*
	Data Quality	"We have a very high data quality as every customer needs to have a customer card with a unique ID" *(Head of Digital Transformation, Consumer 1)*
Data Capabilities	**Data Infrastructure & Toolset**	"We are in a very good position when it comes to our infrastructure and toolset. We have a lot centrally provided, but also the units have what they need with a clearly defined interface." *(Head of Data Analytics, Logistics)*
	Employee Skillset	"Basic training on data analytics and use case identification is currently developed and will be rolled out to all 40.000 employees in the near future" *(Vice President Data Transformation, Automotive)*
Data-driven Culture	**Data-driven Culture**	"The mindset has to be there first - otherwise you have everything in place, but no one uses it" *(Head of Digital Transformation Consumer 1)*
Data-driven Decision-Making	**Exploitative Data Use Cases**	"In meetings, there is a deliberate search for (recurring) decisions that should be made in a more data-based manner in the future" *(Head of CoE Digital Transformation, Pharma 1)*
Data-driven Value Creation	**Explorative Data Use Cases**	"A third dimension [of being a DDO] is new business models enabled through e.g., new risk assessments that allow even e.g., severely ill people to still get a life insurance" *(Group Data Office Member, Insurance)*

Table 3. Coding table for data analysis based on DDO dimensions of Fischer et al. (2022)

The thereby coded data were transferred to a tabular case database organized by category and case. Furthermore, supplemental case information such as company information, the company-specific DDO understanding, the motivation to become such an organization and a short description of the transformation journey so far were also added to the case database. To *shape our hypotheses* (i.e., to

identify transformation starting points and underlying rationales), we build on this database and performed a thorough within-case analysis for each case. In doing so, we relied on data triangulation (Merriam, 1998; Stake, 1995; Yin, 2003) to ensure the validity and reliability of our results and used detailed, descriptive write-ups for each case that summarized the key insights of the interviews, field notes and additional documents in line with Eisenhardt (1989). In a final step, we transitioned to a cross-case analysis. In this stage, we identified and documented case-overarching patterns that emerged when comparing individual cases. This was a highly iterative process, with numerous rounds of discussion among members of the author team. In case of disagreements, the findings where revisited and thoroughly discussed until agreement was reached.

4 Results

Although the overall transformation approaches of the analyzed organizations are highly individual in their nature, four central starting points—namely, *asset-driven, workforce-driven, exploitative use case-driven,* and *explorative use case-driven*—emerged from our case analyses. These four starting points are summarized and briefly illustrated in Table 4 below.

Transformation starting points short description	DDO dimension addressed most prominently	Case companies	Illustrative example
Asset-driven The transformation starts with creating and transparently providing high-quality data assets	Data quality, data availability	Consumer 3, Engineering	In 2016, **Engineering** embarked on its digital transformation with the primary goal of having a more transparent overview of its current state of affairs. To do so, they first and foremost focused on creating and governing an organization-widely available, integrated, and high-quality data basis.
Workforce-driven The transformation initially focuses on a mindset shift toward a data culture and an increased data literacy in the general workforce	Data culture, employee skillset	Consumer 1, Pharma 2	From the very beginning of its transformation in 2020, **Pharma 2** informed and engaged its employees in the transformation process to get their buy-in and achieve the mindset shift necessary for a data-driven working mode. For them, an educated and inspired workforce is the key to enable and drive further steps toward becoming a DDO.
Use case-driven (exploitative) The transformation starts with improving existing processes (e.g., decision-making) through data use	Data-driven decision making	Consumer 2, Energy, Pharma 1	**Pharma 1** started to transform itself in 2019 by deliberately searching for decisions that should be made in a more data-based manner to speed up their time to market through smarter decisions. Moreover, these use cases are used internally to drive cross-divisional data exchange and educate employees about the importance of data quality.
Use case-driven (explorative) The transformation initially focusses on exploring innovative data use cases (e.g., new products)	Data-driven value creation	Automotive, Banking, Insurance, Logistics, Pharma 3, Sports	Having started in 2016, **Automotive** initially focused on exploring innovative data use cases. With 800 centrally managed and coordinated use cases, the company expanded its product portfolio as well as its operating and business model e.g., through data monetization.

