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Leadership für Digital Transformation

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List of Abbreviations

AGFI	Adjusted Goodness-of-Fit Index
AVE	average variance extracted
β	probability of Type II error
C-level	chief level
CA	Cronbach's Alpha
CDO	Chief Digitalization Officer
CEO	Chief Executive Officer
CFA	confirmatory factor analysis
CFI	Comparative Fit Index
CI	confidence interval
CIO	Chief Information Officer
CMIN/DF	minimum discrepancy per degree of freedom
CR	composite reliability
CTO	Chief Technology Officer
DBS	Digital Business Strategy
E-leadership	Electronic Leadership
e.g.	exempli gratia
EFA	exploratory factor analysis
et al.	et alii
F	overall significance
GFI	Goodness-of-Fit Index
i.e.	id est
IFI	Incremental Fit Index

ILT	Implicit Leadership Theory
IS	Information Systems
IT	Information Technology
KMO	Kaiser-Meyer-Olkin Test
N	population size
NFI	Normed Fit Index
p	probability
PCA	principal components analysis
r	Pearson product-moment correlation coefficient
R^2	coefficient of determination
RFI	Relative Fit Index
RMSEA	root mean square error of approximation
ROC	Rank Order Centroid
SD	standard deviation
SRMR	standardized root mean square residual
TLI	Transformational Leader Inventory / Tucker-Lewis Index
TMT	Top Management Team
TSP	Three-Stage Process
$\chi 2$	chi-square value

Abstract

Organizations today are striving to achieve outcome goals in digital transformation. Digital transformation can be threatening to large organizations however, if it is not managed well by skilled leadership. This thesis, therefore, defines competent and skilled leadership for successful digital transformation by initially assessing the attributes that describe the so-called prototypical Digital Leader. The paper then follows an analysis of these attributes' influence on the perception of success and acceptance by employees towards those desired organizational digital transformation outcomes. Current research acknowledges the importance of how technology is reshaping the way leadership is transmitted and how digitalization is transforming the overall business strategy. Nonetheless, research on digital transformation as a new organizational context, demanding adequate leadership, remains scarce. To manage the challenges of digital transformation, management and information systems literature has so far concentrated primarily on the C-level perspective. However, digital transformation reaches across all business units and hierarchy levels. Results of the first, qualitative-exploratory study, based on sophisticated numerical ranking and conceptual clustering methods applied to statements made by employees and leaders of organizations with a high degree of digitalization, indicate 'empathic' as the highest ranked Digital Leader attribute. This is followed by traits describing leaders as 'innovative', 'open' and 'agile'. To further define the Digital Leader, a second, quantitative-empirical study analyzes the influence of the same implicit Digital Leader attributes on employees' perception of their organization's digital business strategy. Based on the results of hierarchical regression analyses with uniquely developed and verified constructs, this thesis is able to fill this research need, by examining whether those distinct Digital Leader attributes, affect the organization's digital transformation on all hierarchy levels. Furthermore, this thesis offers valuable practical implications by suggesting guidelines for identifying Digital Leaders, making use of Digital Leader profiles and lessons learned from observations made by applying Digital

Leadership. Overall, this thesis strengthens ties between management and information systems research and extends current thinking on how leaders are defined in the digital world.

Kurzfassung (German Abstract)

Die digitale Transformation kann eine große Bedrohung für Organisationen darstellen, wenn sie nicht von qualifizierten und kompetenten Führungskräften begleitet wird. Daher ist das Ziel dieser Dissertation adäquate Führung für eine erfolgreiche digitale Transformation zu definieren, indem zunächst die Attribute erhoben werden, die den sogenannten prototypischen Digital Leader beschreiben, gefolgt von einer Analyse des Einflusses dieser Attribute auf die Wahrnehmung eines gewünschten digitalen Transformationsergebnisses. Die aktuelle Wissenschaft hat die zwar erkannt, dass Technologie Veränderungen in der Art und Weise, wie Führung vermittelt wird, bewirkt und insbesondere wie die Digitalisierung die gesamte Unternehmensstrategie transformiert. Dennoch gibt es immer noch zu wenige Forschungsansätze die digitale Transformation als neuer organisatorischer Kontext aufzufassen, der eine angemessene Führung erfordert. Um die Herausforderungen der digitalen Transformation zu bewältigen, hat sich die Management- und Wirtschaftsinformatikliteratur bisher fast ausschließlich auf die oberste Führungsebene konzentriert. Die digitale Transformation durchdringt jedoch alle Geschäftsbereiche und Hierarchieebenen. In der ersten, qualitativ-explorativen Studie dieser Dissertation, ergeben die Ergebnisse auf Basis numerischer Ranking- und konzeptioneller Clustermethoden, die auf Aussagen von Mitarbeitern und Führungskräften von Organisationen mit einem hohen Digitalisierungsgrad angewandt wurden, dass "Empathie" das am höchsten assoziierte persönliche Merkmal von Digital Leadern ist, gefolgt von Attributen, die Führungskräfte als "innovativ", "offen" und "agil" beschreiben. Um den Digital Leader weiter zu definieren, untersucht eine zweite, quantitativ-empirische Studie ob diese impliziten Digital Leader Attribute die Wahrnehmung ihrer Mitarbeiter über die Digitalisierungsstrategie ihres Unternehmens beeinflussen. Basierend auf den Ergebnissen hierarchischer Regressionsanalysen mit eigens entwickelten und validierten Konstrukten deckt diese Dissertation den obigen Forschungsbedarf,

indem sie die Wirkung dieser spezifischen Digital Leader Attribute auf die digitale Transformation des Unternehmens auf allen Hierarchieebenen untersucht. Darüber hinaus bietet diese Dissertation wertvolle praktische Empfehlungen, da sie Richtlinien für die Identifizierung von Digital Leadern vorschlägt, aufzeigt wie man unterschiedliche Digital Leader Profile nutzen kann und Lehren aus der Anwendung von Digital Leadership zieht. Insgesamt stärkt diese Arbeit die Verbindungen zwischen der Management- und der Wirtschaftsinformatikforschung und erweitert das aktuelle Verständnis darüber, wie Führungskräfte in der digitalen Welt definiert werden.

1. Introduction[1]

1.1 Motivation and Research Questions

The organization today has transformed radically from one that operated, was structured and responded to market forces as an analogue endeavor to a digitalized entity, with often completely different characteristics (Kohli & Grover, 2008; Rai, Pavlou, Im, & Du, 2012; Sambamurthy, Bharadwaj, & Grover, 2003; Tanriverdi & Venkatraman, 2005). There have been changes not only in basic business processes for organizational communication internally and externally or the managing of databases, there have been fundamental strategic disruptions and realignments within and between whole industries (Bauer, Schlund, & Vocke, 2018). With mostly positive impact, information is readily and freely available to various stakeholders that did not have access earlier, shifting control away from traditional power sources at the same time democratizing the process (Meffert & Swaminathan, 2018). Business practices and functional tasks have increased in efficiency and in speed, freeing people to tackle other challenges, experimentation and innovation. New business models have emerged (Dörner & Edelman, 2015) and with them, new opportunities (Li, Su, Zhang, & Mao, 2018; Wimelius & Sandberg, 2018). This is reflected in the majority of literature in the field of information systems (Banker, Bardhan, Chang, & Lin, 2006; Collin et al., 2015; Ettlie & Pavlou, 2006; Kane, Palmer, Phillips, & Kiron, 2015).

At the same time, digital transformation may add a layer of complexity to the organization and therefore, must be managed correctly (Ray, Muhanna, & Barney, 2005). For example, the immense data volume, which is often the basis of new digital business models, confronts organizations with data management and security risks (Dehning, Richardson, & Zmud,

[1] This chapter is partly based on and includes elements of Pabst von Ohain (2019), and Pabst von Ohain (2021); see Appendix A for full references.

2003; El Sawy, Kræmmergaard, Amsinck, & Vinther, 2016). Digital transformation is also often accompanied by digital disruption (Wimelius & Sandberg, 2018), which affects most organizations undergoing digital transformation today (Collin et al., 2015). The transformation process of digitalization can be in itself disruptive and threatening, particularly to those firms that have been hesitant to enfold the processes or unable to grasp its significance (Cho, Jung, & Kim, 1996; Goldman, Nagel, & Preiss, 1995). This is especially relevant in digitally inexperienced industries (Kohli & Johnson, 2011). For a reluctant or resistant firm in a traditional industry, it will be excruciatingly painful to stay afloat in the future as businesses universally move towards a digital economy (Dubelaar, Sohal, & Savic, 2005).

To cope with the changes and challenges brought upon by digital transformation, organizations are required to adjust their internal processes. However, organizations are interconnected systems and are becoming more so with the help of digital transformation. Consequently, there is coactive change in the technical system and the social system (Bruce J. Avolio, Sosik, Kahai, & Baker, 2014) as the systems are often interdependent. As a result, digital transformation itself forms a new organizational context (Eberly, Johnson, Hernandez, & Avolio, 2013), demanding adequate leadership (Bennis, 2013). Although many organizations are affected by digital transformation, this is not an organic change process; it needs to be managed by skilled and competent leaders (El Sawy et al., 2016). In the end, these leaders are the ones who have to make decisions concerning digital changes (Chen, Tang, Jin, Xie, & Li, 2014), as it is a part of an adjusted strategic orientation in the turbulent times of digital transformation. Organizations must simultaneously strengthen employee trust in their digital agenda and find appropriate leadership to execute such changes.

Recent preliminary research in management and information systems (IS) is concentrating on new leadership styles for transforming organizations digitally. Nonetheless, literature has taught us, that for successful digital transformation, organizations call for skilled and digital-

literate leaders (Hunt, 2015; Schwarzmüller, Brosi, Duman, & Welpe, 2018) with a specific digital mindset (El Sawy et al., 2016), and certain attributes to accompany this mindset. These individuals, transforming their organizations towards a successful digital future, are commonly referred to as so-called Digital Leaders.

To formulate a profile of these leaders, we examine their attributes comprised of skills, competencies and traits (Hernandez, Eberly, Avolio, & Johnson, 2011). This aids us in defining an adequate Digital Leader. According to the same authors, considering leadership in a digital context which can be transmitted via such attributes, facilitates recognition of leadership by followers. Uncovering the specific set of Digital Leader attributes is fundamental in understanding the leader's influence on the digital transformation of an organization (Bruce J. Avolio et al., 2014). Awareness of which leader attributes are associated with successful digital transformation, allows us to understand the relationship between the application of digital technology by Digital Leaders, their personal qualities and digital transformation as an organizational context (Bennis, 2013).

For this reason, focusing on attribute profiles (Zimmer, 2010) is important for understanding how individuals influence each other and shape the context of leadership in the digital age (Bruce J. Avolio et al., 2014). Leadership and information systems scholars have since identified the necessity to determine the relevant attributes of the Digital Leader (Balthazard, Waldman, & Warren, 2009; Preston, Leidner, & Chen, 2008; Singh & Hess, 2017), though they have not provided knowledge on what these attributes are. Hence, the first goal of this thesis is to qualitatively explore which specific leader attributes are associated with successful digital transformation, as perceived by the direct subordinates of the leader. This leads to the first research question:

Research Question 1: What are the implicit attributes describing a prototype Digital Leader, responsible for successfully transforming the organization digitally?

After assessing which implicit attributes employees in digital contexts associate with their leaders for successful digital transformation, there is need to examine whether a specific attribute profile has an actual influence on a desired digital transformation outcome. This subsequent analysis can substantiate, if indeed the prototype Digital Leader, via respective attributes, has an impact on organizational digital transformation. To determine adequate leadership for digital transformation, i.e., further define the so-called Digital Leader, it is important to take a look at the influence of leader trait profiles (attributes) (Hernandez et al., 2011) on desired digital transformation outcomes (Bruce J. Avolio et al., 2014). A possibility to explore such influence can be found in concepts applied in Implicit Leadership Theory (ILT). This body of research has shown, that in times of business transformation, followers put their faith in leaders who display prototypical leader attributes (Foti & Luch, 1992; Offermann, Kennedy Jr, & Wirtz, 1994). This implies, that when leaders transforming their organization digitally display a set of personal attributes associated with successful digital transformation, they are recognized as prototype Digital Leaders.

Besides employing appropriate Digital Leaders, those organizations that wish to succeed in digital transformation formulate a so-called digital business strategy (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013a, 2013b; Drnevich & Croson, 2013; Kane, Palmer, Phillips, Kiron, & Buckley, 2015; Kiron, Kane, Palmer, Phillips, & Buckley, 2016). The organization's digital business strategy is usually defined as a contrivance of deliberate competitive actions with the main purpose of transforming the organization to which it is able to offer information technology (IT) enabled products and services (Woodard, Ramasubbu, Tschang, &

Sambamurthy, 2013), while leveraging organizational digital capabilities to create a competitive advantage (Bharadwaj et al., 2013a; Pagani, 2013).

We are reminded that leaders disseminate and initiate the organization's business strategy within the firm (Eggers & Kaplan, 2009; Kaiser, Hogan, & Craig, 2008; Raymond & Bergeron, 2008). This entails, that the perception of a digital business strategy, and thus its acceptance by followers (Conger & Kanungo, 1987), depends on whether the particular leader for digital transformation is perceived as a competent Digital Leader (Lord, Brown, Harvey, & Hall, 2001). Consequently, followers perceiving their leader as a prototype Digital Leader, i.e., when exposed to the display of prototype leader attributes, should result in a better understanding of their organization's digital business strategy, in turn. The second purpose of this thesis therefore, is to explore the influence of implicit attributes of the Digital Leader on the organization's digital transformation to further hone our understanding of adequate leadership for digital transformation. Thus, we would like to examine the following, second research question:

Research Question 2: Do implicit leader attributes for digital transformation affect the perception of the organization's digital business strategy?

Summarizing the aforementioned research questions, the goal of this thesis is to determine what adequate leadership for digital transformation is, by assessing which implicit personal leader attributes are associated with successful digital transformation, and later analyzing these attributes' influence on the perception of a desired organizational digital transformation outcome, to help define the so-called Digital Leader. This thesis addresses significant gaps in the research on the relationship between digital technology and leadership (Bruce J. Avolio et al., 2014), as well as the relevance of leader attributes in the context of digital transformation (Nambisan, Lyytinen, Majchrzak, & Song, 2017). By answering these research questions, this

thesis makes four contributions to existing literature in the fields of leadership and information systems research to help analyze leadership's role in strategic digital transformation of the organization.

First, research up until now has acknowledged that skilled leaders with distinct digital competencies as part of an array of attributes are required for successful digital transformation (Hunt, 2015; Schwarzmüller et al., 2018). However, we do not know which particular attributes these may be, nor how they may influence strategic digital transformation outcomes (Berson, Nemanich, Waldman, Galvin, & Keller, 2006). We are able to resolve this matter by analyzing the influence of the identified attributes that describe the prototype Digital Leader, namely empathic, innovative, open and agile on a desired organizational digital transformation outcome, the perception of the organization's digital business strategy.

Second, although much has been written about organizational change as a result of interactions with technology (Alos-Simo, Verdu-Jover, & Gomez-Gras, 2017; El Sawy et al., 2016; McElheran, 2015), we have little understanding of the relationship between technology and leadership (Bruce J. Avolio, Bass, & Jung, 1999; Bruce J. Avolio et al., 2014; Bass & Riggio, 2006). In particular, there is a lack of research on this relationship in the context of organizational digital transformation (Nambisan et al., 2017). Therefore, this thesis extends current management research (Bruce J. Avolio, Kahai, & Dodge, 2000), by adding the new organizational context of digital transformation (Eberly et al., 2013).

Third, digital transformation effects all business units and is present on all hierarchy levels (Bharadwaj et al., 2013b; Gottschalk, 1999; Hansen, Kraemmergaard, & Mathiassen, 2011). This point of view has been neglected so far in the leadership and information systems literature, which is primarily focused only on executive level leadership (Carter, Grover, & Thatcher, 2011; Kohli & Johnson, 2011; Lee, Madnick, Wang, Wang, & Zhang, 2014; Singh & Hess, 2017). This thesis addresses this gap by analyzing the role of the Digital Leader in strategic

management (Drnevich & Croson, 2013) on all hierarchy levels (Gottschalk, 1999) to execute the organization's digital business strategy (Bharadwaj et al., 2013a, 2013b; Chen et al., 2014).

Fourth, the present thesis sheds light on the influence of implicit leader attributes in actual organizational settings (Epitropaki & Martin, 2005). Most ILT research has been conducted under laboratory conditions (Cronshaw & Lord, 1987; Lord, Foti, & De Vader, 1984). We therefore have a limited understanding about the influence of employees' perceptions of implicit leadership. Based on earlier models (Den Hartog, House, Hanges, Antonio Ruiz-Quintanilla, & Dorfman, 1999; Eden & Leviatan, 1975; Lord et al., 1984; Offermann et al., 1994), this thesis extends ILT by the new organizational context of digital transformation on all hierarchy levels, to expose possible effects of implicit leadership, where the immediate influence of leaders may not be directly observable.

1.2 Theoretical Background

1.2.1 Digitalization and Digital Transformation of the Organization

Digitalization is often defined as the way many domains of social life are restructured around digital communication and media infrastructures (Brennen & Kreiss, 2016). Digitalization can also be referred to the increasing penetration of digital technologies in society, accompanied by changes in the connection of individuals and their behaviors; whereas digital transformation can be seen as an ongoing, managed organizational adaptation in order to assure sustainable value creation, in light of progressing digitalization. Collin et al. (2015: 29) describe digitalization and digital transformation as a "fast-moving, global megatrend that is fundamentally changing existing value chains across industries and public sectors".

Change in the organization is inevitable as a result of constant change in information technology (Lucas Jr, Agarwal, Clemons, El Sawy, & Weber, 2013). Therefore the ongoing, continuous updating of the organization through the IT process (Li et al., 2018) allows the

organization's efforts to transform its activities to keep perpetual pace (Matt, Hess, & Benlian, 2015) and achieve new potentialities and competences (Dörner & Edelman, 2015). Digital transformation (Kane, Palmer, Phillips, Kiron, et al., 2015) is an extensive and far-reaching transformation that not only influences the organization through IT technologies (e.g.: El Sawy et al., 2016); it can restructure the basic business model, capabilities and resources of that organization (Agarwal & Helfat, 2009). It can alter the architecture of an economy or organization (Chandler & Cortada, 2000). Digital transformation is not isolated to information technologies and their application (e.g.: El Sawy et al., 2016); it can be said that digital transformation can thoroughly metamorphose a range of industries regardless of their fields and size (Bharadwaj et al., 2013a). It must also be noted however, that digitally inexperienced industries are particularly tested (Kohli & Johnson, 2011).

There is an enormous generation of data as a result of digital technology. The massive volume of information can be a contribution but a confrontation to organizations as well, bringing both opportunities and risk (Dehning et al., 2003; El Sawy et al., 2016). Disruptive innovation may introduce uncertainties, unpredictability (Schwarzmüller et al., 2018; Welpe, Brosi, & Schwarzmüller, 2018) and force organizations into new work processes.

1.2.2 Digital Business Strategy

Organizations must react to the changes brought on by digital transformation, in order to stay competitive (Dubelaar et al., 2005). For this reason, some organizations in this new digital world respond by relying on the use of IT to make the best of technology and achieve successful performance (Hiekkanen, 2015). However, these organizations will truly succeed in digital transformation (Zhu, Dong, Xu, & Kraemer, 2006) when they are able to maintain a relative advantage through innovating their digital products and services, while remaining compatible and consistent with their existing business operations (Rogers, 1995).

With this in mind, organizations can approach digital transformation successfully, if they have an exacting plan that combines analog and digital factors (Tapscott, 1996). Such a strategy should be formulated to allow for the necessary digital change to embrace new technologies and to increase the chances for innovation, differentiation, and growth (Berman, 2012). In other words, organizations willing to succeed in digital transformation apply a so-called digital business strategy, a term coined by Bharadwaj et al. (2013a: 472) and defined as an "organizational strategy formulated and executed by leveraging digital resources to create differential value".

Since its emergence, the pursuit of a digital business strategy has been gaining much attention in recent research (Bharadwaj et al., 2013a, 2013b; Drnevich & Croson, 2013; Kane, Palmer, Nguyen-Phillips, Kiron, & Buckley, 2017; Kane, Palmer, Phillips, & Kiron, 2015; Kane, Palmer, Phillips, Kiron, et al., 2015; Kiron et al., 2016), which focuses on digital innovation (Nambisan et al., 2017), virtual teams (Duarte & Snyder, 2006; Gilson, Maynard, Jones Young, Vartiainen, & Hakonen, 2015) and, especially, leadership (Bruce J. Avolio et al., 2000; Bruce J. Avolio, Walumbwa, & Weber, 2009). Bharadwaj et al. (2013a) and Pagani (2013) tell us the organization leverages its digital capabilities to create competitive advantage through specific actions. These competitive actions reflect the organization's digital business strategy with focus on achieving its goals. The action of transforming the organization in order to offer products and services (Woodard et al., 2013) enabled through information technology creates value and affords attainment of those goals.

According to some of the aforementioned scholars, organizations are encouraged to establish an overarching digital business strategy that combines the organization's general business strategy with their IT strategy. Following this digital paradigm, Mithas, Tafti, and Mitchell (2013) suggest that when formulating a digital business strategy organizations should consider IT as essential to the framing of their overall business strategy, resulting in the fusion of the IT and business strategy (Drnevich & Croson, 2013). This concept argues against merely aligning IT

functions with business strategies (Bharadwaj et al., 2013a). In this way, the formulated digital business strategy achieves cross-functional validity (Bharadwaj et al., 2013a).

Though research has pointed out the necessity of a digital business strategy for coping with the challenges of digital transformation with leadership at its core (Bharadwaj et al., 2013a), the relationship between the organization's digital business strategy and its leaders (with specific attributes) executing that transformation has not been empirically examined. By uncovering this relationship, we can analyze leadership's influence on managing digital transformation successfully.

1.2.3 Leadership for Digital Transformation

Digital transformation is not a natural organizational change process; it needs to be managed by skilled and competent leadership (El Sawy et al., 2016), which implies that digital transformation must be pursued strategically through purposeful leadership. Strategic leadership of digital transformation entails engaging all employees of the organization, providing a common understanding of capabilities necessary to execute it, as well as the skills to preserve the technology-related well-being of employees (Larjovuori, Bordi, Mäkiniemi, & Heikkilä-Tammi, 2016). Consequently, to manage the challenges of digital transformation, employees' trust in change activities must be gained, internal processes have to be adapted, and the appropriate leadership for the process must be addressed.

In general, leaders impact the company's achievements through their decisions, actions, strategies, and their influence on others (Eggers & Kaplan, 2009; Kaiser et al., 2008). Reforming strategic objectives, like any corporate response to change, usually starts with the decision-making of the top management. Managerial cognition has been found to be an essential factor for decision quality and success (Adner & Helfat, 2003; Eggers & Kaplan, 2009), and are particularly connected to new technology and change in the context of digital transformation (Ocasio, 1997). The appropriate strategic orientation is the foundation for technological change

in the organization and should be initiated by leadership (Raymond & Bergeron, 2008). Studies have since identified a correlation between the type of business goals and the susceptibility to a particular form of leadership (Egri & Frost, 1994).

In the context of digital transformation, traditional leadership and information systems research has primarily focused on how leadership is disseminated and appropriated by information technology and how this technology affects the overall business strategy (DeSanctis & Poole, 1994). Introducing a concept analyzing the effects that emerge from the interaction of IT with organizational structures of which leadership is a part, Bruce J. Avolio et al. (2000) were one of the first to define and then name the concept; electronic/(e)-leadership. E-leadership is a concept rooted in the rapid rise of IT for communication purposes and its use in the corporate environment (Bruce J. Avolio et al., 2000; Bruce J. Avolio et al., 2014). It is comprised of technologies such as e-mail systems, information systems, knowledge management systems, collaborative IT systems and other tools that facilitate multiple parties to collaborate and participate in organizational and inter-organizational activities (Bruce J. Avolio et al., 2000; DeSanctis & Poole, 1994; Huber, 1984; Huseman & Miles, 1988).

