Transforming the Information Technology Function: Essays on the Role of Distinct Organizational Capabilities

Dissertation
Transforming the Information Technology Function: Essays on the Role of Distinct Organizational Capabilities

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Introductory Essay to "Navigating Transformations in IT: Essays on the Role of Distinct Organizational Capabilities"

Abstract

This dissertation examines the impact of digital transformation on organizations, particularly on the Information Technology (IT) function in organizations, as they grapple with the need to adapt to the rapid pace of change. Drawing on the resource-based view of the firm and the literature on organizational ambidexterity, it highlights the central role of organizational capabilities in successful digital transformation. Specifically, the research focuses on organizational design capabilities, leadership capabilities, and human resource capabilities. In doing so, it addresses the unique challenges IT organizations face, including talent shortages and the need for bimodal structures to balance exploration and exploitation. Through theoretical and practical insights, this research contributes to a deeper understanding of digital transformation within IT organizations, offering guidance on organizational design, leadership, and human resources capabilities to facilitate successful adaptation in today's dynamic digital landscape. This cumulative dissertation comprises seven essays that address the various research questions. An overview of the research completed as part of this dissertation is provided in this introductory essay. It includes the motivation, the conceptual and theoretical foundations, and the research questions. It also outlines the structure of the dissertation and provides an overview of the methodological approaches based on the seven independent essays. The dissertation concludes with theoretical and practical implications, limitations, and suggestions for further research.

Keywords: IT Organizations, Organizational Capabilities, Ambidexterity, Resource-Based View, Digital Transformation.
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1 Motivation

As the digital transformation reshapes entire industries, organizations must keep pace with these changes (Chen et al., 2018). Successful digital transformation necessitates a thorough comprehension and appropriate responses to the emergence of a new organizational identity (Wessel et al., 2021). Consequently, organizations are increasingly pressured to cultivate greater adaptability, agility, and dynamism (Ravichandran, 2018). In response to these demands, companies frequently undertake digital transformation efforts to restructure their fundamental frameworks, including organizational arrangements and routines (Besson & Rowe, 2012; Gersick, 1991). In that sense, digital transformation has been defined as "a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies" (Vial, 2019, p.118). Scholars increasingly regard organizational capabilities as pivotal for organizations to successfully navigate these digital transformation endeavors (Konopik et al., 2022).

Resource-based theory stands out as one of the most influential frameworks for understanding organizations (Barney et al., 2011). According to the resource-based view (RBV), firms can be conceptualized as collections of resources and capabilities that determine their ongoing viability and potential for advancement (Barney, 1991). Consequently, disparities in performance or profitability are attributed to variations in firms' resources, capabilities, and endowments, which are shaped by their historical trajectories, existing resources, and accumulated capabilities (Dierickx & Cool, 1989; Mahoney, 1995).

The need for change mentioned above also profoundly impacts Information Technology (IT) organizations, leading to re-evaluating their frameworks, methodologies, and operations (Langer & Yorks, 2018). As a result, it is critical to examine capabilities, which are defined as the ability of a firm to transform inputs into higher-value outputs (Wade & Hulland, 2004), especially in IT organizations, for several reasons.

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1 In this dissertation, we follow the definition of Winkler (2012) and understand that the term IT organization encompasses the group of individuals responsible for various IT tasks, including planning, developing, and maintaining information technology applications along with their associated computer and communication systems.
First, IT functions serve as the linchpin in driving business transformation initiatives (Singh & Hess, 2020). However, they face distinct challenges from changing expectations and interpretations of their organizational role as they are seen to be responsible for ensuring stable and reliable operations while simultaneously being tasked with driving digital change (Haffke et al., 2017). Consequently, they need to build organizational ambidexterity, which encompasses the notion that organizations can adapt to their environment and achieve long-term success by simultaneously exploring new opportunities and exploiting existing capabilities (Andriopoulos & Lewis, 2010). In the need to build and deploy organizational design capabilities, companies have pursued bimodal organizational structures for their IT functions to accompany these changing demands, incorporating both explorative and exploitative capabilities (Haffke et al., 2017). Exploration involves experimentation and innovation, while exploitation focuses on efficiency and execution (March, 1991), both essential for achieving organizational ambidexterity (March, 1991). In that sense, individual ambidexterity denotes flexible engagement in both modes (Mu et al., 2022), necessitating the creation of organizational structures and mechanisms, such as certain leadership styles, to facilitate it.

Second, IT organizations face a distinctive struggle for IT professionals in an increasingly competitive environment (Zaza et al., 2023). A recent analysis conducted by McKinsey underscores this difficult situation, projecting a tech talent gap ranging from 1.4 million to 3.9 million individuals by 2027 within EU-27 countries (Blumberg et al., 2023). In addition, in a study conducted in Germany, 60 percent of the companies surveyed found that filling vacancies for IT specialists takes longer than other positions, with positions remaining unfilled for an average of 7.7 months. For one in five companies, the average time to fill a vacancy is between 10 and 12 months, and for 4 percent, it is more than a year (Wintergerst, 2023). Thus, despite the industry's rapid expansion, a critical shortage of IT professionals presents a potential barrier to progress (Oehlhorn et al., 2019; Zaza et al., 2023). The distinctiveness of the IT environment is further compounded by the unique attributes of IT professionals in terms of personality (Lounsbury et al., 2007) and behavioral and motivational outcomes in the work context (Zaza et al., 2023). Consequently, companies must cultivate distinct leadership and human resources (HR) capabilities to attract and nurture talent.
This dissertation contributes to the theoretical understanding of the impact of digital transformation on organizations, particularly on the IT function in organizations. To this end, it synthesizes insights from the resource-based theory and organizational ambidexterity literature to contribute to the understanding of capabilities within IT organizations. In doing so, this dissertation provides practical insights into the importance of organizational design, leadership, and HR capabilities in addressing talent shortages and driving successful digital transformation initiatives, helping organizations adapt to and excel in rapidly evolving digital landscapes.

The dissertation is organized around three primary research objectives and seven research questions, each of which is addressed in one of the seven essays. This introductory essay begins with a discussion of theoretical foundations (Section 2), followed by an exploration of research gaps and questions (Section 3) and the research design and findings (Sections 4 and 5). Finally, the dissertation summarizes and discusses the essay's findings (Section 6). In summary, the work advances conceptualizations with regard to organizational design capabilities within IT organizations (Essays 1 and 2), enhances understanding of leadership capabilities in ambidextrous IT organizations and the public sector (Essays 3, 4, and 5), and provides insights and interventions for deploying HR capabilities effectively (Essays 6 and 7).

2 Conceptual Foundation

This section introduces the resource-based view of the firm and (organizational) capability concept underlying this dissertation. It also provides an overview of the current organizational challenges faced by IT organizations due to the need to adapt to change and remain competitive, as well as the capabilities required to address these challenges. In doing so, this section further provides an overview of the capabilities that are the focus of this dissertation, namely ambidexterity, organizational design capabilities, leadership capabilities, and HR capabilities.

2.1 Resource-Based View

Resource-based theory is considered "one of the most prominent and powerful theories for understanding organizations" (Barney et al., 2011, p. 1299). The resource-based view (RBV) of the firm has been widely used in the management literature over the past 30
years to understand the relationship between a business unit's resources/capabilities and its performance or profitability (Deephouse, 2000; DeSarbo et al., 2007; Hansen et al., 2004; Lin & Wu, 2014).

Following the RBV view, a firm can be regarded as a collection of resources and capabilities that dictate its continued existence and potential for improvement (Barney, 1991). Consequently, differences in performance or profitability are explained by the heterogeneity of firms in terms of their resources, capabilities, and endowments, as firms are constrained by their historical past, existing resources, and accumulated capabilities (Dierickx & Cool, 1989; Mahoney, 1995). While the RBV originated in the strategic management discipline, its impact on other research disciplines, including Information Systems (IS), has grown (Barney et al., 2011). RBV provides a theoretical lens for IS scholars to examine how IS resources and capabilities can contribute to firm strategy and performance (e.g., Wade & Hulland, 2004).

Many extensions and elaborations of RBV in IS research have been published over the years. Most of them have identified critical resources and capabilities and examined their impact on competitive advantage and other organizational issues such as performance, profitability, and strategic alliances (e.g., Wade & Hulland, 2004). The analyzed resources and capabilities in IS research and beyond include human resources, physical assets, technology, and leadership (Grant, 1991; Razzaque et al., 2023; Silvestri et al., 2023; Todorovic & Schlosser, 2007). To the extent that these capabilities are difficult for competitors to imitate, they are seen to lead to long-term competitive advantage and performance (Dierickx & Cool, 1989; Hoopes et al., 2003; Peteraf & Bergen, 2003).

As noted in Hoopes et al. (2003) and Makadok (2001), since the original RBV publications by Wernerfelt (1984) and Barney (1986, 1991), a distinction has emerged in the RBV literature between capabilities and resources. According to Makadok (2001), a resource is an observable (but not necessarily tangible) asset that can be valued and traded. Capabilities are unobservable (and not necessarily tangibly), invaluable, and transferable only as part of the whole. As such, capabilities can be skills, such as technical or managerial skills, or processes, such as systems development or integration (Wade & Hulland, 2004).
Organizational capabilities are especially critical and necessary in times of change (e.g., Teece, 2009). Existing research in the literature has identified a wide range of factors that contribute to organizational capabilities (Wang & Zeng, 2017) and has identified critical organizational capabilities such as organizational design capabilities (Konopik et al., 2022), leadership capabilities (Konopik et al., 2022), and human resource capabilities (Kamoche, 1996). In the following chapter, we will look at distinct capabilities that facilitate the change IT organizations face in light of the need for digital transformation.

2.2 Capabilities

A capability\(^2\) is a term widely used in RBV (Sanchez, 2001). One of the most popular definitions is that capabilities are the ability of a firm to transform inputs into higher-value outputs (Amit & Schoemaker, 1993; Capron & Hulland, 1999; Wade & Hulland, 2004). Another definition is that of Makadok (2001) and Hoopes et al. (2003, p. 890), who state that capabilities are intangible, "cannot be valued, and change hands only as part of their total unit". Another difference with capabilities is that they are less easily transferable than resources. (Amit & Schoemaker 1993; Eisenhardt & Martin 2000). Furthermore, Teece et al. (1997, p. 529) stated that capabilities "cannot be bought easily; they have to be built internally by the organization". Following this line of thought, that the extent to which capabilities and resources are difficult for competitors to imitate determines their value in leading to competitive advantage, capabilities can be assumed to be particularly critical for organizations to possess, deploy, and develop (e.g., DeSarbo et al., 2007; Lippman & Rumelt, 2003).

The effective management of any organization requires coordinating several internal organizational processes, routines, and activities (Andrews et al., 2015). The concept of the organizational capability is increasingly used in the strategic management literature to capture how this coordination can be theorized, studied, and implemented (Schreyoeegg & Kliesch-Eberl, 2007). An organizational capability is essentially constituted by the high-level organizational practices that coordinate the firm's productive activities (Winter, 2003) and, as a concept, has been used to encapsulate the insights of the firm's resource-based theory about the organizational sources of high-performance

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\(^2\) Following Wade and Hulland (2004), in this dissertation, the terms capabilities and competencies are considered to be essentially synonymous.
Helfat and Peteraf define organizational capabilities as "the ability of an organization to perform a coordinated set of tasks using organizational resources to achieve a specific result" (Helfat & Peteraf, 2003, p. 999). These organizational capabilities are combinations of resources available, owned, or controlled by the firm (Amit & Schoemaker, 1993) and routines learned through repeated behavior patterns (Feldman, 2000). Organizational capabilities vary across firms, allowing some firms to perform static, dynamic, or creative activities more effectively than their competitors (Collis, 1994). Organizational capabilities are inherently context-specific, meaning they are developed within an organization around specific resources. As organizational contexts change, individuals must adapt and cultivate new capabilities to fit the new circumstances (Kogut & Zander, 1992).

Consequently, relying solely on past capabilities becomes limited when environments change (March, 1991), meaning that using existing capabilities can only be helpful to the extent that environments remain stable (March, 1991). When environments begin to change, existing rules, standards, and technologies can burden organizations because it is difficult for organizations to unlearn well-learned programs and develop new sets of capabilities (Bhatt, 2000). One can conclude that in today's rapidly changing digital landscape, the survival and success of organizations hinge upon their capability to navigate and adapt to dynamic environments. The dynamic capabilities concept emerges as a valuable framework in response to this multifaceted challenge. This concept posits that organizations' ability to sense environmental changes, seize opportunities, and adapt their resource base is key to thriving in a disruptive digital environment (Helfat et al., 2007; Teece, 2007). These abilities, termed dynamic capabilities, are essential for organizations to cope with the new realities of digital transformation (Eisenhardt & Martin, 2000).

Dynamic capabilities are change-oriented (Zahra & George, 2002) and encompass a set of managerial and organizational routines that facilitate resource acquisition, integration, and reconfiguration (Teece, 2014). They enable organizations to respond effectively to future environmental changes by aligning their resource base with evolving customer demands and market trends (Ellström et al., 2021). From a practical standpoint, dynamic capabilities entail repetitive practices aimed at creating, expanding, and modifying.
resources (Miles, 2012), and in essence, dynamic capabilities represent a competitive advantage in the face of environmental turbulence (Zahra & George, 2002).

There is a consensus in the academic literature that dynamic capabilities are based on organizational capabilities (Eisenhardt & Martin, 2000; Helfat et al., 2007; Winter, 2003) and that they cannot result from a purely formal learning process (Nayak et al., 2020). Previous research disaggregates the concept of dynamic capabilities into "hierarchies of capabilities" (Ambrosini et al., 2009, p. 10), with abstract dynamic capabilities at the top and a larger set of organizational capabilities at the bottom (Ambrosini et al., 2009; Danneels, 2002; Winter, 2003; Zahra et al., 2006). Continuing along this line of thought, it can be assumed that organizational capabilities can evolve into dynamic capabilities during times of change while still maintaining their core identity as organizational capabilities, making them recognizable (and named) as such.

Organizational capabilities, analyzed through the lens of the resource-based view, assume that human resources are crucial in stimulating the positive performance of a company (Andrews et al., 2015), as the knowledge possessed by human resources leads to a high value because they are difficult to imitate (DeSarbo et al., 2007). In addition, Andrews et al. (2015) underscore the pivotal role of certain attributes, specifically the caliber of leadership and management within a company, alongside the quality of its strategic management practices, in shaping organizational capability. Consequently, this dissertation directs its attention to the realm of dynamic organizational capabilities centered around human resources: 1) organizational design capabilities, 2) leadership capabilities, and 3) HR capabilities.
2.2.1 Ambidexterity

While many firms struggle to survive amidst change, a select few endure. This prompts inquiry into their adaptive strategies and asks how they succeed where others fail (O’Reilly & Tushman, 2008). At the core of this adaptability lies the firm's capacity to exploit existing assets profitably, explore new technologies and markets, and adeptly configure and reconfigure organizational resources to seize current and emerging opportunities (March, 1991; Teece, 2007). This duality is often framed as the tension between exploration and exploitation (March, 1991) or embodied in the concept of ambidexterity (Duncan, 1976; Tushman & O’Reilly, 1996). Exploitation prioritizes efficiency, productivity, control, and reducing variance, while exploration focuses on search, discovery, innovation, and embracing variability. Ambidexterity is the art of balancing and excelling in both realms simultaneously (O’Reilly & Tushman, 2008).

Ambidexterity, defined as the simultaneous pursuit of seemingly conflicting activities such as exploitation and exploration, is gaining traction in various domains, including IS research (Werder & Heckmann, 2019; Birkinshaw et al., 2016). While it denotes the ability to concurrently pursue divergent goals (Tushman & O'Reilly, 1996), ambidexterity also entails integrating capabilities from these contrasting dimensions (Cao et al., 2009; Gibson & Birkinshaw, 2004). Organizational ambidexterity suggests that organizations can thrive in their environments and achieve sustained success by exploring new opportunities and exploiting existing capabilities concurrently (Andriopoulos & Lewis, 2010). Exploitation involves efficiently utilizing existing resources and capabilities through established processes, while exploration entails discovering novel ways to combine resources and capabilities to create new potentials and opportunities (March, 1991).

The literature delineates three main forms of ambidexterity: structural, temporal, and contextual ambidexterity. Structural ambidexterity involves the pursuit of two conflicting goals through distinct subunits, such as the utilization of bimodal IT, where each subunit targets a different objective (Kusanke & Winkler, 2022; Tushman & O’Reilly, 1996). Temporal ambidexterity suggests that a unit focuses on one conflicting goal at a time (Duncan, 1976). Contextual ambidexterity posits that paradoxical demands can be reconciled by fostering an organizational context conducive to ambidextrous employee
behavior (Gibson & Birkinshaw, 2004). Thus, within an organizational unit, exploitation, and exploration are orchestrated simultaneously through a context-specific blend of social support, performance management, structure, and capabilities aimed at fostering alignment and adaptability (e.g., Meglio et al., 2015; van Assen, 2020).

As shown in Figure 0-1, ambidexterity can be viewed as an organizational capability on its own. However, it also serves as a boundary-spanning capability that necessitates the dynamic development of other organizational capabilities. Consequently, within organizational contexts, dynamic capabilities form the core of a business's ambidextrous ability to compete effectively by concurrently exploring and exploiting opportunities (O’Reilly & Tushman, 2008).

![Figure 0-1. Research Framework](image)

As mentioned, companies face the unquestionable need to focus on digital transformation, and they must also ensure that stable and reliable operations remain paramount (Haffke et al., 2017; Horlach et al., 2016; Leonhardt et al., 2017). Consequently, IT organizations are especially encountering challenges stemming from altered expectations and perceptions of their role within the organization. On the one hand, IT functions are expected to maintain existing systems ("keep the lights on"), while on the other hand, they are also tasked with driving digital change (Haffke et al., 2017). Consequently,
companies have pursued bimodal forms of IT organization, which provide both exploratory and exploitative capabilities, thereby enabling them to achieve what previous researchers termed "structural ambidexterity" (e.g., Colella et al., 2014; Fortmann et al., 2018; Leonhardt et al., 2017). The exploratory and exploitative modes shaping the respective IT work environments differ in their project management approaches and manifest in distinct cultures guided by different strategic and operational management styles (Haffke et al., 2017).

Therefore, in addition to the structural adaptations required to support organizational ambidexterity, supported by the development of organizational design capabilities (Konopik et al., 2022), there is a need for adapted leadership styles (e.g., van Assen, 2020), and thus the development of leadership capabilities, and adapted recruitment and retention strategies (e.g., Zaza et al., 2023) rooted in HR capabilities. The concepts of organizational design capabilities, leadership capabilities, and HR capabilities will be described in the following.
2.2.2 Organizational Design Capabilities

From the RBV perspective, which emphasizes the role of (organizational) capabilities in differentiation and competitive advantage, organizations need to dynamically adapt and evolve their organizational design capabilities, understood as \textit{capabilities relating to the design of the structural and procedural organization}, in the midst of change (Konopik et al., 2022). This means that the dynamic competitive landscape forces companies to refine their organizational structures, for example, by fostering ambidextrous work environments that balance exploring new ideas and exploiting established ones. (Haffke et al., 2017).

This shift is particularly significant within IT organizations, given their critical role in propelling digitization and innovation, all while ensuring the reliability and stability of IT operations (Gerster, 2017; Leonhardt et al., 2017). Consequently, many firms are experimenting with new and what they hope will be more dynamic organizational structures for their IT functions. They adopt agile practices and build ambidextrous work environments that simultaneously focus on exploration and exploitation (Leonhardt et al., 2017), often called bimodal IT (Haffke et al., 2017). As organizations grapple with the contradictory objectives and potential paradoxes inherent in the pursuit of exploitation and exploration, academia and industry seek strategies to aid organizations and individuals in navigating these challenges (Jöhnk et al., 2019).

The bimodal approach was introduced by Gartner, a market research and advisory firm, defining it as "\textit{the practice of managing two separate but cohesive styles of work: one focused on predictability, the other on exploration}" (Colella et al., 2014). These two modes differ in their project management methodologies and are deeply ingrained in distinct cultures, guided by disparate strategic and operational management styles, each striving to achieve unique objectives (Haffke et al., 2017). The conventional mode (mode 1) is primarily employed for mission-critical information systems and core company processes (Horlach et al., 2017). This exploitative aspect minimizes operational risk using sequential project management methodologies like waterfall approaches (Haffke et al., 2017). Within this mode, management cultivates a risk-averse culture that prioritizes safety and precision (Haffke et al., 2017). Conversely, the agile mode (mode 2) prioritizes customer experience and business outcomes driven by rapidly evolving market
demands (Zhen et al., 2021). Such exploratory endeavors are typically reserved for projects with less predictable results, focusing on short release cycles and employing iterative project management styles such as Scrum (Haffke et al., 2017). The culture within mode 2 is characterized by principles of agility and rapidity (Haffke et al., 2017).

Bimodal IT is a term coined by practitioners for different IT organizational forms through which organizations aim for structural ambidexterity. These endeavors ultimately support an organization’s overall IT ambidexterity (Colella et al., 2014; Jöhnk et al., 2019).

Digital transformation and the corresponding organizational design responses manifest through an organization’s IT governance. IT governance is understood as "the leadership and organizational structures, processes and relational mechanisms that ensure that an organization’s IT sustains and extends its strategy and objectives" (de Haes & van Grembergen, 2004, p. 1). The literature on IT governance has shed light on the prevalent governance structures and their contextual contingencies, elucidating why and how such structures are adopted (Brown & Grant, 2005). Structural, procedural, and relational IT governance mechanisms represent established classifications delineating IT governance forms (de Haes & van Grembergen, 2004; Peterson et al., 2000). Structural mechanisms include decision-making structures, roles, and responsibilities within IT governance (de Haes & van Grembergen, 2004). Procedural mechanisms help formalize and institutionalize these decision-making processes. Relational mechanisms, on the other hand, facilitate informal but active participation and collaborative relationships among all stakeholders involved (Peterson, 2004). Thus, IT governance mechanisms serve as critical horizontal integration capabilities that facilitate changes in organizational structures, such as those needed to implement bimodal IT organizations, and as such, are also considered lower-order capabilities to organizational design capabilities.
2.2.3 Leadership Capabilities

In alignment with the RBV, organizations must cultivate capabilities pertinent to organizational management and culture, amongst others, through managerial capabilities, defined as the "behavioral abilities of managers to effectively manage and organize people and resources" (Welter et al., 2013, p. 274). In the context of the required change and digital transformation, these capabilities are also called digital transformation (DT) leadership capabilities (Konopik et al., 2022). The term "leadership capabilities" used in this dissertation encompasses both concepts.

The importance of leadership capabilities is underscored by the fact that digital transformation is seen as a design task that promotes a holistic view of the organization, people, and technology (Hill, 2016). As such, it represents a key leadership task (Hill, 2021). A growing body of research further indicates that the role of leadership in organizations is particularly crucial in enhancing overall organizational performance (Grant, 1991; Ravichandran & Lertwongsatien, 2005; Silvestri et al., 2023; Todorovic & Schlosser, 2007) and specific leadership styles, such as empowering leadership, can facilitate ambidexterity (van Assen, 2020).

While IS research on empowering leadership is still relatively nascent (Kim & Beehr, 2021), there is a growing body of literature outside the IS field. Empowering leadership entails "the process of enhancing an individual’s or group’s capacity to make purposive choices and to transform those choices into desired actions and outcomes" (Alsop et al., 2005, p. 1). It embodies a leadership style that empowers employees to take ownership of their work, make decisions, and independently solve problems. Empowering leaders give employees the authority, resources, and support necessary to attain their objectives and cultivate their skills and capabilities (Tang et al., 2020). Empowered employees exhibit greater proactiveness, constantly seeking ways to enhance and refine work processes and finding innovative solutions to work-related challenges (Kirkman & Rosen, 1999). As employee empowerment correlates with heightened levels of self-efficacy and self-confidence, fostering an environment where employees feel liberated to take risks and approach problems in novel ways is believed to facilitate exploratory learning (van Knippenberg et al., 2004). Furthermore, employee empowerment correlates with increased commitment and motivation to execute work tasks optimally and effectively,
thus supporting exploitative learning (Kirkman & Rosen, 1999). Consequently, appropriate leadership behaviors conducive to ambidexterity include employee empowerment (Caniëls et al., 2017).

Moreover, the cultural and organizational changes in the context of digital transformation are proving to be particularly challenging for leaders in public administration. In order to successfully exploit the potential of the digital transformation of public administration, the focus is increasingly shifting to employees' competencies (Mergel, 2020; Ogonek et al., 2016). Skills at the management level, in particular, are subject to constant change (Beile et al., 2019), as managers are under considerable pressure to maintain an overview of the transformation and provide guidance (Stich & Schwiertz, 2021). Therefore, the changing landscape is leading to reassessing conventional leadership structures in public administration. A transition in leadership styles and skills is underway, emphasizing the competencies of a digital leader, as highlighted by Mergel (2019) and Fischer (2019).

According to Buhse (2012), digital leadership involves mastering traditional management fundamentals while abstracting old leadership concepts and aligning them with the values and success models of the digital world. It requires shifting between hierarchical and networked leadership patterns as needed (Buhse, 2014). Digital leadership is a relatively new concept, and a concrete definition for its application in public administration has yet to be established. Drawing on the insights of Beile et al. (2019), Buhse (2012), and Kolberg (2019), this dissertation conceptualizes digital leadership in public administration as a novel form of leadership that seeks to integrate employees, technology, the regulatory framework of public administration, and the expectations of citizens and businesses amid the digital transformation.
2.2.4 Human Resource Capabilities

Scholars in the field of human resource management (HRM) have embraced the foundational principles of the RBV of the firm, suggesting that HRM practices have the potential to cultivate organizational skills and desirable employee behaviors that are valuable, rare, and difficult to imitate. Moreover, these employee-based capabilities are seen as a source of competitive advantage that can ultimately enhance organizational performance (De Saá-Pérez & García-Falcon, 2002).

Following Amit and Schoemaker's (1993) view of capabilities as the ability to deploy resources, it can be argued that the firm's ability to secure, nurture, retain, and deploy human resources through HR policies and practices forms a foundation for HR capabilities (Kamoche, 1996). While these capabilities are also referred to as HR system capabilities (De Saá-Pérez & García-Falcon, 2002), we follow the definition of De Saá-Pérez (1999) and understand HR capabilities as capabilities that involve the strategic integration of a set of HR practices, functions and processes including training, appraisal, promotion, and rewards designed to attract, develop, and retain the strategic human resources necessary for the organization to achieve its goals. According to Bailey (1993), managers can use HR practices, such as developing robust selection and appraisal systems, to attract, identify, and retain top talent.

While individuals are a resource that is difficult to replace because of their unique ability to adapt to different environments and technologies, that also implies that those who can create value in one context may struggle to do so in others (Wright et al., 1994). The fit between employees and their work environments is an extensively studied topic in organizational behavior (e.g., Kristof-Brown et al., 2005). Psychological and social science literature emphasizes the importance of the interplay between personality - a stable pattern of psychological traits (Mayer, 2005) - and job characteristics (Erhart, 2006). Personality traits are perceived as context-independent and relatively stable attributes that resist change through behavioral training (Kichuk & Wiesner, 1997). As a result, personality traits show minimal variation over time and profoundly affect an individual's perceptions and behaviors (Pfluegner et al., 2021). Organizations are interested in individual personality traits because of their impact on individual tasks or roles, team dynamics, and outcomes (Balijepally et al., 2006).
According to the tenets of person-environment fit (P-E fit) theory (Kristof-Brown et al., 2005), which includes the person-job fit (P-J fit) perspective, individuals are attracted to (work) environments that allow them to manifest their traits behaviorally (e.g., individuals with dominant traits seek leadership positions). Furthermore, the degree of fit between individuals and their (work) environments profoundly influences positive work-related outcomes, including satisfaction, performance, and productivity (e.g., Rounds & Tracey, 1990). In career intervention, P-E fit is pivotal in career planning, decision-making, and adjustment (Su et al., 2015).

The search for the right talent is not limited to the selection process but begins way earlier in the recruitment process. Amidst the growth of the IT sector, the industry faces a significant challenge that could impede its progress, which is a critical shortage of IT professionals (Oehlhorn et al., 2019; Zaza et al., 2023). Various factors contribute to this scarcity, including a demanding work environment, numerous career alternatives within and outside the sector, and the rapid evolution of technological solutions, resulting in persistently high turnover rates in the IT field (Prommegger et al., 2020). In the short term, a pivotal strategy for mitigating this shortage in the IT sector and its adverse consequences is the practice of career change. Career change involves individuals intentionally switching to different occupations and moving away from their original field of training (Knecht, 2014). In other academic literature and practical contexts, such individuals are often referred to as undergoing redeployment, being lateral entrants, or late-entry professionals (e.g., Joseph et al., 2012). While the practice has acknowledged the importance of redeployment and various initiatives have emerged to support it, IS research is only beginning to explore this strategy as a scientifically studied intervention to address the shortage of skilled IT workers (e.g., Prommegger et al., 2020; Prommegger et al., 2023).

This growing interest in alternative career paths and redeployment within the IT sector presents an opportunity to address another critical issue: the significant underrepresentation of specific demographics, particularly women, in the industry. Given the substantial yet underutilized pool of female talent in the IT sector, women represent a vital demographic for potential recruitment from non-IT backgrounds into IT roles (Heinle et al., 2023). This approach gains further validation from the research of
Prommegger et al. (2021), which observed a notably higher proportion of women embarking on non-traditional, flexible career paths in the IT industry. Closing the gender gap, understood as *significant inequality between men and women* (Yeganeh & May, 2011), in IT offers multiple benefits, including fostering a diverse workforce with different perspectives, expanding the talent pool, promoting inclusivity, fostering innovation, and improving team performance (Gorbacheva et al., 2019; Klinger & Svensson, 2021; Russo & Stol, 2022). Such diversity is further critical for avoiding bias or sexism in technological advancements, particularly in IT design (Klinger & Svensson, 2021; Zhou & Li, 2014).

2.3 **Overview of Key Concepts and Definitions**

An overview of the key concepts used in this dissertation and their respective definitions is provided in Table 0-1. The table includes the overarching concepts, such as digital transformation and ambidexterity, and concepts specific to the research goals, such as organizational design capabilities and leadership capabilities, and the concepts studied in the context of the capabilities, such as bimodal IT and empowering leadership.
<table>
<thead>
<tr>
<th>Concept</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Digital transformation</strong></td>
<td>&quot;A process that aims to improve an entity by triggering changes to its properties through combinations of information, computing, communication, and connectivity technologies&quot; (Vial 2019, p.118).</td>
</tr>
<tr>
<td><strong>IT organization</strong></td>
<td>Encompasses the group of individuals responsible for various IT tasks, including planning, developing, and maintaining information technology applications along with their associated computer and communication systems (Winkler, 2012).</td>
</tr>
<tr>
<td><strong>Resource-based view of a firm</strong></td>
<td>A firm can be regarded as a collection of resources and capabilities that dictate its continued existence and potential for improvement (Barney, 1991).</td>
</tr>
<tr>
<td><strong>Capability</strong></td>
<td>Capabilities can be skills, such as technical or managerial skills, or processes, such as systems development or integration. They are unobservable (and not necessarily tangibly), invaluable, and transferable only as part of the whole (Makadok, 2001; Wade &amp; Hulland, 2004)</td>
</tr>
<tr>
<td><strong>Resource</strong></td>
<td>An observable (but not necessarily tangible) asset that can be valued and traded (Makadok, 2001).</td>
</tr>
<tr>
<td><strong>Ambidexterity</strong></td>
<td>The simultaneous pursuit of seemingly conflicting activities, such as exploitation and exploration. Exploration involves experimentation and innovation, while exploitation focuses on efficiency and execution. (Birkinshaw et al., 2016; Werder &amp; Heckmann 2019).</td>
</tr>
<tr>
<td><strong>Organizational capabilities</strong></td>
<td>&quot;The ability of an organization to perform a coordinated set of tasks using organizational resources to achieve a specific result&quot; (Helfat &amp; Peteraf, 2003, p. 999).</td>
</tr>
<tr>
<td><strong>Organizational design capabilities</strong></td>
<td>Capabilities relating to the design of the structural and procedural organization (Konopik et al., 2022).</td>
</tr>
<tr>
<td><strong>Bimodal IT</strong></td>
<td>&quot;The practice of managing two separate but coherent styles of work: one focused on predictability; the other on exploration&quot; (Colella et al., 2014).</td>
</tr>
<tr>
<td><strong>IT governance</strong></td>
<td>&quot;The leadership and organizational structures, processes and relational mechanisms that ensure that an organization’s IT sustains and extends its strategy and objectives&quot;. (de Haes &amp; van Grembergen, 2004, p. 1).</td>
</tr>
<tr>
<td><strong>Leadership capabilities</strong></td>
<td>&quot;Behavioral abilities of managers to effectively manage and organize people and resources&quot; (Welter et al., 2013, p. 274).</td>
</tr>
<tr>
<td><strong>Empowering leadership</strong></td>
<td>&quot;The process of enhancing an individual’s or group’s capacity to make purposive choices and to transform those choices into desired actions and outcomes&quot; (Alsop et al., 2005, p. 1)</td>
</tr>
<tr>
<td><strong>Digital leadership in public administration</strong></td>
<td>Novel form of leadership that seeks to integrate employees, technology, the regulatory framework of public administration, and the expectations of citizens and businesses amid the digital transformation (Beile et al., 2019; Buhse, 2012; Kolberg, 2019).</td>
</tr>
<tr>
<td><strong>Human resource capabilities</strong></td>
<td>Capability that involves the strategic integration of a set of HR practices, functions and processes including training, appraisal, promotion, and rewards designed to attract, develop, and retain the strategic human resources necessary for the organization to achieve its goals (De Saá-Pérez, 1999).</td>
</tr>
<tr>
<td><strong>Personality</strong></td>
<td>Context-independent and relatively stable attributes that resist change through behavioral training (Kichuk &amp; Wiesner, 1997).</td>
</tr>
<tr>
<td><strong>Gender gap</strong></td>
<td>Significant inequality between men and women (Yeganeh &amp; May, 2011).</td>
</tr>
</tbody>
</table>

Table 0-1. Overview of Key Concepts and Definitions
3 Research Gap and Research Questions

Based on the overarching research goal of contributing to the understanding and facilitation of organizational capabilities within IT organizations in dynamic environments, this dissertation addresses three distinct but thematically intertwined research areas: organizational design capabilities, leadership capabilities, and HR capabilities. All essays are collaborative efforts with my co-authors. Therefore, the plural "we" will be used for the author's perspective for the remainder of this introductory essay.

In the following, the research goals for this dissertation within the three research areas and their essay-specific research questions are presented.

Figure 0-2 shows the relationships between this dissertation’s framework and the three research goals.

![Figure 0-2. Overview of the Research Goals in the Research Framework](image)

**Research goal**: Advance conceptualization with regard to organizational design capabilities that help organizations to become ambidextrous.

**Research goal**: Analyze specific leadership styles and their potential to contribute to building leadership capabilities in challenging environments.