Table 4. Starting points for transformations toward a DDO

In the following, the four starting points are further detailed out, thereby addressing our first research question. Concomitantly, we answer our second research question by outlining the managers' rationales for choosing the respective starting points. Finally, we also point out relevant implications for the further course of the transformation that our advanced cases showed as their digital transformations progressed.

4.1   Asset-driven Transformations

The first pattern that emerged from our case analysis is what we call an asset-driven transformation. Organizations that chose this starting point embark on their transformation journey with a clear focus on their data assets and in particular the quality and availability of these assets. This prioritization of data assets is in both applicable cases (Engineering, Consumer 3) already reflected in the understanding of what it means for the organization to be data-driven. For example, the Head of Data Management & Data Analytics at Engineering sees a DDO as "an organization that has an overview which data is available and the capability to aggregate and provide data [internally and externally]". Consequently, this organization first established a strict governance of data coming from both internal and external sources, with dedicated data owners and data stewards being responsible for the quality and availability of their data. Additionally, they are also putting a lot of effort in a global data catalog to further foster the transparency of their data landscape for all employees. In the same spirit, a transformation leader of Consumer 3 reports that, at the beginning of their transformation, a comprehensive data cleaning and quality initiative was carried out, which is still repeated on a regular basis up to today. Building on this basis, his organization has the vision to "make the data collection and curation processes as smart as somehow possible so that the people further down the processes don't have to put too much thought in it" (Head of Data Management and Operations).

According to our data, asset-driven starting points are chosen by organizations which first and foremost want to better understand what is going on internally as well as in their external environment. This ambition stands out in particular when looking at their motivation to become a DDO. For example, Consumer 3 strives to become a DDO in order "understand ongoing trends and developments better and more in-depth in order to be more persuasive both in sales as well as in purchasing". Similarly, our key informant at Engineering stated they want to "ensure a transparent overview of the current state of affairs and enable timely decision-making through data" (Head of Data Management and Operations). Based on this motivation, these companies then naturally derive a course of action for their transformations which prioritizes data assets.

In the further course of these two digital transformations—one of which has considerably progressed and one of which is still in its early stages—the implications of this starting point became apparent. In both cases, the focus on data assets led to a highly integrated, transparent, and high-quality data basis. However, it turned out in both cases that this data treasure in itself is too abstract for most employees and managers to realize its value. Unless value-creating use cases are developed and communicated in a timely manner, this starting point poses the risk of losing momentum due to a lack of tangible results. For example, a top manager at Engineering reports a "lack of creativity on what to do with the acquired data", which is now slowly being addressed by lighthouse use cases. Even earlier in the transformation process, Consumer 3 encountered the hurdle of its employees not having "the basic knowledge or abstraction capability to perform analytics or even just interpret the data". This need for employee skills is underlined by the Head of Data Management and Operations stating "I urgently need two to three top data scientists that help me understand e.g., the development of purchasing prices around me. I would pay them 400-500 thousand Euro a year, but I can't find a single one.".

In summary, data-asset driven transformations are often chosen by organizations which are looking for better external and internal insights through data and therefore prioritize data assets at the start of their transformation. This starting point can generate an excellent data basis for a DDO, which, however, should then be promptly used by capable employees to develop value-creating use cases in order to ensure a lasting impact.

4.2   Workforce-driven Transformations

In the second pattern that emerged from our cases, organizations start with their workforce when embarking on their transformation journeys to become a DDO, focusing on employee data capabilities and data culture. At Pharma 2, data culture is considered to be the "holy grail" and employees have consequently been informed and engaged in the transformation process by top management from the very beginning. On one hand, this means that transformation goals and content are communicated early

and transparently by the management level and that firm leaders act as role models when it comes to behavioral changes (e.g., making decisions based on data). On the other hand, this change is also promoted on an employee level by deliberately creating time and spaces for a peer-to-peer exchange. In addition, the actual mindset change is tracked so that measures can be adjusted if needed. This happens both explicitly in form of employee surveys as well as implicitly by tracking the so-called adherence-to-model, i.e., whether employees actually follow data-based recommendations. The Head of Transformation of Consumer 1 shares this perspective of having data culture to be the most important DDO dimension and the first one to be deployed, stating "the mindset has to be there first - otherwise you have everything in place, but no one uses it."