Today, many people from different countries, organizations and cultures communicate and work remotely together via the use of IT (Bruce J. Avolio, Kahai, Dumdum, & Sivasubramaniam, 2001) in virtual teams (Rayport & Sviokla, 1995). Leadership in digital contexts is therefore a fundamental change in the relationship between followers and leaders within and between organizations (Bruce J Avolio & Kahai, 2003). However, there is still little known about the interactions between IT and leadership (Bruce J. Avolio et al., 2014).

What we do know is, that top management must make decisions concerning digital change, as they are essential to an organization's strategic orientation (Chen et al., 2014). For this reason, we find the new technology-focused board positions of Chief Information (CIO) (Carter et al., 2011; Kohli & Johnson, 2011) and Chief Digitalization Officers (CDO) (Lee et al., 2014; Singh

& Hess, 2017) in modern organizational structures. The CIO is a management board position that evolved during the information age of the 1980s (Y. P. Gupta, 1991) and represents an IT executive at one of the highest levels of the managerial hierarchy (Grover, Jeong, Kettinger, & Lee, 1993). Historically, this role's focus was on managing information systems and IT infrastructure (Y. P. Gupta, 1991; Tumbas, Berente, & vom Brocke, 2018). The role of the CIO has since shifted from a pure technologist to a strategic business innovation driver (Carter et al., 2011; Chun & Mooney, 2009). This extension has led to a level of complexity that can barely be managed by one person alone (Horlacher & Hess, 2016; Singh & Hess, 2017).

Digital transformation calls for certain capabilities and a specific mindset, most CIOs do not necessarily possess in their formal roles (Fitzgerald, Kruschwitz, Bonnet, & Welch, 2014; Matt et al., 2015). Consequently, organizations in recent years have increasingly introduced a new C-level position – the CDO (Haffke, Kalgovas, & Benlian, 2016; Horlacher & Hess, 2016; Singh & Hess, 2017). This board position is dedicated to coordinating and promoting company-wide digital transformation, which encompasses the development and execution of a digital business strategy (Singh & Hess, 2017; Tumbas et al., 2018). Nonetheless, albeit being vital to promoting the organization's digital agenda, these digital board positions (Armstrong & Sambamurthy, 1999) only represent a narrow, top-down perspective to managing strategic digital transformation, since digitalization impacts all business units and hierarchy levels (Bharadwaj et al., 2013b).

1.2.4 Digital Leadership

We reiterate, that leadership plays such an important role in organizational change caused by digital transformation, and that adequate leadership is fundamental for succeeding in digital transformation (Kakabadse, Abdulla, Abouchakra, & Jawad, 2011), as adaptation to change has a strong impact on organization effectiveness (Yukl, 2008). Still, the appropriate leadership for this particular context has not been properly researched, as of today (Larjovuori et al., 2016).

The reciprocal effect of digitalization as a new organizational context and leadership is one of the topics understudied in the field of digital transformation (Dodge, Webb, & Christ, 1999; Pagani, 2013; Porter & McLaughlin, 2006).

When theorizing about Digital Leadership, transformational leadership theory (Bass & Riggio, 2006) is useful in explaining organizational change management (Eisenbach, Watson, & Pillai, 1999), of which digital transformation is a part, though this theory has not been adopted for the digital age. In particular, according to Berson et al. (2006), there is insufficient empirical evidence on transformational leadership effecting innovation performance at the firm level, which is one of the most important drivers of digital transformation (Nambisan et al., 2017).

New environmental conditions, such as the uncertainty brought on by digital transformation, defines a specific context that determines the appropriate approach of leadership (Hernandez et al., 2011; Shamir & Howell, 1999). Digital transformation has been characterized as such a novel organizational context (Bolden & O'Regan, 2016; Rindfleisch, O'Hern, & Sachdev, 2017), it cannot be ignored when defining adequate leadership (Uhl-Bien, Marion, & McKelvey, 2007). Hence, there is the necessity for a new form of leadership for digital transformation, called digital leadership (El Sawy et al., 2016), that should encompass the whole spectrum of consequences, needs, and requirements of the dynamic system initiated by digital technologies and that which results in digital transformation (Uhl-Bien et al., 2007).

Digital Leaders, who really understand the changes new technology brings about, are needed on all organizational levels to carry out the organization's digital transformation end-to-end (Gottschalk, 1999). Thus, skilled and competent digital leaders are required in the turbulent times of digital transformation (El Sawy et al., 2016). These Digital Leaders are highly trained professionals in digital business fields and are the drivers and orchestrators of organizational digital transformation (Collin et al., 2015).

Social, cultural, interpersonal and task environments constitute leadership perceptions (Lord et al., 2001). This means, that the organizational context influences how leadership is perceived (Eberly et al., 2013; Epitropaki & Martin, 2005; Osborn, Hunt, & Jauch, 2002; Porter & McLaughlin, 2006; Shamir & Howell, 1999). Consequently, as digital transformation itself forms a new organizational context (Eberly et al., 2013), which requires adequate leadership (Bennis, 2013), Digital Leadership can be described as the upcoming leadership style for this digital age.

According to Hernandez et al. (2011), the leadership persona in digital organizational contexts can be transmitted by the traits associated with leaders, which differ from individual to individual and determine if one is up for the task (Moss & Jensrud, 1996). Leaders rely on specific capabilities to envision and make digital transformation possible (Westerman, Bonnet, & McAfee, 2014). For this reason, focusing on leader trait profiles (Zimmer, 2010) - commonly referred to as attributes - is important for understanding how individuals influence each other and shape the context of Digital Leadership (Bruce J. Avolio et al., 2014).

The increased application of new technology at work entails additional requirements from the workforce, besides pure IT competencies. These additional competencies include creativity, life-long learning, a problem-solving mindset, agility, resilience, coping with uncertainty, complexity and change, as well as intercultural and language competencies, and leading virtual teams, among other factors (Schwarzmüller et al., 2018; Singh & Hess, 2017). Leadership and information systems literature has identified specific attributes associated with leadership for successful digital transformation. Preston et al. (2008) have assessed CIO leadership profiles, which can be evaluated by differentiating CIO attributes. These have been found to orchestrate levels of IT contribution in organizations. Moreover, a specific CDO skillset (role) has been suggested for particular digital transformation tasks (Singh & Hess, 2017), as well. Although these top-management profiles are known, we still have little understanding of leader profiles

on lower management levels. For this reason, it is crucial to uncover the distinct attributes associated with leaders on all hierarchy levels, who successfully transform their organizations digitally, to help define the so-called Digital Leader.

Skilled personnel is becoming increasingly important, as technology contributes to more knowledge-based organizations (Schwarzmüller et al., 2018). There is a need for Digital Leaders who are digitally literate and they in turn must ensure their employees are, as well. Digital literacy requires knowledge and understanding of relevant digital concepts, digital tools and systems, and social technology features and platforms (Hunt, 2015). At the same time, Digital Leaders must be aware of the capabilities and limitations of innovations (Horner-Long & Schoenberg, 2002). Executives must proactively acquire these skills (Grover, Karahanna, & El Sawy, 2011), because in digital transformation contexts, leaders are required to be more adaptive and willing to experiment and innovate while occasionally failing (Vitalari & Shaughnessy, 2012).

To summarize, the principles of Digital Leadership differ from conventional leadership principles with regard to impact and importance of certain attributes and with respect to the emergence of the need for specific kinds of leadership, as research on electronic communication indicates (Balthazard et al., 2009). Digital Leadership thus requires a specific mindset at all levels of the organization (El Sawy et al., 2016), and specific attributes to coincide with this mindset, due to the unique nature of digital businesses. These particular attributes are usually defined by the perception of followers (Van Quaquebeke & Brodbeck, 2008). Although C-level leadership profiles (attribute combinations) for digital transformation are now known, we have very little knowledge of the effect of Digital Leader attributes and their relationship to a digital business strategy.

1.2.5 Implicit Leadership Theories and Prototype Digital Leader

There arises the situation where one's leadership influence on a desired digital transformational outcome may not be measurable, observable or traceable. One approach to the authentication of evidence of that leader's influence is to dissect the leader trait profile, i.e., that particular and exclusive combination of attributes of the so-called Digital Leader. In addition, within the organizational context, to understand the leader's influence, we would need to isolate the kind of personality required to best lead and how that leadership is perceived by subordinates and peers (Eberly et al., 2013; Epitropaki & Martin, 2005; Osborn et al., 2002; Porter & McLaughlin, 2006; Shamir & Howell, 1999). Therefore, assessing leader traits or attributes is a common theoretical starting point for the exploration of leadership.

Since our objective is to link the perception of leadership with respective attributes, we employ Implicit Leadership Theories (ILT) to explain leadership attributions and perceptions (e.g.: Den Hartog et al., 1999; Eden & Leviatan, 1975; Lord et al., 1984; Offermann et al., 1994). According to Phillips and Lord (1981), ILT's are a cognitive categorization process in which non-identical perceived stimuli are classified into categories based on similarities with stimuli in the same category (Rosch, 1999). This categorization is an elegant method of reducing external world complexities into a smaller number of categories which allows for easier analysis management; there is a symbolic representation generated in terms of the labels given to the categories which by providing a system of shared labels (e.g., attributes) (Cantor & Mischel, 1979) simplifies the process.

Followers observed leaders and matched their perception of displayed leadership attributes to an internal prototype of leadership categories, which is a cognitive categorization process (Foti & Luch, 1992). The leader prototype model can be described as a collection of specific characteristics or traits and is then labeled as Implicit Leadership. A leader is perceived as such

when the observed individual matches with the observer's internal leadership prototype (Foti & Luch, 1992; Offermann et al., 1994).

For example, when followers believe that if leaders' actions and behaviors exemplify being innovative (Eden & Leviatan, 1975), then they are likely to interpret the leader as being transformational (Conger & Kanungo, 1987). Building an analogy, when we take a closer look at how, where and why leaders match prototypes of Digital Leaders, this may help us understand what is necessary for leaders to be perceived as being successful in their organization's digital transformation.

Research on ILT has been primarily conducted in the field of ideal leaders, emphasizing both positive and negative prototypes (Dorfman, Hanges, & Brodbeck, 2004; Junker & van Dick, 2014; Nye & Forsyth, 1991). Up until now, there have been only a few studies (Foti, Fraser, & Lord, 1982; Ling, Chia, & Fang, 2000) that focus on typical leadership prototypes. However, analyzing the ideal prototype perception can help us understand how the norm of prototype affects leaders and followers. Nonetheless, very little research integrating leadership prototypes has been carried out, to date (Schyns & Schilling, 2011; Van Quaquebeke, Graf, & Eckloff, 2014).

1.3 Research Methodology

The empirical sections of the thesis apply several methods to answer the aforementioned research questions. While Chapter II mostly applies qualitative approaches, Chapter III relies on quantitative research methods. According to Yukl (2006), the nature of leadership involves the exercise of influence and can be described as a complex, multi-faceted form of performance that does not exist unless applied (Mumford, 2011). To date, the attributes that form this particular new leader type have not been identified, as Digital Leadership is a relatively new form

of leadership. Nevertheless, the process of uncovering new leadership properties has to be prepared carefully to ensure internal and external validity (Parry, Mumford, Bower, & Watts, 2014).

An initial inductive qualitative-explorative method was found most fitting and utilized to assess the basic underlying attributes (V. Gupta, MacMillan, & Surie, 2004) due to the reality that research on Digital Leadership is in its infancy. As soon as a distinct set of attributes had been derived, these could be quantified using sophisticated numerical ranking (Barron & Barrett, 1996) and conceptual clustering methods (Michalski & Stepp, 1983) in the first essay. Upon these findings, insights were further tested and analyzed in a quantitative-empirical design (Den Hartog et al., 1999) in the second essay to address whether the acknowledged Digital Leader attributes actually have an influence on the organization's digital transformation. The following sections will briefly summarize the advantages and disadvantages of the individual methods applied, as well as the analyzed data within the different chapters and approaches.

1.3.1 Qualitative Approach

Qualitative methods have gained much momentum as a mode of inquiry for leadership research (Parry et al., 2014), as this form of research is predominantly used to explore people's understanding of new phenomena in society when knowledge about it is rare (Flick, 2018). The advantages of doing qualitative research when studying leadership includes flexibility to follow unexpected ideas during research and explore processes effectively. Qualitative methods also afford sensitivity to contextual factors, and the ability to study symbolic dimensions and social meaning (Alvesson, 1996; Bryman, Bresnen, Beardsworth, & Keil, 1988; Conger, 1998). Moreover, qualitative research increases opportunities to develop empirically supported new ideas and theories for in-depth and longitudinal explorations of leadership phenomena, as well as creates more relevance and interest for practitioners. It can also be used to reveal thoughts and

beliefs associated with a phenomenon, which then can be later examined regarding their predictive validity in quantitative research.

As the first study was primarily directed at IS practitioners and managers of the digital transformation of the organization, the respective essay included in this dissertation only briefly touches on the methodology applied. For this reason, we elaborate on the qualitative approach to give a more detailed methodological context. The main research objective for this first essay was the entirely free statement of implicit attributes of the Digital Leader. In this study, respondents directly ranked their implicit attribute nominations in a corresponding follow-up step within the questionnaire. Following a procedure by Den Hartog et al. (1999) and referring to a seven-point scale, in which middle managers described attributes they felt augmented or hampered outstanding digital leadership. Those attribute nominations were freely named by the participants and then ranked within the questionnaire in a subsequent procedure. This in essence, was the primary core for the first essay. In similar fashion, Epitropaki and Martin (2005) asked their participants to rate how characteristic certain implicit business leader traits were, with no explicit definition of the term provided prior. The researchers then assessed rated characteristics of traits found in the respondents' direct managers, in order to compare and contrast the perception of leadership.

Respondents of our study were asked to rank their prior stated prototype attributes, following the initial exploratory attribute assessment. This ranking, again, follows the procedure used by Den Hartog et al. (1999), where respondents were originally asked to rate the importance of leader characteristics. Ranking is necessary for precise weight elicitation (Johnson & Huber, 1977) of the importance of each attribute, so they can be factored in further calculation, and ranking serves this purpose well, as it is reliable and easy (Eckenrode, 1965). In many cases, participants may not be able to assign weights directly (Kirkwood & Sarin, 1985), but have more confidence in the process of ranking (Barron & Barrett, 1996). However, when attributes

are ranked it is not possible to determine their correct weight directly (Roberts & Goodwin, 2002). To solve this issue, several methods have been developed to transform the ranking into 'surrogate' weights that serve as an approximation of the actual respondents' weights (Roberts & Goodwin, 2002). According to Barron and Barrett (1996), the rank order centroid (ROC) has proven to be most efficacious. ROC is also the most common method applied to real decision-guiding multi-attribute utility measurements (Edwards & Barron, 1994), which formula is:

$$w_i(\mathrm{ROC}) = \frac{1}{n}\sum_{j=i}^{n}\frac{1}{j}, \qquad i = 1, \dots, n. \tag{1}$$

The ROC weights only depend on the number of attributes stated *n* and the assigned rank of the attribute *j* (Barron & Barrett, 1996), and was highly suitable for this research.

To form the definitive list of Digital Leader attributes, The Gioia Methodology (Gioia, Corley, & Hamilton, 2013) was implemented. It is a system used for the semantic coding of collected data. The scheme assigns theoretical dimensions to hypothetical attribute clusters which have been generated. The Gioia Methodology claims to simultaneously offer flexibility and qualitative accuracy and is most appropriate to assess the attributes generated by the survey participants when evaluating the characteristics of a Digital Leader. After the raw data was generated, collected and inserted into the Three-Stage Process (TSP) (Pratt, Rockmann, & Kaufmann, 2006) it was transferred into the Gioia Methodology data structure (Corley & Gioia, 2004) (see Figure 1) for further analysis.

In the first step of the TSP, the participants' stated attributes describing their prototypical Digital Leader were coded openly (Locke, 2001) in order to form provisional categories followed by first order codes (Pratt et al., 2006). In this step, data was unified for further handling, by correcting typing errors and statements initially expressed as nouns and transforming them into adjectives (e.g., "empathy" into "empathic", "willingness to change" into "willing to change"). Those that could not be transformed (e.g., "numerical reasoning", "change manage-

ment") were dismissed from further consideration. The same procedure was applied to expressions like "ability to lead" or "leadership" since they merely replicate terminology specified by the listed adjectives and therefore did not have any informative value. After initial codes were formulated, individual attribute statements could be matched accordingly. If proven that categories should not reflect the whole spectrum of statements, a revision had to be undertaken.

The second stage of the TSP was initiated to form theoretical themes when a point of saturation was met (Corbin & Strauss, 2014) and no new codes were generated. Resulting in more abstract and theoretical categories or clusters (Harrison & Rouse, 2015), the unrelated and unsorted list of first-order concept codes were merged and transformed from open to axial coding (Corbin & Strauss, 2014; Locke, 2001) allowing a comparison of codes. At this stage, by clustering the unsorted semantic codes into two phases of pre-clustering and the clustering itself, we were able to connect first-order concepts to an overall phenomenon. Through numerical evaluation, crucial clusters could be identified, using the main clusters identified in the pre-clustering phase in order to assign the secondary clusters by means of literary analysis.

Pre-clustering: consulting the online version of Duden (Duden, 2018), a professional German dictionary (Allport & Odbert, 1936; Angleitner, Ostendorf, & John, 1990), adjectives were grouped semantically (Cattell, 1943). The German dictionary was thoroughly inspected for meaning and synonyms of every single adjective stated by the respondents. Adjectives that were equal in meaning or listed as synonyms were grouped together (Cattell, 1943; Offermann & Coats, 2018; Offermann et al., 1994). Although several adjectives have various meanings, no distinction was made, since the data did not give any hint about the meaning intended by the respondents. The groups were labeled according to the inclusive expression stated most often (Offermann & Coats, 2018). Next, groups that represented subclasses of other groups were added to the overlying classes (e.g., "digital" to "technology-oriented", "social competent" to "competent") (Schyns & Schilling, 2011). The resulting semantic groups and single adjectives

that were nominated merely one or two times were omitted from further examination (Offermann et al., 1994; Sternberg, 1985). Those attributes and groups that remained, framed the so-called pre-clusters. For each pre-cluster the relative importance was determined numerically by its pre-cluster nomination frequency (Guest & McLellan, 2003) and pre-stated attribute rankings (Epitropaki & Martin, 2005; Offermann et al., 1994). Using the aforementioned ROC method (Barron & Barrett, 1996), attribute ranks were transformed into importance weights as stated by the respective respondent. In a subsequent step, individual weights were aggregated per response (in cases where one pre-cluster was mentioned more than once per respondent) and finally, the total sum of weighted nominations could be calculated. This resulted in aggregated total importance weights, which could be compared among the newly formed pre-clusters (Love, 1981). Pre-clusters were then sorted in descending order in accordance with these total weights, resulting in a notable delta between the fourth and the fifth pre-cluster, delivering the cutoff after the fourth pre-cluster. The four remaining pre-clusters with the highest total weights captured about half of the total number of nominations of all pre-clusters, resulting in the composition of the main clusters.

To assist in comprehension and order categories coherently, they were first grouped into pre-clusters which were designated as theoretical categories when a conceptional relationship was uncovered. Pre-clusters were then assigned to major or main clusters from which aggregate dimensions could be gleaned. Michalski and Stepp (1983) and Stepp and Michalski (1986) work on conceptual clustering established this procedure to allow for the integration of descriptive concepts, environmental knowledge and object coherences into the classification process (Srivastava & Murty, 1990). In contrast, conventional cluster methods considered only numerical distance measures previously. Therefore, in the final stage of the TSP, the pre-clusters (theoretical categories) could be compared to ideas and concepts which were developing in contemporary literature. This present-day literature included material from expert interviews,

journals and case studies, all referring to or related to digital transformation. The theoretical categories were then aligned and main clusters (aggregate dimensions) derived. If a conceptual relation was found, pre-clusters from the previous stage were thus assigned to the main clusters identified (crucial pre-clusters).

As soon as the second-order themes (pre-clusters) were distilled, a data structure (see Figure 1) could be built upon these aggregate dimensions (Gioia et al., 2013), thus delivering the attributes of the Digital Leader. The TSP in combination with the Gioia Methodology serves as a guideline to work up available data and set the foundation for theory derivation. It does not, however, offer a theoretical explanation, per se.

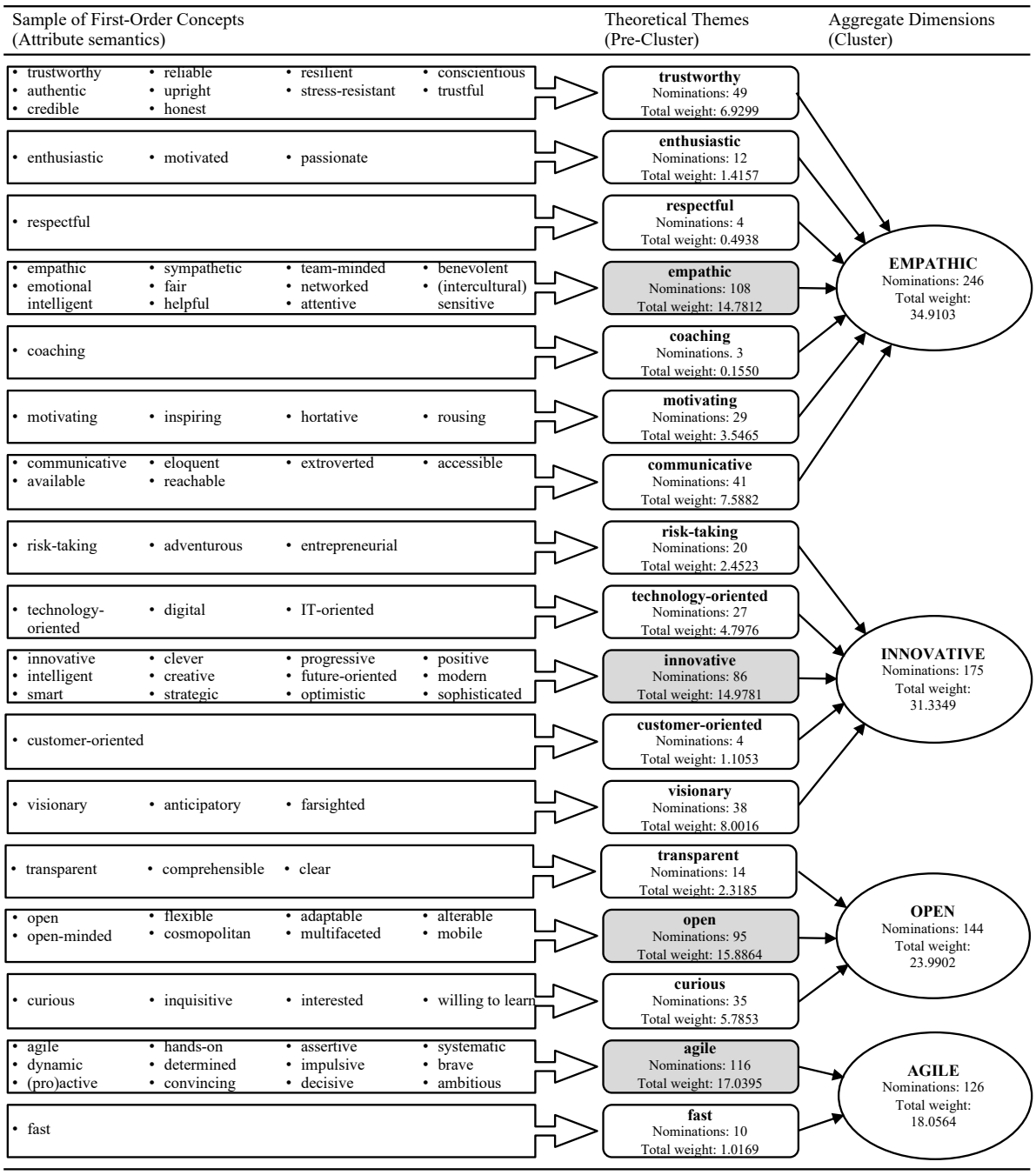

Figure 1: Clustering procedure represented according to the Gioia Methodology data structure (Corley & Gioia, 2004)

1.3.2 Quantitative Approach

In contrast to the qualitative approach, e.g., applied in the first study, quantitative methods can be used to verify hypotheses statistically. While the previously mentioned qualitative approach had aimed to reveal thoughts and beliefs (Willig, 2013) regarding leader attributes associated with successful digital transformation, qualitative methods are unable to draw

conclusions on how these findings might be interrelated (Tashakkori & Teddlie, 2008). Quantitative research can remedy this by allowing inferences between variables and hence their relationship to each other (Nimon & Oswald, 2013; Robson, 2002). The main advantage of quantitative research being the generalizability of results to a large population (e.g., organizations), this methodology allows for identifying trends and patterns that apply in a multitude of situations (Myers, 2020). In particular, survey-based data collection in combination with quantitative analysis methods are highly applicable for leadership research (Antonakis et al., 2004), as reliability is high for surveys (Babbie, 2020). In addition, quantitative analysis should not affect the research result because the participant responses are coded, categorized and reduced to numbers that are manipulated for statistical analysis (Cooper, Schindler, & Sun, 2006).