**Research goal**: Gain insights into how HR capabilities can help to attract and retain human resources.
3.1 Conceptual Clarifications of How Organizational Design Capabilities Can Help Organizations to Become Ambidextrous

The dynamic nature of the competitive landscape necessitates companies to refine their organizational structures, fostering ambidextrous work environments that prioritize both the exploration of novel ideas and the exploitation of established ones (Haffke et al., 2017). Aligned with the RBV perspective, which underscores the significance of firm capabilities in differentiation and competitive advantage, organizations must dynamically adapt and evolve their organizational design capabilities amidst change.

Establishing a bimodal IT organization, characterized by its ability to manage two distinct yet cohesive work styles - one focused on predictability and the other on exploration (Colella et al., 2014) - is a common digital transformation initiative resulting in significant structural changes within organizations. Recent advancements in the IS literature have described and analyzed various aspects of bimodal organization structures, including classifications of different archetypes (Haffke et al., 2017) and challenges associated with structural ambidexterity (Horlach et al., 2016). While previous studies have examined various topics related to bimodal IT, a dedicated review of the current research about bimodal IT is lacking. Hence, we aim to provide an overview of the current academic knowledge, synthesize findings into a conceptual model, and identify potential paths for future research on bimodal IT and structural ambidexterity.

Hence, we posit the following research question:

RQ1: What is the current academic knowledge regarding bimodal IT and structural ambidexterity, and how can this knowledge be synthesized into a conceptual model to identify potential avenues for future research?

Furthermore, there remains a gap in understanding the inner workings of structurally ambidextrous IT organizations and the potential tensions between explorative and exploitative IT modes (Toutaoui et al., 2022). This gap becomes more pertinent considering the developmental nature of bimodal IT and the evolving organizational design capabilities needed to accompany this change. Bimodal IT is described as a dynamic concept, with organizational manifestations evolving (Gerster et al., 2020). Previous research outlines possible pathways for transforming the IT function through
various states of bimodal IT (Haffke et al., 2017). Along this longitudinal progression, several challenges may arise and call for governance mechanisms in the phases of the initial introduction of bimodal IT, its coordination during operational execution, transitions between bimodal IT archetypes, and potential reintegration into an unimodal IT organization (Jöhnk et al., 2017).

Thus, we ask the following research question:

**RQ2**: *Which structural, procedural, and relational governance mechanisms are employed in bimodal IT organizations, and how do these mechanisms relate to challenges associated with structural ambidexterity?*

In summary, our research goal 1 (RG₁) is to advance conceptualization with regard to organizational design capabilities that help organizations become ambidextrous.

### 3.2 Leadership Styles that Contribute to Building Leadership Capabilities in Challenging Environments

It is well established that a company’s managers play decisive roles in influencing success or failure, as they wield significant power in driving organizational strategies to improve efficiency, exploit market opportunities, and identify and neutralize potential threats (Lepak & Snell, 1999). While the importance of leadership and culture for digital transformation is widely acknowledged in the management literature (Matt et al., 2015; Schwertner, 2017; Sow & Aborbie, 2018), it remains largely overlooked in the dynamic capabilities’ literature (Schilke et al., 2018). However, a suitable organizational culture is deemed essential for the successful transformation of businesses (Nadkarni & Prügl, 2021) and to overcome internal resistance from various stakeholders during transformational processes (Matt et al., 2015). In other words, unforeseen contingencies are inevitable in fast-changing environments and necessitate continuous redirection. These constant redirections and adjustments may lead to conflicts that threaten the foundations of the collaborative process (Warner & Wäger, 2019). Such conflicts must be mitigated through adequate leadership capabilities (Konopik et al., 2022).

A growing body of research indicates that specific leadership styles, such as empowering leadership, can be beneficial in challenging environments (van Assen, 2020). Thus, in line with further calls for research (Tang et al., 2020), we seek to gain insights into
empowering leadership in ambidextrous IT organizations. Research on empowering leadership in adjacent disciplines, including its study in the context of ambidexterity, has been increasing, mainly focusing on innovation, representing the exploratory side of ambidexterity (Caniëls et al., 2017). Empowering leadership is assumed to positively influence employees' perceptual, attitudinal, motivational, and behavioral outcomes (e.g., Kim et al., 2018) and firm performance (e.g., Carmeli et al., 2011; Srivastava et al., 2006), but we still lack insight into the outcomes of empowering leadership in the IT context and regarding the influence of the level of ambidexterity. Although a correlation between empowering leadership and contextual ambidexterity has been confirmed by previous research (van Assen, 2020), it is unknown whether individual ambidexterity encountered through one's work environment has a moderating effect of empowering leadership on job satisfaction.

Specifically, we will examine the interplay between individual ambidextrous behavior, empowering leadership, and job satisfaction, shedding light on the combined effects of supervisors and employee behavior within challenging environments. Therefore, we aim to contribute to the existing knowledge base by posing the following research question:

**RQ3: How does empowering leadership affect job satisfaction in ambidextrous IT work environments?**

Furthermore, the cultural and organizational changes in the context of digital transformation are proving to be particularly challenging for leaders in public administration. Consequently, leadership styles and competencies are changing, and the skills of a digital leader are becoming increasingly important (Mergel, 2019). The digital transformation is causing traditional leadership structures in public administration to be questioned and the concept of digital leadership to be emphasized (Fischer, 2019). Although the discourse around digital leadership has primarily been led by practice (Eberl & Drews, 2021), the academic literature has grown considerably in recent years (Matzler et al., 2018; Tigre et al., 2022). Previous authors have recognized the relevance of the topic and reviewed academic literature around digital leadership competencies (e.g., Adie et al., 2022; Eberl & Drews, 2021; Tuschner et al., 2022).
However, earlier studies did not consider the differences between the public and private sectors. This might represent a considerable gap because leadership is seen to be context-specific (Tigre et al., 2022). As the private and public sectors differ in the scope of their activities and organizational structure, among other factors (Kankanhalli & Kohli, 2009), a differentiated analysis might become necessary. Only a few authors who have researched digital competencies in the public sector have recognized these specifics but with a focus different from our research objective. While Distel et al. (2019) analyzed competencies for public sector employees in general, other research studied conceptualizations of digital government and competency requirements specifically in the context of study programs for public administration (Hunnius & Schuppan, 2013; Hunnius et al., 2015). Furthermore, as the required competencies are not static but, due to the high speed of technology-driven change, change rapidly, we see a need for constant reevaluation (Distel et al., 2019).

Therefore, we posit the following research question:

**RQ4: What is the existing academic knowledge on digital leadership competencies and their development within the public sector, and how can synthesizing this knowledge contribute to the advancement in the field?**

Recent studies indicate that many managers within the public sector perceive themselves as inadequately prepared for the challenges posed by digital transformation (Redmann & Rückel, 2021). To derive practical implications, assessing the feasibility of identified competencies drawn from the literature in essay 5 is imperative, and an evaluation of the relevance and applicability of the identified measures in real-world scenarios is needed.
Consequently, we pose the following research question:

*RQ5: From a practical perspective, what measures are considered relevant for developing the digital leadership competencies of managers in public administration?*

In summary, research goal 2 (RG₂) analyzes the requirements and outcomes of specific leadership styles as leadership capabilities in challenging environments.

### 3.3 Insights into How HR Capabilities Can Help to Attract and Retain Human Resources

Drawing from Amit and Schoemaker’s (1993) perspective that capabilities entail effective resource deployment, we posit that a firm's ability to acquire, nurture, retain, and utilize human resources through HR policies and practices establishes the foundation for HR capabilities. As Bailey (1993) asserted, organizations can leverage HR practices, such as robust selection and appraisal systems, to attract, identify, and retain top-tier employees. Consequently, organizations implementing valid selection systems can efficiently draw, assess, and retain top talent (Wright et al., 1994). Amidst the critical shortage of skilled IT professionals, the relevance of HR capabilities becomes even more pronounced (Prommegger et al., 2020).

Consequently, our research goal 3 (RG₃) is to gain insights into how HR capabilities can help to attract and retain human resources. We intend to pursue this goal through two primary avenues: firstly, by investigating personality variances within ambidextrous settings to identify fitting candidates, and secondly, by scrutinizing intervention tactics to recruit female career changers. This approach aims to alleviate the scarcity of skilled labor and mitigate the gender disparity in the workforce.

Despite recent IS research indicating changes in work environments influencing required skill sets (e.g., Merchel et al., 2021; Michalczyk et al., 2021), more research is needed on the relevance of personality traits (Bui, 2017). Recognizing personality's influence in the new work context (De Kok & Helms, 2016), we note a gap in studies assessing individual personality traits among IT employees in explorative versus exploitative work environments. Moreover, while most ambidexterity research has focused on the organizational level, organizational ambidexterity is also viewed as a multilevel phenomenon driven upwards by individuals (Good & Michel, 2013). The individual-level
perspective can help IT professionals and organizations better understand areas where IT workers are likely to have the best individual fit, especially in light of the current shortage of IT workers (Joseph et al., 2007). Considering that attracting, motivating, and retaining workers hinges on fulfilling their needs at work (Prasad et al., 2007), assessing underlying psychological characteristics, including personality traits, is crucial (Mayer, 2005).

Consequently, we inquire:

**RQ6:** How do personality traits differ between IT employees in explorative and exploitative work environments, and does the work environment influence the relationship between personality traits and P-J fit?

The second research avenue to address our research goal is motivated by the fact that the information technology (IT) industry is facing a paradoxical situation characterized by rapid growth on the one hand and a severe shortage of skilled digital talent on the other (Oehlhorn et al., 2019). This dichotomy underscores the urgent need for innovative interventions to address this sector's educational and skills gap and to meet the growing demand for IT professionals. A pivotal solution to this challenge is career transition and reskilling, where individuals intentionally shift into the IT field from other professional backgrounds (Blumberg et al., 2023). Although the concept of career change has been recognized in practice, academic research in information systems to date has focused primarily on the retention and turnover intentions of IT professionals rather than career transitions of non-IT professionals into the IT industry (Zaza et al., 2023) and thus has only recently begun to scrutinize career change as a method to mitigate the IT skills shortage (e.g., Heinle et al., 2023). However, with the ongoing economic transformation, career transition is increasingly necessary for employees and presents an opportunity for IT organizations (Coppolla & Young, 2022).

Given this, our research question is:

**RQ7:** How can organizations recruit and integrate job-seeking women from fields other than IT as potential career changers?
4 Dissertation Structure and Research Design

As shown in Figure 0-3, this dissertation encompasses seven essays to address the research goals (RG) outlined in Section 3. Essays 1 and 2 tackle RG₁, while essays 3, 4, and 5 focus on RG₂, and essays 6 and 7 address RG₃. Positioned after this introductory essay, these essays embody the cumulative essence of this dissertation, with each essay intended to contribute to scholarly discourse through publication in journals or presentations at conferences.

<table>
<thead>
<tr>
<th>Essay</th>
<th>Focus</th>
<th>Publication Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RG₁: Advance conceptualization with regard to organizational design capabilities that help organizations to become ambidextrous.</td>
<td>Published</td>
</tr>
<tr>
<td>2</td>
<td>Essay 1: Structural Ambidexterity through Bimodal IT – A Literature Review and Research Agenda</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Essay 2: Paradoxical Governance Mechanisms for Achieving Structural Ambidexterity in Bimodal IT Organizations</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>RG₂: Analyze specific leadership styles and their potential to contribute to building management capabilities in challenging environments.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Essay 3: Empowering Leadership, Job Satisfaction, and the Moderating Effect of Individual Ambidexterity of Information Technology Workers</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Essay 4: Building Digital Leadership in the Public Sector – A Literature Review</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Essay 5: Measures for the Development of Digital Leadership Skills for Managers in the Public Sector</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>RG₃: Gain insights into how HR capabilities can help to attract and retain human resources.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Essay 6: Personality Traits and Ambidextrous Work Environments in IT Organizations – A Person-Job Fit Perspective</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Essay 7: Delineating the Gender and Skills Gap in IT: Insights into the Recruitment and Onboarding of Women in Career Transitions</td>
<td></td>
</tr>
</tbody>
</table>

Figure 0-3. Overview of the Dissertation's Structure

At the time of this dissertation’s publication, some essays had already been published, while others were either under review or, due to the cumulative nature of this dissertation, in preparation for submission. Table 0-2 summarizes the essays and their publication statuses for each research goal focus—organizational design capabilities, leadership capabilities, and HR capabilities. Subsequently, the research design for this dissertation is presented, along with a methodological overview in Section 4.2.

4.1 Essay Overview

4.1.1 Published Essays Included in this Dissertation

In summary, this dissertation comprises four conference papers, one paper published in a scientific journal, one submitted to a scientific journal, and one intended for submission to a scientific journal. In six of the seven included essays, the author of this cumulative dissertation was the lead author (Table 0-2).
<table>
<thead>
<tr>
<th>Focus</th>
<th>Status</th>
<th>Title</th>
<th>Authors</th>
<th>Outlet (targeted)</th>
<th>Ranking VHB-JQ³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational design capabilities</td>
<td>Published</td>
<td>Essay 1: Structural Ambidexterity through Bimodal IT – A Literature Review and Research Agenda</td>
<td>Kusanke, Winkler</td>
<td>WI (Internationale Tagung Wirtschaftsinformatik) 2022</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>Preparing for submission</td>
<td>Essay 2: Paradoxical Governance Mechanisms for Achieving Structural Ambidexterity in Bimodal IT Organizations</td>
<td>Jöhnk, Kusanke, Oesterle, Urbach, Winkler, Nørbjerg</td>
<td>Scientific journal</td>
<td>nA</td>
</tr>
<tr>
<td>Leadership capabilities</td>
<td>Published</td>
<td>Essay 3: Empowering Leadership, Job Satisfaction, and the Moderating Effect of Individual Ambidexterity of Information Technology Workers</td>
<td>Kusanke, Winkler</td>
<td>WI (Internationale Tagung Wirtschaftsinformatik) 2023</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>Published</td>
<td>Essay 4: Building Digital Leadership in the Public Sector – A Literature Review</td>
<td>Kusanke, Kendziorra, Pilgenröder, Christmann-Schwaab, Winkler</td>
<td>ECIS (European Conference on Information Systems) 2023</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Published</td>
<td>Essay 5: Measures for the Development of Digital Leadership Skills for Managers in the Public Sector</td>
<td>Kusanke, Kendziorra, Pilgenröder, Winkler</td>
<td>HMD Praxis der Wirtschaftsinformatik</td>
<td>C</td>
</tr>
<tr>
<td>HR capabilities</td>
<td>Published</td>
<td>Essay 6: Personality Traits and Ambidextrous Work Environments in IT Organizations – A Person-Job Fit Perspective</td>
<td>Kusanke, Behnke, Winkler</td>
<td>HICSS (Hawaii International Conference on System Sciences) 2023</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>Under review</td>
<td>Essay 7: Delineating the Gender and Skills Gap in IT: Insights into the Recruitment and Onboarding of Women in Career Transitions</td>
<td>Kusanke, Heinle, Kendziorra, Jörs, Winkler</td>
<td>Scientific journal</td>
<td>nA</td>
</tr>
</tbody>
</table>

Notes:
* VHB-JOURQUAL3 is a scientific outlet ranking (e.g., journals and conferences) in advanced business administration. (Verband der Hochschullehrer für Betriebswirtschaft e.V. (VHB), 2024).

Table 0-2. Publication Histories of the Essays in this Dissertation
Some of the essays have a specific provenance that is explained here for transparency. A preliminary version of essay 2 was presented at the "European Conference on Information Systems (ECIS)" in 2019, titled "Juggling the Paradoxes – Governance Mechanisms in Bimodal IT Organizations" (Jöhnk et al., 2019). Further interviews added insights into a third bimodal IT organization as the paper evolved. In addition, each section underwent significant revision.

Essay 5, titled "Measures for the Development of Digital Leadership Skills for Managers in the Public Sector" was initially published in German as "Maßnahmen für den Aufbau von Digital Leadership Kompetenzen für Führungskräfte im öffentlichen Sektor" in the scientific journal "HMD Praxis der Wirtschaftsinformatik" and has been translated into English for inclusion in this dissertation.

A preliminary version of essay 7 was presented at the "Internationale Tagung Wirtschaftsinformatik (WI)" conference in September 2023 in Germany, titled "Closing the Gender Gap: Initial Findings and Lessons Learned from a German Medium-Sized IT Services Company's Efforts for Career Changers" (Heinle et al., 2023). Subsequently, we conducted seven additional interviews and two rounds of coding, expanded and deepened the research scope, and incorporated a theoretical lens. Furthermore, all sections underwent significant revision. The paper included in this dissertation has undergone significant development since the original conference submission.
4.1.2 Further Research Projects Related to this Dissertation

Apart from the seven essays included in this cumulative dissertation, five papers closely linked to this dissertation were published or sent for revision, as shown in Table 0-3. These publications, comprising three full papers, an extended abstract for a poster presentation, and a research-in-progress paper, align with this dissertation's second and third research focus. These foci aim to analyze the requirements and outcomes of specific leadership styles and understand how HR capabilities contribute to attracting and retaining human resources. However, due to their peripheral nature, they have not been included as substantive papers in this cumulative dissertation.

<table>
<thead>
<tr>
<th>Focus</th>
<th>Status</th>
<th>Title</th>
<th>Authors</th>
<th>Outlet (targeted)</th>
<th>Ranking VHB-JQ3*</th>
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<td>Leadership capabilities</td>
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<td>Paper 8: Digital Leadership in the Public Sector: Towards a Digital Leadership Competency Model</td>
<td>Kusanke Pilgenroeder Kendziorra Winkler</td>
<td>AMCIS (Americas Conference on Information Systems) 2023</td>
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<tr>
<td>HR capabilities</td>
<td>Published</td>
<td>Paper 9: Women Mentoring Programs to Reduce the Gender Gap in IT Professions: A Literature Review and Critical Reflection</td>
<td>Aufschläger Kusanke Kendziorra Witte Winkler</td>
<td>AMCIS (Americas Conference on Information Systems) 2023</td>
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<tr>
<td>HR capabilities</td>
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<td>Paper 10: Closing the Gender Gap: Initial Findings and Lessons Learned from a German Medium-Sized IT Services Company's Efforts for Career Changers</td>
<td>Heinle Kusanke Kendziorra Witte Winkler</td>
<td>WI (Internationale Tagung Wirtschaftsinformatik) 2023</td>
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<td>HR capabilities</td>
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<td>Paper 11: Transforming the IT Landscape: Ecosystem-Based Approaches to Career Transitions</td>
<td>Kusanke Kendziorra Zaza Winkler</td>
<td>ACM SIGMIS Computers and People Research 2024</td>
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<td></td>
<td>Published</td>
<td>Paper 12: The Link between IT Workers Individual Ambidexterity and Work Exhaustion – Preliminary Insights into the Explanatory Power of Person-Job Fit (Research in progress)</td>
<td>Kusanke Winkler</td>
<td>ACM SIGMIS Computers and People Research 2023</td>
<td>nA</td>
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</tbody>
</table>

Notes: * VHB-JOURQUAL3 is a scientific outlet ranking (e.g., journals and conferences) in advanced business administration. (Verband der Hochschullehrer für Betriebswirtschaft e.V. (VHB), 2024).

Table 0-3. Publications Related to this Dissertation

Since these papers have not been included as substantive essays in this cumulative dissertation, their content will be briefly presented in the following.
Paper 8 "Digital Leadership in the Public Sector: Towards a Digital Leadership Competency Model," was presented as a full paper at the 2023 "Americas Conference on Information Systems (AMCIS)". The paper examines the changing competency requirements for public sector leaders. Based on interviews with public sector employees at managerial and non-managerial levels, competencies for successful leaders in times of digital change are identified and summarized in a preliminary Public Sector Digital Leadership Competency Model. Our findings suggest that in addition to technical or managerial competencies, social competencies such as communication are particularly important for driving digital transformation in public administration.

Paper 9, "Women Mentoring Programs to Reduce the Gender Gap in IT Professions: A Literature Review and Critical Reflection" (Aufschläger et al., 2023), was presented as a full paper at the 2023 "Americas Conference on Information Systems (AMCIS)" and was nominated for the best paper award and selected as one of the top 25% of papers presented. The paper investigates the measure of mentoring programs to counteract the imbalance of men and women in IT professions. In this study, we presented a literature review to answer the research question of how women's mentoring programs need to be designed to contribute to reducing this gender gap. Drawing on the 13 empirical studies from 2013 to 2022, we identified 21 factors influencing the design of women's mentoring programs.

Paper 10 "Closing the Gender Gap: Initial Findings and Lessons Learned from a German Medium-Sized IT Services Company's Efforts for Career Changers" (Heinle et al., 2023) was presented as a full paper at the "Internationale Tagung Wirtschaftsinformatik (WI)” conference. This research aims to determine how women without IT-specific knowledge can potentially contribute to reducing the gender gap in the German IT sector, especially for small and medium-sized enterprises. A case study with five qualitative interviews within a medium-sized IT service company was conducted. The results reveal that targeted job advertisements can successfully introduce women from other sectors to the possibility of a career change in the IT environment. In this way, new female employees can be recruited, reducing the gender gap.
Moreover, Paper 11, titled "Transforming the IT Landscape: Ecosystem-Based Approaches to Career Transitions" (Kusanke et al., 2024), has been submitted for a poster presentation at "ACM SIGMIS Computers and People Research Conference 2024". This poster presents the follow-up study to essay number 7 ("Delineating the Gender and Skills Gap in IT: Insights into the Recruitment and Onboarding of Women in Career Transitions") and reflects on the need to study the phenomenon of career transitions in the light of the whole ecosystem. We specifically ask how (IT) organizations can effectively integrate professionals from non-IT backgrounds and the conditions and implications of such transitions for the whole ecosystem of individual employees, organizations, government agencies, and the broader IT industry. The anticipated findings aim to open up opportunities for potential career changers in the IT sector by informing IT organizations seeking to secure their digital talent and providing policymakers with actionable insights for developing targeted strategies and measures to promote career change interventions in the IT industry to ensure long-term economic growth.

Paper 12, "The Link between IT Workers Individual Ambidexterity and Work Exhaustion - Preliminary Insights into the Explanatory Power of Person-Job Fit" (Kusanke & Winkler, 2023b), was presented as a research-in-progress paper at the ACM SIGMIS Computers and People Research Conference 2023. This paper expands the research on the organizational capability of ambidexterity and explores the consequences of interventions for ambidexterity on the individual level. We aim to contribute to the current knowledge base by offering initial insight and a starting point for further research on work exhaustion as a potential outcome of individual ambidexterity. While capabilities are generally seen as beneficial for organizations and individuals, this survey critically studies the potential adverse outcomes when organizational capabilities interfere with individual well-being. The survey results on 549 information technology workers indicate a significant direct effect of individual ambidexterity on work exhaustion, and the data further suggest that person-job fit moderates the relationship under investigation.
4.1.3 Additional Research Projects Unrelated to this Dissertation

Apart from the seven essays included in this cumulative dissertation and five papers closely linked to this dissertation, five additional papers unrelated to this dissertation were published or sent for revision, listed in Tables 0-4. These publications comprise two full papers, one research-in-progress paper, and two extended abstracts for a poster presentation.

<table>
<thead>
<tr>
<th>Focus</th>
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<th>Authors</th>
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<td></td>
<td>Published</td>
<td>Modern Project Portfolio Management--Analyzing the Potential of Artificial Intelligence</td>
<td>Pappert Kusanke</td>
<td>PVM-Fachtagung „Nachhaltige IT-Projekte“ 2023</td>
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<td></td>
<td>Published</td>
<td>Gender and Mobility - A Literature Review on Women's (Non-)Use of Shared Mobility Services</td>
<td>Kendziorra Barmann Kusanke Witte</td>
<td>WI (Internationale Tagung Wirtschafts-informatik) 2023</td>
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<td>nA</td>
<td>Published</td>
<td>The Human Gaze and the Blind Spot - A Systematic Literature Review on Biases in Artificial Intelligence (Poster presentation)</td>
<td>Hermosa Witte Kusanke Kendziorra</td>
<td>WI (Internationale Tagung Wirtschafts-informatik) 2023</td>
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<tr>
<td></td>
<td>Accepted</td>
<td>From Dyadic to Triadic Mentoring Relationships: A Holistic View of Expectations and Goals to Enhance the Effectiveness of Formal Mentoring Programs in IT (Research in progress)</td>
<td>Joers Kusanke Kendziorra Winkler</td>
<td>ECIS (European Conference on Information Systems) 2023</td>
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<td></td>
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<td>SHE can do IT: Awakening Girls’ Interest in Information Technology by Making Computer Science a Mandatory Course in Early Education in Germany (Poster presentation)</td>
<td>Kendziorra Kusanke Joers Winkler</td>
<td>ACM SIGMIS Computers and People Research 2024</td>
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Notes:
* VHB-JOURQUAL3 is a scientific outlet ranking (e.g., journals and conferences) in advanced business administration. (Verband der Hochschullehrer für Betriebswirtschaft e.V. (VHB), 2024).

Table 0-4. Publications Unrelated to this Dissertation
4.2 Methodological Overview

Each of the seven essays included in this dissertation contributes to the research objectives outlined in Section 3 of this introductory essay, employing distinct research methodologies. Table 0-5 provides an overview of each essay's research design, outlining the specific data collection and analysis methods. The following is a brief overview of the research methods and the rationale for selecting each approach. For more details on the research methodological steps (including data collection and analysis) and their respective rationale, we may refer to the Methods section of each essay.

<table>
<thead>
<tr>
<th>Research goal</th>
<th>Title</th>
<th>Research method</th>
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<tr>
<td>Research goal: Advance conceptualization with regard to organizational design capabilities that help organizations to become ambidextrous.</td>
<td>Essay 1: Structural Ambidexterity through Bimodal IT – A Literature Review and Research Agenda</td>
<td>Structured literature review (Webster &amp; Watson, 2002) Codification scheme (Bandara et al., 2015)</td>
</tr>
<tr>
<td>Research goal: Analyze specific leadership styles and their potential to contribute to building leadership capabilities in challenging environments</td>
<td>Essay 3: Empowering Leadership, Job Satisfaction, and the Moderating Effect of Individual Ambidexterity of Information Technology Workers</td>
<td>Survey research Moderation analysis (Hayes, 2013) Johnson–Neyman technique (Hayes, 2013)</td>
</tr>
<tr>
<td></td>
<td>Essay 4: Building Digital Leadership in the Public Sector – A Literature Review</td>
<td>Structured literature review (Webster &amp; Watson, 2002)</td>
</tr>
<tr>
<td></td>
<td>Essay 5: Measures for the Development of Digital Leadership Skills for Managers in the Public Sector</td>
<td>Interview study Content analysis (Mayring, 2015)</td>
</tr>
<tr>
<td>Research goal: Gain insights into how HR capabilities can help to attract and retain human resources.</td>
<td>Essay 6: Personality Traits and Ambidextrous Work Environments in IT Organizations – A Person-Job Fit Perspective</td>
<td>Survey research Independent samples t-test Moderation analysis (Hayes, 2013)</td>
</tr>
<tr>
<td></td>
<td>Essay 7: Delineating the Gender and Skills Gap in IT: Insights into the Recruitment and Onboarding of Women in Career Transitions</td>
<td>Case study (Yin, 2009; Miles &amp; Hubermann, 1994)</td>
</tr>
</tbody>
</table>

Table 0-5. Applied Research Methods of the Essays in this Dissertation
Structured Literature Review

Literature reviews play a crucial role in IS research, serving as a valuable source of information for practitioners and researchers alike (vom Brocke et al., 2015; Bandara et al., 2015). Utilizing the literature review method facilitates enhancing existing knowledge and identifying areas requiring further investigation (Webster & Watson, 2002; Rowley & Slack, 2004). Relevant publications can be pinpointed through systematic literature searches using appropriate databases, keyword combinations, and inclusion/exclusion criteria (vom Brocke et al., 2009). Additionally, forward and backward search techniques can uncover papers that previous searches may have missed (Webster & Watson, 2002).

In essay 1, our objective was to gather existing knowledge, synthesize findings into a conceptual framework, and suggest potential avenues for future research (Paré et al., 2015), accomplished through a descriptive literature review. Furthermore, in essay 4, we aimed to provide a comprehensive overview of current academic knowledge concerning digital leadership competencies and their development in the public sector.

Interview Study

Interview studies are a prominent method for uncovering the subjective views of individuals on specific topics (Döring & Bortz, 2016) and provide a platform for exploring the perspectives, experiences, and insights of actors involved in a particular context. The course of an interview can be structured in various ways, offering researchers flexibility in gathering data (Döring & Bortz, 2016). Interview answers are typically documented through transcription, enabling researchers to analyze and interpret the data accurately. Qualitative analysis methods, such as coding, are then employed to evaluate the collected data (Mayring, 2015).

In essay 5, the choice to employ an interview study method was motivated by the need to validate the theoretical insights derived from the literature review conducted in essay 4 from a practitioner perspective. Interviews offer a direct avenue for engaging with professionals actively involved in the field, allowing for a nuanced exploration of their experiences, perspectives, and practical insights.
Grounded theory is a qualitative research approach that can be conducted within an interview study (Charmaz, 2006). The aim of grounded theory is the inductive development of a theory based on the qualitative data collected. This method is particularly suitable for exploring "new" phenomena with limited existing research (Glaser & Strauss, 2017; Corbin & Strauss, 2015). The process of conducting grounded theory involves (semi-structured or open) interviews, transcription of answers, and predefined coding steps. These steps may include open coding, where initial concepts are identified; selective coding to refine these concepts; and theoretical coding to develop the emerging theory (Glaser & Strauss, 2017). In contrast, Corbin and Strauss (2015) distinguish three types of coding procedures needed to develop a grounded theory from the data: open, axial, and selective coding. The procedures are neither clear-cut nor do they neatly delineate sequential phases. Instead, they represent various approaches to working with the data, which can be intermixed and navigated between by the researcher as necessary (Mey and Mruck, 2011).

In essay 2, we aimed to address the identified research gap concerning the internal governance mechanisms and challenges within bimodal IT organizations. The selection of an interview study in combination with the grounded theory method in essay 2 was driven by the necessity to delve deeply into the intricacies of internal governance mechanisms and challenges within bimodal IT organizations. We conducted an interview study across three cases of bimodal IT organizations following an analytical-inductive approach to build a tentative theory of IT governance mechanisms in bimodal IT organizations.

Case Study

Case studies are a valuable research method that involves detailed descriptions of specific cases, often linking them to existing theoretical frameworks derived from prior literature research (Yin, 2018). These studies can take various forms, including single case studies, where a particular instance is thoroughly examined, or multiple case studies, where several cases are analyzed and compared (Yin, 2018). In conducting case studies, researchers often aim to shed new light on a problem or issue by investigating representative or revelatory cases. This approach allows for discovering fresh insights and approaches, contributing to advancing knowledge in the field (Miles & Hubermann,
Data collection in case studies typically involves various methods, such as interviews, observations, examination of documents, and utilization of secondary data sources (Yin, 2018; Miles & Hubermann, 1994). There are different orientations or purposes for conducting case studies, including explorative, descriptive, and explanatory. Explorative case studies aim to explore new areas or phenomena, while descriptive case studies seek to provide a detailed account of a particular case. On the other hand, explanatory case studies focus on understanding causal relationships and explaining why certain outcomes occurred (Miles & Hubermann, 1994).

Essay 7 employed a single case descriptive case study to conduct a thorough examination of the practices of the case company. This approach involved analyzing job advertisements and interviewing career changers to gain comprehensive insights. By adopting this method, we were able to delve deeply into the company's practices, revealing underlying factors and dynamics. Furthermore, we aimed to derive valuable lessons and recommendations from the case study findings, which other organizations could apply in their respective contexts.

**Survey Research**

According to Pinsonneault and Kraemer (1993), survey research is a foundational component of quantitative methodology, characterized by three key attributes. Firstly, surveys are designed to yield quantitative descriptions of specific aspects within the studied population. Secondly, the principal data collection method in survey research involves systematically interrogating participants through structured and predefined questions (see the appendices for the online questionnaire used in essays 3 and 6). Thirdly, while information is typically gathered from a subset of the study population, the methodology is designed to generalize findings to the broader population (Pinsonneault & Kraemer, 1993).

Quantitative studies, such as survey research, play a pivotal role in scientific inquiry by offering systematic and structured approaches to explore relationships, patterns, and trends within data (Holton & Burnett, 2005; Field, 2013). In contrast to qualitative research, which delves into the subjective interpretation of phenomena, quantitative studies aim to quantify variables and scrutinize their relationships through statistical
Quantitative research is advantageous when researchers aim to test hypotheses, establish causality, or generalize about a population (Nardi, 2018). Its suitability extends to studies aiming to measure the prevalence of phenomena, evaluate intervention impacts, or identify outcome predictors.

One common analytical technique in quantitative survey research is moderation analysis, which examines the effect of an independent variable on the relationship between two other variables. Moderation analysis helps researchers understand under what conditions or for whom the relationship between two variables is stronger or weaker. It provides insights into how different factors interact to influence outcomes (Hayes, 2013; Hayes & Rockwood, 2017). In addition, the Johnson–Neyman technique is a statistical approach to identifying regions of significance in moderator variables, revealing the conditions under which the relationship between the predictor and outcome variables is statistically significant (Hayes & Matthes, 2009). This technique is especially valuable for uncovering complex interactions and understanding the boundary conditions of effects (Montoya, 2019).

In essay 3, we aimed to ascertain whether the interplay of empowering leadership and individual ambidexterity significantly impacts job satisfaction. Additionally, we sought to pinpoint specific thresholds along the continuous moderator where the relationship between the independent variable and outcome variable shifts from statistically significant to insignificant or vice versa. This approach was chosen to offer practical insights into the conditions under which different leadership styles contribute to positive outcomes, such as job satisfaction. Hence, we opted to conduct a moderation analysis, supplemented by the Johnson-Neyman technique, to provide a nuanced understanding of the moderating effects and their implications for organizational leadership and management strategies.

Another widely used statistical test is the independent samples t-test, which compares the means of two independent groups to determine if they are significantly different from each other. This test is often employed when researchers want to assess whether there is a significant difference between groups on a particular outcome variable (Field, 2013).
In essay 5, our objective was to investigate the relationship between personality traits, work environment characteristics, and person-job fit (P-J fit) within the context of individual ambidexterity. Specifically, we aimed to discern whether there are variances in personality traits among IT employees in explorative versus exploitative work environments and whether these environments influence the relation between personality traits and P-J fit. We used an independent samples t-test to address these questions to compare personality traits across different work environments. Additionally, we employed a moderation analysis to explore the moderating role of the work environment. These quantitative methods were chosen to foster an understanding of the complex interplay between individual characteristics, work environments, and P-J fit.
5 Essay Summary

This dissertation consists of seven essays that collectively address the research goals and research questions outlined in the preceding sections. Each essay is summarized below to provide an overview.