When it comes to the underlying rationale for choosing workforce as transformation starting point, both the motivation to become a DDO as well as considerations regarding the workforce background are mentioned by key informants. Generally, both analyzed organizations have a human-centric perspective on data-drivenness, thereby sharing an enhanced experience for their customers (Consumer 1, Pharma 2) and employees (Pharma 2) as the main transformation goal. For the Head of Digital Transformation at Consumer 1, "cost and revenue improvements only come secondarily, as they will follow automatically if the customer has a better experience", and the workforce is more satisfied and productive. Notably, both organizations have two widely different backgrounds in terms of their workforces, but they both cite their situation as an argument for choosing this starting point: The organization analyzed in the Pharma 2 case has a considerable focus on medical research & development and therefore already employs highly educated and data-savvy staff. In addition, working with potentially life-deciding drugs already promotes a fundamentally heightened awareness for the correctness and quality of data in general, according to a key informant. Consequently, the Pharma 2 organization considered this circumstance a head-start for their transformation and decided to place it at the heart of their transformation. In contrast, Consumer 1 started its transformation with a mainly data-illiterate, blue-collar workforce. Therefore, they saw this transformation activity as all the more critical to success and prioritized it accordingly.

When reflecting on the implications of this starting point, key informants in both organizations highlighted that having a data-literate and motivated workforce positively impacts several other DDO dimensions such as data quality or data use case ideation. However, Pharma 2 indicates that this enthusiasm can sometimes overshoot the mark and thus be contra-productive again, with employees overengineering fundamentally simple decisions with sophisticated data analytics models.

In summary, workforce-centric transformations are primarily chosen by organizations with a people-centric motivation and understanding of a DDO. Our cases show that both a data-savvy workforce providing a head start for the digital transformation as well as a data-inexperienced workforce, creating the need to catch up, can be seen as a reason for transformation leaders to choose this starting point. If successful, this option can lead to educated and engaged employees further driving the transformation.

4.3 Exploitative Use Case-driven Transformations

The third pattern that emerged from out case data is that of transformations driven by exploitative data use cases. These transformations are started by identifying and developing use cases that exploit data to enhance and improve *existing* operations and processes. Illustratively, the Head of the Transformation Center of Excellence in our Pharma 1 case described their starting point as "a deliberate search for recurring decisions that should be made in a more data-based manner in the future […] to then initiate the required actions, e.g., dashboard development". Thereby, they were in particular looking for cross-divisional use cases to further foster the exchange of data and insights between divisions. This exploitative use case-centric approach also becomes apparent when looking at Consumer 2. According to their Director for Data and Analytics, becoming a DDO is explicitly "not about technology, but about a fact-based working style". Consequently, they have also started with enabling all important operational decisions with data, mostly by testing relevant options in isolated stores and then comparing the results.

The motivation to choose this starting point becomes clear when looking at their DDO motivation and understanding. The companies who have chosen this starting point generally do not want to

fundamentally change their product portfolio or business model (for now) but first rather focus on improving the efficiency and effectivity of their existing operations. For example, Pharma 1 strives to "help patients as fast as possible - therefore [they] need to speed up the time to market through smarter decisions" (Head of CoE Digital Transformation). In a similar vein, the top management at Energy has the transformation goal of "control[ling] the organization better and faster through decision based on unadorned, real-time data" and therefore prioritized exploiting data for their existing decision processes.