Like many related organizational studies, leadership research still remains a puzzle due to its complexity (Jago, 1982). Although research has attempted to define a new digital organizational context (Bruce J. Avolio et al., 2000; Bruce J Avolio & Kahai, 2003) for digital transformation, scholars do not agree on specific attributes related to leaders in the new digital age. Nevertheless, distinct traits associated with successful digital transformation have also been identified in the literature, apart from the findings we have made in the first essay, thus, an empirical approach was conducted to answer the second research question (Stevens, 2012). As mentioned above, while qualitative research is useful for the inductive interpretation of data, quantitative research tends to apply a deductive approach based on hypotheses to analyze relationships of certain variables (Cooper et al., 2006; Gephart, 2004). We thus further analyzed whether the uncovered Digital Leader attributes actually influence desired digital transformation outcomes for the organization with quantitative methods, based on the qualitative results of this dissertation's first study.

Once the scales for measuring Digital Leader attribution and a proxy for a desired digital transformation outcome, the perception of the organization's digital business strategy (DBS),

were selected (Crawford & Kelder, 2019), data was collected to perform the statistical analysis. In order to estimate factors (Field, 2013) and to verify the construct validity and reliability for the attributes emphatic, innovative, open and agile, an exploratory factor analysis (EFA) and a confirmatory factor analysis (CFA) (Stevens, 2012) were applied. Various aspects of these constructs have already been applied in research, though they have not been validated in the form of separate variables. The EFA and the CFA was also applied to verify the DBS variable.

Many leadership scholars have used quantitative research designs to gain valuable insights (Farahani, Taghadosi, & Behboudi, 2011; Joo, Yoon, & Jeung, 2012; Şahin, Çubuk, & Uslu, 2014), in particular when examining the influence of transformational leadership on organizational outcomes (Reichard et al., 2011). Hence, to address research question 2 (i.e., Do implicit leader attributes for digital transformation affect the perception of the organization's digital business strategy?; Chapter III) hierarchical regression was applied, as this method is appropriate when a single-metric dependent variable is hypothesized to be related with multiple metric independent variables (Howell, 2012; Kline, 2015), as in the case of the attributes of the Digital Leader affecting digital transformation outcomes. In line with similar approaches in the literature, we ran a number of hierarchical regressions to account for the perceptions nested in the individual participants in order to test our hypotheses (Raudenbush, Bryk, & Congdon, 2004).

Before taking a closer look at the influence of the attributes of the Digital Leader on DBS, we examined the influence of possible control variables on the perception of the organization's digital business strategy to take into account in further statistical analysis (Bernerth, Cole, Taylor, & Walker, 2018). Following the approach by Reichard et al. (2011), we thus performed the hierarchical regression in two steps. The control variables were entered in Step 1, followed by all four independent variables in Step 2, for the complete model. For models 2-5, each attribute was entered individually in Step 2, representing distinct statistical models for hypothesis testing.

To sum up, an array of research methods with both qualitative and quantitative approaches were used to answer the research questions of this dissertation, based on different sources of data, which were collected over the course of three years. Overall, the variety of both methodical research approaches and data sources contributed to a sound and comprehensive resolution of the research questions of this thesis.

1.4 Structure, Main Results, and Contribution

In total, this thesis is structured in four chapters. Apart from the introduction in Chapter I, above, Chapters II and III form the main part of this dissertation and are independent essays that focus on the specific elements of the previously described research questions. Both essays introduce and investigate closely linked subtopics in detail, including a section on theoretical background, data and methodology, analysis and results, as well as a discussion section. Finally, this thesis is concluded by Chapter IV, highlighting and summarizing the overall findings and main contributions. The next paragraphs briefly summarize the theoretical foundation, main research questions, key results and the contributions of the respective essays.

Chapter II was designed as an exploratory study to help define adequate leadership for successful digital transformation by assessing the attributes that describe the prototypical Digital Leader. The essay's theoretical foundation is rooted in both leadership and IS research on digital transformation of the organization. In particular, we examined which personal skills, competencies and traits (Hernandez et al., 2011) are associated with successful digital transformation, as knowledge of Digital Leader attributes is the first step (V. Gupta et al., 2004) in understanding the leader's influence on the digital transformation of an organization (Bruce J. Avolio et al., 2014). The results, based on sophisticated numerical ranking and conceptual clustering methods applied to statements made by employees and leaders of organizations with a high degree of digitalization, yielded 'empathic' as the highest ranked Digital Leader attribute, followed by traits describing these leaders as 'innovative', 'open' and 'agile'. Chapter II's study

pinpoints the four precise attributes displayed by successful Digital Leaders. The study also provides us with a basis of understanding of how to successfully transform an organization digitally, from a leadership point of view. Finally, referring to the aforementioned attributes of Digital Leadership, we are provided with guidelines and information for choosing or training those individuals who will lead their organizations in digital transformation. In this way, Chapter II contributes to the literature in three ways.

Chapter III follows up on the qualitative-exploratory results of Chapter II by empirically analyzing whether implicit leader attributes, associated with the successful digital transformation of the organization, influence employees' perception of their organization's digital business strategy, to further sharpen the image of the so-called Digital Leader. Based on hierarchical regression analyses with uniquely developed and verified constructs, the results of this chapter indicated that, indeed, all four Digital Leader attributes have a significant positive effect on the organization's digital transformation. This chapter empirically addresses significant gaps in the research on the relationship between technology and leadership (Bruce J. Avolio et al., 2014), as well as the importance of distinct leader attributes on strategic digital transformation (Nambisan et al., 2017). In this chapter the dissertation contributes to three distinct topics: The examination of how ILTs are directly linked to and influence digital transformation within specific organizational settings, as there has been currently little knowledge developed (Epitropaki & Martin, 2005); A comprehensive expansion of the scant existing research on the relationship between technology and leadership (Bruce J. Avolio et al., 1999; Bruce J. Avolio et al., 2014; Bass & Riggio, 2006) and its impact on digital transformation of the organization (Nambisan et al., 2017), extending the examination of e-leadership (Bruce J. Avolio et al., 2000) and transformational leadership, by the new organizational context of digital transformation (Eberly et al., 2013); And finally, a spotlight on the integration of information technology (IT) in overall strategic management planning (Drnevich & Croson, 2013), with focus on the Digital Leader's

input and guidance in a digital business strategy (Bharadwaj et al., 2013a, 2013b; Chen et al., 2014). This is our contribution to the current information systems and leadership literature.

The final Chapter IV of the dissertation discusses the joint findings from Chapters II and III as well as the most important theoretical and practical implications that arose. The chapter concludes by presenting the limitations of said research and gives directions for future research in the analyzed fields.

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2. Leader Attributes for Successful Digital Transformation

Abstract

Digital transformation poses one of the largest threats to incumbent organizations if not managed by skilled and competent leadership. This exploratory study, therefore, defines adequate leadership for successful digital transformation by assessing the attributes that describe the prototypical Digital Leader. Based on sophisticated numerical ranking and conceptual clustering methods applied to statements made by employees and leaders of organizations with a high degree of digitalization, 'empathic' emerged as the highest ranked Digital Leader attribute, followed by traits describing leaders as 'innovative', 'open' and 'agile'. Furthermore, we suggest guidelines for identifying Digital Leaders, making use of Digital Leader profiles and lessons learned from observations made by applying Digital Leadership.

Keywords: Digital Leadership, digital transformation, digital business strategy, leader attributes

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2.1 Introduction

Digitalization and digital transformation have the potential to fundamentally change almost every aspect of our modern society (Bauer, Schlund, & Vocke, 2018). Digital transformation can encompass changes ranging from the simple introduction of new communication methods, through to the total transformation of the organization's business model (Dörner & Edelman, 2015). In literature, emphasis is primarily put on the overwhelming positive effects of digitalization, like simplifying business processes and teamwork or storing and distributing information (Banker, Bardhan, Chang, & Lin, 2006; Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013a; Ettlie & Pavlou, 2006; Kohli & Grover, 2008; Rai, Pavlou, Im, & Du, 2012; Sambamurthy, Bharadwaj, & Grover, 2003; Straub & Watson, 2001; Subramaniam & Venkatraman, 2001; Tanriverdi & Venkatraman, 2005). However, it can also pose a tremendous threat to incumbent organizations, still mired in doing business in an analog fashion. Digitally transforming an organization can lead to higher degrees of complexity within the organization, if not managed correctly (Ray, Muhanna, & Barney, 2005). Since organizations are interconnected systems, change in the technical system affects change in the social system (including leadership), and vice versa (Avolio, Sosik, Kahai, & Baker, 2014). Thus, digitally transforming organizations requires leadership that fosters the ability of organizational cultures to adequately adapt both systems along the entire transformation process (Alos-Simo, Verdu-Jover, & Gomez-Gras, 2017). This digital transformation does not come naturally; it is a process that needs to be managed by skilled and competent leadership (El Sawy, Kræmmergaard, Amsinck, & Vinther, 2016).

As technology contributes to more knowledge-based organizations, skilled personnel is becoming increasingly important (Schwarzmüller, Brosi, Duman, & Welpe, 2018). In particular, leaders must be digitally literate and ensure their employees are as well. Digital literacy requires knowledge and understanding of relevant digital concepts, digital tools, systems, and social

technology features and platforms (Hunt, 2015), balanced with awareness of the capabilities and limitations of innovations (Horner-Long & Schoenberg, 2002). Grover, Karahanna, and El Sawy (2011) have added the notion that for digitalization, explicitly executives must proactively acquire these skills. These leaders are required to be more adaptive and willing to experiment and innovate while occasionally failing (Vitalari & Shaughnessy, 2012). Key to navigating through these challenges towards a successful digital organization are competent Digital Leaders.

Against this background, management and information systems (IS) scholars have set out to determine new leadership styles for transforming organizations digitally, though research in this field is as yet, preliminary. Although much has been written about the way new technology has altered our conception of modern leadership (Avolio, Walumbwa, & Weber, 2009), the relationship between technology and leadership remains relatively under-researched (Avolio et al., 2014). How the use of technology disseminates leadership (DeSanctis & Poole, 1994), and how organizational structures, may transform as a result of interactions with technology (Alos-Simo et al., 2017; El Sawy et al., 2016; McElheran, 2015), have not yet been deeply explored. Moreover, academia has pointed out the necessity of a holistic digitalization strategy from a leadership point of view.

To distinguish which kind of leader digitally transforms an organization, examining their skills, competencies and traits (Hernandez, Eberly, Avolio, & Johnson, 2011) - together commonly referred to as attributes - helps us to define an adequate Digital Leader. Knowledge of Digital Leader attributes is the first step in understanding the leader's influence on the digital transformation of an organization (Avolio et al., 2014). With these attributes, we are able to analyze the relationship between the instrumentation of digital technology by Digital Leaders and their personal characteristics as a function of this particular context and environment, ulti-

mately helping us unravel the interaction of both (Bennis, 2013). This study explores the attributes of the Digital Leader, as perceived by both employees and leaders of digital savvy organizations. Digital savvy organizations are identified as to the extent of digitalization embedded within organizational contexts. This identification is accomplished by ascertaining how digital the respondents' organizational setting was when surveyed. Following the results of our subsequent empirical analysis, we can derive that skilled and competent (El Sawy et al., 2016) Digital Leaders with distinct attributes can cope with higher degrees of complexity within the organization, which arises from digital transformation (Ray et al., 2005). We contribute to management and IS literature in three ways. First, our study yields four distinct implicit attributes associated with successful Digital Leaders. Overall, empathic emerged as the highest ranked Digital Leader attribute, followed by innovative, open and agile. Second, we help to understand how successful digital transformation takes place within organizations from a leadership point of view. Third, by considering the attributes of a Digital Leader, we provide organizations with information and guidelines on how to choose or train the adequate leader for their digital transformation journey.

2.2 Leadership for Digital Transformation

2.2.1 Digital Business Strategy and Information Systems Leadership

Whether a digital strategy is deliberately pursued or not, changes to both established and emerging business ventures occur. Since its emergence, we have witnessed the digital disruption of entire industries, such as personal transportation and telecommunication, as well as the democratization of information availability, which otherwise might not have been possible under other circumstances. Hence, while digitalization may benefit entrepreneurial firms through nascent opportunities, it also may pose a threat to conventional businesses that have not adapted to the zeitgeist. Consequently, some businesses will fail, while others will prosper. Due to the

influence digitalization has on the speed of business metamorphosis, laggards may face the risk of being left behind, if they cannot cope with digital trends adequately (Hansen, Kraemmergaard, & Mathiassen, 2011).

According to Dubelaar, Sohal, and Savic (2005), companies have to react in order to stay competitive in the growing digital economy. Succeeding in digital transformation (Zhu, Dong, Xu, & Kraemer, 2006) often implies maintaining a relative advantage through innovation with regard to digital products and services, while remaining compatible in terms that such innovation is consistent with existing business operations (Rogers, 1995). To cope with these changes, internal processes have to be changed, employee trust must be strengthened, and appropriate leadership must be formed. Decisions concerning digital change like e-business adoption have to be made by leaders as it is a part of companies' strategic orientation (Chen, Tang, Jin, Xie, & Li, 2014).

The integration of information technology (IT) in strategic management (Drnevich & Croson, 2013) is undisputedly vital to the organization's overall digital business strategy. As a result, certain organizations have reacted by installing newly formed IS leadership (Karahanna & Watson, 2006) board positions of Chief Information (CIO) (Carter, Grover, & Thatcher, 2011; Kohli & Johnson, 2011) and Chief Digitalization Officers (CDO) (Lee, Madnick, Wang, Wang, & Zhang, 2014; Singh & Hess, 2017). These digital board positions (Armstrong & Sambamurthy, 1999) form just the tip of the iceberg on the organization's macro level (leadership of the whole organization) (Karahanna & Preston, 2013). However, digital transformation spans across all business units on both macro and micro (leadership of small groups) levels (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013b). To sufficiently carry out the organization's digital transformation, Digital Leaders, who truly understand the changes new technology evokes (Gottschalk 1999), on all organizational levels are needed.

It is therefore important to put emphasis on the crucial role of the Digital Leader within the organization's overall digital business strategy (Bharadwaj et al., 2013a, 2013b; Chen et al., 2014). We have so far failed to bridge the micro-macro divide concerning the organizational level perspective, resulting from sole C-level digital board position literature (Armstrong & Sambamurthy, 1999; Carter et al., 2011; Kohli & Johnson, 2011; Lee et al., 2014; Singh & Hess, 2017). What has been neglected so far is executing a more holistic digital business strategy by putting the Digital Leader at the center of attention on all organizational levels (Gottschalk, 1999) to sufficiently carry out the organization's digital transformation from within their respective entity (Bharadwaj et al., 2013b; Hansen et al., 2011).

2.2.2 Digital Transformation and Digital Leadership

As of now, leadership and IS research on digital transformation has primarily focused, on how IT alters the way leadership is disseminated, and how digitalization itself affects the overall business strategy. According to DeSanctis and Poole (1994), the appropriation of IT by leaders can affect how they lead through technology, and how leadership itself affects the use of technology. The main underlying focus is the interplay between leadership and IT. Based on their theory, Avolio, Kahai, and Dodge (2000) first introduced e-leadership, a concept analyzing the effects of IT, which emerge from their interaction with organizational structures of which leadership is a part. Furthermore, the authors point out, that organizational structures, including leadership, may themselves transform as a result of interactions with IT. In a later study, Avolio et al. (2014) indicated that still little is known about such interaction between IT and leadership, i.e. how leadership is mediated by the use of technology. Technology is undoubtedly affecting leadership and e-leadership is a fundamental change in the way leaders and followers are related to each other within organizations and between organizations (Avolio & Kahai, 2003).

As described above, digital transformation is not limited to purely digital ecosystems; it completely changes the way various industries operate, regardless of their scope (Bharadwaj et

al., 2013a). Digital transformation especially challenges digitally inexperienced industries (Kohli & Johnson, 2011). With respect to the emergence of leadership, research on electronic communication indicates (Balthazard, Waldman, & Warren, 2009) that leadership for digital transformation differs from conventional change or IS leadership theories in terms of impact and importance of certain attributes. And, further, that they are necessary to execute the organization's digital business strategy. Scholars have emphasized that for successful digital transformation skilled and digital literate leaders (Hunt, 2015; Schwarzmüller et al., 2018) with a specific mindset (El Sawy et al., 2016), and specific attributes to coincide this mindset, are needed, though they have not provided knowledge on what these attributes are. Digital transformation itself forms a new organizational context (Eberly, Johnson, Hernandez, & Avolio, 2013), demanding adequate leadership (Bennis, 2013); and Digital Leadership can be described as the upcoming leadership style for this digital age.

2.3 Defining the Digital Leader

2.3.1 Method and Data

As mentioned above, the key to success in the turbulent times of digital transformation is skilled and competent leadership (El Sawy et al., 2016), thus the need for a true Digital Leader. However, as of now, we do not know what constitutes such a Digital Leader. Collin et al. (2015) mention that highly trained professionals in digital business fields are the drivers of digital transformation. According to Hernandez et al. (2011), leadership in digital contexts can be transmitted via the traits (i.e., who one is), associated with leaders and followers, among other factors. Since research on Digital Leadership has yet begun, an initial inductive qualitative-explorative method proved most apt for assessing the basic underlying attributes (Gupta, MacMillan, & Surie, 2004).

2.3.2 Sample

Apart from ventures based on digital technologies (digital startups), these so-called Digital Leaders are typically found in technical industries, though are not limited to such, as digital transformation canvases all business fields. For this reason, surveys with employees and leaders of digital established organizations and startups were conducted, as we believed we would encounter many Digital Leaders in these organizational settings. In our study, we deliberately targeted organizations with a high degree of digitalization, that act in digital market categories such as artificial intelligence and data analytics to ensure a digital context in the survey. We therefore followed a recent approach quantifying the degree of digitalization of an organization - is its Digital Maturity (Kane, Palmer, Nguyen-Phillips, Kiron, & Buckley, 2017; Kane, Palmer, Phillips, & Kiron, 2015; Kane, Palmer, Phillips, Kiron, & Buckley, 2015; Kiron, Kane, Palmer, Phillips, & Buckley, 2016), which can be seen as an index, assessing to which degree they have been transformed by "digital technologies and capabilities that improve processes, [and] engage talent across the organization" (Kane et al., 2017: 66), and limited analysis to participants with a high Digital Maturity index.

Startups were partially sourced from the database crunch base, a website that collects company information from early-stage startups to fortune 1000 companies (Crunchbase, 2018), as well as directly approached through special founders networking events. Focus was laid on companies who had been founded no later than 5 years prior (at the time of inquiry) and employed less than 10 individuals to ensure a startup character and raise the chances of the founders (potential Digital Leaders) to participate in the survey. The majority of surveys completed by corporate employees was collected through intensive contacting through email, professional social media, and personal networking. The total number of participants in the sample comprised 714, with a completion rate of 27%, yielding 196 filled out surveys. Of those, 50 responses had to be removed, due to insufficient data. In total, of the 146 remaining surveys (20%

total completion rate), 120 surveys (82% of total completed) were filled out by employees and leaders at established organizations, and 26 (18% of total completed) surveys were filled out by employees, leaders and founders of startups. A scale from 0% (lowest rank: no employee responsibility) to 100% (highest rank: C-level) was used to portray the hierarchical level within the organization.

In the group of established organizations, the participants' age ranged from a minimum of 24 years to a maximum of 64, with an average of 39.0 years (SD = 11.6 years). Female respondents accounted for 38.3% of this group. The mean of professional tenure was 15.7 years (SD = 11.5 years) and 64.2% of participants held a managing position within the organization, with an average hierarchy level of 58.5% (SD = 31.3). The sub-sample therefore showed a large share of managing personnel, however with a rather low hierarchical rank within their organization. In the startup group, participants' age ranged from a minimum of 23 years to a maximum of 54, with an average of 32.9 years (SD = 8.7 years), and female respondents accounted for 38.5% of this group. The mean professional tenure in startups was notably shorter at 10.2 years (SD = 8.5 years) and 84.6% of participants held a managing position within the organization. In the startup group, the average hierarchy level was 82.8% (SD = 24.8). Therefore, this subsample not only showed a very large share of managing personnel, but also had a high hierarchical rank within the organization. Overall, we managed to collect data from participants, of which mostly held a managing position with moderate to high levels of hierarchy in their organization. Approximately 20% of all participants were in general management, 17% from R&D departments, 10% had a human resources background and 8% were employed in IT departments. Almost 60% of the respondents in this study held technical occupations (e.g.: mathematics, engineering and IT) with their organizations' area of business mostly rooted in mechanical engineering (32%) or electrical engineering and IT (19%), and mostly came from the industrial sector (= 67%; service = 32%; agrarian = 1%). The majority of organizations were

large (> 1000 employees; 20%) or very large (> 5000 employees; 53%) and had mostly been founded in the first half of the 20th century (76%).

2.3.3 Procedure

Our inquiry was mainly focused on the free statement of implicit attributes of the Digital Leader, which were directly ranked by the respondents in a corresponding follow-up step within the questionnaire. This procedure follows the seven-point scale of Den Hartog, House, Hanges, Antonio Ruiz-Quintanilla, and Dorfman (1999), where middle managers were asked to rank their perception of those leader attributes which in their view, either enhanced or impeded outstanding leadership. As participants were asked to name at least five different adjectives describing their ideal Digital Leader, i.e., attributes, skills and competencies they specifically imply with successfully leading through digital transformation, individual nominations were clustered semantically around the overlying phenomena, which had received the most direct nominations. To eventually form a shortlist of distinctive attributes affiliated with the Digital Leader, a semantic coding scheme (Gioia Methodology) for aggregating theoretical dimensions and generating hypothetical attribute clusters was applied, as this methodology offers flexibility and qualitative rigor at the same time (Gioia, Corley, & Hamilton, 2013). The individually stated attributes were embedded into the Three-Stage Process (TSP) of Pratt, Rockmann, and Kaufmann (2006) and transferred into the Gioia Methodology data structure (Corley & Gioia, 2004) to extract theoretical dimension for further analysis.

In the first step of the TSP, open coding logic (Locke, 2001) based on the participants' stated attributes describing their prototypical Digital Leader was applied in order to form provisional categories followed by first order codes (Pratt et al., 2006). After initial codes were formulated, individual attribute statements could be matched accordingly. Once a point of saturation was met (Corbin & Strauss, 2014), where no new codes could be generated, a shift towards the second stage was made to form theoretical themes.