Essay 1: Structural Ambidexterity through Bimodal IT – A Literature Review and Research Agenda (Kusanke & Winkler, 2022)

The bimodality of the IT function is a response to changing expectations and perceptions of the role of IT within an organization. Bimodal IT aims to leverage ambidextrous capabilities, allowing for simultaneous engagement in exploratory and exploitative activities. Research interest in this phenomenon is growing, but there is a lack of knowledge on bimodal IT, including research on the related concepts of structural ambidexterity and IT ambidexterity. Using a structured literature review, in the first essay, we analyzed recent literature found in the AIS Electronic Library and EBSCOhost databases that met the defined inclusion and exclusion criteria. Through this systematic literature review, which identified 42 papers published in a wide range of academic outlets. We identify and describe four research themes summarized in a conceptual model of forms of bimodal IT: antecedents, facilitators, barriers, and outcomes. In addition, we discuss the critique the phenomenon faces in practice and propose a research agenda. The study contributes to research and practice by synthesizing existing knowledge and providing guidance for further research. Specifically, we suggest avenues for further research regarding the human, cultural, and technological factors and the general applicability of bimodal IT.

Essay 2: Paradoxical Governance Mechanisms for Achieving Structural Ambidexterity in Bimodal IT Organizations

While recent progress in Information Systems literature has illuminated the contours of bimodal organizational frameworks, a deeper comprehension of the internal dynamics within such IT setups and the potential frictions between explorative and exploitative IT units remains elusive, particularly with regard to the inherent tensions between exploratory and exploitative IT units. To fill this gap in understanding, we examine the internal governance mechanisms of three bimodal IT organizations through an interview
study in the second essay. Our research is based on data collected through 26 in-depth interviews using grounded theory techniques. First, we identify the challenges of implementing and coordinating activities within ambidextrous bimodal IT setups. We then identify and analyze these organizations' structural, procedural, and relational governance mechanisms and elucidate their interplay with the identified challenges. Finally, we unveil and articulate five novel governance paradoxes inherent in structurally ambidextrous IT organizations synthesized from our empirical findings. Our primary theoretical contribution to the literature on structural ambidexterity lies in unraveling the complex dynamics between constraining governance mechanisms and paradoxes within bimodal IT organizations, elucidating their reinforcing and constraining effects. Finally, we discuss the practical implications of our study and offer insights for organizational practice.

Essay 3: Empowering Leadership, Job Satisfaction, and the Moderating Effect of Individual Ambidexterity of Information Technology Workers (Kusanke & Winkler, 2023a)

Effective leadership is pivotal in fostering and maintaining ambidexterity, encompassing both exploratory and exploitative endeavors. Empowering leadership behaviors, which cultivate trust and discipline to engender engaged employees, have been recognized as catalysts for contextual ambidexterity. Nonetheless, there remains a gap in understanding how these leadership styles impact individual outcomes within ambidextrous IT work settings. This research delves into the influence of empowering leadership on job satisfaction among IT professionals and whether the degree of individual ambidexterity moderates this relationship. Through an analysis of survey data from 553 IT workers, our findings reveal a positive direct impact of empowering leadership on job satisfaction, alongside an unexpected negative moderating effect of individual ambidexterity. This study contributes to leadership and ambidexterity literature within Information Systems by underscoring the necessity for nuanced leadership approaches within ambidextrous IT organizations.
Essay 4: Building Digital Leadership in the Public Sector – A Literature Review
(Kusanke et al., 2023d)

Despite recognizing digital leadership competencies as central to successful digital transformation, the public sector faces unique challenges in its digitization efforts, resulting in a notable lack of consensus on the specific competencies that are essential in this domain. The structured literature review, conducted in essay 4, contributes to the existing body of knowledge on digital leadership by consolidating insights on the required competencies of digital leaders in the public sector. Drawing from 25 relevant publications across multiple databases and disciplines, we delineate 44 sub-competencies organized into seven key competency categories in this fourth essay. In addition, we identify several digital leadership development and recruitment strategies designed to foster these competencies. While researchers can use our findings to advance scholarly discourse in this area, public sector practitioners can use our framework to assess and improve their leadership competencies in digital transformation.

Essay 5: Measures for the Development of Digital Leadership Skills for Managers in the Public Sector (Kusanke et al., 2023b)

The successful digital transformation of public administration requires well-prepared leaders with the appropriate competencies. This fifth essay aims to empirically validate and compare the measures for developing digital leadership competencies in the public sector that were previously identified in essay 4. Guided interviews with ten public sector employees at managerial and non-managerial levels were used to validate the identified competency development measures. The findings help expand knowledge about the requirements and challenges of digital transformation in the public sector and identify additional potential measures for developing these competencies in leadership recruitment and development. This study explains basic concepts such as digital leadership and competencies, describes the methods of qualitative data collection and analysis, presents the study's results, and discusses them in terms of research questions, limitations of the study, and implications for practice and research.
Essay 6: Personality Traits and Ambidextrous Work Environments in IT Organizations – A Person-Job Fit Perspective (Kusanke et al., 2023a)

In response to dynamic competitive landscapes, corporate IT functions are adopting agile methodologies and constructing ambidextrous organizational frameworks, thereby influencing the work environments of individual IT employees. Based on the fundamental tenets of person-environment fit theory, which posits that individuals seek environments conducive to expressing their inherent characteristics, this study seeks to redirect attention in organizational design decisions to an individual-level perspective. Our research examines the interplay between personality traits and work environment characteristics, measured at the individual level of ambidexterity, and their impact on person-job fit (P-J fit). Analyzing survey data from 279 IT professionals, our findings reveal significant differences in personality traits (using the Five Factor Model) between exploitative and exploratory work environments. In addition, our data suggest that the relationship between extraversion, conscientiousness, and openness to experience on P-J fit depends on the level of ambidexterity.

Essay 7: Delineating the Gender and Skills Gap in IT: Insights into the Recruitment and Onboarding of Women in Career Transitions

Drawing on theories of boundaryless and protean careers and signaling theory, this study addresses two pressing industry challenges: the growing shortage of IT skills and the persistent gender gap in technology professions. It seeks to facilitate the integration of non-IT professionals, particularly women, into IT careers. With projections that the IT skills shortage will double soon, organizations are becoming increasingly alarmed and re-evaluating their recruitment strategies. Using a qualitative, descriptive case study methodology, we examined job postings and conducted interviews at a medium-sized German IT services company known for successfully integrating female career changers over several decades. Our research advances the understanding of dynamic, self-directed career aspirations and cross-boundary career transitions. It also explores how organizations communicate their values and culture to attract prospective employees. The insights gained from this study provide valuable contributions to academic discourse and practical implementation, helping organizations navigate the intricacies of career transitions, particularly in the face of the impending IT talent shortage.
6  Discussion of Results

This dissertation makes several contributions to theory and practice. In the following, selected theoretical and managerial contributions are discussed before limitations and opportunities for further research are identified.

6.1  Theoretical Implications

First, this dissertation provides research in the area of ambidextrous work environments in IT organizations with the research goal of advancing conceptualization with regard to organizational design capabilities that help organizations become ambidextrous (essay 1 and essay 2).

Essay 1 makes a theoretical contribution by presenting a conceptual model that integrates existing literature on bimodal IT and structural ambidexterity in the areas of antecedents, facilitators, barriers, and outcomes. In addition, the study contributes to research by providing guidance for further research. Specifically, we suggest avenues for further research regarding the human, cultural, and technological factors and the general applicability of bimodal IT.

Essay 2 contributes theoretically by elucidating the dynamics between impeding governance mechanisms and paradoxes within bimodal IT organizations. It synthesizes insights from interviews to deepen the understanding of challenges, governance mechanisms, paradoxes, and their interdependencies. The essay extends the existing literature by applying the concept of governance mechanisms to study bimodal IT organizations and formalizing paradoxical tensions within them. Furthermore, it introduces the notions of reinforcing and restricting effects to describe the dynamics between governance mechanisms and paradoxes.

Second, this dissertation sheds light on the requirements and outcomes of specific leadership styles as leadership capabilities in challenging environments (essay 3, essay 4, and essay 5).

Essay 3 makes a theoretical contribution to leadership and ambidexterity literature. By investigating the relationship between empowering behaviors and individual ambidexterity, the essay offers insights into how such leadership styles can facilitate or...
hinder ambidextrous behavior. Furthermore, it delves into the potential limitations of empowering leadership in fostering individual ambidexterity, thus adding to the understanding of contextual facilitators and constraints within organizations striving for ambidexterity.

Essay 4 contributes theoretically by providing an overview of digital leadership competencies in the public sector. By synthesizing existing research, the essay advances understanding in the public sector digital transformation field and offers a catalog of competencies grounded in research. Additionally, it synthesizes strategies for developing these competencies within public organizations.

Essay 5 aims to empirically test the findings of the literature review (essay 4) regarding competence development measures, thereby contributing to the practical feasibility of identified measures.

Third, this dissertation contributes to research by gaining insights into how HR capabilities can be leveraged to help attract and retain human resources.

Essay 6 contributes theoretically by examining how individual personality traits interact with work environments to influence person-job fit (P-J fit) among IT professionals. By shifting the focus towards an individual-level perspective in organizational design choices, the essay aims to enhance the understanding of IT workers' fit perceptions. This research provides meaningful insights for theory and emphasizes the importance of considering P-J fit in IT contexts, potentially informing recruitment, selection, and job design strategies.

Essay 7 makes a theoretical contribution by addressing the evolving landscape of IT careers, particularly in the context of career transitions into the IT sector. It expands the scope of management and information systems career studies by examining strategic recruitment of career changers and intervention strategies. Additionally, the essay enriches research on IT professionals and careers by analyzing the trajectories of individuals entering the IT sector, thus contributing to existing knowledge on IT career patterns. Furthermore, it offers insights into intervention strategies to reduce the gender gap in the IT sector, adding to efforts to foster diversity and inclusivity in IT careers.
6.2 Managerial Implications

In addition to the theoretical implications, this dissertation makes several contributions to practice. By synthesizing the knowledge about bimodal IT organizations to aim for structural ambidexterity, essay 1 sheds light on controversies within practitioner discourse surrounding bimodal IT and proposes four directions for further research. It emphasizes the importance of understanding diverging interpretations of bimodal IT and suggests that bimodality may not necessarily lead to irreversibly separate organizational silos, advocating instead for constant evaluation and adjustment. Additionally, it challenges the assumption that all companies aspire to reach a fully agile or multimodal state, suggesting that bimodality can serve as a valuable interim phase for organizational restructuring and learning. Moreover, essay 2 provides practical implications for IT decision-makers, offering insights into challenges and governance mechanisms in bimodal IT organizations and suggesting suitable actions to manage them successfully.

Essay 3, essay 4, and essay 5 provide practical contributions to leadership capabilities in a changing environment. Essay 3 highlights practical implications by emphasizing the need for a balanced approach to empowering leadership, particularly in highly ambidextrous contexts where individuals may seek guidance over empowerment. It underscores the importance of considering individuals’ need for structure and autonomy in leadership strategies. Essay 4 contributes practically by providing a comprehensive overview of digital leadership competencies in the public sector, offering a catalog grounded in research that can guide decision-makers in understanding and fostering digital leadership. Essay 5 offers practical guidance for fostering digital leadership competencies in public administration based on empirical findings regarding competence development measures. It provides actionable insights for implementing effective interventions in practice.

Essay 6’s practical contributions lie in informing managers and HR departments about the specific personality profiles needed in work environments found in ambidextrous IT organizations, thereby enhancing recruitment and selection processes to improve person-job fit. Essay 7’s practical contribution lies in offering insights and guidance on guiding organizations through career transition processes in the IT sector. It provides practical
insights into reaching target groups, motivational drivers for career change, and measures for onboarding and development.

6.3 Limitations and Further Research

Limitations in this dissertation arise, on the one hand, from the utilization of the chosen research methods, their assumptions, and the decisions to be made for the analyses. For example, the literature selection in essay 1 leads to a restricted consideration of the phenomenon of bimodal IT and structural ambidexterity, as the focus was explicitly on research findings in peer-reviewed outlets, which implies that practice-oriented literature is not considered. Moreover, for each partial research process within the essays, the selection of conceptualizations, approaches, interview partners, and cases for the analysis also creates limitations.

An additional limitation of our research lies in its treatment of organizational capabilities, which are inherently context-specific, as noted by Bhatt (2000). While we have endeavored to capture distinct settings, such as operations in the public sector, a more nuanced approach regarding context-specific factors is needed. These factors may include industry dynamics, market environments, and workforce compositions, all of which can significantly influence the development and application of organizational capabilities. Furthermore, our study has neglected the longitudinal view of capability development, which is recognized as a gradual process shaped by historical contexts and organizational experiences (Montealegre, 2002; Tan et al., 2004). By overlooking the longitudinal aspect, we may have missed opportunities to understand how capabilities evolve and adapt to changing circumstances, limiting our analysis's depth and our findings' applicability.

Another notable limitation of our research is the potential for overgeneralization due to the predominant focus on Germany, with only essay 2 including interviews from Denmark and essay 1 incorporating literature regardless of origin. This limited geographical scope overlooks the significant variations in culture and national contexts, particularly concerning leadership and HR practices. Differences in cultural norms, societal values, and regulatory frameworks can profoundly impact organizational dynamics and the effectiveness of management strategies (Berman et al., 2013; Fu et al.,
2004). For instance, leadership styles that are effective in one cultural context may not yield the same results in another, and HR practices that are successful in Germany might not translate well to other countries due to differing labor laws or cultural expectations (Aycan et al., 2000; Pieper 2012). By primarily examining interviews and cases from Germany, our research may fail to capture these nuanced contextual differences, thereby constraining the generalizability and applicability of our findings to broader international contexts. Future research endeavors should strive for greater diversity in interviewee and case selection to better reflect the complexities of cross-cultural and cross-national organizational dynamics.

Moreover, the essays in this dissertation focus on examining one of three distinct capabilities: organizational design capabilities, leadership capabilities, and HR capabilities. However, an opportunity for further investigation lies in exploring their interplay and how they collectively contribute to organizational success. Andrews et al. (2016) highlight the importance of considering the combined impact of leadership quality, strategic and operational management practices, and their interconnectedness on organizational outcomes. Therefore, future research endeavors could delve into the synergistic effects of these capabilities, examining how they interact and influence each other to ultimately shape organizational performance and achievement of desired goals. By exploring these dynamics, researchers can gain a deeper understanding of how organizations can enhance their overall capability to achieve desired outcomes, thereby providing valuable insights for both academia and practitioners in the field of organizational management.
7 Conclusion

The digital era has ushered in unprecedented change, forcing organizations to adapt quickly or risk obsolescence. In this landscape of rapid technological advancement and evolving market dynamics, the concept of digital transformation has gained prominence as organizations strive to remain competitive and relevant (Chen et al., 2018). However, successful digital transformation goes beyond mere technological upgrades; it requires a fundamental shift in organizational identity and capabilities (Wessel et al., 2021). Organizations are under increasing pressure to cultivate adaptability, agility, and dynamism to navigate these changes effectively (Ravichandran, 2018), often leading to significant restructuring efforts, especially in IT organizations (Besson & Rowe, 2012).

The RBV provides valuable insights into understanding organizational capabilities, emphasizing the role of resources and capabilities in determining organizations' viability and competitive advantage (Barney, 1991). As organizations embark on digital transformation journeys, their capabilities become increasingly critical to success (Konopik et al., 2022). IT organizations, in particular, face unique challenges in balancing stability and innovation, necessitating the development of ambidextrous capabilities (Haffke et al., 2017).

This dissertation contributes to the theoretical understanding of digital transformation in IT organizations by synthesizing insights from the RBV and organizational ambidexterity literature. It analyzes the role of organizational design, leadership, and HR capabilities in managing successful transformation in IT organizations. Through a series of essays, this dissertation explores various facets of organizational capabilities and addresses research questions related to bimodal IT structures, empowering leadership, digital leadership competencies, and HR practices.

Essays 1 and 2 focus on organizational design capabilities, elucidating the dynamics of bimodal IT structures and their governance mechanisms. These essays provide a conceptual framework synthesizing knowledge of bimodal IT and structural ambidexterity and offer insights into the challenges and opportunities associated with bimodal IT organizations.
Essays 3, 4, and 5 delve into leadership capabilities, examining the impact of empowering leadership on individual ambidexterity and exploring the competencies required for digital leadership in the public sector. These essays highlight the importance of leadership styles in fostering innovation and driving organizational change.

Essays 6 and 7 shift the focus to HR capabilities, investigating the role of personality traits in IT work environments and exploring interventions to recruit career changers into the IT sector. These essays offer practical insights into talent management and recruitment strategies by examining the intersection of individual characteristics and organizational needs.

In conclusion, this dissertation advances our understanding of organizational capabilities within IT organizations and provides actionable recommendations for navigating digital transformation. By synthesizing theoretical frameworks with empirical evidence, this research contributes to both theory and practice, helping organizations adapt to and excel in rapidly evolving digital landscapes.
8 References


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9 Overview of Essays

<table>
<thead>
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<td>Essay 2: Paradoxical Governance Mechanisms for Achieving Structural Ambidexterity in Bimodal IT Organizations</td>
<td>Preparing for Submission</td>
</tr>
<tr>
<td>Essay 7: Delineating the Gender and Skills Gap in IT: Insights into the Recruitment and Onboarding of Women in Career Transitions</td>
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Table 0-6. Overview of Essays
Essay 1: Structural Ambidexterity through Bimodal IT – A Literature Review and Research Agenda*

Abstract

Bimodality of the information technology (IT) function is one answer to the changed expectations towards and perceptions of IT’s role within an organization. Bimodal IT aims at leveraging ambidextrous capabilities, allowing to engage in explorative and exploitative activities at the same time. Research interest of this phenomenon is growing, but there is a lack of cumulative knowledge on bimodal IT including research on the related concepts of structural ambidexterity and IT ambidexterity. Through a systematic literature review of 42 papers published in a wide range of academic outlets, we identify and describe four research themes which are summarized in a conceptual model of forms of bimodal IT, antecedents, facilitators and barriers, and outcomes. Furthermore, we discuss the critique the phenomenon is facing in practice and propose a research agenda. The study contributes to both research and practice by synthesizing existing knowledge and providing guidance for further research.

Keywords: Bimodal IT, Structural Ambidexterity, IT Organization, Literature Review.

* This essay was co-authored with Till J. Winkler (University of Hagen). It is published in the proceedings of Wirtschaftsinformatik 2022 (minor changes are possible). A slightly changed version has also been published as a book chapter.


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1 Introduction

Companies find themselves in a situation where the need for a focus on digital transformation is unquestioned but, at the same time, ensuring stable and reliable operations remains of unabated importance (Haffke et al., 2017a; Horlach et al., 2016; Leonhardt et al., 2017). As a consequence, companies’ information technology (IT) functions are facing challenges arising from changed expectations towards and perceptions of their role within an organization. One the one hand, IT functions are expected to "keep the lights on", while on the other hand they are also expected to drive the digital change (Haffke et al., 2017b). In most cases traditionally structured unimodal IT setups, constrained by their legacy information systems, are not suited to accompany these contradicting needs (Haffke et al., 2017b). Instead, companies have sought bimodal forms of organization that provide both, explorative and exploitative, capabilities and thus allow them to reaching—what previous researchers also called—structural ambidexterity (e.g., Boulton, 2015; Colella et al., 2014; Fortmann et al., 2018; Haffke et al., 2017a, 2017b; Horlach et al., 2016; Jaenisch, 2017; Leonhardt et al., 2017).

Bimodal IT has been coined by Gartner market research as "the practice of managing two separate, coherent modes of IT delivery, one focused on stability and the other on agility" (Colella et al., 2014). The concept is widely applied in practice by companies such as Ford, DHL, and Deutsche Bahn (Boulton, 2015; Fortmann et al., 2018; Jaenisch, 2017). Bimodal IT can take different organizational forms (Haffke et al., 2017a). While some companies regard bimodal IT as a way to run different (e.g., plan-driven versus agile) projects within the same IT unit, others regard the structural division of IT units as key to meeting the strategic and operational expectations towards IT in digitally transforming companies (Haffke et al., 2017a). More recently, practitioners have also discussed the concept more controversially. Bimodality has been criticized for creating organizational silos and slowing down transformation to a fully agile state (Haffke et al., 2017b; Horlach et al., 2016). In addition, the common characterization of the traditional mode as being the slower one fuels employees’ unwillingness to participate in bimodal IT and creates a cultural division between mode 1 and mode 2, ultimately impeding the alignment between business and IT (Ellermann, 2017; Remfert & Stockhinger, 2018). For some, bimodality
"sets the path for IT's long-term transformation" (Marko, 2015) while others declare it as a "recipe for disaster" (Bloomberg, 2015).

Although the discourse around bimodal IT has primarily been led by practice, the academic literature on bimodal IT has grown considerably within the last five years. Since Horlach et al.’s 2016 study (Horlach et al., 2016), who identified only one academic paper on this phenomenon, research has made progress in the fields of how to organize bimodal IT (e.g., Haffke et al., 2017a; Horlach et al., 2016) its influencing factors (e.g., Tai et al., 2019; Zhen et al., 2021b) and governance mechanisms (e.g., Jöhnk et al., 2019). Other researchers focused on showing the strategic and business performance related benefits of this phenomenon (Fischer et al., 2020; Rueckel et al., 2020). From this growing stream of literature, and in the light of the continued controversies in the practitioner discourse, emerges a need to structure the knowledge domain. Although previous authors have reviewed various topics related to bimodal IT, including digital transformation and IT (e.g., Albino & Souza, 2019; Gerster, 2017), strategies for successful IT projects (Holgeid et al., 2018), and ambidexterity research (e.g., Iho & Missonier, 2020; Lee et al., 2015; Saxena, 2020; Werder & Heckmann, 2019), we lack a dedicated review of the current state of research regarding bimodal IT to discuss our understanding of this contemporary IT phenomenon in the light of the critique among practitioners. The goal of this paper is, therefore, to (1) provide an overview of the current academic knowledge, (2) collect and synthesize findings in an overall conceptual model, and (3) identify potential paths for future research on bimodal IT and structural ambidexterity.

To this end, this paper first explains the practical and theoretical foundations of the three related concepts of bimodal IT, structural ambidexterity, and IT ambidexterity. We then explain our systematic literature review (SLR) approach, in which we retrieved 42 articles based on defined criteria. We analyzed this body of literature for bimodal IT forms, antecedents, facilitators, potential barriers, and outcomes of bimodal IT. Our key contribution is a conceptual model that integrates the cumulative knowledge of the literature on bimodal IT and structural/IT ambidexterity. We discuss our model findings in the light of the controversies in the practitioner discourse and close with an agenda with four directions for further research on the phenomenon of bimodal IT.
2 Practical and Theoretical Foundations

We discuss our model findings in the light of the controversies in the practitioner discourse and close with an agenda with four directions for further research on the phenomenon of bimodal IT. How organizational aspects effectively contribute to the firm’s performance has been a focal point in Information Systems (IS) research and practice ever since (Bossert et al., 2014), and especially in the recent debate on digital transformation (Fitzgerald et al., 2014).

A relatively new model of organizational structure, driven by practitioners and adopted in academia, is the concept of bimodal IT (Horlach et al., 2016). Synonyms such as ‘dual IT’ or ‘two-speed IT’ have also been used (Cuomo et al., 2015). Due to its wider recognition we use the term bimodal IT throughout this paper. The approach of bimodality was introduced by the market research and advisory firm Gartner as "(...) the practice of managing two separate but coherent styles of work: one focused on predictability; the other on exploration" (Colella et al., 2014). These two modes differ not only in their project management approach, but are also embedded in different cultures, based on and steered with different strategic and operational management styles, and aiming at fulfilling unique objectives (Haffke et al., 2017b). The traditional mode, mode 1, is used for mission and business critical information systems and the operation of a company’s core processes (Horlach et al., 2017). This exploitative side is responsible for minimizing operational risk, using sequential project management methods, e.g. waterfall methodologies (Haffke et al., 2017b). Within this unit management promotes a risk averse culture accentuating safety and accuracy (Haffke et al., 2017b). In contrast, the agile mode, mode 2, focuses on customer experience and business outcomes driven by rapidly changing market needs (Zhen et al., 2021a). Such explorative activities are usually employed for projects with less certain outcomes, targeting at short release cycles and choosing iterative project management styles, such as Scrum (Haffke et al., 2017b). The mode 2 culture is driven by the principles of agility and speed (Haffke et al., 2017b).

In past research, the concept of bimodal IT has been viewed as a device through which organizations aim to reach IT ambidexterity (Haffke et al., 2017b). IS research views IT ambidexterity as the ability to simultaneously explore new IT opportunities and exploit existing IT resources and practices (Haffke et al., 2017b; Zhen et al., 2021a). IT
exploration, referring to activities associated with terms such as experimentation and innovation, and IT exploitation, referring to activities associated with terms such as efficiency and execution, are indispensable for organizations (March, 1991). However, experimentation and exploration also compete for resources (March, 1991). To foster exploration and enhance a company’s capability for innovation, organizations can set up agile IT teams that may be structurally separated from the traditional IT (Saxena, 2020).

In IS research the term structural ambidexterity, rather than the term bimodal IT, has been used to describe the pursuit of IT exploration and IT exploitation through an organizational separation (Saxena, 2020). Thus, bimodal IT is a term coined by practitioners that is used for different IT organizational forms through which organizations aim for structural ambidexterity. These endeavors are undertaken to ultimately support an organization’s overall IT ambidexterity (Colella et al., 2014; Jöhnk et al., 2019).

3 Literature Review Method

Literature reviews play an important role in IS research and are seen as powerful information sources for practitioners and researchers alike (Bandara et al., 2015; vom Brocke et al., 2015). The literature review method can be used to build on existing knowledge and to identify areas or gaps where further research is needed (Rowley & Slack, 2004; Webster & Watson, 2020). The goal of this descriptive literature review is to accumulate existing knowledge, to synthesize the findings in a conceptual model, and to derive possible directions for future research (Paré et al., 2015). The literature search was conducted between May and July 2021 using the databases AIS Electronic Library (AISeL) and EBSCOhost with the following search string: "Bimodal IT" OR "Dual IT" OR "Two Speed IT" OR "Multimodal IT" OR "IT Ambidexterity" OR "Structural Ambidexterity". In addition, we performed a cross-check with Google Scholar (search term "Bimodal IT") to find potential other relevant studies outside the outlets indexed by the mentioned databases. Following the recommendations of Rowley and Slack (2004) and Webster and Watson (2020), we focused on articles published in scholarly journals and proceedings of conferences. The initial set of search results was reduced by excluding duplicates and papers in other languages than English. To assess potential relevance of each paper, we screened the articles based on their titles and abstracts. If the fit to the
research purpose was not clear from this screening, we performed a full-text analysis. During this quality assessment, each paper was evaluated based on ex-ante defined inclusion and exclusion criteria, see 1-1.

<table>
<thead>
<tr>
<th>Inclusion criteria</th>
<th>Exclusion criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Study is a peer-reviewed journal or conference paper</td>
<td>• Study is a duplicate</td>
</tr>
<tr>
<td>• Study focuses on bimodal IT, structural ambidexterity or IT ambidexterity</td>
<td>• Study is not written in English</td>
</tr>
<tr>
<td>• Study researches the phenomenon of interest in the light of Information Systems</td>
<td>• Study is research-in-progress w/o first results</td>
</tr>
<tr>
<td></td>
<td>• Study focuses on ambidexterity in general</td>
</tr>
<tr>
<td></td>
<td>• Study focuses on dynamic, temporal or contextual ambidexterity</td>
</tr>
<tr>
<td></td>
<td>• Study focuses on Digital Innovation Units (DIU’s)</td>
</tr>
</tbody>
</table>

Table 1-1. Inclusion and Exclusion Criteria

Once the database search was completed, a forward and backward search was performed in order to find papers that previous search attempts did not yield (Webster & Watson, 2020). Saturation could be assumed as no additional paper of potential relevance was found (Engesmo & Panteli, 2020). Finally, the search and selection process, as described above, led to the finding of 20 eligible papers for the search term "bimodal IT", 9 papers for the search term "structural ambidexterity," and 12 papers for the search term "IT ambidexterity" (see Table 1-2).
Our cross-check with Google Scholar resulted in one additional paper that was found relevant in terms of our inclusion and exclusion criteria and thus included in the analysis (Remfert & Stockhinger, 2018). As vom Brocke et al. (2015, p. 9) note, "there is no reason to exclude a relevant publication from a literature review if the researcher came across it by means other than the keyword search".

Papers included in the search were published between 2014 and 2021 with an increasing number over the years and with a peak of 12 papers in 2020. In total, 26 studies were published in conference proceedings and 16 in refereed journals. Each paper included in the final set of eligible papers was thoroughly read, analyzed, and synthesized through written memos (Bandara et al., 2015). We started analyzing the literature selection based on the pre-codification scheme dimensions proposed by Bandara et al. (2015). This served as a base but evolved over time through recoding and restructuring the coding dimensions to make them heterogeneous across but homogenous among each other. During the coding and analysis phase, which was conducted by the authors independently and included several iterations, we eventually assigned all papers to the final codification scheme presented in chapter four.

### 4 Findings: Research Themes of Bimodal IT

The literature analysis brought up four main research themes related to bimodal IT: forms, antecedents, facilitators and barriers, and outcomes of bimodal IT. The research themes are described in Table 1-3.

<table>
<thead>
<tr>
<th>Source</th>
<th>Search strings</th>
<th>Hits</th>
<th>Included</th>
</tr>
</thead>
<tbody>
<tr>
<td>AISeL</td>
<td>&quot;Bimodal IT&quot; OR &quot;Dual IT&quot; OR &quot;Two Speed IT&quot; OR &quot;Multimodal IT&quot;</td>
<td>111</td>
<td>20</td>
</tr>
<tr>
<td>EBSCO</td>
<td>&quot;Bimodal IT&quot; OR &quot;Dual IT&quot; OR &quot;Two Speed IT&quot; OR &quot;Multimodal IT&quot;</td>
<td>115</td>
<td></td>
</tr>
<tr>
<td>AISeL</td>
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<td>AISeL</td>
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Table 1-2. Search Strings and Results of the Literature Search Process
In the following, we describe the themes derived from the literature and end by presenting a conceptual model that brings together the findings.

### 4.1 Forms of Bimodal IT

The first research theme seeks to find a deeper understanding of the operation of bimodal IT, specifically the organizational forms and their needed alignment with business and within IT units. *Organizational forms* are found with different characteristics.

The most cited classification is the archetype model of Haffke et al. (2017a, 2017b). Haffke et al. (2017a) propose four archetypes differentiated by the *level of separation*: project-by-project (A), sub-divisional (B), divisionally separated (C), and re-integrated bimodal IT (D). The chosen form depends on the company’s internal and external environment and is not ultimate (Haffke et al., 2017b). Haffke et al. (2017a) use the
analogy of an urban metro map to demonstrate that switching between archetypes is common and a consequence of experiences and learnings made during a company’s IT transformation journey.

A different classification is presented by Horlach et al. (2017) who distinguish between five types of bimodal IT. They characterize forms of bimodal IT as (1) traditional IT with bimodal development processes, (2-3) project-based while outsourcing one of both modes and/or partnering with third-party providers, (4) bimodal IT, and (5) agile I. While the designs and focus of the classifications substantially differ, both author groups agree on the fact that the individual environment and situation drive the chosen form of bimodal IT (Haffke et al., 2017a, 2017b; Horlach et al., 2017).

While the aforementioned studies present concepts and types of bimodality along the level of separation, Jöhnk et al. (2017) follow the question of how to realize bimodal IT, more specifically how to implement the agile mode (mode 2). Jöhnk et al. introduce a taxonomy of design options, which gives practical guidelines along seven dimensions, such as staffing, technical integration, and location (Jöhnk et al., 2017).

The duration of separation between mode 1 and mode 2, which can be transitory or ultimate, depends on a company’s structure and resource situation. A bimodal IT structure itself might be considered as the desired final stage (Remfert & Stockhinger, 2018), intermediate state to a fully agile organizational set-up, or even more fine-grained multi-speed structure (Remfert & Stockhinger, 2018). However, there is a broad consensus that in most cases, bimodal IT is rather employed as a transitory state within an overarching transformation process than an organizational target state (Haffke et al., 2017a; Horlach et al., 2017). Haffke et al. (2017a, 2017b) found that in most cases, companies arriving at archetype D (reintegrated bimodal IT) eventually aim for an unimodal agile design.

Another decision to be made when defining bimodal forms of IT is the reporting line, which refers to the functional and hierarchical superiority of the bimodal IT organization. Setting up the right management structure can help avoid barriers faced when balancing the conflicting and often competing activities of exploration and exploitation (Engesmo & Panteli, 2020). Engesmo and Panteli (2020) found that, within their four studied scenarios of structures and leadership for the IT function, it is most often the Chief Digital
Officer (CDO), in contrary to the Chief Information Officer (CIO), who takes the leadership to enable bimodal IT. Tumbas et al. (2017) present three types of CDOs and identify the "Digital Accelerator CDO Approach", with the key capability of digital innovation and primary objective of experimentation and implementation, as best suited to adopt bimodal IT.

The importance of alignment has been emphasized between mode 1 and mode 2 IT as well as between business and IT (Horlach et al., 2016; Leonhardt et al., 2017). The triangular structure of business units, mode 1 IT, and mode 2 IT, brings forth three new forms of alignment: (1) bimodal business IT alignment, (2) bimodal IT alignment, and (3) business digital IT alignment (Horlach et al., 2016) and respective alignment mechanisms (Horlach et al., 2017, 2020). Alignment is seen as an important management task (Haffke et al., 2017a) that also creates the need for additional skill development among IT staff (Horlach et al., 2017, 2020).

4.2 Antecedents

The second theme, antecedents, sheds light on the motivations underlying a bimodal separation of the IT function. Using explorative and exploitative capabilities at the same time is foremost seen as a strategic construct and an "inevitable" step toward digital business transformation by achieving the most advantageous balance of agility and high reliability (Haffke et al., 2017b).

Specifically, studies have shown that bimodality shall settle incompatible goals of stability and experimentation and deliver effective support for digitization (Haffke et al., 2017a). Haffke et al. (2017b) also studied the antecedents of bimodal IT and found that the main reason for companies to realize bimodal IT is to achieve ambidexterity and agility. In a similar vein, Horlach et al. (2017) highlighted the need for flexibility in companies’ IT as an underlying motivation to implement bimodal IT design. In a second publication on this, Haffke et al. (2017a) added companies’ insufficient level of explorative capabilities and need for structural alignment to the list of antecedent factors.
4.3 Facilitators and Barriers

The third identified research theme, *facilitators and barriers*, investigates the intervening factors that might drive or hinder the implementation and operation of bimodal IT.

With regards to the business environment, Syed et al. (2020) suggest that a high level of dynamism and complexity within a firm’s business environment can have a positive impact on IT ambidexterity. Moreover, the study of de Guinea and Raymond (2018) adds that bimodal IT might be less suitable for small and medium enterprises (SMEs) due to their limited size and resources. They suggest that these types of companies benefit more from sequential employment of exploration and exploitation rather than a simultaneous approach (de Guinea & Raymond, 2020). Horlach et al. (2020) point out that companies with a B2C focus, due to their customer-centricity and higher risk of market volatility, tend to favor enterprise-wide approaches towards agility instead of unit-based approaches, as in bimodal IT design.