One considerable advantage of this starting point regarding the further transformation process is the fact that the thereby developed use cases can be shown to the workforce and management to increase their understanding and proof the value-add of the ongoing transformation. The management at Pharma 1 deliberately tells their employees where the data they collected is ultimately used as a sign of appreciation for their work and investments and to foster their sense of ownership and accountability. "In the past, our employees entered data into their systems just because they were told to. But it was 'nice to have'; there was no pressure to get it right. This has changed as our employees now actually see that we are indeed using their data for important decisions." (Head of CoE Digital Transformation). However, Consumer 2 shows that exploiting data to enable better decision making is not sufficient as long as decision makers are not willing to listen to these data. According to our key informant in this organization, "for almost all important operational decisions, all relevant options are tested and then the data is compared, but only in half of all cases, the final decision is actually following the recommendation provided by the data and not the gut feeling or other arguments". From his point of view—especially in overperforming companies without a lot of pressure on the employees—decision makers need to be well incentivized to actually listen to what their data tells them even though it might not lead to the most intuitive or comfortable course of action.

To summarize, top managers that strive to improve their operational efficiency and effectivity without changing their business model tend to start by looking for opportunities for improvement through data in their existing (decision) processes. If they manage to establish those use cases for decision makers, organizations are usually able to quickly generate success stories that can be used to further drive and inspire the digital transformation.

4.4 Explorative Use Case-driven Transformations

Similarly use case-centric, but very different in their nature, is the fourth pattern we discovered in our data. Six of the 13 analyzed organizations chose to start their transformations by searching for and developing explorative data use cases. In contrast to what we call exploitative use cases, these explorative use cases deliberately enable new (1) innovative products and services, (2) business models and (3) operating models. As an example for a new service, Insurance developed a more sophisticated, data-driven risk management, which allowed them to offer a new type of life insurance for severely ill people, thereby increasing its customer pool. Regarding new business models, Automotive wanted to expand their business model by also selling data collected from their cars (e.g., traffic data) to other institutions. And finally, when it comes to new operating models, Sports revolutionized its logistics network to ship faster than its competition: When a customer buys one of their products online, their new 'ship from franchise' system will locate the geographically closest vendor that has said item in store, buy back the item from said vendor and instruct the vendor to ship it to the online customer in order to keep the shipping time and expense as low as possible.

As these kinds of innovative use cases cannot be identified just by looking at existing processes, much more sophisticated innovation management structures were installed in our cases at the beginning of the transformation. Especially in larger organizations, dedicated processes ("use case funnels") were put in place that centrally support and coordinate the identification, approval, budgeting, piloting, development, and rollout of up to 800 ideas in parallel (Automotive). At Logistics, this process had considerable top management involvement from early on, with the CEO chairing the data analytics board which monitors the use case development. Finally, organizations that are advanced in their digital transformation—such as Insurance—even considered sustainability and ethical impacts of their use cases ideas and included them in their assessment logic.

When asked about the underlying rationale to choose this starting point, the analyzed companies mostly named three reasons: First, they have the ambition to create fundamentally new, innovative income streams (e.g., tapping into the high-risk insurance customer pool). Secondly, some companies also cite competitive pressure for innovation as a key reason. For example, the Vice President Data Transformation at Automotive expects data-driven applications in cars to be a basic requirement of future customers and therefore wants to get ahead of its competition. Sports, on the other hand, referred to shipping time as a must-win battle. Finally, starting with explorative data use cases also generates innovative show cases that can be presented internally to educate and inspire both the workforce and the management about the potential of data. For example, Automotive has set up a mobile "data transformation space" in which innovative data use cases have been shown to over 40.000 employees to drive data literacy and cultural change

In addition to these already anticipated benefits, however, this starting point leads to challenges similar to those encountered in explorative use case-driven transformations: Sports, Banking and Pharma 1 initially all drove their transformation efforts exclusively through use case development, i.e., data was only sourced, processed and analyzed when required by a specific use case. This partly led to an uncoordinated development of monolithic and not-interoperable use cases as well as non-integrated databases and toolkits upstream. Such a fragmented landscape will inevitable slow down the transformation in the further course.

In summary, organizations which are striving to stay ahead of their competition by generating new offerings, business models, and operating models are starting their transformations by setting up comprehensive innovation management structures to develop innovative, explorative data use cases. As the transformation process continues, such use cases are highly valuable for educating and inspiring the workforce to have them further drive the transformation. However, if the use cases are developed in isolation from each other, there is a considerable risk of fragmentation of the technology landscape, potentially jeopardizing the success of the transformation.