In this second stage, the unrelated and unsorted list of first-order concept codes was consolidated, moving from open towards axial coding (Corbin & Strauss, 2014; Locke, 2001). This stage of analysis allowed a comparison of codes, resulting in more abstract and theoretical categories, or clusters (Harrison & Rouse, 2015). This step of the procedure was divided into two subsequent phases, pre-clustering and the clustering itself. In the pre-clustering phase adjectives were grouped semantically (Cattell, 1943), consulting the online version of Duden (Duden, 2018), a professional German dictionary (Allport & Odbert, 1936; Angleitner, Ostendorf, & John, 1990). Adjectives that were equal in meaning or listed as synonyms were grouped together (Cattell, 1943; Offermann & Coats, 2018; Offermann, Kennedy Jr, & Wirtz, 1994). The groups were labeled according to the inclusive expression stated most often (Offermann & Coats, 2018). Next, groups that represented subclasses of other groups were added to the overlying classes (Schyns & Schilling, 2011). The resulting semantic groups and single adjectives (that could not be grouped) nominated merely once or twice were omitted from further examination (Offermann et al., 1994; Sternberg, 1985). These remaining attributes and groups framed the so-called pre-clusters.

Next, the relative importance of each pre-cluster was determined numerically using the pre-cluster nomination frequency (Guest & McLellan, 2003) and attribute rankings (Epitropaki & Martin, 2005; Offermann et al., 1994). Respondents of this study were thus asked to rank their prior stated prototype attributes, following the initial exploratory attribute assessment. Ranking of the precise weight distribution of the importance of each attribute is necessary (Johnson & Huber, 1977), so each attribute can be factored in further calculation. Ranking serves this purpose well, as it is reliable and easy (Eckenrode, 1965). According to Barron and Barrett (1996), the rank order centroid (ROC) has proven to be most efficacious in this matter and was applied in this study. Attribute ranks were then transformed into importance weights as stated by the respective respondent. Subsequently, individual weights were added together per response and

finally, a total sum of weighted nominations was calculated. This resulted in aggregated total importance weights, which could be compared among the newly formed pre-clusters (Love, 1981). Pre-clusters were then sorted in descending order in accordance with these total weights, resulting in a notable delta between the fourth and the fifth pre-cluster (Δ(pre-cluster 1/pre-cluster 2) = 1,1531; Δ(pre-cluster 2/pre-cluster 3) = 0,9083; Δ(pre-cluster 3/pre-cluster 4) = 0,1969; Δ(pre-cluster 4/pre-cluster 5) = 6,6428). We hence decided to base the cutoff at this delta. The four remaining pre-clusters with the highest total weights captured 50% of the total number of nominations of all pre-clusters, thus delivering the main clusters, or preliminary attributes of the Digital Leader.

In the last stage (of the TSP), theoretical categories (pre-clusters) were aligned and aggregate dimensions (clusters) derived, in order to understand how different categories fit together in a coherent fashion. Pre-clusters from the prior stage were thus assigned to the main clusters identified (crucial pre-clusters), if a conceptual relation was found. This clustering procedure follows the approach of conceptual clustering introduced by Michalski and Stepp (1983) and Stepp and Michalski (1986). In contrast to conventional cluster methods that consider numerical distance measures, conceptual clustering allows the integration of descriptive concepts, environmental knowledge and object coherences into the classification process (Michalski & Stepp, 1983; Srivastava & Murty, 1990; Stepp & Michalski, 1986). Accordingly, the pre-clusters were compared to emerging ideas and concepts present in contemporary literature in the context of digital transformation, including findings from case studies, expert interviews or other investigations, described in the sections below. Our research procedure yielded four distinct attributes associated with successful Digital Leaders, which are displayed in Table 1. Overall, *empathic* emerged as the highest ranked Digital Leader attribute, followed by *innovative*, *open* and *agile*.

Table 1: Ranks and Weights of Digital Leader Attributes

Attribute	Rank	Direct Nominations	Total Aggregated Nominations	Total Aggregated Weight
Empathic	1	108	246	35.60%
Innovative	2	86	175	25.33%
Open	3	95	144	20.83%
Agile	4	116	126	18.24%

Note: N = 146; Total nominations = 691; Aggregated nominations include attribute subdimensions

2.4 Attributes of the Digital Leader

As mentioned above, each attribute of the Digital Leader identified consists of several sub-dimensions, or nominations made by our participants, that paint a more complex picture of which expectations are linked to leaders succeeding in digital transformation. All these nominations were compared to emerging ideas and concepts present in contemporary management and IS literature in the context of digital transformation. Due to the exploratory nature of this study, we focused on the unique attributes connected to successful digital transformation, as perceived by our participants.

2.4.1 Empathic

The Digital Leader attribute *empathic* consists of subdimensions *trustworthy*, *enthusiastic*, *respectful*, *coaching*, *motivating* and *communicative*. *Empathic* itself is comprised of attributes like *emotionally intelligent*, *sympathetic*, *sensible* or *collaborative*. *Empathy* can be seen as the ability to notice and comprehend others' feelings and attitudes (Goleman, 2006) and was semantically coded with *emotional intelligence*. Displaying *empathy* provides leaders with knowledge of how to understand follower feelings, influence follower emotions and anticipate employee behavior. This knowledge enables leaders to boost *motivation* and *enthusiasm* for an

organization's digital transformation goals among followers, a high-quality leader-follower relation, and trigger followership per se. *Empathic* leaders thus appear more credible and *trustworthy* (George, 2000; Lewis, 2000). According to the statements made by our participants, a Digital Leader is *trustworthy* when seen as *reliable*, *authentic*, *honest* and *responsible*, which aligns with the concept of responsible leadership introduced by Maak and Pless (2006), referring to interpersonal contact with care and foresight. The authors also mention that *respect* is a requirement for such behavior, accompanied by honesty and humility to build lasting and *trustful* relationships. *Trustful* leaders help followers express negative emotions (Little, Gooty, & Williams, 2016), which subsequently can be collectively eliminated. *Trust* assists the Digital Leader in overcoming follower resistance and transmits positive emotions. Additionally, *trust* strengthens cooperation and the feeling of being part of a collective (Jarvenpaa, Knoll, & Leidner, 1998), which usually lacks in virtual teams (Townsend, DeMarie, & Hendrickson, 1998) and might challenge project-based team structures, which are often found in digital transformation tasks.

An *empathic* leader inhabits the function of a *coach*, especially when an organization undergoes change (Maak & Pless, 2006). In the case of digital transformation, relationship skills, such as individualized consideration, which is characterized by follower mentoring, attending to follower needs, and listening to follower concerns, induce care and recognition with followers (Joseph, Dhanani, Shen, McHugh, & McCord, 2015: 3). *Empathy* is also a prerequisite for understanding the changes (Gottschalk, 1999) digital transformation brings to the organizational context (Eberly et al., 2013), thus evoking adequate Digital Leadership (Bennis, 2013). Digital transformation demands new competencies of the entire workforce, especially for organizations that previously acted in analogue markets (Schwarzmüller et al., 2018). While *coaching*, leaders can provide followers guidance for the management of the new digitalization

challenges. Additionally, support and employee well-being *motivates* followers to be innovative (Schermuly, Meyer, & Dämmer, 2013; Van Dierendonck, 2011), and has a positive influence on follower commitment during digital transformation.

Peppard (2010) particularly assigns CIOs (Armstrong & Sambamurthy, 1999) the role of a relationship builder, who should express *empathy* and *enthusiasm*, which is necessary for integrating IT in the organization's overall digital business strategy (Drnevich & Croson, 2013). As digital transformation is characterized by change and unpredictability, these circumstances may cause fear and uncertainty in followers. *Empathic* leaders can detect follower misgivings, provide assistance, and *motivate* followers to take part in digital transformation. Such a relationship builder expresses *empathy* by listening and being passionate about his or her followers' aspirations. This is in line with the notion of transformational leadership (Cho, Park, & Michel, 2011), which additionally emphasizes inspiring and *motivating* employees and colleagues (Bass, 1985; Rubin, Munz, & Bommer, 2005).

The inclusion of emotions and care into Digital Leadership is accompanied by *communication*. According to Singh and Hess (2017), CDOs need *communication* skills in order to inform employees about strategic renewals and spread the digital business strategy (Little et al., 2016; Singh & Hess, 2017). Digital Leaders cater for a company-wide understanding of the digitalization need and implement a comprehensive digital attitude.

2.4.2 Innovative

Nominations such as *risk-taking*, *technology-oriented*, *customer-oriented* and *visionary* comprised the cluster *innovative*, used synonymously with *creative*, *intelligent* or *progressive*. As mentioned in the literature, leaders in the context of digital transformation are commonly characterized as entrepreneurs that try out innovative technical solutions and bear the affiliated risk (Singh & Hess, 2017; Thong & Yap, 1995; Tumbas, Berente, & vom Brocke, 2018) and

implement new concepts and ideas into an organization (Pierce & Delbecq, 1977), which matches our respondents' statements.

Digital Leaders will succeed at overcoming the challenges of digital transformation (Zhu et al., 2006), when they are able to maintain their organizations' relative advantage through *technology-orientation*, by exploiting digital *innovation*, while simultaneously being aware of the limitations of such (Horner-Long & Schoenberg, 2002), and if these remain compatible with existing business processes (Rogers, 1995). Effective Digital Leaders *innovatively* make use of the immense data volume provided by IT, detect *customer* needs, and intelligently align processes and products to the end-*customer*.

Our respondents also emphasized *customer-orientation*, a factor strongly associated with *innovativeness*, and a digital mindset, which is usually disseminated by the leader's *vision* (Singh & Hess, 2017). This kind of leader can be denoted as an institutional entrepreneur (Singh & Hess, 2017; Tumbas et al., 2018). According to Gupta et al. (2004), entrepreneurial leaders create a *vision* that mobilizes follower commitment to strategic value creation. In terms of digitalization, *visionary* leaders should be foresighted and spread a digital *vision* of the company (Singh & Hess, 2017). In digital transformation, creativity is an important factor in order to be perceived as effective leader of the workforce (Weiss, 1977). Digital Leaders thus serve as role models, who are emulated by their followers (Gupta et al., 2004). This is particularly essential in terms of creativity, since organizational *innovation* is undertaken collectively (Gümüşlüoğlu & Ilsev, 2009).

2.4.3 Open

Open, *transparent* and *curious* were the subdimensions forming the *open* cluster, which is a synonym for *adaptable*, *multifaceted* and *flexible*. *Open* is a broad term, usually described as *broad-minded*, *imaginative*, and *adventurous* (Li, Tan, Teo, & Tan, 2006). It is opposed to compulsive, rule-based, rigid, and inflexible attitudes that indicate ignorance for environmental

conditions (Miller & Toulouse, 1986). Research has shown that Digital Leaders should remain *open* to new digital concepts, digital tools and systems, and social technology features and platforms (Hunt, 2015).

Flexibility is semantically related to *openness* and was also stated by the study participants. In particular, it refers to the *adaptability* of an individual's thinking and behavior, especially during the change of organizational conditions. *Flexible* CEOs were found to be associated with strategic *adaption*, informal, *flexible* and simple organizational structures, and intuitive, risk embracing decision-making, rather than protracted processes and complex hierarchies (Miller & Toulouse, 1986). We are reminded that transforming organizations digitally requires leadership that can promote the *adaptive* quality of organizational cultures (Alos-Simo et al., 2017). *Flexibility* can help the Digital Leader to accept and *adapt* to the transition initiated by digitalization. This includes changes in leadership processes, for instance new tasks, shifts to shared leadership, or leading remotely in virtual teams.

C*uriosity*, as part of *openness*, has been proven to be a fundamental CIO characteristic that fosters organizational innovative usage of IT, which was found to be necessary in order to build attentiveness in a changing environment that enables managers to seek out new information that are of corporate relevance (Li et al., 2006; Miller & Toulouse, 1986). This implies advantages in identifying opportunities and risks, which strongly characterize the context of digital transformation (Dehning, Richardson, & Zmud, 2003; El Sawy et al., 2016).

Openness supports the handling of these opportunities and risks and increases the leader's willingness to innovate (Lewin & Stephens, 1994). Digital Leaders *open* to risk react on changing customer and market demands and take appropriate initiatives like strategic renewals, business model changes, or new product developments, which are crucial to withstand competition in the digital environment (Bharadwaj et al., 2013a).

In our study, a Digital Leader was recognized as being *transparent*, when *open* and comprehensible behavior was displayed, which is also essential in order to build trust during change. *Transparent* Digital Leaders address the interaction with followers, characterized by *open* information sharing (Norman, Avolio, & Luthans, 2010). A Digital Leader's decisions and the intention behind these actions are clearly explained and potential risks are disclosed (Avolio & Gardner, 2005; Avolio, Gardner, Walumbwa, Luthans, & May, 2004; Maak & Pless, 2006). As *transparency* has shown to increase follower trust and support (Norman et al., 2010), *transparent* Digital Leaders reduce follower resistance and intensify a collective pursuit of digitalization goals.

2.4.4 Agile

The subdimension *fast* was assigned to the subdimension *agile* and together, they constitute the main cluster *agile*, whereas the subdimension *agile* itself was conglomerated in a semantic group with, e.g., *hands-on*, *impulsive*, *dynamic* and *brave*. It should be noted that, although this cluster only consists of the one subdimension *fast*, *agile* received the highest number of direct nominations by our participants (see Table 1.), justifying its Digital Leader attribution. *Agility* is a dynamic capability, which implies the ability to reconfigure and revise existing capabilities and aligning organizational resources in adaption to dynamic and unpredictable environments at a *fast* pace (Eisenhardt & Martin, 2000; Teece, Pisano, & Shuen, 1997). These capabilities are necessary in order to react properly to change (Yoo, Henfridsson, & Lyytinen, 2010) in uncertain environments and maintain competitiveness (Pavlou & Sawy, 2006, 2010; Sambamurthy et al., 2003; Tan, Tan, Wang, & Sedera, 2017). Our respondents' statements align with the literature, which distinguishes between forms of *agility* in the business environment (e.g. operational agility, customer agility), and includes *speed* (fast) into the definition of *agil-*

ity. Moreover, *agility* is an important business factor that is connected to information technology (Roberts & Grover, 2012; Tan et al., 2017), as Digital Leaders are required to keep pace with the velocity of digital trends, transforming entire business processes (Hansen et al., 2011).

A key part of *agility* lies in sensing and responding to market opportunities (Zaheer & Zaheer, 1997). Sensing refers to identification and implementation of business opportunities quickly, accurately, and cost-efficiently (Tan et al., 2017), which needs exploration activities and alertness (March, 1991; Teece, 2007). Responding is the subsequent step and is about addressing the opportunities by stimulating appropriate operational processes (Roberts & Grover, 2012). Since digital transformation expands the competitive dynamic to an industrial level, organizational attention must be broadened to ensure taking advantage of new business opportunities.

Agile Digital Leaders are proactive in recognizing such opportunities and assertive in executing undertakings. The use of IT enhances corporate *agility* (Tallon, 2008), as, for instance platforms can quickly and easily reveal customer expectations and organizations can take suitable actions (Nambisan & Baron, 2010). Digital transformation of analogue infrastructures thus increases organizational *agility*, including leader *agility*. An immediate access to any organizational or inter-organizational information provided by IT and knowledge sharing enabled by IT strongly speeds up leader decision-making (Bharadwaj et al., 2013a; Sambamurthy et al., 2003).

To summarize our findings, offer an overview and categorize individual traits, competencies and skills associated with successfully transforming the organization digitally, the following Figure 2. displays the Digital Leader attributes with respective subdimensions found in our study.

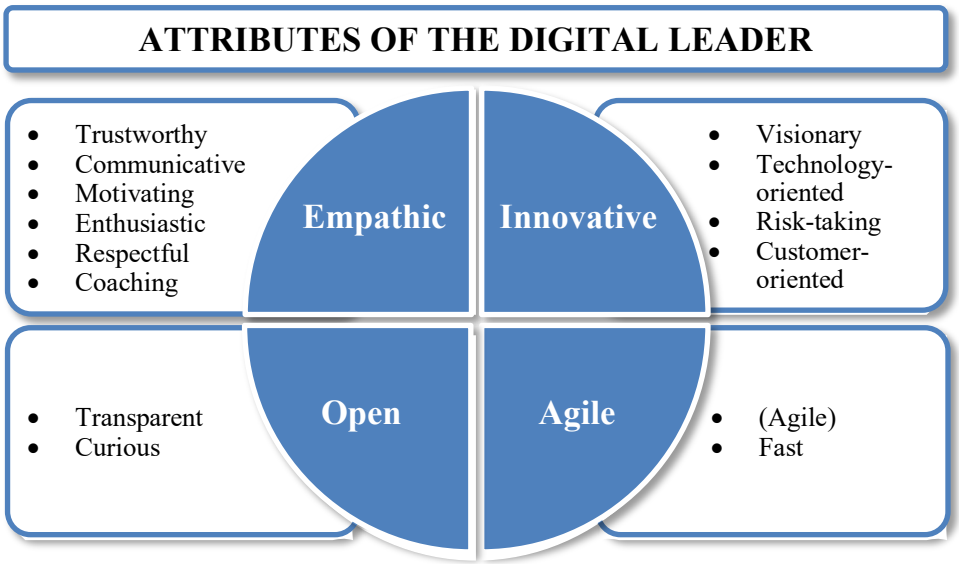

Figure 2: Attributes of the Digital Leader with Subdimensions

2.5 Guidelines for Identifying Digital Leaders

Based on our findings, we present guidelines for identifying Digital Leaders, aimed at organizations aspiring to digitally transform and execute a digital business strategy.

2.5.1 1. Define the Prototype Digital Leader Profile According to the Digital Transformation Task

In an ideal world, prototype Digital Leaders will possess each of the four attributes to a full extent, making them "digital allrounders". However, no leader is perfect and as every digitalization journey has individual prerequisites and unique transformation outcomes, the extent of each Digital Leader attribution should be defined according to the digital transformation task, which has to be determined according to the organization's individual digitalization needs. Depending on this task, individual Digital Leader profiles are employed. Each Digital Leader attribute is therefore measured on a scale from 1 (lowest) to 7 (highest) to allow unique Digital Leader profile combinations, as suggested by Den Hartog et al. (1999).

For example (see guideline 3): organizations will often encounter cases where developing new solutions for established business practices is a timely matter, so that one does not fall

behind competition. Here, *agile* Digital Leaders with resolute actions are needed, sometimes at the cost of displaying less *open* behavior.

Digital Leader Profile A: *empathic* 5, *innovative* 7, *open* 2, *agile* 7.

In other cases, the Digital Leader will be primarily required to build trust in newly formed development teams, emphasizing the attributes *empathic* and *open*, while being less *agile* in the process.

Digital Leader Profile B: *empathic* 7, *innovative* 4, *open* 6, *agile* 2.

2.5.2 2. Assess the Degree of Digital Leader Attribute Profile Overlap

As soon as the task-appropriate Digital Leader profile has been defined, current or future leadership's Digital Leader attribution should be assessed. Through a combination of attribute self-assessment, e.g., a leadership traits difference model (Epitropaki & Martin, 2005) (see section *Prototype Digital Leader Matching*, below) and questionnaires measuring the individual Digital Leader attributes on predefined scales, the degree of each Digital Leader attribute overlap in reference to the prototype can be made. This assessment overlap is then reported in percentage points. Not all leaders will display the desired overlap for each attribute, so it is necessary to assign digital transformation tasks to matching Digital Leader profiles. Where this is not possible, critical deviation from the prototype profile needs to be identified to ensure the correct intervention.

2.5.3 3. Identify Deviation from the Prototype Digital Leader Profile

Only when deficits in the degree of required Digital Leader attribution are known, measures for the correct intervention, such as management training programs, can be applied. A simple and effective way to detect deviations from the prototype Digital Leader is a graphic representation of both the prototype and assessed Digital Leader profile, as depicted in Figure 3 (based

on exemplary profiles in guideline 1), below. Intervention strategies should be directed at the largest attribute deviation.

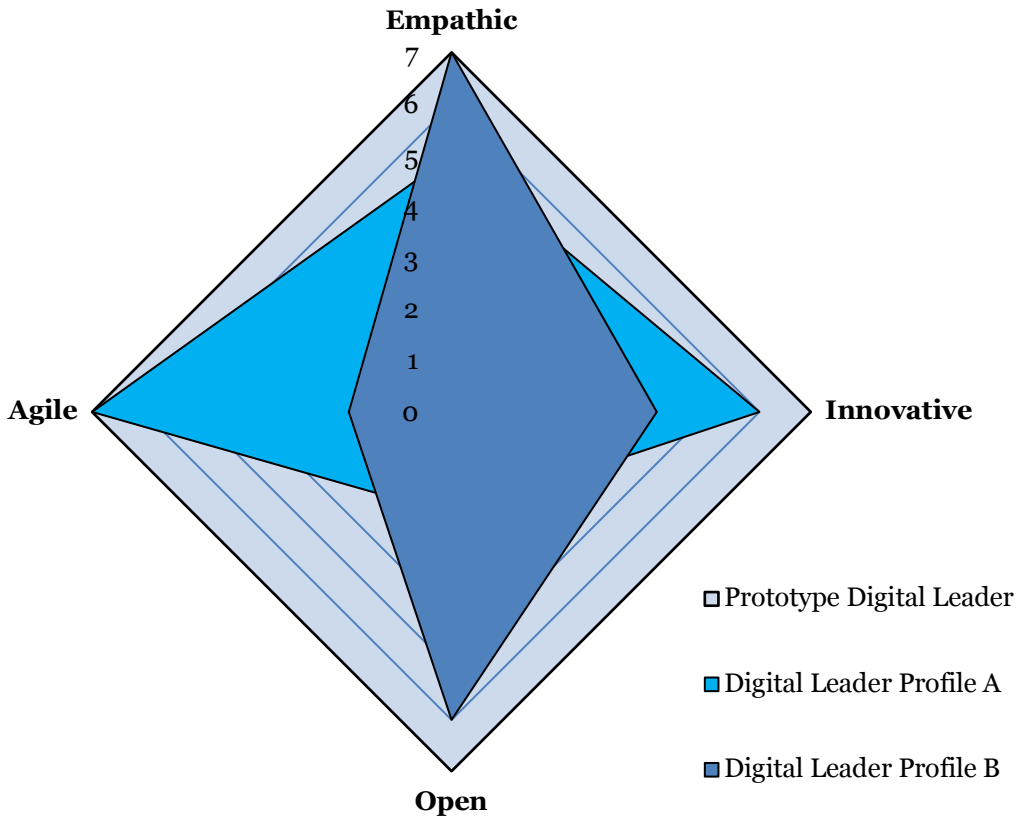

Figure 3: Digital Leader Attribute Profiles

2.6 Making Use of Digital Leader Attributes

We believe that with knowledge of the attributes of the Digital Leader assessed in this study and the quantified findings from our research, executives will be enabled to succeed in transforming their organization digitally, as only skilled and competent leadership, placed at the heart of each digitalization task, can execute their organization's digital business strategy effectively. We also believe that insights on the Digital Leader will provide a foundation for future management and IS research to help uncover the direct influence of leadership on many aspects of the organization's digital transformation.

2.6.1 Prototype Digital Leader Matching

Digital Leader categorization can be used to explain perceptions not only on how followers believe a leader should be within the context of digital transformation, but it can also provide leaders with an abstract understanding of which attributes their subordinates expect them to have in order to be perceived as prototypical Digital Leaders. In particular, the examination of the personal fit between the four Digital Leader attributes and an assessment to which degree these attributes are individually matched by current leadership, can help organizations understand if a mismatch between expectations and reality exists, and then, subsequently, identify critical leverage points for intervention.

According to Eden and Leviatan (1975), if followers believe that leaders' actions and behaviors exemplify being innovative or showing special capabilities, then they are likely to interpret the leader as being transformational (Conger & Kanungo, 1987). Utilizing a simple congruence index suits the purpose of identifying the prototype Digital Leader by measuring the aforementioned match between the four prototype Digital Leader attributes and attributes recognized in the leader. Such leadership traits difference models (Epitropaki & Martin, 2005) have been used in many studies to represent the fit between perceived and desired leader attributes (Barrett, 1978; Dansereau, Graen, & Haga, 1975; Swaney & Prediger, 1985; Toffler, 1981). With regard to the organization's overall digital business strategy, the interplay between this Digital Leader attribute congruence and the progress of the organization's digital transformation is an important cornerstone for understanding possible effects Digital Leaders have on digital transformation outcomes within their organizations. Only with the definition of the prototype Digital Leader though the respective attributes, are we able to align the organization's digital transformation goals with traits, skills and competencies expected of its leadership, commissioned to execute a digital business strategy.