From a managerial perspective, Horlach et al. (2016) highlight the facilitative role of leadership roles on the IT-IT and business-IT alignment in bimodal IT. Tai et al. (2019) researched the importance of leaders’ understanding of business situations, while Syed et al. (2019) show that both studied decision-making styles, directive decision-making, and participative decision-making, enable IT ambidexterity and thus bimodal IT. In a similar vein, Badr (2018), Park et al. (2020) and Haffke et al. (2017a) studied internal and external practices that facilitate bimodal IT and enhance structural ambidexterity, such as communication and collaboration between the modes and towards the business. Furthermore, Tai et al. (2019) add flexible technology assets, such as sharable IT hardware/software as facilitators for bimodal IT.

Haffke et al. (2017a) also highlight appropriate and formalized governance mechanisms as critical success factors in achieving and operating in a bimodal form. With a focus on dealing with challenges during initializing and operating bimodal IT, Jöhnk et al. (2019) define two categories of governance mechanisms, namely impeding governance mechanisms and coping governance mechanisms. More recently, Zhen et al. (2021b) studied the positive influence of process-based and relational governance on IT exploration and exploitation. From a different standpoint and focus, Chi et al. (2017)
investigated which governance strategy to choose depending on the level of IT ambidexterity stating that companies with low IT ambidexterity choose a balancing governance strategy rather than a complementing governance strategy.

Only two papers were identified during the literature search process that deal with potential barriers of bimodal IT (Kalgovas et al., 2014; Zhen et al., 2021b). Jöhnk et al. (2019) assign the observed challenges to either being of a transformational nature, arising while implementing bimodal IT, or operational nature, experienced while operating bimodal IT. During the implementation phase, challenges are attributed to the required organizational shift with regard to structures, processes, and culture, while operational challenges are, among other areas, experienced due to resource allocation or technical barriers (Jöhnk et al., 2019). Kalgovas et al. (2014) add that barriers might also arise from a cost-driven focus of the IT function resulting when responsibility and accountability are with the Chief Financial Officer (CFO). Emerging from their work on challenges and governance mechanisms, Jöhnk et al. (2019) identify five paradoxical tensions within bimodal IT (flexibility vs. predictability, business/IT vs. IT/IT, simplicity vs. complexity, comparability vs. differentiation, integration vs. autonomy).

4.4 Outcomes

With regard to the outcomes of bimodal IT, research shows that bimodality supports companies with their transformation endeavors (Rueckel et al., 2020). Studies suggest that ambidextrous IT capabilities, achieved through establishing a bimodal IT organization, support addressing concurrent demands experienced in overall digital transformation activities (Haffke et al., 2017a; Gregory et al., 2015; Remfert & Stockhinger, 2018). Studies underscore the benefit of bimodal IT structures while initializing (Muehlburger et al., 2019), implementing (Rueckel et al., 2020), managing (Schiffer, 2021), and building the right mindset for transformation endeavors (Remfert & Stockinger, 2018). It is to be noted that El-Tabany et al. (2020) found that the impact of bimodal IT within digital transformation endeavors might be considered of less importance in emerging markets. This can, among other reasons, be ascribed to budget and talent recruiting constraints. Furthermore, a study among IT managers conducted by Fischer et al. (2020) mentions bimodal IT as one of the coping mechanisms for rapid change. Holotiuk and Beimborn (2017) analyzed industry reports on digital business
strategy and indicated that bimodal IT is listed as one of the critical success factors. Bimodality has also been studied as a success factor for agility. Simultaneous exploitation and exploration positively relate to and enhance organizational agility (Zhen et al., 2021a, 2021b), as well as utilize the beneficial aspects of IT agility (Leonhardt et al., 2017). In a performance-related manner, studies show that IT ambidexterity can enhance service innovation performance (de Guinea & Raymond, 2019, 2020), new product development performance (Syed et al., 2019a, 2019b), IT success (Syed et al., 2020) and IS alignment (Tai et al., 2019).

Figure 1-1 synthesizes the presented findings in a conceptual model of bimodal IT forms, antecedents, facilitators and barriers, and outcomes.

Figure 1-1. Conceptual Model of Current Research on Bimodal IT

5 Discussion

With the goal of synthesizing existing knowledge and providing directions for further research on bimodal IT, we conducted a systematic literature review. We synthesized the aggregate findings from 42 eligible papers in a conceptual model of forms of bimodal IT, antecedents, facilitators and barriers, and outcomes (see Figure 1-1). In the following, we first discuss two observations that emerged from our analysis before we reflect on our

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1 The references related to the numbers in brackets can be found in the references list.
research findings against two points of critique in the practitioner discourse on bimodal IT.

First of all, our analysis of existing research has shown that the number of publications on bimodal IT and its related concepts and its related concepts, structural and IT ambidexterity has increased (from one peer-reviewed paper in 2014 to 12 peer-reviewed papers in 2020). This suggests that the phenomenon of bimodal IT is of relevance and growing research interest, which can positively influence the discourse among IS practitioners.

Second, based on the findings of the presented literature review, controversies around bimodal IT might be ascribed to a diverging understanding of the concept itself. Although bimodal IT has been studied as a success factor in strategic and performance-related outcomes, such as mastering digital transformation programs (e.g., Rueckel et al., 2020), the concept provokes discussions and receives critique among practitioners and academics (Ellermann, 2017; Remfert & Stockhinger, 2018). This brings up uncertainties and might hinder or slow down the realization of benefits resulting from bimodal IT. Therefore, we will elaborate on the critique by linking it to the findings of the literature analysis.

The mentioned drawbacks of bimodal IT can be ascribed to two main aspects. The most often mentioned point of critique is the strict separation of the two modes with all its attributed consequences, such as cultural conflicts and misalignment (Boulton, 2016; Haffke et al., 2017b). The presented review shows that, although the base for bimodality is indeed a separation into two modes, it is not intentionally creating irreversible structures and competing organizational silos with no interaction and interference for possible tensions. For example, according to Remfert and Stockhinger (2018), resolving inter- and intra-organizational problems arising in bimodality settings is an important leadership task. In addition, within a bimodal setup, the level and duration of separation shall be constantly reevaluated and adjusted based on requirements and learnings made (Haffke et al., 2017a). Haffke et al. (2017a) have used an urban metro map analogy to visualize how companies might progress through various states of bimodal IT.
As a second point of critique, there is the assumption that all companies will ultimately try to reach a fully agile or multimodal state (Gerster et al., 2020). First, the literature review shows that there is a consensus that for some companies, bimodality itself might be the desired architectural end state, while for others, it is a transitory state. Although the presented studies suggest that some of the companies ultimately desire to progress to a state beyond bimodality (Haffke et al., 2017b), the interim state can serve as valuable time for generating learnings with regard to governance, modus operandi, and alignment processes (Haffke et al., 2017a). Thus, it can be seen as a learning journey, supporting organizational restructuring during IT transformation, or more metaphorically speaking, serving as a bridge that connects the old to the whatsoever "new world." In addition, it should not be neglected that a fully agile or similar form might not be suitable or desired for all companies due to their market environment or resource structure (O’Donnell & Richardson, 2008).

In summary, the reviewed literature suggests that the multi-faceted nature of bimodal IT empowers companies to optimize processes and resource allocation for tasks and challenges with different requirements (Marko, 2015; Saxena, 2020). We conjecture that bimodal IT will likely be a phenomenon of interest for research and practice for many years to come.

6 Research Agenda for Bimodal IT

While our findings (summarized in Figure 1-1) show that the antecedents and outcomes, as well as facilitators and barriers of bimodal IT, have been researched, we also see opportunities for future research. We discussed the potential white spots emerging from the synthesis of the literature and identified a small set of research opportunities and new perspectives that we consider to have theoretical and practical relevance. Specifically, we propose avenues for further research regarding the human, cultural, and technological factors and the general applicability of bimodal IT.

6.1 Human Factors in Bimodal IT

Structure-related questions of bimodal IT are mostly studied at the organizational level (Engesmo & Panteli, 2020; Haffke et al., 2017a; Horlach et al., 2017). Past research on
bimodal IT has somewhat ignored the individual level of IT professionals. This is surprising since it is conceivable that different modes require different skill sets and mindsets (Haffke et al., 2017b). The psychology and social science literature stresses the importance of the interplay of personality and job characteristics, such as the impact of person-job fit on job satisfaction (Ehrhart, 2006; Peng & Mao, 2015). Therefore, we propose that future research should identify the different personality (character) traits of individuals needed to operate in bimodal architecture successfully. In a similar vein, although Horlach et al. (2017) briefly mention the importance of training with regard to bimodal IT, and Remfert and Stockhinger (2018) emphasize the willingness to change, there has been a lack of research on how to support this transformation process on an individual level. Therefore, we propose investigating how companies can support employees in adapting and enhancing their skillset needed to work in bimodal IT. These research questions are expected to have high relevance for IT human resource management in practice.

6.2 Technological Factors in Bimodal IT

Our literature review did not identify many publications with a focus on more technical questions of bimodal IT. We believe that enterprise architecture (EA) thinking can enrich bimodal IT research since EA is organizations' strategic capability and response capability to emerging change drivers (Gill, 2015; Lumor et al., 2021). EA, which provides a long-term view of technologies, systems, and business processes in the organization (Ross et al., 2006), is a central topic in the agile literature (e.g., Gill, 2015; Lumor et al., 2021) and studies have identified architecture as one of the areas impacted when organizations adopt agile practices (Gerster et al., 2018a). For example, Gill (2015) points to the risk of overlooking the need for holistic enterprise architecture when agile practices are introduced (Gill, 2015). Drawing on a systematic review of 43 articles, a study by Lumor et al. (2021) provides an overview of the architectural properties of EA products and process practices organizations can employ to build and sustain organizational agility. We believe, there is a potential to transfer and validate these findings in a bimodal context.
6.3 Cultural Factors in Bimodal IT

The characteristics of mode 1 and mode 2 show that they are based on and operate within different sets of values when they employ different project management methods (Haffke et al., 2017b). While research investigated the importance of and fit with organizational culture when scaling agile methods (i.e., present in mode 2) (Kalenda et al., 2018; Lin et al., 2011), there is a lack of research that considers the environment in which both modes are existent and the consequences on a shared (organizational) culture. The importance of cultural capabilities is also reflected in the recently published Individual and Organizational Ambidexterity Maturity Model (IOAMM) by Huber et al. (2021), which measures individual and organizational capabilities, including cultural capabilities, along five maturity stages. We need to drill deeper into which organizational culture and values are needed for bimodal environments to thrive.

6.4 Applicability to Industries and Company Types

Our literature review showed that bimodality might be more suitable for some companies than others (Syed et al., 2020). Some facilitators (see Figure 1-1) have been studied separately, but only a compromised analysis can foster the understanding of the relation between company type and benefits received from bimodal IT. For example, Horlach et al. (2020) found that B2C companies favor targeting a fully agile approach. Also, benefits from structurally separated IT departments differ depending on the market situation, for example, within emerging markets (El-Tebany et al., 2020) and company size (de Guinea & Raymond, 2018, 2020). In a similar vein, although not specifically investigated for structural ambidexterity, previous studies question the superiority of ambidexterity for small and medium-size enterprises (SMEs) (Mathias, 2014; Wenke et al., 2021). Consequently, to fully harness the potential of bimodal IT further research needs to be done in evaluating which types of companies and industry sectors are most (or least) suited for employing bimodality as an organizational design principle in IT.
7 Limitations

Limitations of our work arise from the review method and the search strategy itself. Only defined keywords in mentioned databases were searched, and the selection of a final set of papers was based on defined inclusion and exclusion criteria (see Table 1-1). Furthermore, we excluded literature that studies potential parts of bimodal IT, e.g., literature on digital innovation units (DIU’s). In addition, readers may see further research avenues beyond the four directions outlined in our research agenda.

8 Conclusion

The presented work expands knowledge about the concept of bimodal IT by bringing together and discussing the status quo of academic work and the critique the phenomenon is facing in practice. Our review delineated the related concepts of structural ambidexterity and IT ambidexterity, but included these in the search process to ensure broad coverage. Through our review, we identified four major research themes, namely forms of bimodal IT, antecedents, facilitators and barriers, and outcomes, which synthesized in a conceptual model. The presented literature review helped us identify four suggested paths for future research with regards to (1) human factors in bimodal IT, (2) technological factors in bimodal IT (3) cultural factors in bimodal IT, and (4) applicability to industries and company types.
9 References


Essay 2: Paradoxical Governance Mechanisms for Achieving Structural Ambidexterity in Bimodal IT Organizations*

Abstract

Businesses and public enterprises must balance exploitative and explorative capabilities in their IT function to cope with the fundamental changes associated with digitalization. One approach to balance these paradoxical demands and achieve structural ambidexterity is to adopt twofold organizational structures known as bimodal IT. While the IS literature has made recent advances in describing and analyzing bimodal organization structures, we still lack a deeper understanding of the inner workings of such IT organizations and the potential tensions between explorative and exploitative IT units. To address this research gap, we study the internal governance mechanisms of three bimodal IT organizations. We analyze data collected through 30 interviews using grounded theory techniques. We first identify challenges associated with the implementation of and coordination within the ambidextrous bimodal IT organizations. We then identify these organizations' structural, procedural, and relational governance mechanisms and elucidate how they relate to the challenges. Finally, we derive and describe five novel governance paradoxes of structural ambidextrous IT organizations that emerged from this research. Our key theoretical contribution to the structural ambidexterity literature is to unfold the reinforcing and restricting effects that describe the dynamics between impeding governance mechanisms and paradoxes in bimodal IT organizations. Implications for practice are discussed.

Keywords: IT Governance Mechanisms, Bimodal IT, Paradox Theory, IT Ambidexterity, Structural Ambidexterity.

*This essay was co-authored with Jan Jöhnk, Severin Oesterle, Nils Urbach (Frankfurt University of Applied Science), Till J. Winkler (Univerity of Hagen) and Jacob Nørbjerg (Copenhagen Business Schoool). The interview guide is provided in the Appendix. The essay is currently being finalized for submission to a scientific journal (minor changes are possible).

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Essay 2: Paradoxical Governance Mechanisms for Achieving Structural Ambidexterity in Bimodal IT Organizations
1 Introduction

The dynamic technological environment forces IT functions to evaluate new digital options, develop innovative solutions, and adapt flexibly to ever-changing business needs. At the same time, however, IT functions must fulfill their traditional role of managing increasingly complex IT infrastructures and providing adequate IT services with high efficiency, stability, and regulatory compliance (Horlach et al., 2016). The information systems (IS) literature has described these conflicting needs to be efficient, stable, and compliant on the one hand and flexible, innovative, and agile on the other. IT functions must address this paradox by becoming strategically and organizationally ambidextrous (Galleries, 2006; Gregory et al., 2015; Leidner et al., 2011). These conflicting needs are consistent with the tension between exploration and exploitation discussed in the broader management literature (March, 1991) and the desire for enterprise-wide organizational ambidexterity (Raisch & Birkinshaw, 2008). A common approach to making IT functions ambidextrous is the adoption of dual organizational structures, often referred to as bimodal IT. Bimodal IT separates the IT function into one mode that emphasizes exploitative capabilities (e.g., traditional IT) and another that cultivates exploratory capabilities (Haffke et al., 2017a). Different organizational units that emphasize exploration have also been referred to as agile IT, digital innovation units, or digital labs (Raabe et al., 2020). Although they differ in name and organizational design, these types of entities aim to foster structural ambidexterity (Horlach et al., 2016), which is defined as the ability of organizations to manage tradeoffs between conflicting demands by creating "dual structures" so that certain business units-or groups within business units-focus on alignment while others focus on adaptation (Duncan, 1976). While this study uses the term bimodal IT to refer to all forms of structural ambidexterity in IT organizations, we expect that the insights gained about the challenges associated with bimodal IT will also apply to other approaches to structural ambidexterity based on the underlying exploitation-exploration dichotomy.

The IS literature has made recent advances in the description and analysis of bimodal organization structures and provided, amongst others, a classification of different archetypes (Haffke et al., 2017a) as well as challenges (Horlach et al., 2016) and tensions of bimodal IT organizations (Toutaoui et al., 2022). However, the literature still lacks a
deeper understanding of the inner workings of structurally ambidextrous IT organizations and the potential tensions between explorative and exploitative IT modes (Toutaoui et al., 2022).

IS governance research has provided ample insights into a related but different intra-organizational interface, namely the business-IT interface, and we have adopted IT governance mechanisms (Brown, 1999; Wu et al., 2015) as an analytical framework for an in-depth analysis of bimodal IT organizations. The notion of mechanisms (structural, procedural, and relational) has been useful in studying organizational boundary issues. Specifically, we ask:

**Which structural, procedural, and relational governance mechanisms are employed in bimodal IT organizations, and how do they relate to challenges associated with structural ambidexterity?**

Using grounded theory analysis techniques to study interviews across three cases of bimodal IT organizations. We first identify the challenges associated with implementing and coordinating within them. We then identify the structural, procedural, and relational governance mechanisms used within these organizations and how they relate to the categories of challenges. In the subsequent synthesis of our findings, we identify tensions arising from seemingly contradictory governance mechanisms in our cases. We discuss a conceptual model that synthesizes our findings.

Our contributions are threefold. First, this paper advances research on bimodal IT organizations by demonstrating the suitability of governance mechanisms to resolve ambidexterity challenges. Second, we identify and describe five novel paradoxes in bimodal IT organizations that emerged from this research: the strategic vision paradox (flexibility vs. predictability), the alignment paradox (business/IT vs. IT/IT), the organization paradox (simplicity vs. complexity), the distinction paradox (comparability vs. differentiation), and the collaboration paradox (integration vs. autonomy). Third, we advance the discourse on managerial responses to paradoxes of ambidexterity by elucidating the reinforcing and constraining effects that characterize the dynamics between constraining governance mechanisms and paradoxes in ambidextrous
organizational structures. Overall, our study advances research on contemporary organizational designs that aim to achieve structural ambidexterity.

In the following sections, we describe this research's background literature, methodology, and findings before discussing our contributions in light of the broader IS literature.

2 Background Literature

2.1 Ambidexterity and Bimodal IT

Pursuing both efficiency and flexibility is crucial for maintaining the competitive advantage of companies in the long run (Kortmann et al., 2014), and the same applies to IT functions. Organizations often struggle with the task of embracing both exploitative and explorative activities. They risk overemphasizing one objective at the disadvantage of the other (He & Wong, 2004). Therefore, it is necessary to find a way to combine both in order to achieve and sustain competitive success (Cao et al., 2009). A growing research stream in organizational research sees ambidexterity as a response to seemingly paradoxical forces (Benner & Tushman, 2003; Smith & Lewis, 2011). Scholarly research argues that companies must embrace paradoxes, which "require[s] problem-solving and creative thinking about how opposing elements can logically or meaningfully coexist" (Gregory et al., 2015, p. 59). Managerial responses to paradoxical tensions can be defensive or receptive (Soh et al., 2019). Depending on the sequence of the responses, salient tensions are either mitigated or exacerbated, which in turn stall or move digital transformation forward.

To achieve such seemingly contrary objectives, companies adopt organizational forms often portrayed as bimodal IT organizations (Haffke et al., 2017b). Part of bimodal IT is new forms of IT entities, sometimes labeled with terms such as digital innovation units, digital labs, digital units, and digital accelerators, that emerged to help companies explore digital options (Raabe et al., 2020). We understand bimodal IT organizations broadly as all IT organizational forms through which organizations aim for structural ambidexterity, consequently allowing them to engage in exploitative and explorative IT activities at the same time (Kusanke & Winkler, 2022).
Bimodal IT divides the IT function into two separate modes (Haffke et al., 2017a). Mode 1 (traditional IT) emphasizes exploitative capabilities, striving for stability, reliability, efficiency, and long-term planning. Therefore, mode 1 is especially suited for predictable, low-risk, and well-known environments (Horlach et al., 2016). In contrast, mode 2 (agile IT) stands for explorative capabilities, focusing on flexibility, innovativeness and experimentation, time-to-market, and customer needs (Haffke et al., 2017a). Thereby, mode 2 is designated for volatile, uncertain, complex, and ambiguous environments. Moreover, mode 1 generally follows more sequential development approaches (e.g., the waterfall model), while mode 2 operates in iterations and increments (e.g., agile methods like Scrum).

The literature describes bimodal IT as dynamic because its organizational manifestations can change over time (Gerster et al., 2020). Prior research (Haffke et al., 2017a) outlines possible pathways for transforming the IT function through various states of bimodal IT using an urban metro map analogy. In this sense, organizations begin their IT transformation journey at any of the hubs on the map and move through one or multiple archetypes of bimodal IT before potentially considering non-bimodal concepts. Similarly, Gerster et al. (2020) identified four different migration scenarios where a bimodal IT setting has been used as a starting point for an agile transformation, eventually leading to a fully agile organization.

Establishing a bimodal IT organization can be considered a joint digital transformation initiative, resulting in significant structural changes (Raabe et al., 2021). Along this longitudinal progression, several challenges may arise that need to be addressed by (IT) management. Challenges can result from the initial introduction of bimodal IT, its coordination during operational execution, subsequent transitions between the archetypes of bimodal IT organizations, and the reintegration into an unimodal IT organization (Kusanke & Winkler, 2022). In the implementation state, challenges may derive from structural changes and subsequent internal disruptions of bimodal IT organizations, for example, adaptations in leadership, roles, and responsibilities or IT governance (Haffke et al., 2017a). However, even beyond the implementation stage, coordinating a bimodal IT organization poses various challenges to operational execution. For instance, the distribution of decision rights and the prioritization and allocation of resources across
traditional and agile IT often cause conflicts in bimodal IT organizations (Haffke et al., 2017a). Moreover, business/IT alignment poses new coordination challenges because companies must differentiate and "triangularly align the traditional mode, the agile mode, and the business" (Haffke et al., 2017a, p. 103). Thus, business/IT alignment in bimodal IT organizations must consider the interdependencies between systems and operations of traditional and agile IT – considering horizontal and vertical governance mechanisms (Singh et al., 2020).

2.2 Governance Mechanisms

In this research, we use the notion of governance mechanisms to understand the challenges associated with organizational ambidexterity in bimodal IT organizations. Generally speaking, the effective use of IT in companies depends on IT governance (Buchwald et al., 2014). We define IT governance as "the leadership and organizational structures, processes and relational mechanisms that ensure that an organization’s IT sustains and extends its strategy and objectives" (de Haes & van Grembergen, 2004, p. 1). IT governance assists in achieving the overarching strategic goals of companies by means of IT (Weill & Ross, 2004).

IT governance are an important component for coordinating IT functions (Peterson et al., 2000). Prior IT governance research conceptualized structural, procedural, and relational IT governance mechanisms (de Haes & van Grembergen, 2004; Peterson et al., 2002) and demonstrated how these contribute to firm performance (Wu et al., 2015). We use the typology of structural, procedural, and relational mechanisms as a lens to investigate how companies implement IT governance within bimodal IT organizations (Vejseli et al., 2022). Since prior research on IT governance mechanisms has focused on the business-IT interface and somewhat ignored IT-internal interfaces, such as the coordination between mode 1 and mode 2 IT, we expect to find potentially different governance mechanisms from those identified by prior IT governance literature (de Haes & van Grembergen, 2004; Wu et al., 2015; Vejseli et al., 2022).
Structural mechanisms refer to the formal organizational structure of the IT function as reflected in the configuration of supervision, roles, staff-skill professionalization, and committees (Peterson et al., 2002). They are formal and facilitate communication, prioritization, and decision-making between business and IT and within IT, for example, through meetings and committees, roles and responsibilities, and reporting lines (de Haes & van Grembergen, 2004).

Procedural mechanisms are measures to institutionalize IT decision-making and monitoring procedures, such as strategic information systems planning, IT balanced scorecards, service level agreements, or maturity models (de Haes & van Grembergen, 2004). Thus, procedural mechanisms seek to integrate strategic and operational functions for clear IT decision-making and IT monitoring processes (Peterson et al., 2002).

Relational mechanisms are less formal, describing the participation, partnerships, and collaboration between executives, business management, and IT management. Relational mechanisms include, for example, co-location, cross-functional training, job rotation, shared understanding, or stakeholder involvement (de Haes & van Grembergen, 2004). While rather implicit, relational mechanisms are of "primordial importance" (van Grembergen & de Haes, 2005, p. 5) because structural and procedural mechanisms depend on a joint commitment and understanding of the stakeholders involved.

Bimodal IT organizations require specific governance mechanisms to manage the aforementioned challenges (Haffke et al., 2017a). These are contingent upon various potentially conflicting internal and external factors, making the right combination of mechanisms a complex endeavor (de Hase & van Grembergen, 2004). Prior research provided initial insights on the allocation of decision rights in bimodal IT organizations through structural configurations (Haffke et al., 2017a; Horlach et al., 2017; Jöhnk et al., 2017). However, research still lacks specific insights into governance mechanisms adopted by bimodal IT organizations to address the paradoxical challenges.
3 Method

We used qualitative-empirical research to investigate challenges and governance mechanisms in bimodal IT organizations. Qualitative-empirical research develops a deeper understanding and generates new insights, especially in areas low on theoretical insights. We conducted an interview study across three cases of bimodal IT organizations following an analytical-inductive approach (Döring & Bortz, 2016; Pekkola et al., 2019) and built a tentative theory of IT governance mechanisms in bimodal IT organizations. Thus, we combine the novel insights from different manifestations of bimodal IT organizations with suitable theoretical concepts, i.e., IT ambidexterity and IT governance. Consequently, we seek to extend the current understanding of ambidexterity in bimodal IT organizations (Grover & Lyytinen, 2015).

We analyzed interviews conducted with IT professionals from three cases of bimodal IT organizations: a) a law enforcement agency (GovIT, 6 interviews), b) a multi-national automotive company (AutoIT, 8 interviews), and c) a manufacturing company specializing in medical aids (ManIT, 12 interviews). In total, we conducted 26 semi-structured interviews. We recorded the interview with the interviewee’s consent and transcribed them to allow for rigorous data analysis or took written notes for two interviews where consent was not given. The interviews conducted in the three cases of bimodal IT organizations across the public and private sectors represent distinct organizational contexts, providing the opportunity for rich insights.

The semi-structured interview guide contained a brief introduction to the research project and research team, followed by the interviewees’ introduction, which comprised their position and background. Subsequently, we asked the interviewees to share their general understanding of structural ambidextrous organizations and their specific organizational context. Furthermore, we asked the interviewees to describe the coordination and collaboration within their bimodal IT organization and the challenges and corresponding governance mechanisms in bimodal IT organizations.

The transcripts of the 1,570 interview minutes were analyzed in subsequent coding cycles using grounded theory analysis techniques. Initially, each coding cycle used two rounds of open coding, followed by a round of axial coding. In line with Glaser and Strauss.
(2017), we conducted an initial open coding round in which two independent coders analyzed a sub-set of interviews individually to harmonize the initial code set and align the coding procedure afterward. We performed a second open coding round with the remaining interviews using this consolidated code set. After this round, we merged similar code categories, subcategories, and codes again, resulting in 1,015 codified statements in 22 categories and 359 subcategories after the second cycle. For instance, we coded the statement "[...] because I have a good network" as a success factor for collaboration business/IT in the subcategory increase collaboration business/IT, and in the category collaboration business/IT. We discussed theoretical insights into challenges and governance mechanisms during the open coding procedures in the spirit of theoretical sensitivity.

In the third round of both cycles, we performed axial coding to identify relationships among open codes for theory development (Corbin & Strauss, 2015). For instance, we coded the statement mentioned before as an indicator for a relational coping governance mechanism to "facilitate informal communication and strategic dialogue (e.g., as an essential part of project prioritization)". This step led us to reassemble our codified statements to more abstract core concepts from which we derived challenges and governance mechanisms of bimodal IT organizations. Based on our data analysis, we steadily and iteratively mapped the impeding and coping governance mechanisms. In the following step, the selective coding phase, paradoxes were identified and validated as our central phenomenon. In collaborative discussions, we identified interdependencies between governance mechanisms that we grouped into five governance paradoxes of bimodal IT organizations. These are presented in the Findings section and discussed in the Discussion section. Thereby, we exposed contradictions in our data, vividly describing the tensions between mode 1 and mode 2. During the final phase of our data analysis, we coded 121 statements in total with the following distribution across the five paradoxes: Strategic Vision (25), Alignment (47), Organization (9), Distinction (16), and Collaboration (24).
4 Findings

4.1 Challenges of Bimodal IT Organizations

We synthesized and explicated the challenges of structural ambidextrous (bimodal) IT organizations identified in the interviews from the specific situations of our studied bimodal IT organizations. We classify our observations in three different states of the longitudinal process of bimodal IT organizations: formation, coordination, and reintegration. **Formation challenges** express an organization’s initial struggles to implement a structural separation. **Coordination challenges** subsume the continuous hurdles during the operation of a bimodality. **Reintegration challenges** comprise the barriers an organization faces when (partly) merging the two modes, thus relieving the structural separation of exploitation and exploration again.

We deliberately chose the term *state* because our observations represent our case organizations’ situation at a specific time. However, although separate in time, we acknowledge that the three states are not independent but highly interconnected. For instance, the formation challenges and how an organization deals with them may influence the coordination challenges once the structural ambidextrous organization is set up. In Table 2-1, we provide examples for each of the three states that allow a better understanding of the challenges of structurally ambidextrous IT organizations.
<table>
<thead>
<tr>
<th>Stage</th>
<th>Associated challenges</th>
</tr>
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| **Formation**          | • Engaging in a comprehensive organizational transformation  
                         • Choosing the right initial design for the bimodal IT organization  
                         • Fostering the necessary mindset toward openness to change |
| **Coordination**       | • Ensuring sufficient integration across both modes  
                         • Overcoming technical barriers in IT infrastructure and operations  
                         • Day-to-day collaboration conflicts of structural ambidextrous organizations |
| **Reintegration**      | • Realigning mindsets, cultures, and working styles of both modes  
                         • Harmonizing structures and processes within IT and towards business  
                         • Fostering a process and product orientation over functional silos |

Table 2-1. Examples of Bimodal Challenges in the Formation, Coordination, and Reintegration State
In the formation state, organizations face the challenge of engaging in a comprehensive organizational transformation. This means that implementing a bimodal IT organization requires more than just incorporating an agile working team into a broader organizational context. It depends upon a shift in organizational levels, including structure, processes, and culture. On a structural level, organizations must implement new and adjusted reporting mechanisms to deal with bimodal IT functions and evaluate them. ("(...) they have to be the right targets, and I do not think we have them consistently today" AutoIT 4). Bimodal IT functions must also rethink and change existing traditional and agile IT processes. Otherwise, they run the risk that traditional and agile IT may hinder each other in their different work environment setup. That can lead to the point where both modes rather avoid working together. ("We tried it at the beginning, where we said we would take them along, but quickly realized that there were two speeds (...)" ManIT4).

Further, it is challenging for companies to choose the right initial design for a bimodal IT organization that is most suitable to achieve their set targets. There are many different options, as illustrated by the different archetypes of bimodal IT organizations.

Gaining the necessary mindset towards openness to change can also be challenging in the formation state. Implementing a structural ambidextrous IT organization has implications for both business and IT functions. We found that business functions often regard IT as service centers where the business buys a service. ("Usually business brings the money, and then following an agile way of working is not always easy, because there is the expectation, 'here, I give you half a million, I want to know what I get for it and when" AutoIT 4). In addition, organizations must realize that agile IT is associated with some uncertainty, which differs greatly from traditional IT. ("The approach that I have in this context is entirely different from that in traditional IT with waterfall because I have to deal with uncertainty, structurally, systematically, and processual " AutoIT 2).

In the coordination state, organizations must cope with a structural separation of the IT organization by ensuring sufficient integration across both modes. ("In the end, my feeling was that you somehow need this ambidexterity, but you can’t let them work completely independently of each other [...] you always need links, i.e., people who are involved in both departments, who understand both worlds [...]" ManIT5).
Further, technical barriers in IT infrastructure and operations are challenging in the coordination state. Many technical barriers between the different IT teams surface due to the frequent dependencies between agile and traditional IT work. In addition, the operations between the two modes differ, which leads to conflicts. ("And then there are such central functions for authentication and authorization, which are sometimes very strict, and their process has to be adhered to" AutoIT 8).

**Day-to-day conflicts of bimodal IT organizations** also constitute an ongoing coordination challenge. For instance, traditional IT must fight the sentiment that they are old-fashioned, slow, and unwilling to change. ("I would classify the colleagues from core IT, i.e., software and infrastructure, as absolute antagonists and blockers" ManIT5). In particular, collaboration problems may arise if the modes are divisionally separated. ("We need to reduce the barriers in such a way that these silos are broken down and people work together [...]" ManIT10).

Finally, in the reintegration state, bimodal IT organizations face the challenge of realigning both modes’ mindsets, cultures, and working styles. In organizations, these realignment challenges originate from perceived differences in approaching tasks. "Because some like to make things fancy, easy, lean, but everyday life in the company is not like that; there's just a lot to fulfill and a lot to consider and a lot of requirements on the legal side, or from the organization, which just has to fulfill that and that has always been difficult" MediIT5).

Further, the reintegration of bimodal IT organizations poses challenges regarding harmonizing structures and processes within IT and toward business, partly fostered by different and altered role classifications and expectations. ("(...) we are changing a lot of roles, i.e., the classic hierarchy, they are suddenly relieved of their decision-making authority [...]" AutoIT 3).

**Fostering a process and product orientation over functional silos** is also a challenge that bimodal IT organizations face in the reintegration state. ("[...] so you automatically get into a situation where you’re not just a supporting unit, but you’re part of the business model, and that’s a big challenge. And as promising and interesting as that is, it's still a big challenge to drive these two tracks [i.e., modes] together" ManIT9).
The challenges in the transformation, coordination, and reintegration state of bimodal IT organizations imply tensions between the two fundamentally different yet co-existing modes in bimodal organizations. Through the interviews, we found that the three bimodal IT organizations take deliberate and arbitrary actions to address their challenges. Thus, we elucidate governance mechanisms and their positive and negative implications to further explore actions during their bimodal IT organizations' formation, coordination, and reintegration.

4.2 Governance Mechanisms in Bimodal IT Organizations

We identified 38 structural, procedural, and relational governance mechanisms across the formation, coordination, and reintegration states of the three bimodal IT organizations. As illustrated in Figure 2-1, each mechanism helped overcome one or more challenges, but it also had (potential) negative implications by creating new or reinforcing existing challenges.