All starting points along with the respective top managers' rationales to choose them (incl. partly already anticipated positive implications for the further transformation course) as well as drawbacks, that resulted from the starting point choice as reported in our cases, are summarized in Table 5.

Starting points (RQ 1)	Rationale (RQ 2)	Potential drawbacks
Asset-driven	Increase transparency on current external and internal situation (more details, more up-to-date) Create integrated, high quality data basis to build data operations on	Building a high-quality data basis is expensive and effortful Data basis does not generate value by itself; hence organization might perceive efforts as not value-adding
Workforce-driven	Increase satisfaction and productivity of employees and customers Enable and motivate workforce to further drive digital transformation	Enthusiasm can lead to uncoordinated efforts and overengineered solutions
Use Case-driven (exploitative)	Increase ability to control organization and make decisions in a fact-based manner Identify use cases that quickly provide efficiency improvements and prove value-add of transformation	Uncoordinated and isolated development of use cases can lead to monolithic, incompatible infrastructure and a fragmented data landscape upstream
Use Case-driven (explorative)	Create new business models, operation models and offerings Develop innovative show cases that inspire and educate workforce	

Table 5. Overview of transformation starting points, underlying rationales, and potential challenges

5 Discussion

With our world becoming more and more data- and technology-centric, organizations are striving to become DDOs. However, the required digital transformation is a highly complex and idiosyncratic process, in which not all DDO dimensions can be addressed simultaneously. In consequence, transformation leaders are carefully selecting starting points for embarking on their transformation journey toward a DDO. Against this backdrop, we analyzed 13 organizations building on the DDO concept of Fischer et al. (2022) as our theoretical framework to address the following two research questions: (RQ1) *What are different starting points for the transformation journey toward a DDO* and (RQ2) *why do top managers deliberately choose one of these starting points?*

According to our data, top level managers chose one of four transformation starting points (asset-driven, workforce-driven, exploitative use case-driven, and explorative use case-driven) to embark on their DDO transformation. Considering those four starting points, two underlying, fundamental thought patterns become apparent. One the one hand, there are top managers who first want to ensure the right foundation for their transformation endeavor by focusing on their data assets or workforce. One the other hand, other top managers embark on their transformations more outcome-oriented, and consequently choose a (explorative or exploitative) use case-driven transformation starting point. Relatedly, our advanced cases indicate that some organizations transition from a foundation-oriented starting point to a second, outcome-oriented starting point in the course of their digital transformation after having addressed the foundations (e.g., developing use cases after having started asset-driven).

In either case, the choice of starting point depends primarily on the top management's understanding of a DDO and the motivation to become such an organization, as these views strongly influence the prioritization of the DDO dimensions addressed in the digital transformation. With these findings, our study makes several important contributions to the IS literature and offers practical implications.

5.1 Research Contributions and Practical Implications

The *research contribution* of our research is threefold. First, this study reveals surfacing patterns in the field of highly individual and complex transformation processes. We found that organizations embark on their transformation journeys on one of four potential transformation starting points (asset-driven, workforce-driven, exploitative use case-driven, explorative use case-driven), thereby prioritizing different DDO dimensions. As organizational transformation processes are highly iterative (see section 2.2), this does not necessarily imply that the prioritized dimensions need to be concluded before other aspects are addressed, but that they instead act as a basis and source of inspiration for all other activities. For example, organizations that choose use cases (exploitative or explorative) as their starting point may use those use cases to either decide what data they need to source and process upstream or to showcase the value add to their workforce, thereby driving the cultural change and data literacy. By offering those four starting points, we address the call for further research on how organizations organize the beginning of their transformation toward a DDO by Berndtsson et al. (2018), as existing literature primarily examines the transformation process as a whole (cf. Li, 2020; Morakanyane et al., 2017; Teichert, 2019).