2.6.2 Management Training Programs

The identification of Digital Leader attributes may help organizations promote Digital Leaders within their organization and aid in the acquisition of external Digital Leaders, when specific leader profiles are known. Leaders who do not fulfill the required Digital Leader attribution could significantly benefit by learning which attributes compose their organization's implicit Digital Leader profile. From the human resources perspective, an important practical application is therefore management training programs that first identify possible gaps or deficits concerning Digital Leader attributes (Boyatzis, 2011) and programs that strengthen awareness for both task specific and subordinates' implicit Digital Leader profiles (Epitropaki & Martin, 2005). In particular, allowing for a holistic Digital Leader training, we suggest management training programs directed at each individual Digital Leader attribute, when applicable. With this approach, organizations can focus on designing bespoke trainings for the required Digital Leader profile and necessary intervention possibilities, when deviation from the prototype is present. In other cases, management training programs could be directed at teaching Digital Leaders with high preexisting attribute overlap when and how to balance the appropriate Digital Leader attribution in accordance to the digital transformation task to match their organization's implicit Digital Leader profile.

2.7 Lessons Learned

This study's intention was to deliver a first definition of the prototype Digital Leader based on respective attributes. During this process our research yielded interesting insights on where and how to identify Digital Leaders and the implications and applications of a categorization, summarized in the lessons learned, below.

2.7.1 Lesson 1: Digital Leaders are Present on All Organizational Hierarchy Levels

Inquiry took place in digitally mature organizational settings and our results unsurprisingly indicate that larger and older organizations have been less digitally transformed, than startups, e.g. We then focused on pinpointing Digital Leaders within their specific organizational entity boundaries, such as a specific department or, in the case of startups, their entire venture. We found evidence that respondents' level of hierarchy had a significant effect on whether their entity had been digitally transformed, which might signal that top management leaders (or founders) may have a greater positive effect on the organization's digital transformation in this particular context. However, since all levels of hierarchy displayed representation of all four Digital Leader attributes, we can gather that not only are Digital Leaders present at both macro and micro organizational levels, but also seem to influence the organization's digital maturity from all organizational levels (Gottschalk, 1999). In other words: Digital Leaders should not solely be limited to C-level positions, but are rather found on all management levels, digitally transforming the organization from within their organizational entities.

2.7.2 Lesson 2: Match Perceptions of Prototypical Digital Leaders

In general, leadership perceptions are based on cognitive categorization processes in which perceivers match the perceived attributes of leaders they observe to an internal prototype of leadership categories (Foti & Luch, 1992). With this in mind, taking a closer look at how, where and why typical and ideal leaders match followers' perception, may help us understand what it takes for leaders to be successful in their organization's digital transformation. In cases where leaders, who are expected to pursue digital transformation tasks, do not match either their followers' ideal Digital Leader, or the organization's internal definition of effective leadership for digital transformation, these leaders will not be seen as Digital Leaders, regardless of their digital transformation efforts. It is therefore important to have a clear understanding of both the

ideal and actual leader attribute profile, so expectations can be met and matched in order to execute a more holistic digital business strategy from within each leader's organizational entity.

2.7.3 Lesson 3: Experience Alone Does Not Make You a Digital Leader

Counterintuitively, our results showed that both professional and digital transformation tenure had no significant effect on whether the respondents' organizational entity was digitally mature or not. We can only speculate that engaging in digital transformation activities over an extended period of time does not influence whether the organization is digitally mature or not. We also could not discover parallels between matching individual Digital Leader attributes and personal experience in pursuing digital transformation over time. Moreover, one would assume, that individuals with extensive exposure to digital technologies, e.g., digital natives, should show a higher overlap in matching Digital Leader attributes, though we did not find proof that the leader's age (nor sex) had any significant effect on the organization's digital transformation. In other words: Experience in digital transformation does not necessarily make you a Digital Leader. Successful Digital Leaders are a function of their individual attribute profiles, and how these profiles match follower prototype expectations.

2.7.4 Lesson 4: Exploit Existing and Train Absent Digital Leader Attributes

The results of our study have been a cross-section of attributes found in various digital industries and for individual digital transformation tasks. Digital Leaders come with strengths and weaknesses, as any individual does, so naturally we will not encounter a Digital Leader profile expressing a full degree of overlap for all four attributes. Nonetheless, it is important to build on Digital Leader expertise and exploit the respective fully developed attributes, wherever applicable. Many organizations, successful at executing digital transformation, achieve this by matching digitalization tasks with appropriate leader profiles. However, our research has shown that truly digital leaders will match the prototype Digital Leader in all four attributes as closely

as possible, in order to flexibly cope with an array of different digitalization tasks. Therefore, it is mandatory to acquire or shore up any attribute absent or weak in the individual Digital Leader profile, through appropriate management training programs. This will ensure leadership is equipped for any digital transformation task.

2.8 Concluding Comments

All in all, the present study provides a useful exploratory framework for understanding the phenomena of Digital Leadership and providing the first definition of the Digital Leader through his or her attributes. By introducing the new organizational context of digital transformation to management and IS leadership research, it tries to resolve some of the largest threats to modern business practice: finding adequate leadership to successfully cope with the challenges the digital transformation of the organization evokes. It is the first empirical study to assess distinct attributes associated with the successful Digital Leader, suggest possibilities to identify and make use of Digital Leaders, and garner lessons we can learn from Digital Leadership. In doing so, the paper not only strengthens ties between management and IS research; it also offers an initial theoretical starting point for extending researchers' current thinking on how leaders are defined in the digital world.

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3. The Influence of Implicit Digital Leader Attributes on the Perception of the Organization's Digital Business Strategy

Abstract

This empirical study analyzes the influence of implicit leader attributes, associated with the successful digital transformation of the organization, on employees' perception of their organization's digital business strategy, to help define the so-called Digital Leader. To cope with the challenges of digital transformation via leadership, information systems literature has so far focused solely on a C-level perspective. Although theory indicates the importance of technology altering the way leadership is disseminated and how digitalization affects the overall business strategy, there is little research on digital transformation as a new organizational context throughout the entire organization and on all hierarchy levels, which demands adequate leadership. Based on the results of hierarchical regression analyses with uniquely developed and verified constructs, we are able to fill this research need, by unveiling whether those distinct Digital Leader attributes, namely *empathic*, *innovative*, *open* and *agile*, affect the organization's digital transformation on all hierarchy levels.

Keywords:

Digital Leader, digital transformation, digital business strategy, leader attributes, implicit leadership theory

Current status: Working paper (see Appendix A)

3.1 Introduction

The era of digital transformation is no longer in its initial dawning phase; it is fully underway. We are observing history in the making: industries as far ranging as personal transportation and telecommunication are not only being totally disrupted by digitalization (Bauer, Schlund, & Vocke, 2018) in and of itself, they are merging to form new industries. Digital transformation has not only bred simple new communication methods; the organization's entire business model (Dörner & Edelman, 2015) is being newly formulated. There have been social and societal impacts attributed to the digitalization of information as well. Because information is now highly accessible and readily available via non-traditional channels to atypical stakeholders, the rules of engagement are being rewritten at an unprecedented rate. The question of who collects, who analyzes, who stores and who controls data is now being challenged in a way that would have been impossible only several years ago. As a result, digitalization is influencing and questioning how we define the democratization of information. Although digitalization simplifies many aspects of business practices (Banker, Bardhan, Chang, & Lin, 2006; Ettlie & Pavlou, 2006; Kohli & Grover, 2008; Rai, Pavlou, Im, & Du, 2012; Sambamurthy, Bharadwaj, & Grover, 2003; Tanriverdi & Venkatraman, 2005), such as how information is stored or distributed, if not managed correctly, it can just as likely add layers of complexity and challenges within the organization (Mithas, Tafti, & Mitchell, 2013; Ray, Muhanna, & Barney, 2005). There are an equal number of organizations that are facing challenges (Day, 2011) adapting to new technologies as there are organizations that are nimbly agile and able to take full advantage of the multitude of benefits on offer through digital technology (Meffert & Swaminathan, 2018). In any case and what is in itself unsettling, is that even if the enterprise is unaware or unwilling to embrace the change (Werner, 2017), and even regardless if digital transformation is deliberately pursued or not, fundamental changes to the organization occur.

Those organizations that wish to succeed in digital transformation and actively counter the risk of being left behind their competitors and other players in their market who are already managing to cope with digital trends (Hansen, Kraemmergaard, & Mathiassen, 2011), formulate a so-called digital business strategy (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013a, 2013b; Drnevich & Croson, 2013; Kane, Palmer, Phillips, Kiron, & Buckley, 2015; Kiron, Kane, Palmer, Phillips, & Buckley, 2016). As a result, carefully formulated competitive actions are planned and carried out to create value (Bharadwaj et al., 2013a; Pagani, 2013) in order for the organization to harness digital resources that enable it to offer information technology supported products and services (Woodard, Ramasubbu, Tschang, & Sambamurthy, 2013). It is therefore necessary that organizations instead of merely aligning IT functions with the overall business strategy, fully integrate IT (Drnevich & Croson, 2013) and its corresponding digital business strategy (Bharadwaj et al., 2013a; Mithas et al., 2013).

The change process for digital transformation must be carried out with intent; it is not a naturally occurring organic chain of events for an organization. The design, planning, implementation and monitoring of the steps of transformation must be managed by skilled competent leadership (El Sawy, Kræmmergaard, Amsinck, & Vinther, 2016). Thus, the implication is that it must be pursued strategically through purposeful leadership. Digital transformation brings on changes to an organization's technical systems, and in turn, demands adequate adaptation of the social system, of which leadership is a part (Avolio, Sosik, Kahai, & Baker, 2014). Transforming organizations digitally therefore requires leadership that can promote the adaptive quality of organizational cultures (Alos-Simo, Verdu-Jover, & Gomez-Gras, 2017). The key to navigating through these digital challenges is competent leadership, though we have to acknowledge that some leaders do not possess the skillset to digitally transform their organizations (Kane, Palmer, Phillips, Kiron, et al., 2015).

Against this background and although research is preliminary, management scholars have set out to determine new leadership styles transforming organizations digitally. Albeit we do not have a consistent definition of leadership for successful digital transformation, knowing the influence of leader trait profiles (attributes) (Hernandez, Eberly, Avolio, & Johnson, 2011) on digital transformation outcomes (Avolio et al., 2014) can help us further define such leadership, i.e., the so-called Digital Leader. A possibility to explore the influence of specific leader attributes are concepts applied in Implicit Leadership Theory (ILT), as this research has shown, that in times of business transformation, followers put their faith in leaders who display prototypical leader attributes. In ILT, the implicit conceptualizations of leaders represent the cognitive structures or schemas that specify what people expect from leaders in terms of traits or attributes (Offermann & Coats, 2018). Since leadership disseminates the organization's business strategy within the firm, the perception of this strategy, and ultimately its acceptance by employees, hinges on whether the leader for digital transformation is perceived as a competent Digital Leader. In other words, when leaders transforming their organization digitally are recognized as Digital Leaders, i.e., they display a set of personal attributes associated with successful digital transformation, this should result in employees having a better understanding of their organization's digital business strategy.

The purpose of the present study is thus to explore the influence of implicit attributes of the Digital Leader on the organization's digital transformation. We empirically address significant gaps in the research on the relationship between technology and leadership (Avolio et al., 2014), as well as the importance of distinct leader attributes on strategic digital transformation (Nambisan, Lyytinen, Majchrzak, & Song, 2017). We established those individual implicit leader attributes employees perceived as necessary for the organization's digital transformation.

We then went on to specifically examine the effects those attributes have on employees' perception of the organizational business strategy. The goal was to help uncover leadership's role in strategic organizational digital transformation.

The present study contributes to the current leadership and information systems literature in three main ways. First, since we do not know how implicit leader traits operate in confined organizational settings (Epitropaki & Martin, 2005), we have set out to extend ILT to the new organizational context of digital transformation, and focus on leader attribution for the development of a more comprehensive framework. These results can help uncover the effects of implicit leadership on desired management outcomes, where the immediate influence of leaders on organizational variables may not be directly observable.

Second, since we have little understanding of the relationship between technology and leadership (Avolio, Bass, & Jung, 1999; Avolio et al., 2014; Bass & Riggio, 2006) on the digital transformation of organizations (Nambisan et al., 2017), we set out to extend the current research in this field, namely e-leadership (Avolio, Kahai, & Dodge, 2000) and transformational leadership, within the new organizational context of digital transformation (Eberly, Johnson, Hernandez, & Avolio, 2013). In particular, we analyzed the influence of attributes describing the prototype Digital Leader, namely empathic, innovative, open and agile, to uncover whether this distinct set of traits, skills and competencies has an effect on organizational digital transformation.

Third, this study puts emphasis on the role of the Digital Leader within the organization's overall digital business strategy (Bharadwaj et al., 2013a, 2013b; Chen, Tang, Jin, Xie, & Li, 2014), i.e. the integration of information technology (IT) in strategic management (Drnevich & Croson, 2013), by putting the Digital Leader into focus on all organizational hierarchy levels (Gottschalk, 1999) to sufficiently carry out the organization's digital transformation (Bharadwaj et al., 2013b; Hansen et al., 2011). Until now, the examination of this aspect has

been neglected in available literature. Additionally, we contribute to information systems literature by offering a method to gauge strategic aspects of digital transformation pursuits, by introducing a construct for measuring the perceived digital business strategy of the organization (Kane, Palmer, Nguyen-Phillips, Kiron, & Buckley, 2017; Kane, Palmer, Phillips, & Kiron, 2015; Kane, Palmer, Phillips, Kiron, et al., 2015; Kiron et al., 2016).

By analyzing the relationship between attributes describing the prototypical Digital Leader and their followers' perception of their organization's digital business strategy, we are able to make a vital contribution to the literature. When this correlation is known, the influence of leadership on transforming organizations digitally can be further examined to help foster digital transformation and its strategic pursuit.

3.2 Theoretical Background

3.2.1 Digital Transformation and Digital Business Strategy

As a result of ongoing changes induced by information technology (Lucas Jr, Agarwal, Clemons, El Sawy, & Weber, 2013), digital transformation is the permanent effort to transform the organization's activities (Matt, Hess, & Benlian, 2015). Digital transformation is a continuous process (L. Li, Su, Zhang, & Mao, 2018), that enables organizations to gain new digital competences and capabilities (Dörner & Edelman, 2015). Digital transformation does not only effect digital ventures; it heavily and profoundly reshapes a variety of industries, regardless of their size and scope (Bharadwaj et al., 2013a). Digital transformation particularly brings challenges to digitally inexperienced industries (Kohli & Johnson, 2011). The tremendous data volume generated by digital technologies and the high information density accompanying it confronts organizations with new-work complexities, while disruptive innovations bring uncertainty and unpredictability (Schwarzmüller, Brosi, Duman, & Welpe, 2018; Welpe, Brosi, & Schwarzmüller, 2018).

Digital transformation is accompanied by digital disruption, which can be seen as a combination of several digital innovations (Wimelius & Sandberg, 2018), caused by the embrace of digital technologies, such as e-commerce (L. Li et al., 2018), in itself, a rather young, flourishing but evolving industry. Today, most organizations undergoing digital transformation face digital disruption (Collin et al., 2015). On the one hand, some complexities are brought on by disruptions which include changes and improvements to internal processes, customer focus, talent engagement, and business models (Collin et al., 2015; Kane, Palmer, Phillips, & Kiron, 2015; Meffert & Swaminathan, 2018; Singh & Hess, 2017). On the other hand, uncertainties and unpredictability manifest themselves in constant market changes, transforming products and services into a more interactive manner that reflects a global dimension. An additional consideration are the competitive challenges those organizations face that have not embraced the milieu of digitalization (H. Cho, Jung, & Kim, 1996; Goldman, Nagel, & Preiss, 1995). Digitalization is no longer just a competitive advantage or a nice-to-have, it is the lifeblood for survival in a business environment (Dubelaar, Sohal, & Savic, 2005). As a response, organizations in this new digital world, must heavily rely on the use of IT to make the best use of technology and achieve successful performance (Hiekkanen, 2015).

Organizations will succeed in digital transformation (Zhu, Dong, Xu, & Kraemer, 2006) when they are able to maintain a relative advantage through innovating their digital products and services, if these remain compatible and consistent with existing business operations (E. M. Rogers, 1995). Therefore, a multiyear, sequenced product roadmap and a sophisticated coordination of product launches are crucial for competitiveness (Bharadwaj et al., 2013a; Sambamurthy et al., 2003). Digital transformation also demands new competencies of the entire workforce, especially for organizations that had previously been active in analogue markets (Schwarzmüller et al., 2018).

Digital transformation can be approached successfully if organizations have a compelling plan that combines analog and digital factors (Tapscott, 1996) in the sense of a digital business strategy. Formulating such a strategy, that allows for digital change combined with the new technologies, increases the chances for innovation, differentiation, and growth (Berman, 2012). Since its emergence, the pursuit of a digital business strategy for successful digital transformation of the organization, which focuses on digital innovation (Nambisan et al., 2017), virtual teams (Duarte & Snyder, 2006; Gilson, Maynard, Jones Young, Vartiainen, & Hakonen, 2015) and, especially, leadership (Avolio et al., 2000; Avolio, Walumbwa, & Weber, 2009), in the focus of much attention in recent research (Bharadwaj et al., 2013a, 2013b; Drnevich & Croson, 2013; Kane et al., 2017; Kane, Palmer, Phillips, & Kiron, 2015; Kane, Palmer, Phillips, Kiron, et al., 2015; Kiron et al., 2016). Scholars emphasize the necessity to establish an overarching digital business strategy that combines the organization's general business strategy with their IT strategy. In this fusion, the digital business strategy achieves cross-functional validity, while aligning all other functional strategies to it (Bharadwaj et al., 2013a).

Digital transformation utilizes a holistic approach within the organization: all employees are engaged at all levels, and a framework is provided for the capabilities needed to carry out the transformation. There is also focus on the skills required to maintain the technological aptitude and knowledge of employees (Larjovuori, Bordi, Mäkiniemi, & Heikkilä-Tammi, 2016) so that the change becomes imbedded in organizational processes.

Scholars have pointed out the necessity of a digital business strategy for coping with the challenges of digital transformation, empathizing leadership at its core (Bharadwaj et al., 2013a), though they have not empirically examined the relationship between the organization's digital business strategy and its leaders (with specific attributes) implementing change. Only when this relationship becomes apparent, can leadership's influence on managing digital transformation successfully be further analyzed.

3.2.2 Information Systems Leadership and Digital Leadership

To manage the challenges of digital transformation, employees' trust in change activities must be captured, internal processes have to be adapted, and the appropriate leadership for the process must be addressed. Traditional leadership and information systems research in the context of digital transformation has primarily focused on how leadership is disseminated and appropriated by information technology and how this technology affects the overall business strategy (DeSanctis & Poole, 1994). Avolio et al. (2000) were one of the first to introduce a concept analyzing the effects that emerge from the interaction of IT with organizational structures of which leadership is a part and they subsequently coined the term electronic or (e)-leadership. Though leadership in digital contexts represents a fundamental change in the relationship between followers and leaders within and between organizations (Avolio & Kahai, 2003), there is still little known about the interactions between IT and leadership (Avolio et al., 2014).

What we do know is, that decisions concerning digital change must be made by leaders, as they are essential to an organization's strategic orientation (Chen et al., 2014). For this reason, some organizations have begun to install the new technology-focused board positions of Chief Information (CIO) (Carter, Grover, & Thatcher, 2011; Kohli & Johnson, 2011) and Chief Digitalization Officers (CDO) (Lee, Madnick, Wang, Wang, & Zhang, 2014; Singh & Hess, 2017). However, since digitalization involves all business units and hierarchy levels (Bharadwaj et al., 2013b), these digital board positions (Armstrong & Sambamurthy, 1999) only represent a narrow, top-down perspective to managing strategic digital transformation. Digital Leaders who are thoroughly versed in technology and the impact thereof, must be the ones to spearhead the complete transformation of the organization. Digital transformation is very disruptive (El Sawy et al., 2016) to an organization. The skills and competencies of these Digital Leaders are needed on all organizational levels (Gottschalk, 1999) no matter their current title or status. As long as

they are highly trained professionals in a digital business field, they can be the catalysts and maneuverers for the organizational digital transformation (Collin et al., 2015).

Leadership perceptions are influenced by social, cultural, interpersonal and task environments (Lord, Brown, Harvey, & Hall, 2001). Therefore, an organization's context, each with its unique social and cultural personality, will influence how leadership is perceived in that organization (Eberly et al., 2013; Epitropaki & Martin, 2005; Osborn, Hunt, & Jauch, 2002; Porter & McLaughlin, 2006; Shamir & Howell, 1999). We can consider Digital Leadership to be the essential leadership component (Bennis, 2013) in our digital age, as digital transformation itself impacts the organization and formulates a new context (Eberly et al., 2013).

Hernandez et al. (2011) tell us traits convey leadership to others within a digital organization. In order to make digital transformation possible, leaders depend on their own specific traits and attributes to envision change and then put the process into motion (Westerman, Bonnet, & McAfee, 2014). This is why focusing on leader trait profiles (Zimmer, 2010), which are often referred to as attributes, is a logical step in the journey to understanding how digitalization, transformation and individuals interact and react to one another in the context of leadership (Avolio et al., 2014). The ideal CIO profile which reflects those definitive attributes associated with leadership and successful transformation, has been found to impact levels of IT contribution in organizations and has already been evaluated in leadership and information systems literature (Preston, Leidner, & Chen, 2008). Further, for specific digital transformation tasks (Singh & Hess, 2017), a specific CDO skillset (role) has been suggested. What has not yet been examined in detail, are leader profiles and their impact on lower management levels.

Following this approach, Pabst von Ohain (2019) assessed distinct attributes associated with leaders on all hierarchy levels, who successfully transform their organizations digitally, which helps us to define the so-called Digital Leader.

Digital Leadership theories differ from conventional leadership theories with regard to the emphasis, impact and importance of certain attributes as research on electronic communication indicates (Balthazard, Waldman, & Warren, 2009). As technology contributes to more knowledge-based organizations, personnel skilled not only in technological management, but in managing the people who interact with technology as well as the changes brought to the organization due to technology, are becoming increasingly important (Schwarzmüller et al., 2018); Particular emphasis must not only be on leaders who are digitally literate, these leaders must also ensure their employees understand and can master the technology, understand the reason for changes in processes, and trust their leader's management decisions. Digital literacy requires a scope of knowledge and understanding. This specific kind of literacy certainly requires fluency in relevant digital concepts, digital tools and systems. But there are also requirements of knowledge in social technology features and platforms (Hunt, 2015). Finally, Digital Leaders must be aware of the capabilities and limitations of innovations (Horner-Long & Schoenberg, 2002). Grover, Karahanna, and El Sawy (2011) have pointed out that executives who proactively acquire these skills within the digital context, along with the occasional failure (Vitalari & Shaughnessy, 2012), tend to be more adaptive and willing to experiment and innovate. Due to the nature of digital businesses, Digital Leadership thus requires a unique makeup of attributes and psyche at all levels of the organization (El Sawy et al., 2016). These attributes are typically defined by the perception of followers (Van Quaquebeke & Brodbeck, 2008). Additionally, although leadership profiles (attribute combinations) for digital transformation are now known, we have no knowledge of the effect of Digital Leader attributes on pursuing a digital business strategy.