![Figure 2-1. Interdependencies of Challenges and Governance Mechanisms](image)

The following sections describe the governance mechanisms and their positive and negative implications. We structure the analysis according to the three previously identified states: formation, coordination, and reintegration. For brevity and clarity, we provide quotes for selected governance mechanisms while summarizing all observed governance mechanisms in tables.
4.3 Formation Governance Mechanisms

We identified 13 different governance mechanisms concerning challenges in the formation state, which we present in Table 2. During the formation of bimodal IT organizations, companies would establish structural governance mechanisms such as separate legal entities and development environments to divide agile and traditional IT. This helps, for example, encapsulate risks and allow for exploration without implications for traditional IT. ("And because it’s a separate entity, we can also implement a few things within a less strict and less rigid framework, which otherwise wouldn’t work in the group" AutoIT3). However, such measures can create new organizational complexities and separation between departments and functions.

Organizations implementing bimodal IT also implement procedural governance mechanisms such as separate performance and product evaluation criteria that take the evolutionary nature of agile processes and products into account. ("The traditional IT always optimizes, is it technically stable, uptime, are all features there. That is the traditional IT thinking [...] perfectly correct and legitimate. But when we think about digital, we must never set that as a primary goal [...]" AutoIT 2). However, such tailored goals and measures for agile IT may invoke critique of the preferential treatment of agile over traditional IT.

Bimodal IT organizations can facilitate the business-IT alignment and support integration and communication between the two modes through the relational governance mechanism, communicating that the IT organization, both agile and traditional modes, works in integrated efforts towards business solutions. We try not only to focus on such [agile] lighthouse projects but also to give recognition to those people who somehow do their job and are not so visible. So, for example, we had a town hall meeting where these projects were all named equally and not. If someone does a traditional project and is successful with it, then he gets the same praise as if someone does an agile project and is successful" AutoIT 6). However, this collaboration across modes may result in fuzzy responsibilities within IT and contact persons to business.
### Essay 2: Paradoxical Governance Mechanisms for Achieving Structural Ambidexterity in Bimodal IT Organizations

<table>
<thead>
<tr>
<th>Governance mechanisms</th>
<th>Positive implications</th>
<th>Negative implications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Structural</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structural divide (e.g., separate legal entities) or technical separation (e.g., different development environments) of agile IT</td>
<td>Externalizes risks of agile IT Makes room for exploration in agile IT (green field approach)</td>
<td>Increases organizational complexity Implies need to integrate both modes</td>
</tr>
<tr>
<td>Align agile IT with overarching strategy (e.g., break initiative down to projects)</td>
<td>Fit of traditional and agile IT activities in accordance with IT strategy</td>
<td>Diluted and distributed strategic vision (e.g., a variety of strategy documents)</td>
</tr>
<tr>
<td>Form new IT committees (e.g., for prioritization decisions)</td>
<td>Close strategic alignment gaps</td>
<td>Presence of multiple overlapping committees</td>
</tr>
<tr>
<td>Limit the scope of agile IT (e.g., no new or backend functions)</td>
<td>Focus on core tasks and allow for effective exploration in agile IT</td>
<td>Dependency of agile IT on traditional IT requires/induces additional procedures</td>
</tr>
<tr>
<td>Multiple CIO responsibilities / non-delegation of IT operations responsibility</td>
<td>Firefighting current problems in running the IT function</td>
<td>Overboarding CIO responsibility for spanning operations and digital transformation</td>
</tr>
<tr>
<td>Establish new roles to foster agile IT (e.g., in dedicated governance meetings)</td>
<td>Chance to reflect on existing roles and responsibilities to identify gaps and problems</td>
<td>Non-conscious assignment of roles (e.g., only based on free capacity, experience, or personal influence)</td>
</tr>
<tr>
<td><strong>Procedural</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incorporate traditional and agile IT into a common master plan</td>
<td>Allows for a clear division of tasks and responsibilities toward a joint vision Aligns traditional and agile IT activities</td>
<td>Hampers the autonomy and flexibility of agile IT</td>
</tr>
<tr>
<td>Define tailored goals and measures for agile IT that consider agile IT output as evolutionary (i.e., converging towards a moving target)</td>
<td>Considers the specific focus of each mode Loosens rigid organizational requirements (e.g., in terms of reporting and immediate business impact) in favor of experimentation</td>
<td>Envy of traditional IT causes cultural tensions Challenges to compare and prioritize trad and agile IT (e.g., regarding resource allocations)</td>
</tr>
<tr>
<td>Traditional IT provides common IT service processes for agile IT and business</td>
<td>Enables efficient IT service provisioning Focuses on core tasks and allows for effective exploration in agile IT</td>
<td>Lagging existing processes (e.g., IT infrastructure provisioning) / current problems in traditional IT services hamper agile IT Perception of trad IT reflects on agile IT Constant prioritization issues between exploitation and exploration</td>
</tr>
</tbody>
</table>
## Essay 2: Paradoxical Governance Mechanisms for Achieving Structural Ambidexterity in Bimodal IT Organizations

### Table 2-2. Formation Governance Mechanisms

<table>
<thead>
<tr>
<th>Relational</th>
<th>Communication of strategic vision and responsibilities</th>
<th>Activities cultural multipliers</th>
<th>Delivering on specific goals instead of incorporating a joint understanding of agile IT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Activates cultural multipliers</td>
<td>Increases transparency of the organizational transformation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Facilitates business-IT alignment by providing joint solutions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alleviates integration and communication between trad and agile IT activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CIO involvement speeds up IT infrastructure processes for agile IT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Facilitates change in discussions with management</td>
<td></td>
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<tr>
<td></td>
<td>Discrepancy and hidden agendas within the management team thwart agile IT</td>
<td></td>
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<tr>
<td></td>
<td>Different perceptions of CIO responsibilities blur the mission of agile IT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ensures support of trad and agile IT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Provides opportunities to shape the organizational change together</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Denying /playing down trad IT’s value in agile IT’s vision</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.4 Coordination Governance Mechanisms

Our analysis resulted in 17 governance mechanisms related to the coordination of an established bimodal IT organization, which we present in Table 2-3. Bimodal IT organizations can, for example, ensure that agile IT has sufficient resources for experimentation and evolution through a structural governance mechanism that separates resource allocation into two modes. ("The lack of traditional IT resources for agile IT was more severe in the past; it got better; we now have our IT infrastructure department manager, who works specifically for us" AutoIT 8). Such measures may, however, hamper the flexibility of agile IT through the early allocation of fixed resources.

Bimodal IT organizations can meet external or internal demands for regulatory compliance through the procedural governance mechanism of imposing strict internal procedures for communication, documentation, and deadlines. ("Of course, whenever we get any new regulatory requirements, there is no question that we have to do this and that we have to do it in such a way that we meet the deadline" ManIT2). However, such strict internal procedures, irrespective of their underlying internal or external intentions, can restrict the flexibility of both modes and limit coordination and collaboration between them.

Co-location of agile and traditional IT can facilitate ad-hoc communication within the two modes, as well as between IT and business, and thus help overcome relational challenges. ("Once [the co-location] is done, then it’s a matter of exchanging more information with each other, of actively approaching each other. Because we simply realize after six months that it is quite nice to have a colleague from another department sitting next to me and I can exchange ideas ad hoc" ManIT10). However, some employees struggling to adapt to new or changed situations may, however, refuse co-location and resist the change process or consider evasion strategies, such as working from home. In our cases, resistance to co-location was a strong indicator of the cultural tensions between agile and traditional IT.
## Essay 2: Paradoxical Governance Mechanisms for Achieving Structural Ambidexterity in Bimodal IT Organizations

<table>
<thead>
<tr>
<th>Governance mechanisms</th>
<th>Positive implications</th>
<th>Negative implications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Structural</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Establish dedicated units or meetings to coordinate and integrate traditional and agile IT (e.g., change team)</td>
<td>Ensures collaboration between traditional and agile IT</td>
<td>Formalizes collaboration to the detriment of a joint understanding and continuous collaboration</td>
</tr>
<tr>
<td>Allocate dedicated resources to agile IT and reserve fixed trad IT resources in advance (e.g., work agreements)</td>
<td>Provides necessary resources to allow for experimentation in agile IT</td>
<td>Hampers the flexibility of agile IT and requires upfront planning; Creates conflicts with existing traditional IT priorities in case of rescheduling</td>
</tr>
<tr>
<td>Institutionalize creative spaces in agile IT (e.g., Google Friday) Institutionalize knowledge sharing across both modes</td>
<td>Transfers insights from agile IT to trad IT and business (e.g., spreading new technology insights) Facilitates exploitation of explorative agile IT output</td>
<td>Leads to inappropriate comparisons of disparate traditional and agile IT output; Creates or fosters envy of trad IT regarding agile IT</td>
</tr>
<tr>
<td>Multiple concurrent digital transformation initiatives</td>
<td>Accelerate exploration activities in agile IT Create a conducive environment for experimentation</td>
<td>Insufficient integration leads to complexity and redundancy</td>
</tr>
<tr>
<td>Actively addressing tensions between traditional and agile IT in major committees</td>
<td>Resolves tensions prior to open conflicts</td>
<td>Contradictory decisions from different committees (e.g., varying decision focus)</td>
</tr>
<tr>
<td>Integrating agile IT increments in overarching organizational planning processes</td>
<td>Acknowledges dependencies between trad and agile IT Increases transparency of agile IT output</td>
<td>Creates distractions due to incessant reprioritization and subsequent reallocation</td>
</tr>
<tr>
<td>Synchronize agile IT release planning with traditional IT capacities</td>
<td>Increases predictability of required resources for traditional IT and transparency of agile IT output</td>
<td>Slows down agile IT in case of resource scarcity in traditional IT; Causes constant reprioritization owing to flexibility in agile IT release planning</td>
</tr>
<tr>
<td><strong>Procedural</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal restrictions and strict procedures (e.g., communication regulations, fixed release cycles, and lengthy approvals)</td>
<td>Formalizes procedures to ensure compliance, traceability, and consistency</td>
<td>Restricts flexibility and coordination of both modes (e.g., limited collaboration between traditional and agile IT)</td>
</tr>
<tr>
<td>Separate prioritization of each mode</td>
<td>Allows for the particularities of each mode and different prioritization approaches (e.g., different committees, time periods, and decision-making freedom)</td>
<td>Causes absence of a joint portfolio and aligned decisions for traditional and agile IT</td>
</tr>
</tbody>
</table>
## Essay 2: Paradoxical Governance Mechanisms for Achieving Structural Ambidexterity in Bimodal IT Organizations

<table>
<thead>
<tr>
<th>Define clear IT architecture specifications</th>
<th>Fosters independence and integration of agile IT and increases acceptance of agile IT output in traditional IT</th>
<th>Limits exploration activities in agile IT to comply with the given guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combine participatory decision-making (e.g., bottom-up advice for management) and autonomy (e.g., independent decisions based on strategic direction)</td>
<td>Allows for flexibility (e.g., for urgent business or agile IT requests) Strengthens contextual ambidexterity in traditional IT</td>
<td>Fosters favoritism within traditional IT to selected persons in a business or agile IT, which undermines proper collaboration</td>
</tr>
<tr>
<td>Co-location of business, traditional, and agile IT</td>
<td>Facilitates ad-hoc communication within and across both modes as well as with the business</td>
<td>Leads to employee evasion strategies (e.g., home office) and diffusion of tasks</td>
</tr>
<tr>
<td>Build collaboration upon informal communication and strategic dialogue (e.g., as an essential part of project prioritization) vs. limiting interaction between trad and agile IT to documentation rather than collaboration</td>
<td>Fosters joint understanding and trust for mutual service provisioning (e.g., equal appreciation for both modes)</td>
<td>Hampers service provisioning in case of one-way collaboration / one-sided dependency (agile needs traditional IT, but traditional IT sees no need for / value in collaboration)</td>
</tr>
<tr>
<td>Respect scope boundaries and incremental approach of agile IT</td>
<td>Acknowledges priorities and resources of agile IT for experimentation</td>
<td>Hampers the comparison of and consistent dealing with traditional and agile IT (e.g., inconsistent handling of project deviations)</td>
</tr>
<tr>
<td>Continuously request adherence to strategic prioritization in daily business</td>
<td>Enforces realization of strategic plans and prevents potential flaws in the collaboration of modes</td>
<td>Causes cultural tensions on the operational level</td>
</tr>
<tr>
<td>Incorporate a constant evaluation of the overall transformation progress and organizational learning</td>
<td>Provides an overview of the organizational transformation and relevant fields of action Fosters the relevance/importance of transformation and learning in the collective organizational perception</td>
<td>Builds upon inconclusive measurement units (e.g., reduces cultural change to KPIs)</td>
</tr>
<tr>
<td>Introducing communication tools (e.g., Jira, MS Teams) and incentivizing their use</td>
<td>Facilitate ad-hoc communication within and across both modes as well as with the business</td>
<td>Aggravate documentation, transparency, and accessibility of information</td>
</tr>
</tbody>
</table>

**Table 2-3. Coordination Governance Mechanisms**
4.5 Reintegration Governance Mechanisms

We identified eight governance mechanisms for reintegration, which we present in Table 2-4. An organization can, for example, establish a centralized unit for coordination between business and IT. This structural governance mechanism can strengthen business-IT alignment through shared liaison roles. ("[...] and above all, you always need links, i.e., people who are involved in both departments, who understand both worlds, and that is somehow, I would say, the organizational anchoring [...]." ManIT5). However, shared coordination will not necessarily resolve tensions (cultural or other) in the collaboration between agile and traditional IT.

Organizations seeking to reintegrate agile and traditional IT will aim to uphold and possibly even extend the flexibility and customer-centric approach of agile IT to the whole organization. This requires the procedural governance mechanism of assigning more decision-making authority to individuals in the IT organization. ("And culturally, it is certainly the case in a more agile environment that people take on significantly more responsibility" AutoIT3). There is a price to pay for customer-centricity and flexibility, however. ("We should not only think about projects leaving no room for helping the users in everyday life. So, if they need a smaller customization of the existing system or need to be advised about something, there must be time for it." GovIT 1). Such ad hoc activities force employees in the IT organization to prioritize their efforts following corporate prioritization while ensuring transparency for steering IT activities with an overview of progress and costs.
**Essay 2: Paradoxical Governance Mechanisms for Achieving Structural Ambidexterity in Bimodal IT Organizations**

<table>
<thead>
<tr>
<th>Governance mechanisms</th>
<th>Positive implications</th>
<th>Negative implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision-making freedom of CIO within the management board and within IT to share reintegration</td>
<td>Reintegration can incorporate the experiences and advantages gained from the structural separation</td>
<td>Insufficient business commitment and lack of harmonization across other digitalization initiatives hampers reintegration</td>
</tr>
<tr>
<td>Establishing a bundled / centralized business-IT coordination unit</td>
<td>Maintains increased/improved level of collaboration with the business</td>
<td>Interfaces and cultural tensions in IT/IT collaboration remain</td>
</tr>
<tr>
<td>Diluted decision-making for digitalization across several units/departments/individuals</td>
<td>Accelerates the organization’s overarching digital transformation Foster's decision-making authority and responsibility across all levels</td>
<td>The organization lacks a joint vision of reintegrated IT activities</td>
</tr>
<tr>
<td>Combining structured prioritization processes and IT service delivery with contextual decision autonomy of individuals</td>
<td>Empower employees in the IT function to take responsibility and act customer-/business-centric Maintain and extend the flexibility of agile IT for the reintegrated IT function</td>
<td>Deficiencies in prioritization on corporate and individual levels are aggravated Loss of transparency for steering IT activities</td>
</tr>
<tr>
<td>Enhanced business-IT alignment through strong bonds between business and agile IT</td>
<td>Positive agile IT reputation improves future collaboration of reintegrated IT functions with business</td>
<td>Challenging the efficient IT service provisioning of traditional IT (e.g., requiring changes to the existing service portfolio and higher outsourcing degree)</td>
</tr>
<tr>
<td>Emphasizing reintegrated IT function’s focus on newly acquired agile IT competencies</td>
<td>Retains and fosters knowledge and resources for exploration activities to further drive digital transformation</td>
<td>Dilutes internal IT knowledge and capabilities</td>
</tr>
<tr>
<td>Fostering a high degree of collaboration during coordination state</td>
<td>Familiarity between trad and agile IT Engaging employees of both modes for the desired transformation/reintegration</td>
<td>Relapse into old patterns for business-IT collaboration</td>
</tr>
<tr>
<td>Strong cultural divide / different perceptions within IT of IT/IT collaboration</td>
<td>Reunifying the IT function with a stronger focus on joint service provisioning and process orientation</td>
<td>Remaining tensions and cultural separation after reintegration</td>
</tr>
</tbody>
</table>

Table 2-4. Reintegration Governance Mechanisms
4.6 Paradoxes

In the following, we elucidate the intricate interdependencies among governance mechanisms observed in the three cases of bimodal IT organizations, delineating five distinct governance paradoxes that underscore the tensions between mode 1 and mode 2 dynamics. The interdependencies of challenges, governance mechanisms, and paradoxes

Paradox 1 – Vision: Flexibility vs. Predictability

The first paradox in bimodal IT revolves around the tension between flexibility and predictability in mode 1 and mode 2. Mode 2 in bimodal IT aims to foster explorative capabilities and adapt quickly to changing requirements from external contexts and internal decisions (Haffke et al., 2017). Exploration requires flexibility and the ability to respond rapidly. On the other hand, mode 1 primarily provides reliable support to business functions, emphasizing stability and predictability (Haffke et al., 2017). As a result, mode 1 and mode 2 differ significantly in their governance mechanisms, including meeting formats, work organization methods, success criteria, and mindset, particularly regarding error tolerance. These differences can give rise to tensions that manifest this vision paradox.

In the case of ManIT, for example, there was an acknowledgment of the importance of predictability in mode 1, particularly for providing a reliable and secure network infrastructure. However, when forming mode 2 through bimodal IT, it became evident that increased flexibility also introduced a different speed in delivering IT services and products. Tensions arose when mode 2 approached mode 1 with their requirements, such as providing IT infrastructure like new databases. Mode 1 struggled to provide the necessary flexibility in prioritizing tasks, leading to frustrations for mode 2, which found the requirements with dependencies on mode 1 to be slow and burdensome. This tension escalated to the point where mode 2 sought to avoid dependencies and interfaces with mode 1, considering external service providers to gain more flexibility.
Paradox 2 – Alignment: Business/IT vs. IT/IT

The alignment paradox in bimodal IT refers to the challenge of aligning both the business and IT, as well as aligning mode 1 and mode 2 within the IT organization. Traditionally, IT organizations primarily focused on aligning IT with the business (Luftman, 2003). However, bimodal IT introduces a new dimension to the alignment puzzle, necessitating alignment between mode 1 and mode 2 (Kusanke & Winkler, 2022). Achieving alignment in both dimensions simultaneously is challenging because they have different requirements and means to achieve alignment. Consequently, organizations often face tensions and trade-offs when prioritizing one alignment perspective over the other.

In the case of GovIT, for example, the organization faced challenges in achieving business/IT alignment and managing tensions between regulatory boards, policymakers, and the IT organization. Mode 2 aimed to improve this alignment by adopting a common language with the business and planning for co-location in the future. However, the alignment between mode 1 and mode 2, or IT/IT alignment, remained problematic. Cultural barriers were evident in joint meetings, and difficulties arose when transitioning responsibilities from development (mode 2) to operation (mode 1), highlighting the tensions in IT/IT alignment.

Paradox 3 – Organization: Simplicity vs. Complexity

The third paradox relates to the level of organizational intricacy resulting from bimodal IT. One characteristic of mode 2 in bimodal IT is its pursuit of simplicity to enhance speed and enable faster releases and rollouts of products or services to customers. This is partly achieved through leaner processes, nimble teams, and a different mindset. Additionally, mode 2 often intentionally limits its scope and disregards the complexity that mode 1 must adhere to, such as regulatory requirements (Haffke et al., 2017). However, despite striving for simplicity, the implementation of structural ambidexterity through bimodal IT introduces some level of organizational complexity.

In the case of AutoIT, the interviews revealed that mode 2 added to the already high level of organizational complexity in such a large organization. The introduction of new organizational entities resulted in different roles that required individuals to have different skill sets and cultural mindsets. This required adjustments across all organizational
functions, such as HR, to accommodate the new ways of organizing for mode 2, adding complexity. In addition, the adoption of new formats, such as review formats instead of traditional steering committees, required stakeholders to learn new ways of interacting with IT and articulating their requirements. This coexistence of different modes and interaction styles created sources of new or increased complexity, resulting in tensions that manifest this paradox.

*Paradox 4 – Distinction: Comparability vs. Differentiation*

The fourth paradox in the governance of bimodal IT organizations relates to the degree of distinction between mode 1 and mode 2. It involves the question of whether the two modes are comparable in terms of processes (such as working methods) and outcomes (such as results and implemented features/products/services). On the one hand, comparability between the modes facilitates regulatory compliance, knowledge transfer, exchange of best practices, long-term integration of mode 2 results within the organization, and cultural cohesion. On the other hand, differentiation helps to emphasize the unique role of mode 2 in driving innovation. This includes lower regulatory and compliance requirements, a distinct culture to attract diverse talent, and the promotion of different ways of working and outcomes.

In the case of AutoIT, respondents explained that software development in the automotive industry is very different from manufacturing cars. In addition, developing software for a car is different from developing workplace IT. The different outcomes and understandings of these differences between mode 1 and mode 2 created tension. For example, the use of very different key performance indicators (KPIs) sometimes led to feelings of envy or perceived differences in criticality or rigor. The conflicting and, at times, ambiguous expectations for mode 2 results further exacerbated these tensions. In addition, AutoIT had a hierarchical structure, and the partial changes introduced by mode 2 in their area of responsibility created tensions related to cultural perceptions and decision-making authority.
Paradox 5 – Collaboration: Integration vs. Autonomy

The fifth paradox in the governance of bimodal IT organizations revolves around the degree of collaboration between mode 1 and mode 2. Integration in this context refers to close cooperation and alignment between the two modes, while autonomy represents mode 2 IT's ambition to act independently, including aspects such as IT infrastructure provisioning and more implicit mechanisms such as knowledge sharing and information gathering.

In the case of GovIT, there was a general alignment of goals and ambitions between mode 1 and mode 2. However, their working methods differed significantly, deliberately allowing mode 2 to explore innovative approaches. This divergence in working methods meant the autonomy of mode 2 to choose its own approaches. However, it also resulted in differences in development environments, cadences, and other factors. Consequently, when collaboration was needed or desired, aligning the different modes of operation became a challenge, highlighting the tensions inherent in this paradox of collaboration and autonomy.

5 Discussion

Our analysis was motivated by the need for a deeper understanding of the inner workings and potential tensions within bimodal IT organizations. Figure 2-2 summarizes the challenges, the governance mechanisms, and their interdependencies that we identified in our data analysis and have previously explained.
The data also show that no governance mechanism is an obstacle or a solution in itself. However, all have a raison d'être rooted in past, present, or future incidents or events. Moreover, the governance mechanisms used to address challenges may reinforce new ones. Rather than rehearse the findings of impeding and coping governance mechanisms, we organize our discussion around five paradoxes of bimodal IT organizations that emerge from our analysis.

All interviews show that their organizations, GovIT, AutoIT, and ManIT, were exposed to the overarching strategic paradox of exploitation vs. exploration, which is why they established a bimodal IT organization. We have synthesized the findings into five paradoxes of bimodal IT organizations, which are the synthesis of seemingly contradictory governance mechanisms in our cases. For instance, the impeding governance mechanism "increased organizational complexity (e.g., additional coordination units)" and the coping governance mechanism "use dedicated units or meetings to ensure collaboration of traditional and agile IT (e.g., change team)" express such a seeming contradiction. During our iterative analysis, we constantly considered the underlying statements of our interviewees to ensure the verisimilitude of our interpretation.
Essay 2: Paradoxical Governance Mechanisms for Achieving Structural Ambidexterity in Bimodal IT Organizations

Paradox 1, the tensions of strategic vision between flexibility vs. predictability, expresses the conflicting expectations associated with agile IT. IT project agility values flexibility and changes and therefore challenges the demand for predictability and control found in many organizations due to, e.g., rigid budget and portfolio planning (Gerster et al., 2018), heavy documentation and testing requirements from customers or regulatory bodies (Heeager & Nielsen, 2018), or organizational cultures that value predictability and stability (Iivari & Iivari, 2011). In our cases, boundary conditions, expectations of management and business, or internal processes imposed a need for predictability and planning on agile IT. This contrasts with the flexibility agile approaches require and provide for companies. Navigating this paradox requires finding ways to leverage the benefits of flexibility while addressing the need for predictability and stability. Effective communication, coordination, and mutual understanding between the two modes are essential to manage tensions and balance these conflicting demands harmoniously.

Paradox 2 encompasses the tensions of business/IT vs. IT/IT alignment. While unimodal IT organizations have traditionally focused on alignment between business and IT functions (e.g., Luftman, 2003), bimodal IT organizations face another organizational interface that requires continuous alignment efforts, namely the interface between mode 1 and mode 2 IT. For example, ManIT implemented new liaison roles in both divisions of their separate bimodal IT organization; AutoIT emphasized relational mechanisms such as communication approaches involving agile and traditional IT to create a sense of shared purpose and belonging. In addition to their internal interfaces, bimodal IT organizations must manage the business/IT interface at two contact points.

Previous IT governance research has shown that governance mechanisms contribute to firm performance by always ensuring business and IT alignment (Wu et al., 2015). Our research adds to this literature by demonstrating how governance mechanisms employed within bimodal IT organizations contribute to IT/business alignment. While these two distinct foci of the alignment challenge compete for managerial attention and resources, efforts must be made to reconcile the paradoxical tension between these two distinct foci of organizational alignment. While efforts can be made to prioritize one alignment perspective, such as improving business/IT alignment, it often comes at the expense of neglecting the alignment between mode 1 and mode 2. Balancing these alignment
perspectives requires a comprehensive approach that addresses the unique requirements and challenges of each, fostering collaboration and communication between the different modes of IT and the broader business context.

Paradox 3 describes tensions between **simplicity vs. complexity** in organizational design. Although agile IT aims to achieve simplicity in processes and solutions (Rico et al., 2009), bimodal IT organizations may also increase complexity due to additional coordination units, dual reporting, and decision-making structures (Jöhnk et al., 2019). Striking the right balance requires careful consideration of contextual factors, effective coordination mechanisms, and ongoing adjustments to optimize the benefits of simplicity while mitigating the challenges of increased complexity. This observation is consistent with seminal work in the organizational theory literature that elaborates on coordination mechanisms, also called horizontal mechanisms (Brown, 1999). These complement the mechanisms of firms through additional and dedicated reporting lines to facilitate communication and decision-making in cross-unit collaboration (Mintzberg, 1979; Galbraith, 1994).

Paradox 4 constitutes the distinction between traditional and agile IT, resulting from tensions between **comparability vs. differentiation**. These tensions arise from organizational characteristics related to performance measurement, decision-making, reporting lines, and project visibility. On the one hand, our interviews show patterns that make traditional and agile IT comparable, for example, by using similar performance measures. On the other hand, the underlying goal of agile IT is to be truly different to succeed. Finding the right level of differentiation while ensuring sufficient comparability is critical to effective governance. It requires careful consideration of contextual factors, strategic alignment, and clear communication to overcome potential tensions. These findings are supported by recent studies within IS that examine the necessary adaptations of organizational structures during the implementation of agile methods, as well as the challenges that arise from the coordination of traditional and agile units (Fuchs & Hess, 2018; Fuchs, 2019).

Finally, paradox 5 concerns the degree to which agile IT units are embedded within their surrounding organization, characterized by a tension between **integration vs. autonomy**. On the one hand, autonomy is a core value and success factor of agile approaches at the
unit, team, and individual levels (Moe et al., 2019). In the case of AutoIT, there was even an expectation that the autonomy and ways of working of the new agile IT would inspire the rest of the organization. For example, the company introduced creative spaces and a "Google Friday" where agile IT workers could pursue their own projects. On the other hand, our cases depict how agile IT units need to integrate to some extent with their traditional IT counterparts and the business to create value. For example, GovIT synchronized their agile IT release planning according to the availability of the IT capacities in their traditional IT so that changes would immediately affect the business and not wait in the pipeline. In this sense, some governance mechanisms that were added within the bimodal IT organization cases investigated here served to increase horizontal coordination between the two modes, while others were introduced to strengthen the autonomy of mode 2 specifically.

The dynamic interrelations between governance mechanisms and paradoxes within bimodal IT organizations are highlighted in our investigation. Drawing on Gregory et al.'s (2015) insights, which delineate blending and balancing as managerial responses to paradoxes in IT transformation programs, our findings confirm these approaches in the context of coping with governance mechanisms. Additionally, our analysis unveils two other influential dynamics: reinforcing and restricting effects. Impeding governance mechanisms with a reinforcing effect exacerbates the tensions within bimodal IT organizations, exemplified by contradictory decisions from different committees that underscore paradox 2 (business/IT vs. IT/IT) and hinder the alignment of business, traditional, and agile IT. Conversely, mechanisms with a restricting effect, such as internal restrictions and strict procedures, impose obstacles to addressing paradoxical demands, as seen in paradox 5 (integration vs. autonomy). Consequently, navigating these paradoxes requires a nuanced understanding of blending, balancing, reinforcing, and restricting effects, recognizing that there is no one-size-fits-all solution due to the contextual variations in organizational dynamics.
5.1 Theoretical Contributions

The findings from our interviews contribute to a deeper understanding of the relevant concepts for the successful transformation and operation of bimodal IT organizations. Specifically, we synthesize insights about challenges, governance mechanisms, paradoxes, and their interdependencies. Our contribution to the existing body of knowledge is threefold. First, this study demonstrates how the concept of governance mechanisms (de Haes & van Grembergen, 2004; Wu et al., 2015) can be used to study a related but different domain, namely bimodal IT organizations. Second, our five paradoxes extend the existing literature on bimodal IT organizations (e.g., Haffke et al., 2017a) by specifying the overarching strategic paradox of ambidexterity and formalizing the paradoxical tensions within bimodal IT organizations. Third, previous research on the ambidexterity paradox has emphasized the blending and balancing of managerial responses (Toutaoui et al., 2022; Soh et al., 2019). We extend this perspective with reinforcing and constraining effects, which describe the dynamics between hindering governance mechanisms and paradoxes in bimodal IT organizations. Overall, our work can be a starting point for stronger theorizing and recommendations for successfully managing paradoxes in bimodal IT organizations.

5.2 Practical Implications

Our research also provides practical implications for challenges and governance mechanisms in bimodal IT organizations. IT decision-makers can use our findings to consider the descriptive overview of challenges for transforming their IT function and coordinating their bimodal IT organizations. This understanding helps IT leaders assess and proactively address potential pitfalls. To respond to bimodal IT organizations’ transformational and operational challenges, IT managers should eliminate inhibiting governance mechanisms and promote coping governance mechanisms. In doing so, practitioners can use our findings as a solid basis for appropriate actions to adapt to their specific organizational context to successfully manage bimodal IT organizations.
5.3 Limitations and Future Research

Our research is subject to limitations which stimulate further research. First, our sample is limited to the chosen interviewees and their respective bimodal IT organizations, which differ greatly in their organizational and environmental contexts. While this high variance in our data enables us to comprehensively understand challenges, governance mechanisms, and paradoxes in bimodal IT organizations, comparisons between the bimodal IT organizations should be considered with caution. Hence, future research could validate and extend our findings through theoretical sampling (Glaser & Strauss, 2017) to include, among others, other bimodal IT organization archetypes and different industries. Second, we see initial evidence for contingency factors influencing the described interdependencies, for example, company and IT size, existing organizational culture, degree of external service provisioning, or industry specifics. A more detailed investigation of such contingency factors bears the potential to develop context-dependent recommendations for governance mechanisms. Third, bimodal IT organizations are part of a dynamic environment and, thus, are not static structures but are subject to constant transformation (Haffke et al., 2017a). Therefore, future work could investigate the longitudinal development and the specific measures taken to progress from impeding to coping governance mechanisms and address the complex relationships of the included theoretical concepts.

6 Conclusion

Bimodal IT organizations represent a strategic approach to addressing the complex demands of digital transformation, particularly the challenge of achieving IT ambidexterity – the ability to balance both exploitation and exploration. Through an analysis of 26 interviews across three bimodal IT organizations, we have uncovered the intricacies of implementing and coordinating such structures. Our research sheds light on the paradoxes, governance mechanisms, and their interconnectedness within bimodal IT organizations. In addition to elucidating existing challenges, we have identified and characterized five additional paradoxes: strategic vision, alignment, organization, distance, and collaboration. These paradoxes offer a nuanced understanding of the overarching strategic challenge of IT ambidexterity within the context of bimodal IT organizations.
Furthermore, our study identifies various governance mechanisms that either exacerbate challenges (impeding governance mechanisms) or alleviate them (coping governance mechanisms) within bimodal IT organizations. By examining the interplay between challenges, governance mechanisms, and paradoxes, we provide insights into the complex dynamics. Our analysis extends beyond traditional managerial responses of blending and balancing to encompass reinforcing and restricting effects, offering a comprehensive framework for addressing the multifaceted challenges of bimodal IT organizations.
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Essay 3: Empowering Leadership, Job Satisfaction, and the Moderating Effect of Individual Ambidexterity of Information Technology Workers

Abstract

Effective leadership is crucial for developing and sustaining ambidexterity, which involves engaging in both exploratory and exploitative activities. Empowering leadership behaviors, which foster trust and discipline to create engaged employees, have been identified as facilitators of contextual ambidexterity. However, there is still a lack of understanding of how individual outcomes are affected by these leadership styles in ambidextrous information technology (IT) work environments. This study investigates the impact of empowering leadership on job satisfaction among IT workers and whether the level of individual ambidexterity moderates this relationship. Analyzing survey data from 553 IT workers, we find a positive direct effect of empowering leadership on job satisfaction and, contrary to our hypothesis, a negative moderating effect of individual ambidexterity. Our study contributes to the leadership and ambidexterity literature in Information Systems by highlighting the need for nuanced approaches to leadership in ambidextrous IT organizations.

Keywords: Individual Ambidexterity, Empowering Leadership, Job Satisfaction, Information Technology (IT) Worker.

*This essay was co-authored with Till J. Winkler (University of Hagen). The online questionnaire and additional statistics are provided in the Appendix. The essay is published in the proceedings of the Wirtschaftsinformatik 2023 (minor changes are possible).

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Essay 3: Empowering Leadership, Job Satisfaction, and the Moderating Effect of Individual Ambidexterity of Information Technology Workers
1 Introduction

Dynamic competitive conditions have forced companies to adapt their organizational structures by creating ambidextrous work environments that focus on both exploration of innovative ideas and exploitation of the known (Haffke et al., 2017). This phenomenon is especially relevant in information technology (IT) organizations, as they play a crucial role in digitization and innovation, while ensuring stable and reliable operations (Gerster, 2017; Leonhardt et al., 2017). To manage the contradictory goals and potential paradoxes of exploitation and exploration, academia and practice are searching for measures that help organizations and individuals cope (Jöhnk et al., 2019). Regarding facilitating factors of ambidexterity, a growing body of research indicates that the role of leadership in organizations and specific leadership styles, such as empowering leadership, can be beneficial (van Assen, 2020).