As a second, related contribution, our research empirically supports the conceptual DDO framework of Fischer et al. (2022), as our four starting points map to the respective DDO dimensions with asset-driven transformations addressing data sourcing & sensemaking, workforce-driven transformations addressing data culture and (employee-centric) data capabilities, exploitative use case-driven transformations addressing data-driven decision making and explorative use case-driven transformations addressing data-driven value creation. At the same time, it also shows that practitioners are following the recommendation of researchers such as Mueller (2022) and Wessel et al. (2021) who strongly advise against approaching a digital transformation as a purely technical transformation.

Third, our paper sheds empirical light on why organizations choose specific starting points for their transformations. In line with existing organizational management literature that emphasizes the importance of top managers to provide the context and direction for the transformation (cf. Fernandez-Vidal et al., 2022; Wrede et al., 2020) our cases show that the organization's understanding of a DDO

and the related motivation to become such an organization expressed by the interviewed top managers strongly influences the prioritization of DDO dimensions to be addressed and thereby the starting point in the transformation. Possible transformation head starts (such as a very data-savvy workforce) or deficits (such as a data-illiterate blue-collar workforce) also play a role here, but our cases show that those prerequisites are used in practice as both, arguments for and against certain starting points.

In addition, our study gives insights into advantages and drawbacks that can result from selecting a certain starting point for the further transformation process. For example, use case-driven transformation starting points quickly generated return on investment in our cases but could lead to an isolated development of monolithic use cases when left uncoordinated, causing fragmentation and incompatibility of the data and process landscape upstream. On the other hand, focusing on the foundations first also brought some drawbacks in our cases, as key informants experienced a loss of momentum in their transformation because they couldn't demonstrate the value of their efforts.

As a *practical implication,* this study also helps practitioners such as top managers in several ways. First, it helps them better understand their options on where to start their digital transformation journey toward a DDO. Secondly, in particular the link we surfaced between the managers' fundamental DDO understandings and motivations, and the transformation starting point they chose, may help future transformation initiators reflecting on their priorities and resulting first steps. Relatedly and thirdly, our four starting points can guide practitioners comparing and contrasting different digital transformations. Finally, the paper at hand also supports top managers weigh the advantages and disadvantages of particular starting points and mitigate risks at an early stage, as it points out implications of these starting points on the further course of the transformation, that emerged from out case studies.

5.2   Limitations and Future Research Directions

As with any research, our study is also subject to several limitations, representing potential directions for future research. First, in line with Eisenhardt (1989), we focused on analyzing a larger number of cases and gaining insights from senior managers, thereby limiting our number of sources per case. Hence, we would like to encourage future research to delve deeper into a smaller number of cases to shed more light on individual transformation journeys and underlying top manager considerations. In this context, particularly in-depth longitudinal case studies could be a promising research approach. Secondly, we deliberately focused our research on starting points of transformation journeys toward a DDO. Building on our results, the transformation process toward a DDO as a whole could be further analyzed, for example, by conducting a series of longitudinal studies along the transformation journey. Thirdly and relatedly, we acknowledge that our identified starting points may not always be clearly demarcated in practice, as most organizations eventually address all five DDO dimensions within the course of their transformation. Based on our cases, however, we argue that even a seamless transition to addressing other DDO dimensions does not compromise the existence of an original starting point. Finally, the paper at hand does not evaluate the individual starting points in terms of their prospects of success regarding the digital transformation. In this regard, the qualitative comparative analysis (QCA) method (e.g., fsQCA; Fiss, 2011) presents a promising research avenue, as it enables scholars to identify configurations of conditions within organizations that lead to high and low developed DDOs.

6   Conclusion

In conclusion, our study contributes to existing DDO and organizational transformation literature by providing important insights into the starting points of digital transformations toward DDOs and the underlying considerations of top managers. Based on the 13 organizations we analyzed, we found that top managers initially either focus on the transformation foundations by choosing an asset-driven or workforce-driven starting point, or they focus on the transformation outcome by choosing and exploitative or explorative use case-driven starting point, based on their DDO understanding and their motivation to transform their organization into such a DDO. Based on this first-time focus on the starting points of such digital transformations, we hope that our research will inform and inspire future research on organization's transformation journeys toward becoming a DDO.

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