3.2.3 Implicit Leadership Theories

Knowing leader trait profiles, or attributes of so-called Digital Leaders can us help us understand the leader's influence on desired digital transformation outcomes, where the influence may not be directly observable. To reach this goal, ILT's are a useful tool for explaining leadership attributions and perceptions (e.g.: Den Hartog, House, Hanges, Antonio Ruiz-Quintanilla, & Dorfman, 1999; Eden & Leviatan, 1975; Lord, Foti, & De Vader, 1984; Offermann, Kennedy Jr, & Wirtz, 1994). ILT's can be described as a cognitive categorization process (Phillips & Lord, 1981) classifying non-identical perceived stimuli into categories based on similarities with stimuli in the same category (Rosch, 1999). This process reduces the complexity of the external world into a smaller number of categories, permitting symbolic representation in terms of the labels given to the categories, providing a system of shared labels (e.g. attributes) (Cantor & Mischel, 1979). In general, leadership perceptions are based on cognitive categorization processes in which perceivers match the perceived attributes of leaders they observe to an internal prototype of leadership categories (Foti & Luch, 1992). In ILT, a prototype can be conceived as a collection of characteristic traits or attributes. When the perceived individual and the leadership prototype match, this person will be seen as a leader (Foti & Luch, 1992; Offermann et al., 1994). In their systematic review, Junker and van Dick (2014) stress that ILT research has been primarily conducted in the field of ideal leaders, utilizing both positive and negative prototypes (Dorfman, Hanges, & Brodbeck, 2004; Nye & Forsyth, 1991). There only have been a few studies (Foti, Fraser, & Lord, 1982; Ling, Chia, & Fang, 2000) that focus on typical leadership prototypes and the authors determine that analyzing the ideal prototype perception can help us understand how the norm of prototype affects leaders and followers. However, the authors also point out, that very little research integrating leadership prototypes has been carried out to date (Schyns & Schilling, 2011; Van Quaquebeke, Graf, & Eckloff, 2014).

According to Eden and Leviatan (1975), followers believe that if leaders' actions and behaviors exemplify being innovative or showing special capabilities, then they are likely to interpret the leader as being transformational (Conger & Kanungo, 1987). Transformational leadership theory (Bass & Riggio, 2006) is a key foundational theoretical point for Digital Leadership, and is useful in explaining organizational change management (Eisenbach, Watson, & Pillai, 1999), of which digital transformation is a part. This theory has not yet been adopted for the digital age, however. Furthermore, according to Berson, Nemanich, Waldman, Galvin, and Keller (2006), there is insufficient empirical evidence on how transformational leadership affects innovation performance at the firm level, which is one of the most important drivers of digital transformation (Nambisan et al., 2017).

Lord and Maher (2002) point out that being perceived as leader is a prerequisite for being able to influence followers beyond the formal role. With this in mind, taking a closer look at how, where and why leaders match prototypes, may help us understand what it takes for leaders to be perceived as being successful in their organization's digital transformation, and ultimately build trust in their digital agenda. This leads us to the question: Do implicit leader attributes for digital transformation affect employee's perception of the organization's digital business strategy?

3.2.4 Attributes of the Digital Leader

As mentioned above, an initial inductive qualitative-explorative method (Gupta, MacMillan, & Surie, 2004) was applied for uncovering the basic underlying attributes of the Digital Leader in a preceding study. A distinct set of four attributes could be derived and quantified using sophisticated numerical ranking (Barron & Barrett, 1996) and conceptual clustering methods (Michalski & Stepp, 1983). Upon these findings, insights were further tested and analyzed in a

quantitative-empirical design (Den Hartog et al., 1999) to address whether the uncovered Digital Leader attributes were actually related to the organization's digital transformation. This research yielded four individual traits, competencies and skills associating leaders with successfully transforming the organization digitally. 'Empathic' emerged as the highest ranked Digital Leader attribute, followed by traits describing leaders as 'innovative', 'open' and 'agile' (Pabst von Ohain, 2019). Figure 4, below, displays the Digital Leader attributes with respective subdimensions.

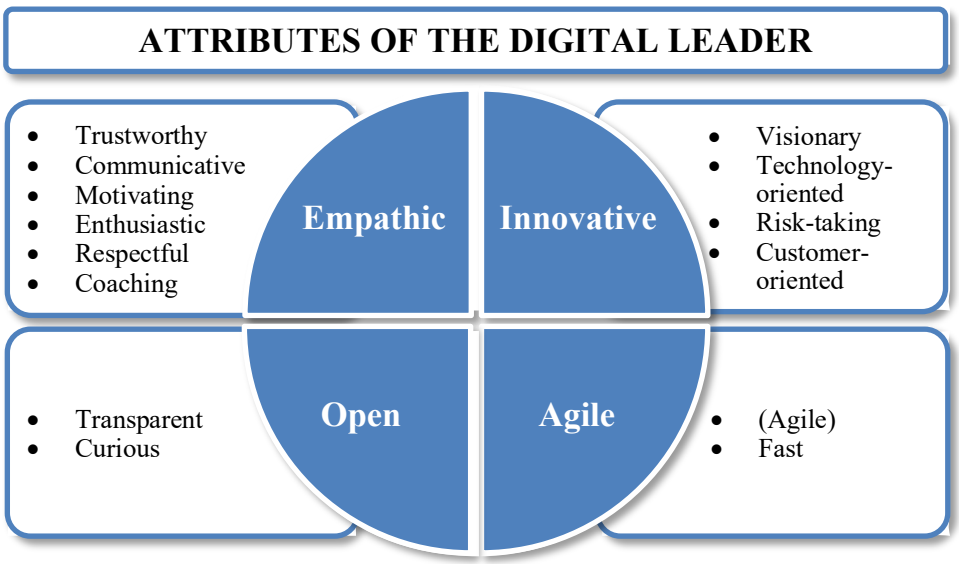

Figure 4: Attributes of the Digital Leader with Subdimensions

Source: (Pabst von Ohain, 2019)

Each attribute of the Digital Leader identified consists of several subdimensions, or nominations made by participants of the preceding study, that paint a more complex picture of which expectations are linked to leaders succeeding in digital transformation. In this study, in order to form our hypotheses, Digital Leader attributes are examined in context with contemporary management ideas and concepts in order to ascertain an organization's business strategy for a successful digital transformation.

Empathic

Empathy in leadership can be seen as the ability to notice and comprehend the feelings and attitudes of others, especially subordinates (Goleman, 2006). In particular, displaying empathy

helps leaders understand follower feelings, anticipate employee behavior and even influence follower emotions. In a high-quality leader-follower relation, support and employee well-being motivates followers to be innovative (Schermuly, Meyer, & Dämmer, 2013; Van Dierendonck, 2011), and has a positive influence on follower commitment during digital transformation. In doing so, it can trigger followership. This is in line with the body of literature on transformational leadership (J. Cho, Park, & Michel, 2011), which emphasizes inspiring and motivating employees and colleagues (Bass, 1985; Rubin, Munz, & Bommer, 2005).

Empathic leaders appear more credible and trustworthy (George, 2000; Lewis, 2000), which is key in promoting a complex agenda, such as a digital business strategy. Trust assists the Digital Leader in overcoming follower resistance and transmits positive emotions. It also can help followers express negative emotions (Little, Gooty, & Williams, 2016), which can be collectively eliminated. Additionally, trust strengthens the feeling of being part of a collective and fosters cooperation (Jarvenpaa, Knoll, & Leidner, 1998); this can be particularly challenging when operating within or managing a virtual team (Townsend, DeMarie, & Hendrickson, 1998). Lack of trust particularly challenges team structures based on projects, which are often found in digital transformation tasks. Aligning with the concept of responsible leadership introduced by Maak and Pless (2006) and referring to interpersonal contact with care and foresight, empathic Digital Leaders are also seen as reliable, authentic, honest and responsible.

The inclusion of caring and considering emotions into Digital Leadership is accompanied by communication, and empathy is one of the most important prerequisites for understanding the changes (Gottschalk, 1999) digital transformation brings to the organization (Eberly et al., 2013), thus evoking adequate Digital Leadership (Bennis, 2013). According to Singh and Hess (2017), CDOs, e.g., need communication skills in order to inform employees about strategic renewals and spread their vision of a digital business strategy (Little et al., 2016; Singh & Hess,

2017). Digital Leaders expressing empathy thus strive for a company-wide understanding of the need for digital transformation and implement a comprehensive digital attitude.

When an organization undergoes change, an empathic leader assumes the role of a coach (Maak & Pless, 2006), and in the case of digital transformation, empathic relationship skills induce care and recognition with followers (Joseph, Dhanani, Shen, McHugh, & McCord, 2015). While coaching, leaders can provide followers guidance for new digitalization challenges in form of a digital business strategy.

Necessary for integrating IT in the organization's overall digital business strategy (Drnevich & Croson, 2013), particularly CIOs (Armstrong & Sambamurthy, 1999) should express empathy and enthusiasm, mimicking the role of a relationship builder (Peppard, 2010). Such a relationship builder expresses empathy, support and being passionate about his or her followers' aspirations. Digital transformation is characterized by change and unpredictability, which may cause fear and uncertainty. Empathic leaders can help followers overcome these fears, provide assistance, and motivate followers to put faith in their particular strategy for digital transformation.

Hypothesis 1: The more empathy a leader for digital transformation displays, the better the employees' perception of the organization's digital business strategy.

Innovative

Mentioned in the literature, in the context of digital transformation, leadership is commonly characterized by an institutional entrepreneur who probes for innovative technical solutions and takes responsibility for the affiliated risk (Singh & Hess, 2017; Thong & Yap, 1995; Tumbas, Berente, & vom Brocke, 2018). These Digital Leaders are also known to introduce and implement new concepts and ideas into an organization (Pierce & Delbecq, 1977). Effective Digital

Leaders innovatively detect customer needs, intelligently align processes and products to the end-customer, and make use of the immense volume of data, generated by IT.

The Digital Leader will succeed in overcoming the challenges of digital transformation (Zhu et al., 2006). However, Digital Leaders should promote innovations compatible with existing business processes (E. M. Rogers, 1995), to create a strategy that works with an organization's own resources, within their capacity for what is feasible. Fostering digital innovation through a digital business strategy, tailored to their organization's digital needs, Digital Leaders are particularly aware of their organization's limitations and that of the innovation, realistically balancing needs with practicalities (Horner-Long & Schoenberg, 2002).

To be perceived as an effective, progressive leader (Weiss, 1977), especially in digital transformation, one should be perceived as creative. Since organizational innovation is often undertaken collectively (Gümüşlüoğlu & Ilsev, 2009), Digital Leaders serve as role models (Gupta et al., 2004), who are emulated by their followers. According to Gupta et al. (2004), follower commitment to creating strategic value can be mobilized by entrepreneurial leaders that create a vision. Innovative Digital Leaders curate a digital mindset, which is usually disseminated by the leader's vision (Singh & Hess, 2017) and encourage their followers to develop their own innovative mindset (Basadur, 2004). In terms of digitalization, visionary leaders spread a digital vision of the company via their digital business strategy (Singh & Hess, 2017).

Hypothesis 2: The more innovativeness a leader for digital transformation displays, the better the employees' perception of the organization's digital business strategy.

Open

Research has shown that Digital Leaders should remain open to new digital concepts, digital tools and systems (Hunt, 2015), when pursuing a digital business strategy. When open and

coherent behavior is displayed, Digital Leaders are recognized as being transparent, which is essential for building trust and support for their digital agenda. Openness in communication has both an impact on the communication within organizations and the organization's overall performance, since it involves an active share of data from peers. Open communication also works as a channel to transmit problems and opportunities, and analyze their possible solutions (D. P. Rogers, 1987). Sharing information with their followers openly, e.g., characterizes a transparent Digital Leader (Norman, Avolio, & Luthans, 2010). Transparency increases follower trust and support (Norman et al., 2010). Therefore, receptive and transparent Digital Leaders reduce resistance in followers and help to deepen the concerted corporate effort to reach digitalization goals. If a Digital Leader wants to promote their digital business strategy, the decisions and the intention behind these actions need to be explained clearly and potential risks must be disclosed (Avolio & Gardner, 2005; Avolio, Gardner, Walumbwa, Luthans, & May, 2004; Maak & Pless, 2006). A positive attitude and displaying transparency has an influence on whether followers put trust in their leader (Walumbwa, Avolio, Gardner, Wernsing, & Peterson, 2008) and if this leader is seen as effective (Norman et al., 2010). Thus, a Digital Leader, perceived as being open, will evoke trust in their proposed digital business strategy.

Managers must constantly be aware of the competitive and changing environment, not only in their own, but in outside markets as well. Curiosity, which is often synonymously used with openness, was found to be a necessary trait to keep managers alert to new information that is of corporate relevance (Y. Li, Tan, Teo, & Tan, 2006; Miller & Toulouse, 1986). This implies advantages in identifying opportunities and risks, which strongly characterize the context of digital transformation, as curiosity has also been proven to be a fundamental CIO characteristic that fosters organizational innovative usage of IT (Dehning, Richardson, & Zmud, 2003; El Sawy et al., 2016).

Openness increases the leader's motivation to explore new digital opportunities and willingness to innovate (Lewin & Stephens, 1994). Digital Leaders react to shifting customer and market demands and are open to initiatives that may reformulate business models or lead to the development of new products. These are crucial activities to defend against competition in the digital environment. Moreover, when more open, they are aware of but not adverse to risk as they push for necessary strategic renewals (Bharadwaj et al., 2013a). In uncertain digital contexts, Digital Leaders are not only required to be open to the unknown but should also embrace knowledge acquired from unsuccessful experiences (Bennis, 2013).

Openness can also be described as being broad-minded, imaginative, multifaceted and adventurous (Y. Li et al., 2006). These traits are directly opposite to rule-based, rigid, compulsive, and inflexible attitudes that indicate ignorance for environmental conditions (Miller & Toulouse, 1986). Flexibility in leadership, refers to the adaptability of an individual's thinking and behavior, especially during the complex task of organizational digital transformation. CEOs displaying open, flexible behavior are associated with strategic adaption, informal, flexible and simple organizational structures, and intuitive, risk embracing decision-making, rather than protracted processes and complex hierarchies (Miller & Toulouse, 1986). According to Alos-Simo et al. (2017), transforming organizations digitally requires leadership that can promote such an adaptive quality of organizational cultures as described. In order to accept and adapt to the transition initiated by strategic digitalization, flexibility and openness can aid the Digital Leader while adding value to the organization.

Hypothesis 3: The more openness a leader for digital transformation displays, the better the employees' perception of the organization's digital business strategy.

Agile

Agility is a dynamic and vigorous capability, which implies aligning organizational resources with dynamic and unpredictable environments, at a fast pace. Therefore, agility is the competence and qualification to recompose, acclimate and revise existing capabilities (Eisenhardt & Martin, 2000; Teece, Pisano, & Shuen, 1997). Particularly in volatile or ambivalent environments, these capabilities are necessary in order to react quickly when change is inevitable (Yoo, Henfridsson, & Lyytinen, 2010) to maintain competitiveness (Pavlou & Sawy, 2006, 2010; Sambamurthy et al., 2003; Tan, Tan, Wang, & Sedera, 2017). Digital Leaders are required to keep pace with the tempo of digital changes, reconfiguring entire business processes (Hansen et al., 2011). Mining capabilities of agility is an important business factor connected to information technology (Roberts & Grover, 2012; Tan et al., 2017).

Key to aspects of agility lies in sensitivity to the signals of market opportunities and their brisk responses (Zaheer & Zaheer, 1997). Sensing refers to the accurate and cost-efficient identification and implementation of business opportunities, quickly (Tan et al., 2017). Digital transformation raises the competitive dynamic to an industrial level, so organizational attention must be broadened. For instance, platforms can quickly and easily reveal customer expectations and organizations can take suitable actions (Nambisan & Baron, 2010). This will require skills of vigilance and readiness for exploration activities (March, 1991; Teece, 2007). In order to address business opportunities quickly, Digital Leaders are required to provide a proactive, flexible and agile response for stimulating appropriate operational processes (Roberts & Grover, 2012; Schwarzmüller et al., 2018).

As digital transformation of analogue infrastructures and the use of IT enhances organizational agility (Roberts & Grover, 2012; Tallon, 2008), technologies that facilitate effective execution of processes are crucial in agile forms of work (H. Cho et al., 1996). Working agile

represents a digital mind-set that encourages faster decision-making, involves different departments within the firm, affords less attention to hierarchies, and provides the support of conditions that stimulate creativity (Dörner & Edelman, 2015). The role of the CDO is characterized by such cross-functional skills for interacting with other teams and the conception of new digital solutions (Tumbas et al., 2018), which are required for the agile execution of a digital business strategy. An immediate access to organizational information provided by IT and knowledge sharing enabled by IT also strongly accelerates leader decision-making (Bharadwaj et al., 2013a; Sambamurthy et al., 2003) therefore, enhancing the leader's agility.

We are informed that constantly changing markets on a global dimension and products and services that are transformed to satisfy demand for more digital interactivity, is one of the largest threats to established corporations (H. Cho et al., 1996; Goldman et al., 1995). Organizations facing such radical digital change incorporate a digital business strategy, that provides enough freedom to react in an agile manner. Being able to react to changes induced by digital transformation quickly is one of the most important competitive advantages of our time (Goldman et al., 1995). Agility can also be seen as the reaction to unpredictable threats that might benefit the organization and the market at different levels and in various dimensions (Goldman et al., 1995; Roberts & Grover, 2012). Therefore, Digital Leaders executing their organization's digital business strategy strive to be more agile and help their organization become a faster market player to take advantage of these threats (Dörner & Edelman, 2015; Schwarzmüller et al., 2018).

Hypothesis 4: The more agility a leader for digital transformation displays, the better the employees' perception of the organization's digital business strategy.

3.3 Data and Method

3.3.1 Sample

To determine whether attributes describing the Digital Leader influence their employees' perception of a digital business strategy, inquiry in the form of a questionnaire was set in organizational contexts affected by digital transformation. For this reason, surveys with employees of mostly digitally established organizations were conducted, as we believed we would encounter many Digital Leaders in these organizational settings. The questionnaire was designed with regard to previous studies on transformational leadership and leadership in digital contexts (Alos-Simo et al., 2017; Avolio et al., 1999; Kaplan & Duchon, 1988; McElheran, 2015), and distributed online to reach a greater audience.

Pre-study: As no measures for the four Digital Leader attributes, nor the perception of a digital business strategy were available, a pre-study was carried out with the sole purpose to develop, test and validate scales for the major study variables. The total number of participants in this sample consisted of 304, with a completion rate of 39.8%, yielding 121 filled out surveys. Of those, 14 responses had to be removed because they could give no information on their leaders, as the participants were unemployed. In total, of the 107 remaining surveys (35.2% total completion rate), 42.1% of the sample were females (45 respondents) and the participants' age ranged from a minimum of 18 years to a maximum of 60 years, with an average of 35 years (SD = 10.1 years). The average professional tenure was 13 years (SD = 9.6 years), and 25% of participants held a management position (27 respondents). 75% of the assessed organizations employed more than 500 people and 84% were older than 10 years. The majority of the respondents' supervisors evaluated were men, accounting for 81.3% (87).

Main study: The total number of participants in the main study sample comprised 478, with a completion rate of 28.5%, yielding 136 filled out surveys. Of those, 7 responses had to be removed, due to insufficient data, resulting in 129 remaining surveys (27.0% total completion

rate). Participants' age ranged from a minimum of 23 years to a maximum of 73 years, with an average of 39 years (SD = 11.3 years). Female respondents accounted for 34.9% of this sample. A scale from 0% (lowest rank: no employee responsibility) to 100% (highest rank: C-level) was used to portray the hierarchical level within the organization. The respondent's (employees) average professional tenure was 15 years (SD = 10.6 years) and 47.3% of participants held a managing position within the organization, with an average hierarchy level of 41.2% (SD = 32.8). The age of the respondents' supervisors (leaders) ranged from a minimum of 26 years to a maximum of 73 years, at an average of 44 years (SD = 9.5 years) and 24% (31) of the supervisors assessed in this survey were female. On average, the respondents had been working for and with their supervisors for 4 years (SD = 2.9 years), whereas leaders had been working for their current organization for approx. 10 years (SD = 7.9 years). The average hierarchy level displayed by the supervisors was relatively high at 64.9%; 20.2% were leading executives (C-level), 17.1% were senior managers and another 28.7% were employed in middle management. The leaders in this study therefore showed a large share of top management positions, with a moderate to high hierarchical rank within the organization. To ensure a digital context, larger technology-oriented organizations were targeted, as they are known for applying digital tools in their daily activities and we expect that innovation and digitalization processes are embedded in their culture and practices. Therefore, 41.1% of this sample's organizations were mainly from the IT sector, 75% had a minimum headcount of over 500 employees and two thirds were founded at least 20 years prior to this assessment. These organizations had been engaged in digital transformation activities for an average of 11 years (SD = 7.7 years). In 51.2% of the cases, a CTO was appointed, followed by 20.9% CIOs employed. CDOs accounted for the smallest proportion, or 8.5% of the cases. The respondents were also asked to categorize the degree of digitalization of their organizations on a scale ranging from 0% (not digital at all) to 100% (completely digital), averaging at 74.2%. Overall, the sample is comprised of many top

managers from mostly larger technology firms with a considerable track record in digital transformation activities and with high degrees of digitalization.

3.3.2 Measures

To examine the influence of said Digital Leader attributes on the perception of the organization's digital business strategy, we follow an approach by Den Hartog et al. (1999), where middle managers were asked to describe leader attributes that they perceived to enhance or impede outstanding leadership on a seven-point Likert-scale. In a related study, Epitropaki and Martin (2005) assessed rated characteristics of implicit attributes found in the respondents' direct managers, in order to compare and contrast the perception of leadership. The items for scales that represented the description of Digital Leader attributes were selected from scales from pre-validated studies in the field of leadership. Most scales were slightly adapted to emphasize the leader as the unit of analysis, rather than the entire organization. A scale was also assigned to the perception of the organization's digital business strategy. All scales were administered with Likert-scales ranging from 1 (= strongly disagree) to 7 (= strongly agree) and validated via exploratory and confirmatory factor analysis.

Empathic (α = .916): Measurement for the attribute empathic was based on the Transformational Leader Inventory (TLI) scale, developed by Podsakoff, MacKenzie, Moorman, and Fetter (1990), considering transformational and transactional dimensions of leadership with 28 items in total. However, for the measurement of empathy in this study only two of the original dimensions were taken into account. These are most suited to describe findings on empathy in the context of digital transformation, i.e., *providing an appropriate model* and *fostering acceptance of group goals*, with items such as: "My leader provides a good model for me to follow" and "My leader gets the group to work together for the same goal".

Innovative (α = .869): Measurement for the attribute innovative was derived from the Top Management Team (TMT) scale (Chen et al., 2014) and limited to the dimension *technology orientation*. This dimension included 4 items with questions such as "My leader encourages the use of sophisticated technologies in our new product development" and "Technical innovation, based on research results, is readily accepted by my leader".

Open (α = .857): To measure the attribute open, the scale Organizational Innovativeness (Ruvio, Shoham, Vigoda‐Gadot, & Schwabsky, 2014) was selected with regard to its dimension *openness*. This dimension, consisting of 4 items, comprised questions such as "My leader is open and responsive to changes" and "My leader is always searching for fresh, new ways of looking at problems".

Agile (α = .803): The Organizational Innovativeness scale developed by Ruvio et al. (2014) was also utilized to measure the attribute agile. Among the dimensions used in this scale, the dimension *proactiveness* is most apt in describing agility. This dimension was based on 4 items containing questions such as "My leader takes the initiative in an effort to shape the environment to the organization's advantage".

Digital Business Strategy (α = .883): The perception of the organization's digital business strategy (DBS) describes an external point of view on the organization's preparation and necessary competences to face digital changes (Kane et al., 2017; Kane, Palmer, Phillips, & Kiron, 2015; Kane, Palmer, Phillips, Kiron, et al., 2015; Kiron et al., 2016; Yukl, 2008) and to take advantage of the evolution of digital technologies, as well as the execution of a strategy to implement a digital vision (Larjovuori et al., 2016). Measurement for DBS is based on a scale including questions about to what extent do respondents agree or disagree with statements such as "Our organization has a clear and coherent digital strategy" and "Our organization's leadership has sufficient knowledge and ability to lead our organization's digital strategy" (Kane et

al., 2017; Kane, Palmer, Phillips, & Kiron, 2015; Kane, Palmer, Phillips, Kiron, et al., 2015; Kiron et al., 2016).