In line with further calls for research (Tang et al., 2020) we examine empowering leadership, a leadership style in which leaders provide support, resources, and autonomy to their team members, allowing them to take ownership of their work and make decisions (Tang et al., 2020). Research on empowering leadership in adjacent disciplines, including the study of empowering leadership in the context of ambidexterity, has been increasing. There is a particular focus on innovation, which represents the exploratory side of ambidexterity (Caniëls et al., 2017). In addition, empowering leadership is assumed to influence perceptual, attitudinal, motivational, and behavioral outcomes in employees (e.g., Kim et al., 2018). Although several studies and two meta-analyses have linked empowering leadership to, among other things, positive employee work behavior (e.g., Kim et al., 2018) and firm performance (e.g., Srivastava et al., 2006; Carmeli et al., 2011). Given the notion that leadership must be evaluated contextually (Tigre et al., 2022), we still lack insight into the influence of empowering leadership on job satisfaction in the IT context.

Job satisfaction significantly affects business-critical outcomes, such as organizational business performance (e.g., Chi & Gursoy, 2009) and turnover intentions (e.g., Alam & Asim, 2019). The importance of job satisfaction is fueled by the current shortage of information systems (IS) professionals, creating a highly competitive labor market for IT workers (Prommegger et al., 2019). Given the dynamic nature of the global marketplace
and the pace of change, attracting, motivating, and retaining employees is critical to an organization’s continued success (e.g., Venkatesh et al., 2017).

Although a correlation between empowering leadership and contextual ambidexterity has been confirmed by previous research (van Assen, 2020), it is unknown whether individual ambidexterity, encountered through one's work environment, has a moderating effect of empowering leadership on job satisfaction. Therefore, we aim to contribute to the existing knowledge base by posing the following research question: How does empowering leadership affect job satisfaction in ambidextrous IT work environments? Specifically, we examine the interplay between individual ambidextrous behavior, empowering leadership, and job satisfaction, shedding light on the combined effects of supervisors and employee behavior within challenging environments.

Our analysis of survey data from 553 IT workers reveals a positive direct effect of empowering leadership on job satisfaction. This reinforces the notion that a leadership style that empowers employees and fosters trust and discipline can lead to more engaged and satisfied workers. However, contrary to our hypothesis, we also found a negative moderating effect of individual ambidexterity. These results highlight the importance of considering individual differences in ambidexterity when examining the effects of leadership on job satisfaction in IT organizations.

We contribute to the current research on (empowering) leadership by investigating the context (i.e., individual ambidexterity) in which and the extent to which empowering behaviors can be considered beneficial. Simultaneously, we contribute to the ambidexterity literature by adding potential measures (i.e., empowering leadership) that could help build and maintain successful individual ambidexterity. The remainder explains the theoretical foundations, methods, and results, before closing with a discussion of the findings, limitations, implications for future research, and a brief conclusion.
2 Background and Hypotheses

This section reviews the theoretical foundations of job satisfaction, individual ambidexterity and empowering leadership, which are core constructs of this research.

2.1 Job Satisfaction

Job satisfaction remains one of the most studied work attitudes in industrial and organizational psychology and organizational behavior theory (Judge et al., 2020). Academics and practitioners have recognized the value of job satisfaction due to its usefulness in predicting the efficiency and effectiveness of business organizations (e.g., Judge & Kammeyer-Mueller, 2012). Further, employee job satisfaction is often considered a significant predictor of organizational business performance (Chi & Gursoy, 2009; De Leaniz & Rodríguez, 2015) and turnover intention (Ali, 2008; Alam & Asim, 2019) in the literature. Judge et al. (2020) presented a detailed review of job satisfaction outcomes (performance, effectiveness, organizational citizenship behavior, counterproductive work behavior, and withdrawal). Their review also concluded that, especially in today’s turbulent climate with high turnover rates, "satisfied employees are more likely to be loyal champions, ambassadors, and advocates for their organizations" (Judge et al., 2020, p.1). Thus, companies are interested in creating and maintaining organizational and structural conditions conducive to employee satisfaction.

2.2 Ambidexterity

The need to adapt organizationally and structurally to changing economic conditions (O'Reilly & Tushman, 2013) is as inevitable as the ongoing and intensifying struggle for resources in the IT industry (e.g., Prommegger et al., 2019). Ambidexterity (i.e., the simultaneous performance of two seemingly contradictory activities, such as exploitation and exploration) helps organizations meet this challenge and has become increasingly popular with multiple applications in IS research (Werder & Heckmann, 2019; Birkinshaw et al., 2016). While ambidexterity describes the general ability to pursue two different goals simultaneously (Tushman & O'Reilly, 1996), it also includes combining capabilities from these two conflicting dimensions (Cao et al., 2009; Gibson & Birkinshaw, 2004).
Organizational ambidexterity encompasses the notion that organizations can adapt to their environment and achieve long-term success by simultaneously exploring new opportunities and exploiting existing capabilities (Andriopoulos & Lewis, 2010). In other words, exploitation refers to the efficient use of existing resources and capabilities through known processes, whereas exploration refers to discovering how to combine resources and capabilities in new ways to create new capabilities and further opportunities (March, 1991). Accordingly, in the context of IS research, IT ambidexterity is viewed as the ability of an IT function to simultaneously explore new IT resources and practices (IT exploration) and exploit current IT resources and practices (IT exploitation; Gregory et al., 2015; Napier et al., 2011). In addition, IT utilization reflects the ability of the IT function to manage existing IT assets well and to improve the effectiveness and efficiency of deployed IT resources to ensure their best use. In contrast, IT exploration reflects the ability of the IT function to devote resources to learning about and experimenting with new technologies, methodologies, and capabilities to select those of the highest value to the organization (Leonhardt, 2017).

The literature generally distinguishes between structural, temporal, and contextual ambidexterity. Structural ambidexterity achieves two conflicting goals using two separate subunits, such as through bimodal IT, each of which pursues a different goal (Tushman & O'Reilly, 1996, Kusanke & Winkler, 2022). Temporal ambidexterity suggests that a unit works on one of the conflicting goals at a time (Duncan, 1976; Turner, 2011). Contextual ambidexterity suggests that paradoxical demands can be resolved by providing an organizational context that enables employees to behave ambidextrously (Gibson & Birkinshaw, 2004). Thus, exploitation and exploration are simultaneously organized in an organizational unit based on a context-specific combination of social support, performance management, structure, and capabilities to create alignment (i.e., coherence among all activity patterns) and adaptability (i.e., the ability to quickly reconfigure activities to meet changing demands in the task environment; van Assen, 2020; Meglio et al., 2015).

From a contextual ambidexterity perspective, individual ambidexterity refers to an employee’s behaviour to balance, coexist, and nest two extreme ambidextrous activities (Gibson & Birkinshaw, 2004). This can be achieved through aligning the current goals...
with performance and adaptability to a changing environment and future performance in the context of an individual’s daily work (Zhang et al., 2019). The combination of these two distinct behaviors, stemming from exploitation and exploration, is conceptualized as individual ambidexterity (e.g., Mom et al., 2009; Zacher et al., 2016). Good and Michel (2013) theoretically, that ambidextrous individuals should be proficient in both exploratory and exploitative activities, with high skill levels in each. In practice, individual ambidexterity is challenging because individuals tend to be biased toward either exploratory or exploitative behaviors, potentially creating inter- and intrapersonal conflicts (Smith & Tushman, 2005, Schnellbächer et al., 2019).

Thus, at the organizational unit level (i.e., department/group level or even individual level), determining when and how conflicting activities and corresponding goals can best be pursued is necessary, depending on the specific context (van Assen, 2020). Consequently, contextual and, thus, individual ambidexterity requires a supportive organizational context that enables and encourages employees to make judgments about allocating their time between the conflicting demands of alignment and adaptability (van Assen, 2020). Organizational factors that support individual ambidexterity are proposed to be support and trust to provide employees with the security and assistance they may need to perform (Gibson & Birkinshaw, 2004). This supportive environment inspires people to work together and feel free to engage in conflicting ambidextrous behaviors (Zhang et al., 2019). Extending this approach, scholars have begun to discuss the active role of operational managers in reconciling tensions between exploration and exploitation (e.g., Mom et al., 2009; Zimmermann et al., 2017). Effective leaders could help organizations and individuals balance exploration and exploitation, creating a culture that fosters innovation and continuous improvement.

2.3 Empowering Leadership

Leadership style plays an important role in developing and maintaining contextual ambidexterity throughout organizational ambidexterity (Havermans et al., 2015; Junni et al., 2013) by implementing and maintaining mechanisms of differentiation and integration (Andriopoulos & Lewis, 2010; Raisch et al., 2009). As part of a qualitative study exploring leadership in project-based organizations, Havermans et al. (2015) examined the role of adaptive leadership in enabling contextual ambidexterity by
exploring the daily practices that leaders enact to promote exploration and exploitation and shift dynamically between them. Similarly, Gibson and Birkinshaw (2004) found that appropriate leadership behaviors to enable contextual ambidexterity are based on facilitating trust and discipline to create engaged and empowered employees.

Although research on empowering leadership is at a relatively early stage (Kim & Beehr, 2021), the number of publications outside the IS field is growing. Empowering leadership is considered "the process of enhancing an individual’s or group’s capacity to make purposive choices and to transform those choices into desired actions and outcomes" (Alsop et al., 2005, p. 1). It refers to a leadership style that empowers employees to take control of their work, make decisions, and solve problems independently. Empowering leaders provide employees with the authority, resources, and support they need to achieve their goals and develop their skills and abilities (Tang et al., 2020). Empowering leadership is a set of leadership behaviors characterized by the following (Kirkman & Rosen, 1999; Sharma & Kirkman, 2015; Knippenberg, 2017):

1. Trust: Empowering leaders trust their followers to take responsibility for their work and make decisions in the best interest of the organization (Caniëls et al., 2017).

2. Collaboration: Empowering leaders encourage collaboration and teamwork and create a supportive and inclusive work environment.

3. Delegation: Empowering leaders delegate responsibility and authority to their followers, allowing them to take ownership of their work and develop their skills.

4. Coaching: Empowering leaders provide support and coaching to their followers, helping them overcome challenges and achieve their goals (Arnold et al., 2000).

5. Empowerment: Empowering leaders empower their followers to take control of their work, make decisions, and solve problems independently.

Kim et al. (2018) meta-analyzed 55 independent samples to examine the relationship between empowering leader behaviors and subordinate responses, confirming positive associations of empowering leadership, among others, with employee motivation and
attitudes such as job satisfaction. Subordinates who were subjected to empowering leadership displayed increased job satisfaction, likely due to the emphasis placed by empowering leaders on granting them autonomy in establishing objectives and determining work methods. This approach facilitates employees' comprehension and execution of complete tasks, ultimately enabling subordinates to find purpose in their work (Amundsen & Martinsen, 2014). Given the importance of IT workers retention, which is largely influenced by job satisfaction, we seek to replicate these findings and validate previous findings within the research setting of IT workers.

**Hypothesis H1:** Empowering leadership has a positive direct effect on job satisfaction in IT workers.

Empowered employees are more proactive, continually searching for methods to improve and revise work processes and seeking innovative solutions to work problems (Kirkman & Rosen, 1999). Because employee empowerment is associated with higher levels of self-efficacy and self-confidence and makes employees feel free to take risks and solve problems in novel ways, it is thought to support exploratory learning (van Knippenberget al., 2004). In addition, employee empowerment is associated with higher commitment and motivation to perform work most efficiently and effectively; thus, it is assumed to support exploitative learning (Kirkman & Rosen, 1999). Accordingly, appropriate leadership behaviors to facilitate contextual ambidexterity include employee empowerment (Caniëls et al., 2017). This finding is supported by other studies confirming that empowerment is positively associated with contextual ambidexterity (van Assen, 2020; Yu et al., 2012), including in an IT context (Siachou & Gkorezis, 2018) and software developer context (Xu & Shen, 2018). As individuals strive to manage and balance the two potentially conflicting and, in any case, opposing work styles of exploration and exploitation, tensions may arise (March, 1991), and empowering leadership could help resolve these conflicting demands. Consequently, we hypothesize that the more an individual must balance the conflicting demands of exploration and exploitation, the greater the influence of empowering leadership on job satisfaction. In other words, employees who need to balance both exploration and exploitation perceive higher job satisfaction if they receive support and guidance through empowering leadership from their supervisor.
Hypothesis H2: The influence of empowering leadership on job satisfaction is moderated by the individual ambidexterity level.

3 Research Method

3.1 Sample and Procedure

We conducted an online survey to assess the hypotheses and collected data in April and May of 2022. A pretest \((n = 12)\) was performed to ensure the comprehensibility and technical functioning of the online questionnaire. Survey data were collected by a market research company. Participants were part of an online panel in Germany and received a small compensation for their participation. The participants were preselected and confirmed that they worked in the IT department of a company, participated in IT projects, or were employed or self-employed as IT professionals. At the beginning of the questionnaire, we guaranteed confidentiality to reduce social desirability bias. After data collection, we applied data cleaning procedures. All incoming datasets were filtered for data quality based on consistency checks in the respondents’ response behavior. We received a total of \(n = 553\) datasets. Of the 553 participants included in the analysis, 348 were male (63%), and 201 were female (36%). The age of the participants ranged from 21 to 70 years, with a mean of 44 years. The participants came from a variety of industries, including professional services (18%), public services (10%), and electronics and high technology (9%). Over 50% of respondents had been with their company for over 5 years.

3.2 Measures

Following Judge et al. (1998), we measured job satisfaction with five items adapted from the Brayfield–Rothe (1951) measure of job satisfaction. These items included the statements "I feel fairly satisfied with my current job" and "I find real enjoyment in my work". These and all subsequent items in this study were translated from English into German in a collaborative, iterative process, as suggested by Douglas and Craig (2007), and tested for applicability at the level of an IT employee. This approach is superior to the method of back-translation because it also considers issues of conceptual equivalence (Douglas & Craig, 2007). We measured responses on a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Cronbach’s alpha was calculated for the
reliability analysis. The internal consistency is satisfactory, with a Cronbach’s alpha job satisfaction of .79.

We measured empowering leadership with ten items from the empowering leadership questionnaire developed by Arnold et al. (2020). These items aim to measure employees’ perceived level of empowering leadership behaviors exhibited by a direct supervisor. The scale included the statements "My supervisor encourages team members to point out ideas and suggestions" and "My supervisor encourages team members to solve problems together". We measured responses on a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). The internal consistency is highly satisfactory, with a Cronbach’s alpha score for empowering leadership of .95.

To measure the individual level of ambidexterity experienced in the work environment, we used two 7-item scales by Mom et al. (2009), who validated these scales in the financial services industry (exploration $\alpha = .85$ and exploitation $\alpha = .81$). The authors developed a measure of exploration and exploitation consisting of exploration and exploitation activity items. Thus, we asked respondents about the extent to which they engaged in certain work-related activities (e.g., activities in which considerable experience was accumulated). We measured responses on a five-point scale ranging from 1 (never) to 5 (always). While some scholars, such as March (1991), viewed exploration and exploitation as two opposite ends of a line, with ambidexterity being the exact midpoint, more recent scholars (e.g., Gupta, 2006) have begun to characterize exploration and exploitation as more orthogonal. This way, firms and individuals could increase their exploration or exploitation levels without compromising. Following this line of reasoning, we multiplied the exploration and exploitation measures to obtain the magnitude to construct the measure of individual ambidexterity (see also Gibson & Birkinshaw, 2004; Cao et al., 2009; Mom et al., 2009, 2015). This approach reflects the argument that these two abilities are nonsubstitutable and interdependent.

We included several covariates to control for their direct effect on job satisfaction. Specifically, we tested for the influence of age and gender, the respondent’s hierarchical assignment to the business or IT department, tenure (measured in years associated with the company currently employed), leadership responsibility, company size and IT department size. Harman’s single-factor test was applied to test for common method
variance. The factor analysis results (33.9%) are below the 50% threshold, suggesting that common method bias is not an issue in the data.

4 Results

A moderation analysis was performed using the PROCESS macro by Hayes (2013), which has become widely used by researchers interested in testing hypotheses about moderation (Hayes & Rockwood, 2017), to determine whether the interaction between empowering leadership and individual ambidexterity significantly predicts job satisfaction. This method uses ordinary least squares regression, yielding unstandardized coefficients for all effects. Bootstrapping with 5,000 samples and heteroscedasticity-consistent standard errors were employed to compute the confidence intervals (Davidson & MacKinnon, 1993).

The overall model, shown in Figure 3-1 was significant, $F(10, 509) = 20.4, p < .001$, predicting 28.62% of the variance. The analysis reveals a significant direct effect of empowering leadership on job satisfaction (.57, $p < .001$). Thus, H1 is supported. In addition, the moderation analysis indicates that individual ambidexterity significantly moderates the effect between empowering leadership and job satisfaction, $\Delta R^2 = 1.25\%$, $F(1, 509) = 6.15, p =.01$. Despite the modest level of significance, there is support for Hypothesis 2. Furthermore, the data, presented in Table 3-1, reveal that the interaction coefficient is negative (-.02). If the direction (indicated by the sign) of the interaction coefficient is the same as that of the main effect (positive sign), then the interaction
variable strengthens the main effect. An opposite (negative) direction means the main effect is weakened. Therefore, the data shows a negative moderation effect.

<table>
<thead>
<tr>
<th></th>
<th>Coeff.</th>
<th>SE</th>
<th>t</th>
<th>p</th>
<th>LLCI</th>
<th>ULCI</th>
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<tbody>
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<td>.572**</td>
<td>.106</td>
<td>5.38</td>
<td>&lt;.001</td>
<td>.363</td>
<td>.780</td>
</tr>
<tr>
<td>H2</td>
<td>.109**</td>
<td>.031</td>
<td>3.50</td>
<td>&lt;.001</td>
<td>.048</td>
<td>.170</td>
</tr>
</tbody>
</table>

Table 3-1. Moderation Model Output

Of the control variables we included, only age had a significant direct effect on job satisfaction, indicating that older IT workers in our sample had higher job satisfaction. Table 3-2 shows that regarding the moderating effect, we find that as the level of ambidexterity increases, the effect size of moderation decreases.

<table>
<thead>
<tr>
<th>Individual Ambidexterity</th>
<th>Effect</th>
<th>SE</th>
<th>p</th>
<th>LLCI</th>
<th>ULCI</th>
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<td>.25</td>
<td>.04</td>
<td>&lt;.001</td>
<td>.16</td>
<td>.34</td>
</tr>
</tbody>
</table>

Table 3-2. Conditional Effects of the Focal Predictor at Values of the Moderator

The interaction effect was significant. We used the Johnson–Neyman technique (Hoyt, 1944) to identify the points along the continuous moderator where the relationship between the independent variable and outcome variable transitions from being statistically significant to insignificant or vice versa (Hayes & Matthes, 2009). Based on the multiplicative interaction effect model, the Johnson–Neyman technique uses a regression line where the effect of the predictor on the outcome is regressed on the moderator to demonstrate how the effect changes with changes in the moderator. The Johnson–Neyman technique also uses 95% confidence bands around the simple regression line to determine the region of significance. When one of the confidence bands
crosses the x-axis, the corresponding value of the moderator is the dividing point between a region of significance and a region of nonsignificance (Bauer & Curran, 2005). By finding the transition points within the observed data, this method allows us to understand the patterns of significance across the moderator range (Montoya, 2019). The analysis results reveal that the positive effect of empowering leadership on job satisfaction became insignificant when the ambidexterity score was >20.7.

We used the data to visualize the conditional effect of individual ambidexterity in Figure 3-2. The graphs depict that, within the corridor of significance, the interaction effect is negative, and the effect size decreases. Thus, when exposed to the same level of empowering leadership, higher scores of individual ambidexterity generally lead to higher job satisfaction. However, this effect decreases with elevated individual ambidexterity.

![Figure 3-2, Visualized Interaction Effects](image)
5 Discussion

While the relationship between empowering leadership and ambidexterity has been investigated by previous research outside the IT domain, this study assesses the extent to which empowering leadership facilitates job satisfaction of IT workers and the role of individual ambidexterity in this relationship. We hypothesized that empowering leadership influences job satisfaction (H1) and that individual ambidexterity is a moderator that positively amplifies this relationship (H2). While our findings confirm H1, we found an opposing moderating effect regarding H2: higher levels of individual ambidexterity reduce the effect of empowering leadership on job satisfaction. Consequently, our contribution is two-fold.

Our finding regarding H1 supports the notion that relate leadership behaviors leader to positively connotated outcomes such as, increased employee motivation, performance, and creativity (e.g., Srivastava et al., 2006; Lee et al., 2018). This finding adds to the empowering leadership literature by adding job satisfaction to the outcomes and consequences and encourages organizations to promote and facilitate empowering leaders.

This research also expands the knowledge base on ambidexterity, the simultaneous occurrence of exploitation and exploration, and empowering leadership in the IT context. As individuals strive to manage and balance the two potentially conflicting and, in any case, opposing work styles, tensions may arise (March, 1991), and empowering leadership could help resolve these conflicting demands. Empowering leadership can assist individuals in managing the conflicting demands of explorative and exploitative tasks by providing them with the autonomy and support necessary to navigate these dual responsibilities effectively (van Assen, 2020). This, in turn, may positively influences job satisfaction as individuals feel supported and empowered to strike a balance between exploration and exploitation, ultimately enhancing their ability to cope with these conflicting demands. Consequently, we hypothesized that the greater the level of ambidexterity (i.e., the greater the exposure to both dimensions or modes), the greater the need for and effect of empowering leadership on desired work outcomes, such as job satisfaction.
Thus, our second contribution, regarding H2, are further evaluations of the contextual facilitators and, ultimately, the potential limitations of this leadership style. The need for organizations to build more dynamic and exploratory capabilities while ensuring efficient operations through exploitation is undeniable, resulting in the need to implement ambidextrous structures through bimodal IT (Haffke et al., 2017), for example, or foster contextual and, thus, individual ambidexterity. To this end, we evaluated whether individual ambidexterity moderates the relationship between empowering leadership and job satisfaction in IT workers.

Supporting our hypothesis, IT workers with the same perceived empowering leadership report higher job satisfaction at higher levels of individual ambidexterity. However, this effect, which appears to account for significant differences, diminishes with increasing levels of ambidexterity (see Figure 3-2) until it becomes insignificant (ambidexterity score >20.7). The data also indicates a moderate negative moderation effect of the interaction of individual ambidexterity and empowering leadership. Thus, the moderator weakens the main effect of empowering leadership on job satisfaction. A potential explanation for this effect can be found in previous studies that have suggested that empowering leadership could also yield negative outcomes, potentially due to the emphasis on granting high autonomy in decision-making and task delegation, which might consequently amplify task uncertainty (Kim et al., 2018).

These results have interesting and practical implications. Although organizations should generally encourage empowering leadership, this may lose its power when individuals are confronted with very high levels of ambidexterity because, as the level of ambidexterity increases, the tension and potential for intrapersonal and interpersonal conflict may become too high for the individual to manage alone. In this case, the individual may be more likely to seek guidance than empowerment and trust. From a different point of view, Kim and Beehr (2021) suggested that empowering leadership may be construed as a source of stress for employees who desire structure and have a low need for autonomy. This line of thinking is supported by literature that seeks the boundaries of empowering leadership and encourages researchers to explore the less positive outcomes of empowering leadership (Sharma & Kirkman, 2015).
Consequently, individual characteristics should continue to be considered potential moderators when examining the outcomes of empowering leadership (Kim & Beerh, 2021). Furthermore, we propose including the construct of person-job fit in this research model. Person-job fit refers to the relationship between employee characteristics and job characteristics (Kristof-Brown et al., 2005) and includes the question of whether employees would agree that their abilities fit the demands of the job and whether they believe that they are the right type of person for that type of job (Lauver & Kristof-Brown, 2001). From a survey sample of 6,179 employees of a technology company in China, Cai et al. (2018) concluded that empowering leadership has a positive, indirect effect on employee work engagement through person-job fit. Therefore, it is reasonable that person-job fit may also play a role in the individual assessment of job satisfaction.

This study is not without limitations. Job satisfaction is a multidimensional concept that includes personality traits and environmental factors (Ilies & Judge, 2013). Thus, examining the relationship between empowering leadership and job satisfaction by accounting for the level of ambidexterity may fall short if other potential influencing factors, such as personality traits, teamwork, or performance, are neglected. In addition, we do not account for any learning effects because we did not ask about or account for the length of time someone is led by empowering leadership.
6 Conclusion

Leadership styles that promote trust, discipline, and employee empowerment are crucial in fostering and maintaining ambidexterity. Therefore, we aimed to investigate whether empowering leadership affects job satisfaction among IT workers and whether individual ambidexterity moderates this relationship. The findings contribute to existing research by demonstrating that empowering leadership affects IT employees’ perceived job satisfaction. In addition, the data suggest that individual ambidexterity negatively moderates these relationships in that higher levels of individual ambidexterity reduce the effect of empowering leadership on job satisfaction. We explained this finding by potential interpersonal and intrapersonal conflicts arising from the conflicting work modes of exploration and exploitation, which may lead individuals to seek guidance and structure rather than trust and empowerment. Our paper contributes to the empowering leadership and ambidexterity literature in IS by highlighting the need for nuanced approaches to leadership in ambidextrous IT organizations.
7 References


Haffke, I., Kalgovas, B., and Benlian, A. (2017). Options for Transforming the IT Function Using Bimodal IT. MIS Quarterly Executive, 16(2), 101-120.


Essay 4:
Building Digital Leadership in the Public Sector – A Literature Review*

Abstract

While digital leadership competencies have been recognized as key to succeed with digital transformation, there is a lack of a common understanding about what constitutes such competencies specifically in the public sector—a sector that faces particular challenges with digitally transforming. This structured literature review adds to the existing body of knowledge on digital leadership by synthesizing what is known about the required competencies of digital leaders in the public sector. Based on 25 relevant publications from different databases and disciplines, we identified 44 sub-competencies classified into seven categories of key competencies. In addition, several measures for digital leadership skill development and recruitment could be identified that help building these competencies. While researchers can use our findings to advance knowledge in this research area, practitioners in the public sector can apply our framework to assess their leadership competencies for the digital transformation.

Keywords: Digital Leadership, Competencies, Public Sector, Literature Review.

*This essay was co-authored with Jennifer Kendziorra (University of Hagen), Sonja Pilgenroeder (University of Hagen), Teresa Christmann-Schwaab (University of Hagen), and Till J. Winkler (University of Hagen). The essay is published in the proceedings of the European Conference on Information Systems (ECIS) 2023 (minor changes are possible).

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1 Introduction

The digital transformation rapidly changes the way organizations produce products, deliver services and interact with their customers (Kraus et al., 2022; Vial, 2019). At the same time, the combination of ever-changing technology, increased complexity, and greater expectations for speed have created the need for new forms of leadership (Petrucci & Rivera, 2018). To deal with the fast-moving environment and associated uncertainties, digital leadership, a new form of understanding leadership in times of digitalization, is crucial (Beile et al., 2019; Peng, 2021). While a clear definition of digital leadership has yet to emerge in the literature, it is clear that the underlying self-understanding of digital leadership is less about management and more about leadership, emphasizing the transfer of power from managers to employees, the importance of relational and coaching behaviors, and the appreciation of agility, transparency, and change (Petry, 2019). Digital leaders support organizations to develop a digital culture enabling fast and collaborative work and enhancing agility (Kane et al., 2019). Therefore, traditional leadership skills and competencies must be updated to enable leaders to cope with digital disruption and to handle these new challenges (Bartsch et al., 2021; Contreras et al., 2020). The major importance digital leadership has for organizations to manage digital transformation emphasizes the relevance of studying digital leadership with regard to skills and competencies (Tigre et al., 2022).

Although the discourse around digital leadership has primarily been led by practice (Eberl & Drews, 2021), the academic literature has grown considerably within recent years (Matzler et al., 2018; Tigre et al., 2022). Previous authors have recognized the relevance of the topic and reviewed academic literature around digital leadership competencies (e.g., Adie et al., 2022; Eberl & Drews, 2021; Tuschner et al., 2022). However, earlier studies did not consider the differences between the public and private sector. This might represent a considerable gap, because leadership is seen to be context-specific (Tigre et al., 2022). As the private and public sector differ in scope of their activities and organizational structure, among other factors (Kankanhalli & Kohli, 2009), a differentiated analysis might become necessary. Only a few authors who have researched digital competencies in the public sector have recognized these specifics, but with a focus different from our research objective. While Distel et al. (2019) analyzed competencies
for public sector employees in general, other research studied conceptualizations of
digital government and competency requirements specifically in the context of study
programs for public administration (Hunnius & Schuppan, 2013; Hunnius et al., 2015).
Furthermore, as the required competencies are not static, but, due to the high speed of
technology-driven change, rather change rapidly, we see a need for constant reevaluation
(Distel et al., 2019).

Hence, the goal of this literature review is to provide a dedicated overview of the current
academic knowledge on digital leadership competencies and their development in the
public sector, and, by synthesizing knowledge, to advance practice and research.
Consequently, this literature review contributes to the research field of public sector
digital transformation and it provides practitioners with a catalog of competencies that is
grounded in research. In the context of this newly created catalog of competencies, this
literature review suggests ways on how to build these competencies in public
organizations. As such, it targets decision makers in the fields of information systems,
human resource management, and general management who are interested in
understanding what competencies constitute digital leadership within the public domain
and how to build up and develop these competencies.

To this end, this paper first gives an overview of the relevant theoretical and practical
foundations regarding the digital transformation and digital leadership in the public
sector. Next, we explain our applied approach of the structured literature review. The
results then show the key competencies of digital leaders in the public sector with their
specific sub-competencies, as well as opportunities for internal leadership development
and recruitment of external leaders.

2 Background and Hypotheses

The public administration sector is a notable employer in many countries and comprises
various areas, ranging from teaching in education to securing energy, water or housing.
Especially in federal countries like Germany or the US, the existence of traditional
working methods and hierarchical structures in public administrations can have an
inhibiting effect on digital transformation processes (Redmann & Rückel, 2021). Digital
transformation is "a process that aims to improve an entity by triggering significant
changes to its properties through combinations of information, computing, communication, and connectivity technologies" (Vial, 2019, p.118). As it can be seen as a design task that promotes a holistic view of organization, people, and technology (Hill, 2016), it represents a key leadership task (Hill, 2021b). However, the cultural and organizational changes in the context of digital transformation are proving to be particularly challenging for leaders in public administration. Consequently, leadership styles and competencies are changing and the skills of a digital leader are becoming increasingly important (Mergel, 2019). The digital transformation is thus causing traditional leadership structures in public administration to be questioned and the concept of digital leadership to be emphasized (Fischer, 2019). Now more than ever, employees must be empowered to act in a motivated and self-organized manner (Lühr et al., 2019), while traditional hierarchical management is becoming less important (Dreas & Klenk, 2021). This requires leaders who can take a step back in their leadership role, act in a self-reflective manner, and use agile forms of work as needed (Beile et al., 2019).

Competencies are considered to be relevant drivers of digitization in the public sector (Distel et al., 2019) and regarded as necessary in order to successfully exploit the potential of the digital transformation of public administration (Mergel, 2020; Ogonek et al., 2016). They can be composed of multiple more specific sub-competencies (Le Deist & Winterton, 2005) and describe the dispositions (e.g., abilities, possibilities or readiness) of people to act safely and in a self-organized manner in situations with an uncertain outcome (Heyse, 2007). Furthermore, the term key competencies is often used to denote overarching competencies that are particularly crucial to influencing employee and organizational performance (Almatrooshi et al., 2016). The majority of competency researchers differentiate personal, professional, methodological, and social competency (Erpenbeck & Heyse, 2021). As digitalization significantly challenges managers to maintain an overall view of the transformation and provide orientation (Stich & Schwiertz, 2021), the competencies of leaders in particular are undergoing change, giving rise to the emerging research stream of digital leadership (Beile et al., 2019).

According to Buhse (2012, p. 243), "digital leadership is "leadership that not only masters the old management basics, but is also able to abstract old leadership concepts and recipes for success, align them with the new values and success models from the digital world,"
and then use them. "It is an art to switch between hierarchical and networked leadership patterns depending on the requirements" (Buhse, 2014, p. 213). Digital leadership is a rather new type of leadership and no definition has yet been established for public administration. Based on the ideas of Beile et al. (2019), Buhse (2012), and Kolberg (2019), this paper understands digital leadership in public administration as a new form of leadership that attempts to unite employees, technologies, the framework conditions of public administration, and the desires of citizens and companies in times of digital change.

Although previous authors have reviewed the existing knowledge about digital leadership, we lack a dedicated review of the current state of research regarding digital leadership competencies in the public sector. However, an understanding of these is particularly important, because the private and public sector differ in terms of various factors (Kankanhalli & Kohli, 2009) and thus presumably also in the required competencies.

While the private sector seeks profitability and growth, the public sector is also expected to focus on upholding public values, such as obligation-oriented (e.g., responsibility to citizens), service-oriented (e.g., transparency), and socially-oriented (e.g., equal treatment and equal access) values (Bannister & Connolly, 2014; Weigl et al., 2022). For example, the customer base of public institutions includes all citizens of a country, and special attention must be paid to providing equal access to public services to non-technical people. Also, the scope of public information services is much more diverse compared to private organizations, including areas such as education, transportation, and employment (Kankanhalli & Kohli, 2009). In addition, the organizational structure in many public administrations tends to be hierarchical to ensure standardization, stability, and predictability. This is true, for example, of public administration in the United States (Kankanhalli & Kohli, 2009), but public administration in Germany is also still based on Max Weber's bureaucracy model (Musati, 2022), which is highly hierarchical (Weber, 1976). Thus, the organizational structure in which digital systems and services are designed and delivered is different, being highly centralized and having formalized processes with little decision-making autonomy. While digital government systems and services are expected to be more regulated in case of budget overruns, private
organizations are more flexible and not as rigid in terms of budget constraints as public sector organizations (Kankanhalli & Kohli, 2009). These differences, among others, may call for different competencies of digital leaders in public and private sector organizations and the need for a detailed analysis of digital leadership skills and competencies in the public sector.

Hunnius et al. (2015) aimed at studying conceptualizations of e-government in study programs for public administration and identified five relevant competencies in the context of a digital transformation of the public sector: (1) technical competencies, including general IT skills ranging from the fundamentals of information systems (IS) to their design, (2) socio-technical competencies, focusing on the interface between people and technology, (3) organizational competencies, including knowledge of the organizational environment in which digital services are offered (e.g., organizational structures), (4) management competencies, combining business skills that are required to manage and control an organization, and (5) political-administrative competencies, including knowledge of the political and legal framework. Subsequent studies additionally cite the relevance of social competencies that is understood as "the ability and willingness to deal with oneself and others in a constructive, self-determined, cooperative, and situationally appropriate manner" (Wunderer & Dick, 2002, p. 365). Wunderer and Dick (2002) suggest further subdividing social competency into the competencies of cooperation (e.g., communication skills or empathy) and autonomy (e.g., self-control).

This literature review will use these categories as a framework of seven key competencies to structure our findings.

3 Method

Literature reviews play an important role in IS research and are seen as powerful information sources for practitioners and researchers alike (vom Brocke et al., 2009). Due to the relevance of digital leadership in the public sector, we conducted a structured literature study based on the procedures recommended by vom Brocke et al. (2009). The research goal of our structured literature review is to extract categories or themes from the data set and summarize important key findings. Hence, this review classifies as a descriptive review in the typology of Paré et al. (2015). By using appropriate databases, combinations of keywords, and inclusion and exclusion procedures, the literature search
enables the identification of relevant publications (vom Brocke et al., 2009). The identified literature was then assigned and documented according to topic using a concept matrix according to Webster and Watson (2002).

The literature search was conducted between April and May 2022 using the databases AIS Electronic Library (AISeL), EbscoHost, Springer Link / Professional, Web of Science and WISO. An overview of the search parameter is given in Table 4-1. We focused our literature search on journal articles and conference papers and excluded book chapters, book reviews, and editorials. Articles published in scholarly journals are considered a credible source of high quality due to their peer-review approach and proceedings of renowned conferences were added to include more recent and novel ideas (Rowley & Slack, 2004). Furthermore, we did not restrict our search to the information systems discipline, but also included other disciplines relevant to our context in the search process in order to obtain a broader overview of the field under study and to allow for a more comprehensive and complete presentation of the results.

<table>
<thead>
<tr>
<th>AIS eLibrary</th>
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<th>Filter</th>
</tr>
</thead>
<tbody>
<tr>
<td>EbscoHost</td>
<td></td>
<td>Databases: Business Source Ultimate; Applied Science &amp; Technology Source; Library Information Science &amp; Technology Abstracts</td>
</tr>
<tr>
<td>Springer Link / Professional</td>
<td></td>
<td>Field of study: Social Sciences; Political Science; Business &amp; Management; Economics; Education</td>
</tr>
<tr>
<td>Web of Science</td>
<td></td>
<td>Field of study: Business Management &amp; Organization; Business Sciences; Economic Sciences; Social Sciences</td>
</tr>
<tr>
<td>WISO</td>
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</table>

Table 4-1. Literature Search

The database queries covered the years 2013–2022. In the databases AIS eLibrary, EbscoHost, Springer Link/Professional, Web of Science, and WISO, we searched for keywords related to digital leadership, competencies and e-government by using Boolean operators and wildcards. The query for identifying required digital leadership competencies in the public sector was as follows: ("digital leader*" OR "leader* 4.0") AND ("competenc*" OR "skills" OR "knowledge") AND ("public administration" OR
"e-govern*" OR "digital govern*" OR "public sector"). As a second step, we also added search terms such as "curricula" or "learning" to the beforementioned search query in order to identify measures with regard to developing such competencies. Because previous research has shown that public sector and leadership research are shaped by country and culture (Dorfman et al., 1997; Haque, 2013) we applied the criteria of relevance that the articles focus on the country contexts of Europe and the United States in order to make our literature review on digital leadership competencies in the public sector comparable and, to some degree, generalizable across the majority of Western regions. Due to the language proficiency of the authors, both, English and German publications were considered.

Our initial search produced 1,436 hits. To assess potential relevance, such as the mentioned country context, of each paper we screened the findings based on title and abstract. Consequently, as shown in Figure 4-1, the initial set of search results was reduced by excluding 1,072 irrelevant articles for the research purpose based on a screening of the titles and a further 248 articles based on an evaluation of the abstract. After the exclusion of 26 duplicates, 90 articles remained, which were then reduced to 19 after full-text screening for relevance to the research goal. A forward and backward search was applied in order to find papers that previous search attempts did not yield (Webster & Watson, 2002). In this process step, we added six articles to our set of literature that were not part of the results of the literature search, but fit the requirements of the present review.
Finally, the search and selection process as described above led to the finding of 25 eligible papers for the purpose of our research goal, that provide information on either the competencies required for digital leadership in the public sector, or their development, or both. Table 4-2 gives an overview of all 25 papers found by research stance (empirical, conceptual, or design-oriented) and the type of outlet. The numbering in square brackets reflects the alphabetical order of the references and serves as an orientation for the following Tables 4-4, 4-5, and 4-6.

<table>
<thead>
<tr>
<th>Conference papers</th>
<th>Journal articles</th>
<th>Sums</th>
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<td><strong>Empirical</strong></td>
<td></td>
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<tr>
<td>[22] Sarantis et al., 2019;</td>
<td>[21] Redmann &amp; Rückel, 2021</td>
<td></td>
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<tr>
<td>[23] Schenk &amp; Dolata, 2020</td>
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<tr>
<td><strong>Conceptual</strong></td>
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<td>6</td>
</tr>
<tr>
<td></td>
<td>[8] Hill, 2021b;</td>
<td></td>
</tr>
<tr>
<td><strong>Design-oriented</strong></td>
<td></td>
<td>4</td>
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<tr>
<td></td>
<td>[13] Lang, 2020;</td>
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<tr>
<td></td>
<td>[24] Schneider, 2018</td>
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<tr>
<td><strong>Sums</strong></td>
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<td>25</td>
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<tr>
<td>11</td>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>

Table 4-2. Relevant Publications according to our Selection Criteria by Research Stance and Type of Outlet
Literature reviews reporting results across different categories or themes are either inductive, deductive, or a mixture of the two (Bandara et al., 2015). In our case we started analyzing the literature selection based on a pre-defined coding scheme for the required key competencies, listed in Table 4-3, and derived the sub-competencies inductively. The coding categorization of key competencies for digital leaders in this paper is based on the five competency categories identified by Hunnius et al. (2015) and the additional one – divided into two – by Wunderer & Dick (2002) presented earlier. These categories already take into account the specifics of public administration and are suitable to classify the relevant competencies for leaders in times of digital transformation. Through the coding, which was conducted by the authors independently and included several iterations, we eventually assigned each of the papers to one or more of the pre-defined competency categories (see Table 4-3).

<table>
<thead>
<tr>
<th>Key competencies</th>
<th>Description – Coding guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical competencies</td>
<td>Technical competencies range from general IT skills regarding the fundamentals of information systems (IS) to their design.</td>
</tr>
<tr>
<td>Socio-technical competencies</td>
<td>Socio-technical competencies are located at the interface between people and technology and attempt to integrate both equally. This includes, for example, knowledge about the effects of digitalized administration.</td>
</tr>
<tr>
<td>Organizational competencies</td>
<td>Organizational competencies include, for example, knowledge of the organizational environment in which digital services are offered (e.g., organizational structures, process management, etc.).</td>
</tr>
<tr>
<td>Management competencies</td>
<td>Management competencies combine business skills that are required for the management and control of an organization. This applies, for example, to financial, project and change management.</td>
</tr>
<tr>
<td>Political-administrative competencies</td>
<td>Political-administrative competencies include knowledge of the political and legal framework. These include, for example, administrative procedures.</td>
</tr>
<tr>
<td>Social cooperation competencies</td>
<td>Cooperation includes, among other things, communication skills, the ability to empathize with others and the ability to work together to achieve a common goal.</td>
</tr>
<tr>
<td>Social autonomy competencies</td>
<td>Autonomy is aimed at the ability and motivation of managers to act autonomously. It includes, among other things, recognizing one's own needs and competencies and reflecting on one's own strengths and weaknesses.</td>
</tr>
</tbody>
</table>

Table 4-3. Coding Guidelines (Key Competencies based on Hunnius et al. (2015) and Wunderer & Dick (2002))
During the data analysis, we extended our codification scheme by adding sub-competencies which included developing definitions and coding rules for each of the inductively derived sub-competencies. For example, the technical competency includes the sub-competencies general IT competencies, which refers to the general ability to use and apply technology in the public sector, while IT expertise implies the specific IT knowledge related to, for example, the installation of software or hardware. These inductively and iteratively generated sub-competency coding guidelines allowed us to assign the competencies found in the literature to clearly predefined categories and to avoid inconsistencies. The assignment of the sub-competencies to the overarching key competencies was considered final because there was agreement among the authors that all identified sub-competencies were as homogeneous as possible within the competencies and as heterogeneous as possible across the competencies.

4 Findings

In our literature review, we find that scholarly interest in digital leadership within the public sector has increased in recent years. In our period under consideration (2013-2022) we saw a trend of increasing numbers of publications over time, where most studies (10) were published in 2021.

4.1 Key Competencies for Digital Leaders in the Public Sector

The first part of our literature analysis shows that 22 out of the 25 identified papers mentioned one or more of the seven key competencies with regards to digital leadership in the public sector (see Table 4-4). Most of the articles mentioned social cooperation competencies (18), followed by management competencies (17), political-administrative (14), socio-technical (13), social autonomy (10), organizational (10), and technical competencies (10). While this order does not necessarily reflect the importance of the respective competency for digital leaders to deal successfully with digital transformation in practice, it demonstrates the frequency of these categories addressed in research.
## Key Competencies for Digital Leaders in the Public Sector

<table>
<thead>
<tr>
<th>Reference</th>
<th>Social Cooperation Competencies</th>
<th>Management Competencies</th>
<th>Political-administrative Competencies</th>
<th>Socio-technical Competencies</th>
<th>Social autonomy Competencies</th>
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<tr>
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</tr>
<tr>
<td>[10] Hunnius et al., 2015</td>
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<td>X</td>
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Table 4-4. Key Competencies for Digital Leaders in the Public Sector
The 44 inductively derived individual sub-competencies were then matched to their respective key-competency as shown in Table 4-5. The numbers in brackets indicate how often this specific sub-competency was mentioned in the literature set. For example, within the key competency ‘technical competencies’ we identified the sub-competency ‘general IT competencies’. This sub-competency was mentioned by five different sources, namely source 1, 2, 10, 16 and 21 as classified in Table 4-2.

<table>
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<th>Key competencies</th>
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<td>Social cooperation competencies</td>
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<td>• Communication skills (12)</td>
<td>• 1, 2, 3, 5, 9, 13, 14, 16, 17, 19, 20, 21</td>
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<td>• Ability to lead based on trust (1)</td>
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<td>• Ability to share leadership responsibilities (2)</td>
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<td>• Ability to lead individually (2)</td>
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<td>• Ability to network (4)</td>
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<td>• Empathy (1)</td>
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<td>• Ability to motivate (4)</td>
<td>• 6, 7, 17, 21</td>
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<td>• Ability to take a user perspective (7)</td>
<td>• 1, 2, 12, 14, 16, 17, 24</td>
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<td>• Knowing and supporting flexible forms of work (2)</td>
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<td>• Ability to cooperate (4)</td>
<td>• 5, 8, 19, 23</td>
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<tr>
<td>• Negotiation skills (2)</td>
<td>• 17, 19</td>
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<td>• Adaptability (1)</td>
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<td>• Interdisciplinary understanding (1)</td>
<td>• 16</td>
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<td>• Ability to tolerate errors (1)</td>
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<td>• Mediation between business department and IT department (1)</td>
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<td>Management competencies</td>
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<tr>
<td>• Project management (8)</td>
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<td>• Change management (6)</td>
<td>• 7, 10, 11, 13, 20, 23</td>
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<td>• Problem solving skills (10)</td>
<td>• 1, 5, 6, 9, 12, 13, 16, 19, 23, 24</td>
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<td>• Financial management (1)</td>
<td>• 20</td>
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<tr>
<td>• Analytical skills (2)</td>
<td>• 2, 3</td>
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<tr>
<td>• Data literacy (2)</td>
<td>• 1, 23</td>
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<tr>
<td>• Strategic management (4)</td>
<td>• 2, 13, 17, 19</td>
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<tr>
<td>• Business process management (1)</td>
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<tr>
<td>• Transformation skills (1)</td>
<td>• 16</td>
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<tr>
<td>• Entrepreneurial thinking (2)</td>
<td>• 16, 17</td>
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<tr>
<td>• Program management competencies (1)</td>
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The evaluation of the literature study indicates that social cooperation competencies are the most extensively researched key competency with the most frequent mentions of particularly relevant competencies for digital leaders. This is also confirmed, for example, by Distel et al. (2019, p. 296): "It shows that besides the need for functional or task-related
competencies like organizational or management skills, there is also an increased need for soft skills and personality traits. In this key competency area, communication, cooperation and motivation skills are cited in particular, as well as the ability to adopt a user perspective or to form networks (see Table 4-5). Lemke et al. (2021) warn, for example, that it is more difficult to implement digital initiatives if there is a lack of successful communication and cooperation between departments and institutions. A large number of publications point to the particular relevance of communication skills for managers. For example, communication is described as an essential element in driving forward digital transformation: "Communication at all levels and with all parties is a crucial factor for the development of digital initiatives in the public sector" (Lemke et al., 2021, p.76). However, the ability to communicate also includes the consideration of individual language repertoires: "In multidisciplinary teams (...) it is important to take into account the different perspectives by paying attention to communication and to use linguistic empathy and simple language" (Mergel et al., 2021, p. 30). While the ability to lead based on trust was not mentioned in older literature sources, in a more recent publication by Hill (2021b), in the context of the Covid-19 pandemic, he states, "On the other hand, rigid patterns of control must give way to more trust-based collaboration to enable successful cooperation across spatial (and temporal) boundaries" (Hill, 2021b, p. 180). Furthermore, publications emphasize motivational skills and the ability to take the user perspective: "Managers are required to actively engage with (...) customer needs" (Schneider, 2018, p. 44).

In terms of key competencies for digital leaders, management competencies are mentioned second most frequently after social cooperation competencies. Distel et al. (2019) emphasize that business skills in particular have been identified as significant in the context of the digital transformation of public administration, such as "project, program, performance and strategic management" (Distel et al., 2019, p. 292). For example, in order to promote innovation, managers need problem-solving skills that can be fostered by means of creative methods such as design thinking. Furthermore, project management skills are required to carry out digitization projects (Klein et al., 2021), with agile methods increasingly being used (Lang, 2020). Ogonek et al. (2016) emphasize the importance of such project management competencies for delivering e-government projects and related services in a sustainable way.
Within the identified political-administrative competencies, the need to acquire knowledge about legal frameworks and potential IT risks and security is emphasized most. In this regard, digital leaders should have background and expertise related to the public sector (Halsbenning, 2021b). Mergel et al. (2021) also state that assessing IT risk and security in relation to personal data and privacy protection is an essential competency and that all administrative employees have a "special responsibility to protect the personal data of citizens" (Mergel et al., 2021, p. 30).

With regard to the identified socio-technical competencies, knowledge of the effects of a digitized administration and an understanding of digital trends are highlighted in particular, "since they are seen as role models and provide the basis for a digital-friendly organisation culture" (Hofmann & Ogonek, 2018, p.131). According to Schneider (2018), managers should particularly grasp the significance of trends for their own organization. Mergel (2020) even cites an understanding of technological trends as the most important competency for executives in the public sector, for example, in order to reduce the dependence on IT consultants.

In terms of social autonomy competencies, innovation competencies and skills for self-organization and self-reflection are named. On the one hand, innovation competencies should ensure that new solutions continue to drive forward the digitization of public administration. Thus, according to Hill (2016, p.246), it is significant that "open innovation processes' are also increasingly stimulated internally with the aim of encouraging and involving independent contributions and ideas from employees and configuring new solutions together with them". On the other hand, digital leaders should possess self-management skills and the ability to learn in a self-organized manner (Schneider, 2018). Furthermore, in order to identify their own deficits, "each leader analyzes the need for learning and change" (Schneider, 2018, p. 45).

With regard to organizational competencies, the main focus is on design competencies, but process management is also considered important. The digitization of processes, for example, requires an adaptation of organizational structures and even a holistic change in organizational culture (Redmann & Rückel, 2021). For example, traditional hierarchical structures are being broken: "Knowing when it is appropriate to lead and when to follow is a core competency of the digital age" (Schneider, 2018, p. 45). Adherence to traditional
structures is seen as an obstacle to the introduction of digital administrative services: "One of them (...) is the adherence to traditional or rather outdated methods of work, hierarchical organizational structures, and silos. They are obstacles to the adoption of new digital initiatives and significantly slow down the process of change" (Lemke et al., 2021, p. 73).

**Technical competencies** such as IT expertise and general IT skills are considered relevant, but they seem to play a rather subordinate role compared to the other competencies in terms of the frequency mentioned. Although they are recognized as fundamental, they are not seen as the most essential competencies (Hofmann & Ogonek, 2018). General IT skills are particularly important, because "managers are often not IT-savvy themselves and thus do not live up to a role model" (Hofmann & Ogonek, 2018). Mergel (2020) argues that IT skills are particularly needed for managing IT specialists within public administration. Even if IT skills are considered relevant in the literature, "a distinction must be made between leadership responsibility for large units, which can also be led with less specific IT skills, and the leadership of specialist teams, for which specialized IT knowledge is necessary" (Mergel, 2020, p.35).

**4.2 Development and Recruitment of Digital Leaders in the Public Sector**

As part of the results analysis of the literature study, we identified various measures for leadership development in order to build up some of the key competencies listed for digital leaders (see Table 6-4). According to Lang (2020), "Digital Leadership" centers can be named as one example to build leadership competencies in the public sector. Within this setting, educational events to train agile project management methods or design thinking are offered. In this regard, Hill (2021b) warns that managers must not adopt what they have learned as a template, but that it must be transferred to their own situation in a self-reflective manner, e.g., by means of learning diaries. Mergel (2020) also points to the benefits of informal learning, for example, through the use of open laptops for independent testing of new technologies.

As an internal measure, employees taught as digital pilots function as multipliers to interact and motivate their colleagues in certain manners of digitalization (Hofmann & Ogonek, 2018; Mergel, 2020). Furthermore, executives can share experiences and (best
practice) use cases within Communities of Practice (CoP) or homogeneous focus groups (Hill, 2021a; Lang, 2020).

In the context of higher education in administrative sciences, Ogonek et al. (2019) point out the value of simulation games, especially planning games. They are intended to serve as tools for building competencies by simulating real-world contexts (e.g., the introduction of digital service accounts) to help future civil servants gain an understanding of the concerns of a digitized administration and thereby build competencies such as cooperation or problem-solving skills (Ogonek et al., 2019). Ogonek and Becker (2018) also state that all content in the course of study should have a practical relevance and thus be context-related. A topic is thus not only viewed from a legal perspective, for example, but also includes business, technological or social aspects. According to Sarantis et al. (2019), interdisciplinary approaches should be promoted in education by, for example, seeking cooperation between science, technology companies and consulting firms in order to build up competencies for assessing technological trends.

Halsbenning et al. (2021a) recommend setting up an education and training platform in the form of a Massive Open Online Courses (MOOC) solution as part of electronic learning (e-learning). Educational content can be offered here by various universities. The digital learning units can be supplemented with blended learning (face-to-face and e-learning) and business games.

For newly learned methods and ways of working, a transfer into the daily work routine must also be ensured. To this end, fellowship programs are also being tested (e.g. Tech4Germany), in which experts from the private sector teach employees new ways of working as part of projects within the respective authority (Mergel et al., 2021).

Another way is to ensure digital leadership competencies in the public sector is the recruitment of specialists from within and outside of the public sector. In particular, to increase the chances of recruiting professionals with the required competencies from the private sector, prosocial motives for emphasizing the strengths of public administration and incentives (e.g., bonuses) can be emphasized (Newcombe2019). New positions should also be created to integrate relevant IT knowledge into public administration (Redmann & Rückel, 2021).
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<th>Communities of practice/ focus groups/ collegial advice</th>
<th>Administrative education and further training</th>
<th>E-Learning/ Blended Learning</th>
<th>Transfer into daily work routine</th>
<th>Fellowship program</th>
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Table 4-6. Leadership Development and Recruitment
5 Limitations and Further Research

Limitations of our work arise from the review method and the search strategy itself. For example, only five different databases were considered for the literature analysis. This limited number excluded search results from databases such as Scopus, ScienceDirect or IEEE. Furthermore, the analysis was carried out with selected keywords, some of which are buzzwords of recent years. Supplementary search words such as "e-leader","public institution" or "ministry" might have yielded additional results that use alternative terminologies in their publications. Further limitations arose in the context of the database queries, for example, from the limitation of the time period or the languages. In terms of comparability, only literature related to Western country contexts in the US and comparable European countries was selected, which might allow for a high level of comparability across these countries but leads to comparability issues in contexts other than those selected. In order to reflect the current state of research, publications from textbooks were disregarded.

Overall, the aim of our research was to provide an overview of all the competencies for digital leadership in the public sector that have been identified as relevant in the literature to date, and to raise awareness of their diversity. Consequently, although this research seeks to answer our postulated research question, our findings are not unique to digital leadership in the public sector, but also include competencies that may be of equal or different importance to non-digital leaders in the public sector or to (non-)digital leaders in the private sector. In addition, the competencies identified represent a very broad ideal, of which certain competencies are likely to be more important than others for successful leadership. Further research could build on our classified overview and investigate the differences in the required skills for different groups of leaders to see which are specifically relevant for digital leaders in in various parts of the public sector and how these need to be addressed differently. This could lead to an extended and more nuanced categorization, which could be particularly useful for appropriate leadership development and recruitment activities (for example, if a potential leader moves from the non-digital private sector to a digital leadership position in the public sector, the measures can be targeted).
Although we developed coding guidelines for each of the key and sub-competencies to prevent overlaps or blurriness between the categories, there might still be some interdependencies. These could be addressed in future research, for example, to see how certain competencies depend on and influence each other, so that practitioners understand what they should focus on when developing and strengthening competencies.

Although the literature review showed that some competencies were mentioned less or more frequently, this only gives a limited indication of their importance or impact. Future research can attempt to develop instruments or scales to make the competencies measurable and investigate the extent to which the individual competencies contribute to successful digital transformation in the public sector. While the literature study has already provided first insights into measures for the development of digital leadership skills as well as for digital leader recruitment, future research can continue to investigate and validate these measures. In addition, an overview of the necessary range of competencies can also help practitioners in particular to find the right digital leaders to advance the digital transformation more quickly and successful.

6 Conclusion

This paper expands the existing knowledge base on the competencies of digital leaders in the public sector by cumulating and structuring knowledge from a broad range of systematically selected papers published between 2013 and 2022. By conducting a structured literature search in different data bases, 25 relevant publications were identified and thoroughly analyzed. It was shown that digital leaders in the public sector need a broad range of sub-competencies in order to successfully deal with digital transformation and that these sub-competencies can be assigned to and summarized under the key competency categories of social cooperation competencies, management competencies, political-administrative competencies, socio-technical competencies, social autonomy competencies, organizational competencies and technical competencies, with the order ranging from the most frequently mentioned category in literature to the least mentioned. In addition, several measures for digital leadership competency development and recruitment could be identified in the articles analyzed.
7 References


Essay 5:
Measures for the Development of Digital Leadership Competencies for Managers in the Public Sector*

Abstract

The successful digital transformation of public administration requires well-prepared leaders with the appropriate competencies. This study aims to empirically validate and compare the measures for developing digital leadership competencies in the public sector that were previously identified in a literature review. Guided interviews with ten public sector employees at managerial and non-managerial levels were used to validate the identified competency development measures. The findings help expand knowledge about the requirements and challenges of digital transformation in the public sector and identify additional potential steps for developing these competencies in leadership recruitment and development. This study explains basic concepts such as digital leadership and competencies, describes the methods of qualitative data collection and analysis, presents the study's results, and discusses them in terms of research questions, limitations of the study, and implications for practice and research.

Keywords: Digital Leadership, Public Sector, Competencies, Leadership.

*This essay was co-authored with Jennifer Kendziorra (University of Hagen), Sonja Pilgenroeder (University of Hagen), and Till J. Winkler (University of Hagen). The interview guide is provided in the Appendix. The essay is published in HMD Praxis der Wirtschaftsinformatik 2024. It was initially published in German and has been translated into English for inclusion in this dissertation.

Essay 5: Measures for the Development of Digital Leadership Competencies for Managers in the Public Sector

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Essay 5: Measures for the Development of Digital Leadership Competencies for Managers in the Public Sector
1 Introduction

The successful digital transformation of public administration is a crucial leadership challenge (Schneider, 2020) that requires well-prepared managers with the appropriate competencies. As digital leaders, managers must break up traditional organizational structures, act as drivers of innovation, and proactively involve employees in the transformation processes (Fischer, 2019; Beile et al., 2019; Kolberg, 2019). However, recent studies show that many managers in the public sector do not feel adequately prepared for this task (Redmann & Rückel, 2021).

Even if no clear definition of digital leadership has yet emerged in the literature, it is clear that the underlying concept of digital leadership has less to do with management and more to do with leadership. Digital leadership involves the transfer of decision-making powers from managers to employees, the importance of relationship and coaching behavior, and the appreciation of agility, transparency, and change (Petry, 2019). Digital leaders support organizations in developing a digital culture that enables fast and collaborative work (Kane et al., 2019). Therefore, traditional leadership skills and competencies need to be updated to enable leaders to meet these new challenges (Bartsch et al., 2021).

The academic literature has begun to increasingly address the topic of the digital transformation of public administration (Redmann & Rückel, 2021) and there is general agreement that the competencies required by managers are changing (Beile et al., 2019). Initial studies are also addressing the question of what these new competencies look like and how they can be structured. For example, Hunnius et al. (2015) examined relevant competencies for public sector employees with a focus on educational curricula. Based on a structured literature review, Kusanke et al. (2023) summarize what is known about the competencies required by digital leaders in the public sector and identify measures that contribute to building these competencies.

Against this background, the aim of this study is to empirically test the results of the literature review by Kusanke et al. (2023) with regard to the measures identified for competence development in terms of their practical feasibility. To this end, guided interviews were conducted with ten public sector employees at management and non-management levels, with whom the measures from the literature were discussed and
validated. The contrasting comparison of the findings from the literature research with the results of the interviews with practitioners not only expands the current state of knowledge but also allows the measures identified from the literature to be evaluated in terms of their relevance and applicability in practice. We pose the following research question:

*From a practical perspective, what measures are considered relevant for developing the digital leadership competencies of managers in public administration?*

The following section provides background information on the context of the study in Germany and explains basic terms such as digital leadership and competencies. Section 3 describes the methods of qualitative data collection and analysis. The results of the study are presented in section 4. Section 5 discusses the results with regard to the research questions, including the limitations of the study and its implications for research and practice.

2 **Theoretical and Practical Background**

2.1 **Digitalization in the German Public Sector**

Of the approximately 45 million people currently employed in Germany, around 5.2 million work in the public sector. This makes this sector the largest employer in Germany (Federal Statistical Office, 2022). This makes it all the more important to understand the impact of digital change on the German public sector. The first step is to create an awareness of its structures.

Diligence, reliability, and legal certainty in the performance of tasks characterize everyday life in public administration (Stich & Schwiertz, 2021), but also thinking in terms of responsibilities (so-called silo thinking) and pronounced hierarchical relationships, which result in long decision-making paths (Beile et al., 2019; Mergel et al., 2021). Compared to Scandinavian countries, for example, training in the German administration is based on a career system. Vacancies are, therefore, usually filled internally, meaning that there is no competition between applicants from the private and public sectors (Demmke, 2019). Innovation is also driven much less by competitive pressure than is the case in the private sector (Klein et al., 2021). In 2022, Germany ranked
only 22nd in the United Nations' Electronic Government (eGovernment) Development Index, which assesses progress in access to digital administrative services, among other things (United Nations, 2022).

In order to improve access to digital services, the Online Access Act (OZG) was passed in Germany and came into force in 2018. This law obliged federal, state, and municipal authorities to digitize 575 administrative services by the end of 2022 (Mergel et al., 2021). Germany has never had an administrative modernization reform of this magnitude (Proll, 2021). This put the authorities under enormous time and political pressure (Fischer, 2019). However, according to the annual report of the National Regulatory Control Council, only 33 out of 575 administrative services were digitally available across the board two months before the end of the implementation period (National Regulatory Control Council, 2022). Thus, the measurable results fell well short of expectations, not least due to a lack of corresponding resources and prioritization (National Regulatory Control Council, 2021). In May 2023, the Federal Cabinet therefore passed a law to amend the OZG to continue the efforts and prioritize and standardize the digital transformation. The amendment also included closer integration of the OZG with other major public administration projects, such as register modernization and digital identities (Federal Ministry of the Interior and for Home Affairs, 2023).

2.2 Digital Transformation and Digital Leadership Competencies in the Public Sector

The digital transformation has developed into a significant megatrend that permeates all areas of life and is accompanied by considerable challenges (Hölterhoff et al., 2018). The public sector is not unaffected by this change (Schardt, 2017). The digital transformation of public administration is leading to a paradigm shift in administrative culture (Stich & Schwiertz, 2021), which in turn significantly impacts work processes within the administration (Lühr et al., 2019). This is not just a digitalization of processes and services, but a reform of public administration (Mergel, 2019). The European Commission also emphasizes this:

"Successful digital transformation does not come from implementing new technologies but from transforming an organization to take advantage of the possibilities that new
technologies provide. Besides leading the change, this also requires that all people in an organization - leadership, IT professionals, employees in other divisions - obtain the competencies to embrace technology." (European Commission, 2016a, p. 76 f.)

Digital transformation is a design task that does not focus on technology (Stich & Schwiertz, 2021) but requires a holistic view of organization, people, and technology (Hill, 2016). In order to successfully exploit the potential of the digital transformation of public administration, the focus is increasingly shifting to the competencies of employees (Mergel, 2020; Ogonek et al., 2016). Competencies are seen as relevant drivers of digitalization in the public sector (Distel et al., 2019). Competencies at the management level, in particular, are subject to constant change (Beile et al., 2019), as managers are under considerable pressure to maintain an overview of the transformation and provide guidance (Stich & Schwiertz, 2021).

According to Heyse (2007), competencies describe people's dispositions (e.g., abilities, possibilities, and willingness) to act confidently and self-organized in situations with uncertain outcomes. Competencies are "founded on knowledge, constituted by values, disposed of as abilities, consolidated by experience [and] realized on the basis of will" (Heyse 2017, p. 246). Competencies are only verifiable retrospectively or in the context of current action (Heyse, 2017). In order to record them, competence-related categories can be formed which, among other things, record the characteristics of individuals (Faulstich, 1998). Observations or interviews are particularly suitable empirical research methods (Kaufhold, 2006).

According to Beck et al. (2017), in order to maintain efficiency and effectiveness in public administration in times of digital change, digital leadership is required to combine forms of traditional bureaucracy with open forms of leadership, self-organized units, and flat hierarchies. In an interview for the specialist portal VdZ (Administration of the Future), digital leadership has been described as a new type of leadership that makes it possible to meet the challenges of digital transformation. In public administration, digital leaders are needed to act as drivers of innovation and create a climate that enables the development of a digital mindset. To this end, they empower their employees to act in a self-organized manner and encourage them to develop innovations for citizens before discussing necessary budget changes and implementation options (Kolberg, 2019). Beile et al.
(2019) also emphasize that digital leadership is characterized by trusting and considerate interaction with one another, which also takes into account the individuality of employees (e.g. their understanding of technology). This requires managers who can take a step back in their leadership role, act in a self-reflective manner, and use agile forms of work as required.

As digital leadership is a rather new type of leadership and no definition has yet been established in public administration, this paper - based on the ideas of Beile et al. (2019), Buhse (2012), and Kolberg (2019) - understands digital leadership in public administration as a new form of leadership that attempts to harmonize employees, technologies, the framework conditions of public administration and the desires of citizens and companies in times of digital change.

2.3 Management Development, Recruitment, and Retention to Build Digital Leadership Competencies

The results of the literature review by Kusanke et al. (2023) show measures for digital leadership development, management recruitment, and retention in various areas of public administration.

Measures for leadership development are presented below. In the field of higher education in administrative sciences, simulation games, especially business games, are recommended as tools for building competencies (Ogonek et al., 2019). By simulating real contexts, future employees can develop an understanding of the concerns of a digitalized administration and build competencies such as cooperation and problem-solving competencies. It is also emphasized that the content of studies should have practical relevance and must consider various aspects such as business, technological, and social aspects. Interdisciplinary approaches should be encouraged by seeking collaboration between academia, technology companies, and consultancies to build competencies in assessing technological trends.

In terms of transferring these competencies to everyday working life in public administration, the identified competencies can be built up through educational events such as workshops. The "Digital Leadership" center, for example, offers such events in which agile project management methods such as Scrum and problem-solving approaches
such as Design Thinking are taught (Lang, 2020). However, it is emphasized that
managers should not simply adopt what they have learned but must apply it to their own
situation self-reflectively (Hill, 2021).

There is also informal learning, which promotes the independent exploration of new
technologies (Mergel, 2020). In addition, employees can be trained as digital pilots who
act as multipliers and teach their colleagues (Hofmann & Ogonek, 2018; Mergel, 2020).
Communities of practice (CoP) and homogeneous focus groups offer the opportunity for
managers to discuss specific use cases together and develop solutions to problems (Lang,
2020).

In the area of e-learning, the development of an education and training platform in the
form of a Massive Open Online Course (MOOC) solution is recommended. Such a
platform enables various universities to offer educational content that can be
supplemented by blended learning (face-to-face and e-learning) and simulation games
(Halsbenning et al., 2021).

Fellowship programs are also recommended to ensure the transfer of newly learned
methods and ways of working into everyday working life. Experts from the private sector
can teach employees new ways of working as part of projects within the authority (Mergel
et al., 2021).

Recruiting and retaining managers also play a role in building up competencies in public
administration (Mergel, 2020). It is recommended to recruit specialists not only from
within the administration but also from the private sector. Prosocial motives can be
emphasized to highlight the strengths of public administration. Additional incentives such
as bonuses can be used to attract and retain managers with special competencies from the
private sector. It is also recommended to create new positions, especially to integrate
appropriate IT knowledge into public administration (Redman & Rückel, 2021).

In the further course of this study, the results of the literature review by Kusanke et al.
(2023) are subjected to an empirical analysis about the identified measures for
competencies development in order to gain insights into whether or which measures are
already being successfully applied in practice and to uncover further potentially valuable
measures.
3 Method

A qualitative empirical interview study was conducted to answer the research question, "Which measures are classified as relevant from a practical perspective so that digital leadership competencies can be developed by managers in public administration?” which is explained in this chapter. As shown in Table 5-1, five interviews were conducted with managers (I1 to I5), such as Chief Digital Officers (CDOs), and five interviews with employees without management responsibilities (I6 to I10). The interviews were conducted in April and May 2022. Due to the COVID-19 pandemic, they were held as video meetings via Zoom or telephone interviews.