3.3.3 Procedure

Though several items of the constructs above have been applied in research, they have not been validated in the form of separate variables to date. For this reason, construct validity and reliability through exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) was established (Kostopoulos & Bozionelos, 2011). Prior to EFA, it had to be determined whether the data was suitable for analysis (Williams, Onsman, & Brown, 2010). When factor loadings are high (> 0.60), a smaller sample size is sufficient (Guadagnoli & Velicer, 1988), therefore this pre-study's sample size of 107 was acceptable (J. F. Hair, Anderson, Tatham, & Black, 1995; Tabachnick & Fidell, 2007). The internal consistency of *Empathic*, *Innovative*, *Open* and *Agile* was good, displaying a Cronbach's alpha ranging between $\alpha = .785$ and $\alpha = .916$. Similarly, the *DBS* variable provided an alpha of $\alpha = .883$, which also demonstrates high reliability (Cortina, 1993). Moreover, the reliability results for the *Empathic* construct showed that removing the first item of the scale would increase reliability, therefore, this item was removed.

Table 2, below, provides an overview of the exploratory and confirmatory factor analyses for the four independent Digital Leader attribute variables, whereas Table 3 provides EFA and CFA results for this study's dependent variable *DBS*.

Table 2: Factor Analysis results (EFA & CFA) for the Digital Leader Attributes

Variables	Items	Eigenvalues	% of Variance Explained	Factor Loading	CA	AVE	CR	KMO
Empathic	Empathic_2	8.177	48.100	.633	.916	.562	.882	.890
	Empathic_3			.595				
	Empathic_4			.620				
	Empathic_5			.799				
	Empathic_6			.947				
	Empathic_7			.835				
Innovative	Innovative_1	2.016	11.861	.865	.869	.552	.827	
	Innovative_2			.824				
	Innovative_3			.700				
	Innovative_4			.540				
Open	Open_1	1.023	6.016	−.571	.857	.415	.726	
	Open_2			−.504				
	Open_3			−.899				
	Open_4			−.520				
Agile	Agile_2	1.187	6.983	.421	.785	.404	.654	
	Agile_3			.586				
	Agile_4			.832				

$\chi 2$ (112) = 200.336; CMIN/DF = 1.789; p <.000; RMSEA (90% CI) = .086; SRMR = .086;
GFI = .826; AGFI = .762; NFI = .845; RFI = .812; IFI .925; TLI = .907; CFI = .924
Note: N: 107, CA = Cronbach's Alpha; CR = Composite Reliability; AVE = Average Variance Extracted.

Table 3: Factor Analysis results (EFA & CFA) for Digital Business Strategy (DBS)

Variable	Items	Eigenvalue	% of Variance Explained	Factor loading	CA	AVE	CR	KMO
DBS	DBS_1	2.966	74.154	.873	.883	.6584	.9778	.824
	DBS_2			.751				
	DBS_3			.857				
	DBS_4			.757				

χ2 (2) = 1.735; CMIN/DF = 0.867; p = .420; RMSEA (90% CI) = .000; SRMR = .041;
GFI = .992; AGFI = .959; NFI = .993; RFI = .978; IFI 1.001; TLI = 1.003; CFI = 1.000
Note: N: 107, CA = Cronbach Alpha; CR = Composite Reliability; AVE = Average Variance Extracted.

For all study variables the correlation coefficients ranged well over the threshold (Henson & Roberts, 2006; Tabachnick & Fidell, 2007; Williams et al., 2010), the KMO Sampling Adequacy measured over .8 (Kaiser & Rice, 1974) and Bartlett's Test of Sphericity significance showed values of $p < .000$ (Bartlett, 1950), hence all four Digital Leader attributes and *DBS* items were suitable for factor analysis. Principal components analysis (PCA) was then carried out to extract factors (Thompson, 2004) using the oblique rotation method *Direct Oblimin*, since it allows for correlation among the factors (J. F. Hair et al., 1995; Tabachnick & Fidell, 2001). Cumulative percent of variance (Horn, 1965) with eigenvalues > 1 (Kaiser, 1960) and scree tests (Cattell, 1966) both indicated the use of a single factor per construct. The cumulative percentage of total variance yielded 72.96% of explained variance for the four Digital Leader attributes and 74.15% for the *DBS* variable. In most cases, all factor loadings were higher than .75, therefore being not only above the cut-off level of .5 (J. F. Hair et al., 1995) but also presenting an excellent fit of the items (Costello & Osborne, 2005). Only the first item from the scale *Agile* loaded higher in another factor and was therefore removed.

To verify the factor structure extracted from the EFA, CFA was conducted. These results indicated a good model fit following Hu and Bentler (1999) thresholds. For the Digital Leader

attributes the chi-square value ($\chi 2$ (112) = 200.336) divided by the degrees of freedom CMIN/DF = 1.789; $p < .000$, which confirms that the model is significantly different. Comparative fit index (CFI) showed a high value at .924, root mean square error of approximation (RMSEA) was moderate with .086 and the standardized root mean square residual (SRMR) was sufficient with a value of .086. Furthermore, the Goodness-of-Fit Index (GFI), adjusted Goodness-of-Fit Index (AGFI), Tucker-Lewis Index (TLI) and Normed Fit Index (NFI) were all close to the cutoff value of .9 and the Incremental Fit Index (IFI), and the Comparative Fit Index (CFI) with values between 0 and 1 all showed a good model fit: GFI = .826; AGFI = .762, TLI = .907, NFI = .845, RFI = .812, IFI = .925, respectively.

The results of the CFA analysis for *DBS* were as follows: $\chi 2$ (2) = 1.735, CMIN/DF = 0.867; $p < .420$, confirming a nonsignificant difference between the predicted values, the RMSEA = .000 and SRMR = .041 are under the cutoff value, but GFI = .992, AGFI = .959, TLI = 1.003, NFI = .993, RFI = .978, IFI 1.001; CFI = 1.000 are all above the cutoff value of .9 and very close or equal to 1 showing a good fit, as well.

After confirming the final structure of one single factor per theoretical construct, the internal reliability and validity were verified by calculating the composite reliability (CR) and the average variance extracted (AVE). Both the CR and AVE values of the proposed study variables were above the thresholds (J. F. Hair, Jr, Black, Babin, & Anderson, 2010). Overall, the Digital Leader and *DBS* variables presented a good model fit and the reliability and validity could be confirmed. Thus, the means of individual items per scale were calculated for further calculation and represent the constructs of respective variables.

3.4 Results

Table 4 provides an overview of descriptive statistics, variable intercorrelations, and internal consistencies of the measures used in this study. Before taking a closer look at the influence of

the four independent variables (the attributes of the Digital Leader) on this study's dependent variable, *DBS*, we examined the influence of possible control variables on the perception of the organization's digital business strategy for consideration in further statistical analysis (Bernerth, Cole, Taylor, & Walker, 2018).

On a scale from 1 (lowest) to 7 (highest), the mean *perception of the organization's digital business strategy* (DBS) depicted by respondents is rather high at 5.393 (SD = 1.233). This implies that these organizations possess a coherent strategy for digital transformation and have been *engaged in digital transformation* activities for many years (Mean = 11.263; SD = 7.706). *Digital transformation engagement* is significantly positively correlated with *DBS* (r = .353), substantiating that pursuing digital transformation for a considerable amount of time has a positive effect on the organization's perception of a digital business strategy. The results also show a significant negative correlation between *DBS* and the *age of the organization* (r = -.250). Unsurprisingly, this indicates that older organizations are not perceived in having a strategy for their digital transformation. The *leaders' current professional tenure* also significantly negatively correlates with *DBS* (r = -.319), which might signal that the longer leaders have been working at their current organization, the less employees associate them with their organization's digital business strategy. However, this examination was not subject to this study. We additionally controlled for the *leaders' gender*, but could not find any significant effect on *DBS*. Further examination of intercorrelations revealed, that the individual *level of hierarchy* for both employees and leaders does not affect *DBS*. Whether the organization had employed a CTO, CIO or CDO had no effect on *DBS*, either. We can only speculate that formal leadership for digital transformation does not influence whether the organization is perceived in having a digital business strategy or not. In sum, the variables *digital transformation engagement*, *leader tenure* and *age of organization* are of statistical and theoretical relevance in regard to *DBS* and thus were taken into account as control variables for regression modelling, below.

Table 4: Means, Standard Deviations and Correlations of Major Study Variables

Variable	Mean	SD	Range	1	2	3	4	5	6	7	8
1. DBS	5.393	1.233	1.00 - 7.00	1							
2. Digital Transformation Engagement	11.263	7.706	1.00 - 27.08	.353***	1						
3. Leader Tenure	10.005	7.890	1.33 - 37.00	−.319***	.062	1					
4. Age of Organization	3.960	1.665	1.00 - 7.00	−.250**	.221**	.382***	1				
5. Empathic	5.567	1.166	1.00 - 7.00	.293***	−.146*	.064	−.006	1			
6. Innovative	5.502	1.115	1.00 - 7.00	.382***	−.075	−.051	−.123	.492***	1		
7. Open	5.655	1.010	1.00 - 7.00	.308***	−.024	.021	−.047	.741***	.607***	1	
8. Agile	5.163	1.074	1.00 - 7.00	.293***	.010	−.018	.030	.573***	.527***	.622***	1

Note: N: 129; *p < .05; **p < .01; ***p < .001; Age of Organization data was categorized.

The results show significant positive correlations between all four independent variables and *DBS* (Empathic: r = .293; Innovative: r = .382; Open: r = .308; Agile: r = .293). This information allows us to further analyze reported implicit Digital Leader attributes in the context of digital transformation in accordance to previous implicit leadership traits models (Epitropaki & Martin, 2005). Although all independent variables significantly correlate positively, multicollinearity doesn't represent a problem since correlations display values lower than the threshold of .9 (J. F. Hair et al., 1995), nor could we detect possible transformation bias (Bishara & Hittner, 2015). The influence of the four Digital Leader attributes on *DBS* was further analyzed via hierarchical regression, below.

In order to test our hypothesis, we ran a number of hierarchical regressions to account for the perceptions nested in the individual participants (Raudenbush, Bryk, & Congdon, 2004). In Table 5, the results of the hierarchical regression with five models are presented, four of which only include a single Digital Leader attribute together with the control variables and DBS as the dependent variable. The complete model includes all four attributes and controls as predictors for the perception of the organization's digital business strategy (DBS). All variables of the proposed predictors were entered in the regression equation. For the complete model, Step 1 allowed the entering of control variables, while Step 2 followed with the addition of all four independent variables. Representing distinct statistical models for hypothesis testing, each attribute was entered individually in Step 2 for models 2-5. In all five models, the coefficient of determination (R^2), expressing the variance of the dependent variable *DBS*, improved significantly with entering the independent variables in Step 2.

Table 5: Hierarchical Regression Analysis

	Variables	(1) Empathic	(2) Innovative	(3) Open	(4) Agile	(5) Complete
Step 1: Controls	Dig. Trans. Engagement	.077*** (.011)	.071*** (.011)	.068*** (.012)	.068*** (.012)	.077*** (.011)
	Leader Tenure	−.043*** (.011)	−.039*** (.011)	−.041*** (.012)	−.038** (.012)	−.041*** (.011)
	Age of Organization	−.184** (.056)	−.153** (.056)	−.170** (.058)	−.193** (.058)	−.167** (.054)
	Constant	5.750*** (.258)	5.750*** (.258)	5.750*** (.258)	5.750*** (.258)	2.647*** (.555)
	R^2	.291	.291	.291	.291	.291
	F	17.133***	17.133***	17.133***	17.133***	17.133***
Step 2: **Digital Leader Attributes**	**Empathic**	**.401*** ** (.073)				**.304** ** (.109)
	Innovative		**.417*** ** (.076)			**.293** ** (.095)
	Open			**.383*** ** (.086)		−.100 (.136)
	Agile				**.336*** ** (.082)	.043 (.102)
	Constant	3.457*** (.476)	3.297*** (.502)	3.543*** (.551)	4.036*** (.481)	2.647*** (.555)
	R^2	**.431**	**.431**	**.389**	**.377**	**.481**
	ΔR^2	**.140**	**.139**	**.098**	**.086**	**.189**
	F	23.515***	23.459***	19.759***	18.750***	16.003***
	ΔF	30.523***	30.363***	19.877***	17.014***	11.031***

Note: N = 129; *p < .05; **p < .01; ***p < .001; Dependent Variable: DBS; Method: Enter; Coefficients and Standard Errors (in parentheses) shown for predictors.

As shown in Table 5, above, regarding the prediction of *DBS* in all five models, the control variables *digital transformation engagement* and *leader tenure* accounted for a low percentage of the variance in *DBS*, though more variance could be explained by controlling for the *age of organization*. In all five models, a longer *digital transformation engagement* significantly im-

proves *DBS*. In contrast, *leader tenure* and the *age of organization* significantly negatively affect *DBS*. These results are in line with our previous observations, gathered from the correlations, displayed in Table 4, further above.

Regarding the Digital Leader attribute *Empathic*, *Hypothesis 1* predicted that the more empathy a leader for digital transformation displays, the better the perception his or her subordinates will have on their organization's digital business strategy (*DBS*). In Model 1, the regression coefficient for *Empathic* was significant and predicts over 40% of variance ($\beta = .401$, $p < .001$) in *DBS*, thus confirming *Hypothesis 1*. Empathy is a prerequisite for understanding the changes (Gottschalk, 1999) digital transformation brings to the organizational context (Eberly et al., 2013), thus evoking adequate Digital Leadership (Bennis, 2013). Peppard (2010) assigns CIOs (Armstrong & Sambamurthy, 1999) the role of a relationship builder, who should express empathy and enthusiasm, which is necessary for integrating IT in the organization's overall digital business strategy (Drnevich & Croson, 2013). This goes in line with the notion of transformational leadership, which additionally emphasizes inspiring and motivating employees and colleagues (Bass, 1985; Rubin et al., 2005). Also matching current literature, the inclusion of emotions and care into Digital Leadership is accompanied by communication (Little et al., 2016; Singh & Hess, 2017), which is, in turn, a fundamental skill in promoting a digital business strategy within the organization.

In Model 2, the regression coefficient for *Innovative* significantly predicts almost 42% of variance ($\beta = .417$, $p < .001$) in *DBS*. We can therefore confirm that employees will indeed have a better perception of their organization's digital business strategy when their supervisor displays innovative behavior (*Hypothesis 2*). As mentioned in the literature, leaders in the context of digital transformation are commonly characterized as entrepreneurs that try out innovative technical solutions and bear the affiliated risk (Singh & Hess, 2017; Thong & Yap, 1995;

Tumbas et al., 2018), which matches our observations. The results confirm that a coherent digital business strategy positively viewed by the employees of that firm is a factor strongly associated with innovativeness and a digital mindset, which is usually disseminated by the leader's vision (Singh & Hess, 2017).

Hypothesis 3 postulates that the more openness a leader for digital transformation displays, the better the employees' perception of the organization's digital business strategy will be. Taking a look at Model 3, over 38% of variance in *DBS* can be significantly explained by the Digital Leader attribute *Open* ($\beta = .383$, $p < .001$), supporting *Hypothesis 3*. Digital Leaders are recognized as been transparent, when open and comprehensible behavior is displayed, which is also essential in order to build trust during change (Norman et al., 2010). We also repeat that transforming organizations digitally requires leadership that can promote the adaptive quality of organizational cultures (Alos-Simo et al., 2017). Openness, has been proven to be a fundamental CIO characteristic that fosters organizational innovative usage of IT (Y. Li et al., 2006). Research has also shown that Digital Leaders should remain open to new digital concepts, digital tools and systems, and social technology features and platforms (Hunt, 2015), in order to undergo strategic digital transformation.

Results from Table 5 suggest that when leaders for digital transformation are perceived by their subordinates as being agile, the perception of the organization's digital business strategy will be better, as well. This is consistent with *Hypothesis 4*, as *Agile* significantly predicts roughly 34% of the variance in *DBS* ($\beta = .336$, $p < .001$). Agility is an important business factor that is connected to information technology (Roberts & Grover, 2012; Tan et al., 2017), as Digital Leaders are required to keep pace with the velocity of digital trends, transforming entire business processes (Hansen et al., 2011), if they wish to formulate a successful adaptive digital business strategy.

In a final analysis step, Model 5 represents the complete hierarchical regression model with all relevant predictors. Although not directly hypothesized, in theory, this model intends to predict the perception of the organization's digital business strategy, when a leader for digital transformation displays all four Digital Leader attributes, simultaneously. As gathered in Table 5, *Empathic* ($\beta = .304$, $p < .001$) and *Innovative* ($\beta = .293$, $p < .001$) remain significant in predicting the variance in *DBS*. The attributes *Open* and *Agile*, however, both become insignificant in Model 5. We can only speculate that, for this sample, implicit leader characterization for a multitude of attributes simultaneously becomes too complex to yield significant results. However, in the complete model, *Empathic* and *Innovative* account for close to 70% of variance in *DBS*. As suggested by Pabst von Ohain (2019), Digital Leader attribution should follow specific digital transformation tasks, demanding specific Digital Leader profiles, i.e., to which extent the respective Digital Leader attribute is portrayed by the leader. As for *Empathic* and *Innovative,* we can add to this notion.

3.5 Discussion

This present study was one of the first attempts to assess the influence of implicit leadership attributes describing a prototypical Digital Leader, i.e., an individual who successfully transforms the organization digitally, in light of the perception of the organization's digital business strategy. Several important findings emerged from this research that extend our current thinking on leadership in the digital age. Specifically, three major contributions of our study can be outlined.

First, most studies on ILTs have been undertaken in laboratory settings (Cronshaw & Lord, 1987; Lord et al., 1984), thus the influence of employees' perceptions of explicit leadership has not yet gained much empirical attention. As a result, our understanding of how ILTs operate in specific organizational settings remains limited. Epitropaki and Martin (2005) were among the

first to focus on employees' implicit leadership profiles. By extending ILTs to a new organizational context - that of digital transformation - the effects of implicit prototypical Digital Leader attributes on organizational digital transformation outcomes can be analyzed. To our knowledge, this approach has never been attempted, though it allows implicit prototype assessment in a confined organizational context for the development of a much more comprehensive framework than hitherto examined. The results of this study can help us understand effects of implicit leader attributes on desired management outcomes, where the immediate influence may not be directly observable.

Second, although much has been written about the way new technology has altered our conception of modern leadership (Avolio et al., 2009), how the use of technology disseminates leadership (DeSanctis & Poole, 1994), and how organizational structures, including leadership, may transform as a result of interactions with technology (Alos-Simo et al., 2017; El Sawy et al., 2016; McElheran, 2015), the relationship between technology and leadership remains relatively under-researched (Avolio et al., 2014). Moreover, there is little research on digital transformation as a new organizational context (Eberly et al., 2013), evoking adequate leadership (Bennis, 2013). Scholars have emphasized that for successful digital transformation, skilled and digital literate leaders (Hunt, 2015; Schwarzmüller et al., 2018) with a specific mindset (El Sawy et al., 2016), and specific attributes that coincide with this mindset, are needed. Scholars have not however, provided knowledge on how these attributes directly influence the pursuit of strategic digital transformation, necessary for competitive advantage. We therefore extend the current research on leadership for the digital age, such as e-leadership (Avolio et al., 2000), by introducing the new organizational context (Eberly et al., 2013) of digital transformation; as well as, transpose elements of transformational leadership theory (Avolio et al., 1999; Bass & Riggio, 2006) for the digital age, since as of now, we have little knowledge (Berson et al., 2006) of how these theories effect digital transformation (Nambisan et al., 2017).

Finally, the present study addresses how the role of leadership for digital transformation should be defined in terms of how attributes, necessary for transforming the organization digitally, influence the perception of a digital business strategy. Knowing this influence, we are able to understand the relationship between the personal characteristics of successful Digital Leaders and their pursuit of a digital business strategy as a function of this particular context and environment, helping us unravel how the two interact (Bennis, 2013). As of now, leadership and information systems literature focuses solely on a C-level perspective (Carter et al., 2011; Kohli & Johnson, 2011; Lee et al., 2014; Singh & Hess, 2017) to cope with the challenges of digital transformation (Dubelaar et al., 2005). However, digital transformation spans across all business units and hierarchy levels. Therefore, there is a noted absence of research on the relevant attributes of the Digital Leader, found on all organizational levels, who truly understands the changes that occur through new technology (Gottschalk, 1999). This study puts emphasis on the crucial role of the Digital Leader within the organization's overall digital business strategy (Bharadwaj et al., 2013a, 2013b; Chen et al., 2014), i.e. the integration of technology in strategic management (Drnevich & Croson, 2013). In particular, we bridge the micro-macro divide concerning the organizational hierarchy level perspective, resulting from sole C-suite digital board position literature (Armstrong & Sambamurthy, 1999; Carter et al., 2011; Kohli & Johnson, 2011; Lee et al., 2014; Singh & Hess, 2017), by investigating the Digital Leader in all organizational hierarchy levels (Bharadwaj et al., 2013b; Gottschalk, 1999; Hansen et al., 2011).

We additionally contribute to the information systems literature by introducing and validating a construct for the perception of the organization's digital business strategy (Kane et al., 2017; Kane, Palmer, Phillips, & Kiron, 2015; Kane, Palmer, Phillips, Kiron, et al., 2015; Kiron et al., 2016), which to our knowledge, is the very first approach for measuring employees' perception of strategic digital transformation.

To conclude, leading scholars have pointed out the necessity of a holistic digitalization strategy from a leadership point of view; though have not provided theory on how to pursue such a strategy. Therefore, this paper aimed at determining the influence of attributes of Digital Leaders, to help us understand how successful digital transformation is understood from an individual's position and help fill the gaps left behind. As a result, we can gather that skilled and competent (El Sawy et al., 2016) Digital Leaders, who display the distinct attributes associated with successful digital transformation, will build trust in their digital agenda, when followers have a better perception of their vision of a digital business strategy.

3.5.1 Practical Implications

The present study also has important practical implications, especially from the human relations perspective, as the analysis of Digital Leader attributes may help organizations promote Digital Leaders within their organization and aid in the acquisition of external Digital Leaders, when the influence of specific leader profiles is known. Leaders not fulfilling the required Digital Leader attributes, as perceived, could significantly benefit by learning which attributes compose their organization's implicit leadership profile for pursuing a digital business strategy. Thus, an important practical application would be management training programs identifying the gaps of possible deficits concerning Digital Leader attributes (Boyatzis, 2011) and strengthening awareness for subordinates' positive perception of implicit Digital Leader profiles (Epitropaki & Martin, 2005).

Moreover, Digital Leader categorization can be used to explain perceptions not only on the basis of ILTs indicating to followers how a leader should be within the context of digital transformation, but it can also provide leaders with an abstract understanding of which attributes their subordinates expect them to have in order to be perceived as effective in the execution of a digital business strategy. In particular, the examination of Digital Leader attribution can help

organizations understand if a mismatch between expectations and reality exists, and identify critical leverage points for intervention. Lastly, concerning the organization's overall digital business strategy, the interplay between Digital Leader attribution and subordinates' perception of this strategy is an important cornerstone for understanding possible further effects Digital Leaders have on digital transformation outcomes of their organizations.

3.5.2 Limitations and Implications for Future Research

The present study is not without limitations, despite significant contributions. First, self-assessed measures were used, hence we cannot rule out the possibility of some bias. However, the literature suggests that self-reported data is no longer as limited as previously believed and that participants often accurately perceive their social environment (Alper, Tjosvold, & Law, 1998). Also, single-source data was used in the questionnaires, which was measured from the employee's perspective. Although this does not seriously weaken our study findings, since we were interested in these perspectives, we should still acknowledge it as a limitation. In contrast to most research centered on leaders' perceptions in their description of the behaviors that they themselves used to describe leadership, the study of subordinates' perceptions of the leader's behavior or attributes may be most useful in examining linkages between leadership and organizational variables (Yukl, 2006).

A second issue is the operationalization of implicit leader attribute and organizational perception data. In particular, since no quantitative research on the attributes describing the Digital Leader had been undertaken, no scales nor constructs were available for uncovering implicit leader attributes in direct connection to the digital transformation of the organization. It was hence necessary to apply exploratory and confirmatory factor analyses to quantify the perception of the specific Digital Leader attributes and the organization's digital business strategy by

means of validated scales, e.g., in order to generate constructs for empirical modelling and regression analysis. A further limitation involves the study's ability to predict causal relationships. Because the data was cross-sectional, there might have been associations between the variables in this study. Future research in more controlled settings needs to be done before causal inferences regarding the relationships observed in the present study can be made (Lovelace, Shapiro, & Weingart, 2001). An experimental design focused on Digital Leader perception can help overcome this issue.

Furthermore, this study primarily assessed organizations headquartered in Germany. Since cultural and social differences influence the appropriation of technology and the handling of digital transformation, the examination and comparison of the perception of Digital Leader attributes could be conducted across cultures (Schwarzmüller et al., 2018). Results from this cross-cultural research might provide insights on culture-specific Digital Leader attributes (Avolio et al., 2000), as culture strongly impacts the development of implicit beliefs (Den Hartog et al., 1999; House, Javidan, Hanges, & Dorfman, 2002). Future research using multilevel techniques (Henderson, Wayne, Shore, Bommer, & Tetrick, 2008) set in various cultures may be able to overcome such limitations and offer additional insights on the perceptual interplay between leaders and followers in the digital transformation context to uncover possible dyadic Digital Leadership relationships (Avolio et al., 2014).

Future research could help replicate our findings and, moreover, help uncover the direct influence of the Digital Leader in many other aspects of the organization's digital transformation. Through the introduction of additional variables within the realm of the organizational (digital) innovation process of theoretical and empirical interest, the effects of the Digital Leader and respective attributes on product innovation performance at the firm level could be explored, which is one of the most important drivers of digital transformation (Nambisan et al., 2017).

3.6 Conclusion

This study uniquely investigates the influence the distinct attributes of so-called Digital Leaders have on followers' perception of their organizations' digital business strategy. It is the first empirical study to establish a relation between the personal characteristics of Digital Leaders and their pursuit of strategic digital transformation. In doing so, the paper unifies and extends current theories on leadership for digital transformation, rooted in leadership and information systems research and makes a vital contribution to the literature, by introducing the new organizational context of digital transformation to these fields. With the results of this study, we are able to provide a useful theoretical framework for analyzing the influence leaders have on desired organizational digital transformation outcomes and help define the theory on digital leadership.

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4. Discussion[2]

This thesis's primary intention was to determine and describe what kind of leadership (El Sawy, Kræmmergaard, Amsinck, & Vinther, 2016) is necessary and adequate to cope with the challenges of digital transformation of the organization (Ray, Muhanna, & Barney, 2005). On the one hand, a first step in this direction was achieved through essay I in the form of a qualitative-exploratory study. The underlying study assessed those personal leader attributes (Hernandez, Eberly, Avolio, & Johnson, 2011) that are associated with successful digital transformation in order to deliver an initial definition of the prototype Digital Leader (Epitropaki & Martin, 2005) based on their respective attributes; On the other, the second essay followed an quantitative-empirical design, to substantiate the first essay's findings and contrast these with the current literature. To suggest Digital Leadership as a new leadership principle for the digital age, this thesis investigated the influence of these uniquely uncovered Digital Leader attributes on employees' perception of their organization's digital business strategy (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013a, 2013b; Drnevich & Croson, 2013; Kane, Palmer, Phillips, Kiron, & Buckley, 2015; Kiron, Kane, Palmer, Phillips, & Buckley, 2016). The specific findings of each of the chapters will be summarized in the sections below.

4.1 Summary of Findings

Chapter II aimed at exploring the attributes of the Digital Leader, identified in embedded digital organizational contexts. In particular, Chapter II examined which implicit attributes, as perceived by both employees and leaders of digital savvy organizations, appear necessary for the organization's digital transformation. In doing so, this study delivered several important

[2] This chapter is partly based on and includes elements of Pabst von Ohain (2019), and Pabst von Ohain (2021); see Appendix A for full references.

findings. First, the respective study yielded four distinct implicit attributes associated with successful Digital Leaders. Overall, empathic emerged as the highest ranked Digital Leader attribute. This was followed by innovative, open and agile. Second, this chapter helps scholars to understand how successful digital transformation takes place within organizations from a leadership point of view. Third, by emphasizing Digital Leader attribution, this study's insights provide organizations with information and guidelines on how to choose or train the adequate leader for their digital transformation journey.

A close examination of the first identified attribute, empathic, considers a Digital Leader trustworthy when reliable, authentic, honest and responsible. This is synergistic with the concept of responsible leadership introduced by Maak and Pless (2006), referring to interpersonal contact exhibiting caring and empathetic traits. These authors also mention that respect is an important behavioral aspect. Moreover, they see a leader in the function of a coach, especially when a company undergoes change, such as in digital transformation contexts. Empathy is also a prerequisite for understanding the changes (Gottschalk, 1999) digital transformation brings to the organization (Eberly, Johnson, Hernandez, & Avolio, 2013), thus evoking adequate Digital Leadership (Bennis, 2013). Peppard (2010), e.g., refers to CIOs (Armstrong & Sambamurthy, 1999) in the role of a relationship builder, who should express empathy and enthusiasm necessary for integrating IT in the organization's overall digital business strategy (Drnevich & Croson, 2013). This echoes the concept of transformational leadership, which additionally emphasizes inspiring and motivating employees and colleagues (Bass, 1985; Rubin, Munz, & Bommer, 2005). Also matching current literature, the inclusion of emotions and caring into Digital Leadership is accompanied by communication (Little, Gooty, & Williams, 2016; Singh & Hess, 2017), another important subdimension of empathy.

Regarding the second attribute, innovative, and according to the literature, leaders in the context of digital transformation are commonly characterized as entrepreneurs that try out innovative technical solutions and carry any risks related (Singh & Hess, 2017; Thong & Yap, 1995; Tumbas, Berente, & vom Brocke, 2018). This characteristic is in accordance with respondents' statements recorded in Chapter II. Digital Leaders will succeed at overcoming the challenges of digital transformation (Zhu, Dong, Xu, & Kraemer, 2006), when they are able to maintain their organizations' relative advantage through technology-orientation and by exploiting digital innovation. Simultaneously, they must be aware of the limitations of such (Horner-Long & Schoenberg, 2002), and if these remain compatible with existing business processes (Rogers, 1995). The results of this study also emphasized customer-orientation, which is a factor strongly associated with innovativeness. In addition, a digital mindset is usually disseminated by the leader's vision (Singh & Hess, 2017).

The third Digital Leader attribute identified was open. In the study described in Chapter II, a Digital Leader was recognized as being transparent, when open and comprehensible behavior was displayed. Since we are reminded that transforming organizations digitally requires leadership that can promote the adaptive quality of organizational cultures (Alos-Simo, Verdu-Jover, & Gomez-Gras, 2017), it is essential that transparency is evident in leadership in order to build trust during that change (Norman, Avolio, & Luthans, 2010). Research has also shown that Digital Leaders should remain open to new digital concepts, digital tools and systems, and social technology features and platforms (Hunt, 2015). Moreover, curiosity, as part of openness, has been proven to be a fundamental CIO characteristic as well, which fosters organizational innovative usage of IT (Li, Tan, Teo, & Tan, 2006).

Lastly, the attribute agile was isolated, completing the Digital Leader attribute profile and thus ultimately defining the prototype Digital Leader. In this study, respondents' statements,

such as hands-on, impulsive, dynamic and brave, align with the scientific literature, which distinguishes between forms of agility in the business environment (e.g., operational agility, customer agility). Speed is also included into the definition of agility. Moreover, agility is an important business factor that is connected to information technology (Roberts & Grover, 2012; Tan, Tan, Wang, & Sedera, 2017), as Digital Leaders are required to keep pace with the briskness of change of digital trends, and must transform entire business processes rapidly (Hansen, Kraemmergaard, & Mathiassen, 2011).

Apart from the implicit Digital Leader attributes stated above, Chapter II yielded interesting insights on where and how to identify Digital Leaders and the implications and applications of such a categorization. In Chapter II, the respondents' level of hierarchy had a significant effect on whether their organizational entity could be considered digitally mature, implying that top management leaders may have a greater positive effect on the organization's digital transformation. Nonetheless, all four Digital Leader attributes were present on all levels of hierarchy assessed (Gottschalk, 1999). Thus, Digital Leaders are not limited to C-level positions, but are rather present on all management levels, digitally transforming the organization.

While taking a closer look at how, where and why typical and ideal leaders match followers' perception, we can try to understand what it takes for leaders to be perceived as being successful in their organization's digital transformation. In cases where leaders do not match either their followers' implicit Digital Leader characterization, nor the organization's internal definition of effective leadership for digital transformation, these leaders will not be seen as Digital Leaders, regardless of their digital transformation efforts. It is therefore important to have a clear understanding of both the prototypical and actual leader attribute profile, so expectations can be met.

In Chapter II, we found no evidence that engaging in digital transformation activities in an organization over an extended period of time had an effect on whether the organization was digitally mature or not. Moreover, no parallels were discovered between personal experience in

pursuing digital transformation over time and corresponding individual Digital Leader attributes. The study found no proof that the leader's age (nor gender) had any significant effect on the organization's digital transformation, either. To summarize, the results indicate that neither extensive experience in digital transformation, age, gender or job level necessarily makes you a Digital Leader.

Each Digital Leader comes with their own set of strengths and weaknesses, so naturally it is difficult to encounter a Digital Leader profile expressing a full degree of overlap for all four attributes. For this reason, organizations successful at executing their digital transformation, match digitalization tasks with appropriate leader profiles, i.e., specific attribution. Therefore, it is advised to acquire any attribute absent or weak in the individual Digital Leader profile, through appropriate management training programs. This will ensure leadership is equipped for any digital transformation task.

The study in Chapter III was designed as a follow-up on the results uncovered in Chapter II, which were further challenged and juxtaposed with contemporary literature and management concepts. Empirical evidence was gathered to manifest whether the four identified Digital Leader attributes – empathic, innovative, open and agile – actually have an effect on a concrete organizational digital transformation outcome. Hence, this study investigated the influence of the aforementioned Digital Leaders attributes on followers' perception of their organizations' digital business strategy (DBS). For this reason, hierarchical regression analysis with distinct models for each Digital Leader attribute, as well as a complete model with all four attributes as predictors for the perception of the organization's digital business strategy was performed.

With regard to the results in Chapter III, evidence in the data of the four distinct models (a single attribute per model) was found, suggesting that indeed each individual Digital Leader attribute has a significant effect on whether the follower has a positive perception of their organization's digital business strategy. These results confirm the close ties each Digital Leader

attribute has with the respective body of literature, as stated in the preceding paragraphs. In contrast, the complete model (all four attributes in the same model) intended to predict the perception of the organization's digital business strategy, of the employees when a leader for digital transformation displays all four Digital Leader attributes, simultaneously. While empathic and innovative remained significant in predicting the variance in the DBS variable, the attributes open and agile both became insignificant. Based on this outcome, we can only speculate that implicit leader characterization for a multitude of attributes simultaneously becomes too complex to yield significant results. However, in this complete model, empathic and innovative had accounted for nearly 70% of variance in displayed in the DBS variable. As suggested earlier on, these results add to the notion, that for the attributes empathic and innovative, Digital Leader attribution should follow specific digital transformation tasks, where this specific Digital Leader profile is required.

4.2 Implications for Theory

This thesis was one of the first to take a closer look at the unique set of implicit leadership attributes that describe the prototypical Digital Leader. We also offer an initial definition of the Digital Leader, who can be described as an individual successfully transforming their organization digitally. By uncovering the relationship between these attributes and the respective leader's subordinates' perception of their organization's digital business strategy, this thesis can substantiate the anteceding findings from the first study and thus make a more vital contribution to the literature. In doing so, this study addresses significant gaps in the research on the relationship between technology and leadership (Avolio, Sosik, Kahai, & Baker, 2014), as well as the importance of certain leader attributes on digital transformation (Nambisan, Lyytinen, Majchrzak, & Song, 2017). By examining the correlation between personal leader attributes and a concrete digital transformation outcome, we are able to give guidance on how to foster

digital transformation and thus aid in its strategic pursuit. This thesis contributes to management and IS literature in four main ways.

First, we are aware that for successful digital transformation, skilled leaders with distinct digital competencies and attributes (Hunt, 2015; Schwarzmüller, Brosi, Duman, & Welpe, 2018), accompanied by a specific mindset (El Sawy et al., 2016) are needed. However, research has not yet provided which particular attributes are required, nor how these attributes may directly influence the pursuit of strategic digital transformation (Berson, Nemanich, Waldman, Galvin, & Keller, 2006). We are thus able to make a vital contribution to the literature by analyzing the influence of identified attributes describing the prototype Digital Leader, namely empathic, innovative, open and agile, to uncover whether this distinct set of traits, skills and competencies has a measurable effect on a desired organizational digital transformation outcome.

Second, although the literature indicates how new technology has changed the way we perceive modern leadership (Avolio, Walumbwa, & Weber, 2009), how the use of this technology disseminates leadership in organizations adopting it (DeSanctis & Poole, 1994), and how the organization itself may transform as a result of interactions with technology (Alos-Simo et al., 2017; El Sawy et al., 2016; McElheran, 2015), we still have little understanding of the bilateral relationship between technology and leadership (Avolio, Bass, & Jung, 1999; Avolio et al., 2014; Bass & Riggio, 2006). By unraveling the interaction of this diploid, we are able to understand the relation between personal characteristics of Digital Leaders and their pursuit of a successful digital business strategy as a function of this particular context and environment (Bennis, 2013). Moreover, as there is hardly any research on this relationship in the context of the digital transformation of organizations (Nambisan et al., 2017), we set out to extend the contemporary research in this field, namely e-leadership (Avolio, Kahai, & Dodge, 2000) and transformational leadership, by the new organizational context of digital transformation (Eberly

et al., 2013). Within this organizational context, we additionally contribute to information systems literature by introducing a construct for measuring the perceived digital business strategy of the organization (Kane, Palmer, Nguyen-Phillips, Kiron, & Buckley, 2017; Kane, Palmer, Phillips, & Kiron, 2015; Kane, Palmer, Phillips, Kiron, et al., 2015; Kiron et al., 2016), which is a method to assess strategic aspects of desired digital transformation pursuits.

Third, leadership and information systems literature has primarily focused on executive level leadership (Carter, Grover, & Thatcher, 2011; Kohli & Johnson, 2011; Lee, Madnick, Wang, Wang, & Zhang, 2014; Singh & Hess, 2017) to overcome the challenges digital transformation poses to the organization (Dubelaar, Sohal, & Savic, 2005). Research has shown us, however, that digital transformation will span across all business units and hierarchy levels (Bharadwaj et al., 2013b; Gottschalk, 1999; Hansen et al., 2011). Therefore, there is an apparent gap concerning the investigation of relevant attributes of the Digital Leader, found on all organizational levels (Gottschalk, 1999). We are able to overcome this void by placing the role of the Digital Leader on all hierarchy levels found in the organization (Gottschalk, 1999) within the organization's overall digital business strategy (Bharadwaj et al., 2013a, 2013b; Chen, Tang, Jin, Xie, & Li, 2014), i.e., the integration of information technology (IT) in strategic management (Drnevich & Croson, 2013), to sufficiently carry out the organization's digital transformation (Bharadwaj et al., 2013b; Hansen et al., 2011).

Lastly, since the majority of ILT research is based on confined laboratory requisites (Cronshaw & Lord, 1987; Lord, Foti, & De Vader, 1984), we have little knowledge of how implicit leader traits operate in actual organizational settings (Epitropaki & Martin, 2005). For this reason, the influence of employees' perceptions of implicit leadership has not yet gained much empirical attention. Building on previous theoretical models of implicit leadership (Den Hartog, House, Hanges, Antonio Ruiz-Quintanilla, & Dorfman, 1999; Eden & Leviatan, 1975;

Lord et al., 1984; Offermann, Kennedy Jr, & Wirtz, 1994), this thesis extends ILT to observations in the new organizational context of digital transformation, while focusing on inherent leader attribution for the development of a more comprehensive framework. This is important, as these findings can help uncover the influence of implicit leadership on desired management outcomes, where it is difficult to directly observe the immediate influence of leaders on organizational variables.

4.3 Implications for Practice

Apart from the previously outlined theoretical contributions, this thesis provides several important practical implications, aimed at organizations aspiring to digitally transform themselves and execute a digital business strategy. Based on the findings, guidelines for identifying and making use of Digital Leaders are presented. On the one hand, Digital Leader attribute categorization can be used to explain perceptions indicating to followers how a leader should be within the context of digital transformation. Such categorization, on the other hand, can also provide leaders with an abstract understanding of which attributes their subordinates expect them to have in order to be perceived as effective in the execution of a digital business strategy. The correlation between Digital Leader attribution and subordinates' perception of the organization's overall digital business strategy is an important cornerstone for understanding possible further effects Digital Leaders have on digital transformation outcomes of their organizations. Organizations can therefore gain insights if a mismatch between expectations and reality exists, and identify critical leverage points for intervention.

As each digital transformation is unique to the organization, the extent of each Digital Leader attribution should be defined according to the digital transformation task. Depending on this particular task, individual Digital Leader profiles are then employed. Organizations will often encounter cases where developing new solutions for established business practices is a matter of precise timing, so that one does not fall behind competition. These kinds of tasks call for

agile Digital Leaders with resolute actions, sometimes at the cost of displaying less open behavior. In other cases, the Digital Leader will be primarily required to build trust in newly formed development teams, emphasizing the attributes empathic and open, while being less agile in the process. Not all leaders will display each attribute in a full measure, nor at the same time, so it is necessary to assign digital transformation tasks to matching Digital Leader profiles. Where this is not possible, critical deviation from the prototype profile needs to be identified to ensure the correct intervention.

Measures for the correct intervention, such as management training programs (Boyatzis, 2011) can only be applied when deficits in the degree of required Digital Leader attribution are known. Such intervention strategies should then be directed at the largest attribute deviation. Leaders who do not fulfill the required Digital Leader attribution could therefore significantly benefit by learning which attributes compose their organization's implicit Digital Leader profile. Management training programs directed at each individual Digital Leader attribute should be applied, allowing for a holistic Digital Leader training. A different kind of management training offering could be directed at teaching Digital Leaders with high preexisting attribution when and how to balance the appropriate Digital Leader attribute in accordance to the digital transformation task to match their organization's own implicit Digital Leader profile.

4.4 Limitations and Directions for Future Research

Despite significant contributions, this thesis is not without limitations. We cannot rule out the possibility of some bias, due to the self-designed collected and assessed methods for data generation and evaluation as displayed in Chapter II. In addition, in Chapter II and III, single-source data from an employee's perspective was utilized which might also be determined as a biased approach. However, since we are primarily interested in these employees' perspectives and since studying subordinates' perceptions of leader behavior and attributes are necessary to understand the connections between leadership and organizational processes (Yukl, 2006), the

single-approach does not impair the findings of the study to any significant degree. Regarding the self-assessed measures of the data management, according to Alper, Tjosvold, and Law (1998) self-reported data is no longer viewed as limited as previously thought since questionnaire participants appear to be apt at correctly evaluating and understanding their social environment. This is in contrast, however, to most research which is centered on leaders' perceptions in describing the behaviors that they themselves use to describe leadership. Future research, based on multilevel techniques (Henderson, Wayne, Shore, Bommer, & Tetrick, 2008), may be able to overcome such limitations and offer additional insights on the perceptual interplay between leaders and followers in the organizational context of digital transformation to uncover a possible dyadic Digital Leadership relationship (Avolio et al., 2014).

A limitation can be inferred in that no scales or constructs were available for reference which revealed implicit leader attributes that influence the organization in digital transformation. The reality is that until these studies were conducted, no quantitative research had been done on Digital Leader attributes. In Chapter III, this brought us to a second study design issue: to generate constructs for empirical modelling and regression analysis, we had to apply exploratory and confirmatory factor analyses in order to operationalize implicit leader attributes and data on organizational perception. This allowed us to quantify the perception of the specific Digital Leader attributes and the organization's digital business strategy by means of validated scales. Future research could help replicate our findings and substantiate the validated scales in a broader sense. By extending the theoretical model, we might be able to uncover the direct influence of the Digital Leader in many other aspects of the organization's digital transformation. For example, through the introduction of additional variables within the realm of the organizational (digital) innovation process of theoretical and empirical interest, the effects of the Digital Leader and respective attributes on product innovation performance at the firm level could be

explored. This is one of the most important drivers of digital transformation (Nambisan et al., 2017) and is closely linked to the Digital Leader attribute innovative.

Although there was a direct link established between Digital Leader attributes and a desired outcome of an organization's digital transformation, the thesis' ability to predict causality may be called into question. We do have to consider that due to the cross-sectional nature of the data, there might have been hidden and unacknowledged associations in the variables isolated. It is therefore recommended that future research should be conducted under more controlled settings (Lovelace, Shapiro, & Weingart, 2001). Regarding the relationships detected in the study, experimental design focused on the perception of the Digital Leader attributes along with other variables that measure more diverse organizational outcomes other than those we have discussed, should be structured before causal inferences can be firmly established.

A final limitation may be applied to the fact that there are cultural and social differences that influence one's approach to digital transformation. In the studies of Chapter II and III, the majority of respondents to our study were employed by German organizations or the firms were based in Germany. Moreover, our respondents were not exclusively but most often, German. We have to acknowledge that culture is the reflection of societal norms and beliefs and impacts the development of implicit prototypical attribution (Den Hartog et al., 1999; House, Javidan, Hanges, & Dorfman, 2002), as well as how one engages digital transformation. Should the examination and comparison of the perception of Digital Leader attributes be conducted across various cultures (Schwarzmüller et al., 2018), those results may reveal insights that reflect culture-specific Digital Leader attributes (Avolio et al., 2000).

4.5 Conclusion

In two closely linked essays, which build upon each other, this study uniquely assesses distinct attributes associated with the so-called Digital Leader and later investigates the influence these distinct attributes have on followers' perception of their organizations' digital business

strategy. In the first essay, the thesis suggests possibilities to pinpoint Digital Leaders and make use of their profiles. The second essay was the first empirical study to establish a relation between the personal characteristics of Digital Leaders and their pursuit of strategic digital transformation. All in all, the thesis unifies and broadens current theories on leadership for digital transformation, grounded in conventional leadership and information systems disciplines. It makes substantial contributions to the literature, by extending its research with the new organizational context of digital transformation. Upon the results of this thesis, we are able to provide a useful theoretical framework for analyzing the leader's influence on desired organizational digital transformation outcomes and help set the definition of a new leadership principle – that of digital leadership. We discuss the practical implications of our findings in much detail and attempt to resolve one of the largest threats to organizations in the digital age: finding adequate leadership to successfully overcome the challenges brought upon the organization in its quest for digital transformation.

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5. Appendix

Appendix A: References for the Essays

Reference for Essay I:

Pabst von Ohain, B. (2019). Leader Attributes for Successful Digital Transformation. In: *Proceedings of the Fortieth International Conference on Information Systems (ICIS)*. Munich, Germany. ISBN 978-0-9966831-9-7.

Reference for Essay II:

Pabst von Ohain, B. (2021). *The Influence of Implicit Digital Leader Attributes on the Perception of the Organization's Digital Business Strategy*. Working paper.

Appendix B: Author Contribution to the Essays

Benjamin Pabst von Ohain is the single author of both essays. Benjamin Pabst von Ohain was responsible for developing the questionnaires and the development of the hypotheses. The research questions for these studies as well as their research design and methodological approaches were developed by Benjamin Pabst von Ohain. Benjamin Pabst von Ohain was responsible for collecting and analyzing the data, writing the manuscripts as well as receiving feedback from Theresa Treffers and Isabell M. Welpe.