<table>
<thead>
<tr>
<th>No.</th>
<th>Type of authority</th>
<th>Job title</th>
<th>Duration/min</th>
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<tbody>
<tr>
<td>I1</td>
<td>City administration</td>
<td>CDO</td>
<td>17</td>
</tr>
<tr>
<td>I2</td>
<td>Police</td>
<td>Head of Human Resources</td>
<td>42</td>
</tr>
<tr>
<td>I3</td>
<td>University</td>
<td>CDO</td>
<td>31</td>
</tr>
<tr>
<td>I4</td>
<td>University</td>
<td>CDO</td>
<td>36</td>
</tr>
<tr>
<td>I5</td>
<td>City administration</td>
<td>IT Coordinator</td>
<td>18</td>
</tr>
<tr>
<td>I6</td>
<td>Police</td>
<td>Clerk</td>
<td>29</td>
</tr>
<tr>
<td>I7</td>
<td>District government</td>
<td>Clerk</td>
<td>26</td>
</tr>
<tr>
<td>I8</td>
<td>Tax authority</td>
<td>Clerk</td>
<td>21</td>
</tr>
<tr>
<td>I9</td>
<td>Police</td>
<td>Press spokesman</td>
<td>12</td>
</tr>
<tr>
<td>I10</td>
<td>City administration</td>
<td>Clerk</td>
<td>21</td>
</tr>
</tbody>
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Table 5-1. Overview of Interviewees

A semi-structured interview guide was developed to structure the research field. Semi-structured guidelines give the interviewer a certain amount of freedom to make decisions (Gläser & Laudel 2010), which allows for adjustments during the course of the interview (Döring & Bortz 2016). The content of the questions was derived from the preliminary theoretical considerations in the research field. A pre-test of the interview guide was conducted with two public service employees who did not take part in the empirical study.
The interviews were evaluated using Mayring's structuring content analysis method (2015). Structuring the content aims to filter out and summarize certain topics, content, or perspectives from the material (Mayring 2015). Mayring (2015) recommends using a coding guide containing definitions, anchor examples, and coding rules. As part of the evaluation, the transcribed contents of the interviews were first assigned or coded independently of two of the above-mentioned authors to the measures deductively derived from the current state of research (see Kusanke et al., 2023). Individual measures that emerged from the interviews were also added inductively. The newly created measures were added to the coding guide in an iterative process to ensure reliability between the coders.

4 Results

The possibilities and measures for developing digital leadership competencies mentioned in the interviews are presented below.

4.1 Management Development within the Authorities

Both the managers and non-managerial employees surveyed stated that training events could be a way of enabling managers to meet the requirements of the digital transformation of public administration. For example, technical competencies could be acquired through training, e.g. "so that you can now zoom or that you can operate a conference system" (I2). However, the fact that further training is not visible in the context of digitalization is seen as problematic. They are often offered "but by external providers, so you have to look for them specifically" (I9). It is also stated: "A lot is offered, but people don't take advantage of it. (...) That's still a big mistake" (I6). In this regard, it is also emphasized that older managers, in particular, often have difficulties with innovations and should therefore be introduced to training.

One key aspect that managers, in particular, point out is the transfer to everyday working life. Training courses have no added value without this transfer, because "then they come back and say: You've crammed this knowledge into me. But that does not mean I'm agile" (I3). Accordingly, the conclusion is: "A bit of theory and a whole lot of practice" (I3). With regard to transfer, reference is made to the advantage of actively supporting
managers in the authority so that they"also participate in these strategic decisions, which often really have to be made by the manager" (I2).

Informal learning, which can take place in a self-organized manner, for example as part of everyday life or work, is also seen as a further possibility for leadership development: "My first agile projects were also: you try it out, and at the same time simply acquire additional knowledge from books" (I3).

The transfer to everyday working life is also considered important in the area of administrative science training and higher education. The context should be taken into account through "a lot of practical units" (I3), and it is recommended, for example, not to go through numerous positions in the administration during a dual course of study but rather to "train those interested in IT in a job-specific way" (I10). Interdisciplinarity is also perceived as important with regard to management development. Higher education in public administration appears to focus on "law and legislation" (I6) and that digital aspects, for example, are hardly ever addressed. "Digital is given far too little attention and should actually be integrated everywhere" (I5).

One of the managers named the use of multipliers, such as change agents, as a relevant measure. Within this concept, "up to 16 employees are trained in-house (...) so that there is at least one contact person for all colleagues in every line" (I4). Communities of practice, focus groups, and collegial consultation are also popular, as they enable "mirroring with experiences" (I3) and feedback via "management feedback" (I6). This allows an exchange to take place in order to "talk to managers about the problems that arise as a result of digitalization (...)" (I2).

The technical equipment to support managers in their development is seen as problematic. For example, it is stated that during the time of "homeschooling (...) the internet connection was simply overloaded" (I8) and the equipment is often no longer up to date, e.g. due to a "small screen" (I4) or the "struggle to access special software components" (I9). There is a lack of planning systems to "better organize team tasks" (I4), and it seems that in some cases "a lot of value is placed on functionality (...), but very little value is placed on intuitive usability" (I9) when it comes to software developed internally by the authorities. With regard to the networking of cities, another disadvantage is that they
"obtain their programs from [individual] external providers and do not (...) work with a large [uniform] system" (I10).

While forms of blended learning are not discussed by either side, which could be due to a lack of availability or a previously mentioned lack of visibility, forms of e-learning appear particularly attractive during the COVID-19 pandemic. They offer "great flexibility" (I1) but also lead to an "inhibition threshold" (I8) compared to „sitting together in person" (I8).

Rethinking internal personnel structures underlines the relevance of training and selecting suitable managers within the authorities. The criterion should not be: "Have they waited long enough to be promoted? But rather: Do we trust them to do it?" (I2). The promotion of future managers by superiors also seems to be essential because "they have promoted a lot themselves, and they pass it on" (I6).

4.2 Measures to Recruit and Retain Managers

The results of the survey regarding the opportunities for attracting and retaining managers who are driving the digital transformation in public administration are presented below.

An employee from HR emphasizes that more recruitment from the private sector should be undertaken in order to "open up the field of applicants much further" (I6). In addition, managers in particular point to the need to improve the image of public administration. The external impression seems to be that "public authorities work rather slowly and don't have much to do with digitalization" (I1). It seems necessary to shed the "dusty image of the authority" (I5) and "establish an employer brand" (I4) or "attractive employer branding" (I6) in order to "appear modern to young recruits" (I1).

This can result in the creation of incentives, which is a particularly relevant way of attracting and retaining managers, both on the part of managers and non-managerial employees. In order to increase the attractiveness of public administration, for example, "modern equipment" (I9) is required, but also "simply to have confidence in other ways of working, that working hours also change (...) (that I) can work from home when I want" (I6). One employee emphasizes "that there is still so much on paper: I'm the only one in
the department (...) who can do home office sometimes" (I10). The "salary bracket (...) that is opening up in business and administration (...) that is now so divergent, especially for IT topics" (I4) also proves to be particularly problematic. This leads to the conclusion that "other salaries (are) to be paid, even if nobody wants to hear that" (I4).

However, the public administration should also emphasize its strengths. For example, there appears to be a good "work-life balance" (I4). In addition, "work is not done here for profit" (I3), but "for the common good" (I5). One manager also states that according to the Higher Education Act in North-Rhine Westfalia, for example, "there is no dismissal for operational reasons" (I3), which results in "a great deal of security and (...) a great deal of courage for these changes" (I3).

The creation of new positions is also seen as an important step. For example, recognizing the relevance of the role of a Chief Digital Officer (CDO) is "a very, very, very big step towards change" (I4). However, the new managers should also be open to innovation. This can lead to a lot of frustration if they ask themselves: "What can be optimized? And they are basically always dismissive" (I10).

As part of a suitable personnel selection process, care should be taken with regard to job advertisements to ensure that, for example, "digital competence" (I9) is specified as a criterion and that preference is not given to employees from within the authority for financial reasons, "some of whom come from completely different areas" (I10). At the same time, shorter tendering procedures should also be implemented, as otherwise a good manager "has already been snapped up elsewhere in the private sector in the meantime " (I3). Suitable publication channels should also be chosen to address digital managers. For example, an employee from HR stated that a lot of money is spent on newspaper advertisements that could possibly reach a "65-year-old grandma" (I6) in terms of their reach, but less so a suitable manager. Furthermore, one manager states that - if no suitable personnel can be found - IT areas should be outsourced to external or shared service providers such as IT.NRW.
5 Discussion

In order to answer the research question as to which measures are considered relevant from a practical perspective in order to develop the digital leadership competencies of managers in public administration, the results of the interviews were presented with regard to the two focal points, internal management development and the recruitment and retention of (external) managers. The findings are compared below with the current state of research (Kusanke et al., 2023).

The measures (M) marked in bold in Tables 5-2 and 5-3 were derived inductively from the expert interviews, while the measures in italics were only mentioned in the literature. Measures without further highlighting were both found in the literature and mentioned in the interviews. The comparison of the findings from the literature research with the results of the interviews not only expands the current state of knowledge but also enables the measures described and examined in the literature to be checked for their practical relevance and application.
Leadership development - synthesis of the results of the literature study and the interviews

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
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<tbody>
<tr>
<td>M1:</td>
<td>Organizing and increasing the visibility of educational events</td>
</tr>
<tr>
<td>M2:</td>
<td>Transferring what has been learned into everyday working life</td>
</tr>
<tr>
<td>M3:</td>
<td>Encouraging informal learning</td>
</tr>
<tr>
<td>M4:</td>
<td>Inclusion of digital, practice-oriented content in the university curriculum</td>
</tr>
<tr>
<td>M5:</td>
<td>Promotion of university research on competencies and leadership</td>
</tr>
<tr>
<td>M6:</td>
<td>Integration of digital, practical content in in-company training</td>
</tr>
<tr>
<td>M7:</td>
<td>Use of multipliers</td>
</tr>
<tr>
<td>M8:</td>
<td>Formation of communities of practice/focus groups / peer counseling</td>
</tr>
<tr>
<td>M9:</td>
<td>Improvement of technical equipment</td>
</tr>
<tr>
<td>M10:</td>
<td>Development of e-learning programs</td>
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<tr>
<td>M11:</td>
<td>Rethinking internal personnel structures</td>
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<td>M12:</td>
<td>Promotion of future managers by superiors</td>
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<td>M13:</td>
<td>Use of learning diaries</td>
</tr>
<tr>
<td>M14:</td>
<td>Offer of fellowship programs</td>
</tr>
</tbody>
</table>

Measures marked 'bold' (M): inductively derived from the interviews
Measures marked in italics (M): only mentioned in the literature
Measures without further emphasis were both found in the literature and mentioned in the interviews

Table 5-2. Synthesis of the Measures Identified to Build Competencies as Part of Management Development

Both in the previous research and the interviews, educational events and e-learning courses were cited as helpful in developing relevant competencies for managers. However, both sides emphasized that this requires a successful transfer into the day-to-day work of the authorities. With regard to suitable training formats, "examples from practice and the transferability of the content to everyday working life were identified as essential for effectiveness" (Lang 2020, p. 15). Hill also refers to the value of learning diaries in this regard (Hill, 2021). The introduction of learning diaries and feedback discussions can also encourage managers to recognize their own shortcomings and to develop themselves in a self-organized manner. According to the interviewees, the lack of visibility of teaching and learning opportunities and the lack of motivation to take advantage of them are problematic. Accordingly, making suitable training courses visible, e.g., through notices from the authorities or recommendations on the intranet, are
important measures. In the event of a lack of motivation, consideration should also be
given to obliging managers to participate in essential measures, for example with regard
to holding video meetings.

With regard to administrative science training and higher education, the interviewees
again emphasize the importance of contextualization and practical transfer in order to be
able to implement the content learned in the working world. This also applies to the
simulation games recommended in the literature for competency development (Ogonek
et al., 2019). With regard to interdisciplinarity, a holistic perspective should continue to
be adopted (Ogonek & Becker, 2018). For example, "every subject should (...) include
digitalization competencies at a fundamental level" (Mergel et al., 2021, p. 31). In the
view of the interviewees, university research should also be increasingly supported in
order to identify promising developments at an early stage. In some cases, such initiatives
can already be found in practice. For example, the state of North Rhine-Westphalia has
funded the establishment of the "Work - Education - Digitalization" (Arbeit – Bildung-
Digitalisierung) research institute at the FernUniversität in Hagen with the aim, among
other things, of investigating the question of what digital transformation means for
leadership and how the corresponding personnel and organizational development is
changing with regard to administrations (FernUniversität Hagen, 2023).

While multipliers are cited in the literature as important for advising colleagues on digital
transformation issues (Hofmann & Ogonek, 2018), this option is apparently hardly known
in practice. Instead, feedback discussions with employees or collegial advice in the form
of an exchange of experiences between managers, for example, are considered valuable
in order to build up new competencies.

Inductive conclusions from the interviews included the technical equipment as a
necessity, the lack of which can stand in the way of successful management development,
as small monitors and a lack of planning systems, for example, make a cooperative
exchange in video meetings more difficult. It was also possible to inductively derive the
category 'Rethinking internal personnel structures', which questions the career principle
within public administration and focuses on competencies. The promotion of future
managers by superiors was also inductively derived from the interviews.
In terms of attracting and retaining suitable managers for public administration, interviewees also recommend increased recruitment from the private sector. According to Mergel, this is already being taken into account: "Other countries, like Germany (...), have focused on recruiting IT staff from other administrative or economic sectors" (Mergel 2020, p. 36).

| Manager recruitment and retention - synthesis of the results of the literature study and the interviews |
|---------------------------------|-----------------------------------------------|
| M15: Recruitment from the private sector | M20: **Openness to innovation** |
| M16: **Improving the image**          | M21: **Appropriate personnel selection**      |
| M17: Creating incentives             | M22: **Shorter tendering procedures**         |
| M18: Emphasizing strengths           | M23: **Selection of suitable publication channels** |
| M19: Creation of new jobs           | M24: **Integration of external IT service providers** |

Measures marked '**bold**' (M): inductively derived from the interviews

Measures without further emphasis were both found in the literature and mentioned in the interviews

Table 5-3. Synthesis of the Measures Identified to Build Competence in the Context of Management Recruitment and Retention

The category of image improvement was also inductively derived from the interviews. It is recommended to establish an attractive employer brand in order to overcome the ‘dusty’ image of public administration. To this end, targeted advertising campaigns could be carried out to publicize the strengths of the public administration. Various media channels should be used to present the administration as modern and to dispel the outdated image cited by the interviewees. For example, the state government of North Rhine-Westphalia launched the target group-specific advertising campaign "You make the difference" in 2021 with the aim of raising awareness of the diversity of professions in the public sector and creating more role models that young people with a migration background in particular can look up to (Ministerium für Kinder, Jugend, Familie, Gleichstellung, Flucht und Integration des Landes Nordrhein-Westfalen, 2021).
Moreover, in order to attract higher-paid managers from the private sector, both sides also emphasize the need to create incentives, for example in the form of financial bonuses or the facilitation of flexible working methods. This problem is also recognized in the literature: "Although it is known what competencies the public administration needs, there is still a lack of penetration of competencies (...). This may be due to lower pay in the public sector or even a lack of interest in administrative informatics" (Halsbenning et al. 2021, p. 176). In this regard, experts also consider it particularly relevant to emphasize the strengths of the public sector. For example, public administration offers a great deal of security, which can give rise to the courage to change. Furthermore, "the prosocial motives" (Mergel 2020, p. 36) for promoting the common good can be emphasized.

Interviewees are of the opinion that "new positions need to be created" (Redmann & Rückel 2021, p. 987) and roles rethought as part of the digital transformation of public administration. For example, "the role of the CDO is currently rather rare. (...) However, this only does limited justice to the importance of digitalization" (Fischer 2019, p. 244). In this context, the inductively created category of openness to innovation also indicates that it is not enough to provide the relevant positions; new ideas should also be promoted and implemented within the authorities.

Measures 21 to 24 were also derived inductively. Interview participants pointed out that vacant positions should not be filled with non-specialist, internal personnel for cost reasons, but that suitable personnel should be selected with a focus on the required competencies. In addition, shorter tendering procedures should be established in order to avoid losing suitable specialists to the private sector. The perceived need for these measures (especially M21-M23) could be related to the intensifying 'war for talent'. According to a recent study by management consultants McKinsey, a total of 840,000 additional full-time specialists will be needed in the public sector by 2030, compared to 'only' 360,000 in 2023, with the personnel gap in IT and digital professions being particularly large. The consultancy firm also recommends accelerating recruitment processes and advises using a specialist agency if necessary (McKinsey & Company, 2023).

Furthermore, the publication channels must be selected in such a way that digital leaders are also reached. The emergence of the need for a multimedia approach is also made clear
by the "Randstad Employer Brand Research 2022" study. The study, which has been conducted annually since 2000, asks German employees what is important to them when choosing an employer and how they find their next potential employer. The results show that in 2022, over 25 percent of those looking to change jobs, four percentage points more than in 2021, searched for jobs via search engines such as Google. In addition, the use of social media in job searches has more than doubled from 10 to 21 percent since 2021 (Randstad, 2022).

This study is not without limitations. In particular, it surveyed a sample of five managers and five non-managers from different areas of public administration. Accordingly, it is not representative and the results should be generalized with caution.

6 Conclusion

As part of the study, it was possible to empirically derive various options for developing competencies for digital leaders in public administration. The results, which can also be interpreted as practical implications, indicate that missing competencies can be developed, for example, through educational events such as workshops or flexible e-learning offerings. In this context, however, it seems essential that a connection to everyday working life in the respective authorities is established and a transfer is made possible, as otherwise the competencies learned can hardly be applied. This could also be determined for the training courses within the framework of administrative science training and higher education, which should also be less legally focused and more interdisciplinary. The exchange of experience between managers and forms of collegial consultation were also considered valuable for the development of important competencies. However, it is relevant that managers self-reflectively recognize their own deficits in order to be able to specifically develop skills for their individual situation in the authority. With regard to building up skills by attracting and retaining suitable managers for public administration, it was stated that the latter must shed its outdated image in order to appear as an attractive employer. To this end, the strengths of, for example, a secure workplace and prosocial aspects should be emphasized, but incentives should also be created, for example by offering more flexible working methods or by making the remuneration model more flexible.
Future research could build on the empirically derived overview of measures presented here and examine the differences in the measures to determine which are specifically relevant for digital leaders in different areas of the public sector and how these need to be addressed differently. This could lead to an expanded and more nuanced categorization. It could also be useful to investigate how, for example, managers from different authorities can network with each other to encourage an exchange of experience, which could also help less experienced and financially weaker local authorities to drive forward the digital transformation in their authority.
7 References


Essay 5: Measures for the Development of Digital Leadership Competencies for Managers in the Public Sector


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Essay 6: Personality Traits and Ambidextrous Work Environments in IT Organizations – A Person-Job Fit Perspective*

Abstract

Driven by dynamic competitive conditions, companies’ information technology (IT) functions adopt agile practices and build ambidextrous organizational structures, which, in turn, affect the work environment of individual IT employees. Based on the fundamental assumption of person-environment fit theory that people seek out environments which allow them to behaviorally manifest their traits, this research aims to shift the focus in organizational design choices towards an individual-level perspective. We study whether and how personality traits and work environment characteristics, measured at the individual level of ambidexterity, relate and impact person-job fit (P-J fit). The results of a survey of 279 IT workers show that personality traits (operationalized by the Five Factor Model) significantly differ across exploitative and explorative work environments. Furthermore, the data suggests that the relationship between extraversion, conscientiousness and openness to experience on P-J fit is moderated by the level of ambidexterity.

Keywords: Ambidexterity, Personality, Work Environments, Bimodal IT, Person-Job Fit.

*This essay was co-authored with Janna Behnke (Eindhoven University of Technology) and Till J. Winkler (University of Hagen). The online questionnaire is provided in the Appendix. The essay is published in the proceedings of 56th Hawaii International Conference on System Sciences 2023 (minor changes are possible).

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1 Introduction

Driven by the dynamic competitive conditions of today’s business environment, an increasing number of firms are experimenting with new, and what they hope will be more dynamic, organizational structures for their IT functions. They adopt agile practices and build ambidextrous work environments that simultaneously focus on exploration and exploitation (Leonhardt et al., 2017), which is often referred to as bimodal IT (Haffke et al., 2017).

Scholars who have studied bimodal IT and ambidextrous IT work environments have worked predominantly at the organizational level, neglecting the individual level of the employee (Kusanke & Winkler, 2022). This is surprising given that the two different modes (exploitative vs. exploratory) require entirely different skills and mindsets (Haffke et al., 2017). Going further, these two modes differ not only in their project management approach, but are also embedded in different cultures, are based on different strategic and operational management styles, and fulfill unique objectives (Haffke et al., 2017). Ultimately, they represent opposing job characteristics (e.g., process-centered vs. human-centered) (Gerster et al., 2018). Therefore, people with different personality traits might be necessary within exploratory vis-à-vis exploitative work environments.

The match between employees and their work environments is a widely researched topic in organizational behavior (e.g., Kristof-Brown et al., 2005). The psychology and social science literature stress the importance of the interplay of personality, a stable pattern of psychological processes, characteristics (Mayer, 2005), and job characteristics (Erhart, 2006). According to the assumptions of the person-environment-fit theory (P-E fit) (Kristof-Brown et al., 2005), which encompasses the person-job fit (P-J fit) perspective, people seek out (work) environments that allow them to behaviorally manifest their traits (e.g., dominant individuals seek leadership positions). Furthermore, the extent to which one fits their (work) environment has significant consequences for positive work-related outcomes, such as satisfaction, performance, and productivity (e.g., Rounds & Tracey, 1990). In the context of career intervention, P-E fit is essential for career planning, decision-making, and adjustment (Su et al., 2015). In addition, meta-analytic evidence has shown that fit perceptions are more predictive than objective fit assessments for almost all work-related outcomes (Kristof-Brown et al., 2005).
While recent Information Systems (IS) research has shown that the aforementioned changes in work environments have an influence on the skillset needed (e.g., Michalczyk et al., 2021; Merchel et al., 2021) authors call for more research studying the relevance of personality traits (Bui, 2017). Personality is acknowledged to be relevant in IS (Maier, 2012) and to have influence in the new work context (De Kok & Helms, 2016). Previous research regarding personality focused on agile work environments and was of qualitative nature studying, for example, personality traits of those fulfilling Scrum roles (Baumgart et al., 2015), software developers (e.g., Balijepally et al., 2006), and software engineers (Capretz, 2003). Other studies focus on personality traits at the IT team level (Strode, 2016). To the best of our knowledge, there is no study that assesses individual personality traits among IT employees in explorative versus exploitative work environments.

Addressing the lack of knowledge on personality in today’s IT work environments, this research aims to shift the focus on organizational design choices towards an individual-level perspective. While most ambidexterity research has focused on the organizational level it is seen as a multilevel phenomenon that is also driven upwards by individuals (Good & Michel, 2013). The individual-level perspective can help IT professionals and organizations better understand the areas in which IT workers are likely to have the best individual fit. We see relevance for further research, especially in light of the current shortage of IT workers and their high replacement cost (Joseph et al., 2007). Acknowledging the fact that attracting, motivating, and retaining workers hinges on fulfilling their needs at work (Prasad et al., 2007) it is important to assess the underlying psychological characteristics and tendencies which can be used to determine individual commonalities and differences, part of which are determined by personality traits (Mayer, 2005).
We aim to contribute to the existing knowledge base by studying whether and how individual personality traits relate to different work environments and affect an individual’s P-J fit. Thus, we formulate the following research questions:

**RQ 1:** How do personality traits differ between IT employees in explorative and exploitative work environments?

**RQ 2:** Does the work environment influence the relationship between personality traits and P-J fit?

To this end, this paper first explains the theoretical foundations of ambidextrous work environments and the chosen model of personality traits. We then explain our methods and results. We finally discuss our findings and close with the limitations and potential further research directions emerging from this study.

## 2 Theoretical Background

### 2.1 Ambidextrous Work Environments

Today’s business world is affected by continuously changing market demands and changes in technology. Therefore, organizations face increasing pressure to become more adaptable, agile and dynamic (Ravichandran, 2018). As a result, companies adopt and scale agile capabilities to account for the demand to deal competitively with changes at increased levels of speed and flexibility (Kohli & Melville, 2018). This corresponds with the observation that companies have sought bimodal forms of organization for their IT functions that provide both, explorative and exploitative capabilities (Haffke et al, 2017).

While exploration refers to activities associated with terms such as experimentation and innovation, exploitation refers to activities associated with terms such as efficiency and execution (March, 1991). Both of them are seen as indispensable for achieving organizational ambidexterity (March, 1991). Consequently, while (organizational) ambidexterity is defined as simultaneously – and equally successfully – pursuing exploitative and explorative activities, individual ambidexterity represents the ability to flexibly engage in both modes (Mu et al., 2022).

These, explorative and exploitative work environments in IT not only differ in their project management approach, but they are also embedded in different cultures, based on,
and steered by different strategic and operational management styles, and they aim at fulfilling unique objectives (Haffke et al., 2017). Within the exploitative mode, the focus mostly lies on individual work, where the process flow is predominantly consecutive with strong emphasis on documentation. It is associated with a work environment that places emphasis on experience, routine and present knowledge (Mom et al., 2009). Thus, within an IT context, it is often used for mission and business-critical information systems and the operation of a company’s core processes (Horlach et al., 2017). This side of a bimodal organization is responsible for minimizing operational risk, often using sequential project management methods, such as waterfall methodologies (Haffke et al., 2017). Within this environment, management promotes a risk averse culture, accentuating safety and accuracy (Haffke et al., 2017) wherein roles and tasks of each individual are clearly defined and relatively constant (Balijepally et al., 2006). In contrast, the explorative work environment focuses on customer experience and business outcomes driven by rapidly changing market needs (Zhen et al., 2021). It is associated with work environments that put an emphasis on searching for new possibilities, evaluating diverse options, adaptability, and new skills (Mom et al., 2009). Such explorative activities are usually employed for projects with less certain outcomes, targeting at short release cycles and choosing iterative project management styles, such as Scrum (Haffke et al., 2017). The culture in explorative work environments tends to be driven by the principles of agility and speed and is characterized by self-organizing teams and teamwork (Haffke et al., 2017). In contrast to exploitative work environments, explorative work environments and associated project methods often demand frequent deliveries of work results, constant close collaboration with the customer, an openness to changing requirements, and an avoidance of excessive planning and documentation (Tripp et al., 2016). From a management perspective, the shift to flat hierarchies with trust-based collaboration and self-organization changes the role of supervisors to a more coordinating and mentoring role (Balijepally et al., 2006). In summary, adopting practices that are associated with exploration have far-reaching implications especially at the level of the individual, and, their roles and responsibilities (Gerster et al., 2018).
While work environments can combine elements of both, exploration and exploitation, one of the two modes typically prevail in a given IT context. In this work we, therefore, conceptualize work environments dichotomously to be either more explorative or more exploitative.

2.2 Personality

Personality is defined as a stable pattern of characteristics and tendencies (Mayer, 2005). They are commonly seen as context-free and relatively enduring characteristics that are not easily changed with behavioral training (Kichuk & Wiesner, 1997). Consequently, personality changes little over time and influences various aspects of an individual’s perceptions and behaviors (Pfluegner et al., 2021). Individual personality traits are of interest to organizations both for their effect on an individual task or role and on team processes and outcomes (Balijepally et al., 2006). Previous research has also demonstrated the relevance of personality traits in various IS domains. It has been shown to be an important variable to many facets of one’s (work) life; proneness to technostress, job satisfaction (Pfluegner et al., 2021), influence on innovation and performance (Eshet & Harpaz, 2021), career choices (Warren et al., 2012), and IT addiction (Vaghefi & Qahri-Saremi, 2018). An overview of personality in IS literature was published by Maier (2012).

The Five Factor Model of Personality (or Big-Five Personality) is one of the most common methods to analyze and describe a person’s distinct personality. It has been well-researched by personality psychologists and is accepted as providing substantial evidence of its merits as a measure of individual personality and personality differences (McCrae & John, 1992; John et al., 2008). The Five Factor Model is a hierarchical organization of personality traits in terms of five basic dimensions: neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness (McCrae & John, 1992). These dimensions have been found to demonstrate convergent and discriminant validity across instruments and observations have also been shown to be stable over time and generalizable across cultures (McCrae & John, 1992; Balijepally et al, 2006). The Big Five structure does not imply that personality differences can be reduced to only five traits, but these five traits represent personality at the broadest level of abstraction, and
Each dimension summarizes a large number of distinct, more specific personality characteristics (John & Srivastava, 1999). The five traits thus provide a holistic picture of an individual’s personality.

Neuroticism is a measure of affect and emotional control. It indicates the level of personal adjustment to and tolerance for stress. Individuals that score low on this dimension exhibit higher emotional stability and are better prepared to cope with stressful situations, whereas those with high levels of neuroticism are reactive and more easily troubled by stimuli in their environment. They more frequently become unstable, worried, temperamental, and sad (McCrae & John, 1992). Extraversion is a measure of the degree of sociability and gregariousness. People scoring high on this dimension tend to be more outgoing and enjoy interacting with others (McCrae & John, 1992). The extraversion dimension contrasts an outgoing character, with associated adjectives such as talkative, rapid personal tempo, gesturally expressive, assertive behavior with a withdrawn nature (Warren et al., 2012). Those with high extraversion are perceived as attention-seeking and domineering while those with low extraversion are reserved and reflective (Warren et al., 2012; McCrae & John, 1992). Openness to experience is a measure of the tendency to prefer new experiences over routines (Pflügner et al., 2021) and indicates being open to new ideas. Individuals scoring high on this dimension show tendencies of inquisitiveness and creativity with adjectives commonly associated with openness, curiosity, imaginativeness, and originality (McCrae et al., 1987). Agreeableness measures friendliness and the degree of trust exhibited by individuals. People high on this dimension tend to be trusting and cooperative and are moved by the needs of others (Pflügner et al., 2021; McCrae & John, 1992). Adjectives commonly associated with agreeableness include appreciative, forgiving, generous, kind, sympathetic, non-critical, and trusting (McCrae et al., 1987). Conscientiousness measures the level of organization, commitment, and persistence exhibited by individuals. It describes the tendency to act in a planned and duty-oriented manner and is manifested in qualities such as self-discipline and goal orientation. Adjectives that are generally associated with conscientiousness include organized, efficient, planned, reliable, responsible, and thorough (McCrae et al., 1987).
3 Hypothesis Development

Based on the presented literature, we develop our hypotheses about the relationship of personality traits among IT workers in explorative versus exploitative work environments and their relationships with P-J fit.

As theorized above, individual exploration entails activities with regards to new or alternative knowledge and skills, while individual exploitation entails activities comprising existing experience and present knowledge that help optimize existing job tasks (Mu et al., 2022)

The neuroticism trait is associated with affect and emotional control. While people with high levels of neuroticism are reactive and more easily bothered by stimuli in their environment, those with lower levels tend to have high levels of personal adjustment and tolerance for stress (McCrae and John, 1992). Since, in explorative environments, employees are confronted and expected to deal with fast changing environments, seeking out new possibilities, and measures to enhance the speed and flexibility of organizations, we posit the following hypothesis:

**H1:** The level of neuroticism is higher for employees in exploitative work environments compared to those in explorative work environments.

Extraversion is associated with sociability and gregariousness as well as the desire to seek out new opportunities and excitement (McCrae & John, 1992). Explorative environments encourage the search for new possibilities and new skills (Mom et al., 2009), while exploitative environments focus more on individual work using existing knowledge and routines (Mom et al., 2009). Therefore, we posit the following hypothesis:

**H2:** The level of extraversion is higher for employees in explorative work environments compared to those in exploitative work environments.

Agreeableness encompasses the lower-level trait of trust, so that those who are high agreeable tend to be trusting and cooperative (Balijepally et al., 2006). In explorative environments, collaborative team decision-making devolves down to teams and even individual level and a team is jointly responsible for work outcomes (Balijepally et al.,
Thus, an essential requirement for effective collaboration is trust and goodwill among team members. Management control shifts to trust based collaboration and self-organization (Balijepally et al., 2006). In exploitative environments management control tends to be executed through plans, processes and verification, so we therefore posit the following hypothesis:

**H3:** *The level of agreeableness is higher for employees in explorative work environments compared to those in exploitative work environments.*

Conscientiousness is associated with organization and persistence tends to be an indicator of competence, order, dutifulness, achievement striving, self-discipline, and deliberation. Therefore, high conscientious people prefer order and planning to spontaneity. They prefer to work in highly-structured environments with clear lines of responsibility and authority (Shropshire et al., 2017). In explorative environments, teams operate under a smaller set of guidelines and are allowed and required to adapt to changing demands by encouraging behavior that includes searching for alternatives and disengagement from the current task (Laureiro-Martinez et al., 2010). Consequently, an absence of rules to deal with every possible situation could be discomforting to those who prefer a more orderly work environment. Therefore, we posit the following hypothesis:

**H4:** *The level of conscientiousness is higher for employees in exploitative work environments compared to explorative work environments.*

Openness to experience is associated with a tendency to prefer new experiences over routines (Pflügner et al., 2021) and indicates being open to new ideas. People with high levels of "openness to new experiences" tend to show curiosity and creativity. In explorative environments, employees refine themselves constantly, deal with new technologies and react to changing market demands, often by experimenting with new alternatives (March, 1991). In contrast, exploitative work environments are stable, routine-based operations that build upon experience and present knowledge (Mom et al., 2009). Therefore, we posit the following hypothesis:

**H5:** *The level of openness to experience is higher for employees in explorative work environments compared to those in exploitative work environments.*
Following the assumption that people seek out (work) environments that allow them to behaviorally manifest their traits, we hypothesized in which environment (exploitation vs. exploration) employees score higher on each of the five traits (H1-H5). Moreover, fit theory proposes that outcomes are most optimal when environmental and personal attributes are compatible (van Vianen, 2018). While outcomes show at all levels of fit, they are optimal when individuals experience fit on high personal attributes and fit at higher levels of an attribute is superior to fit at lower levels (van Vianen, 2018). Following the above-mentioned research findings and the fundamental assumptions of the P-J fit theory, we assume that certain personal characteristics fit better with certain work environments. Thus, we expect:

**H6:** The relationship between extraversion, agreeableness, and openness to experience and P-J fit is stronger in more explorative work environments.

**H7:** The relationship between neuroticism and conscientiousness and P-J fit is stronger in more exploitative work environments
4 Research Method

4.1 Sample and Procedure

To test our hypotheses, we conduct an online survey and collected data in Germany in April and May 2022. A pre-test (n=12) was conducted. Survey data was collected through a market research company. Participants were part of an online panel and compensated by the market research institute. They were pre-selected and confirmed that they work in the IT department of a company, are involved in IT projects, or are employed or self-employed as an IT professional. At the beginning of the questionnaire, we guaranteed confidentiality to reduce social desirability biases. After the data collection, we applied data-cleaning procedures. All incoming datasets were filtered according to a) speeding (all respondents whose processing time was lower than half of the pre-test processing time of 20 minutes) and b) for data quality based on consistency checks in respondents’ answering behavior. From the total data set (n = 553), 49.6% of the responses (n = 274) were removed due to insufficient data quality. The vast majority of the respondents that were removed (94%) had spent less than 10 minutes on the questionnaire, which, according to our pre-test, we regarded as below the minimum threshold for the survey. Of the 279 participants that were included in the analysis, 169 were male (60.57%) and 110 were female (39.43%). The ages of the participants ranged from 21 to 70 years, with a mean of 46 years and a standard deviation of 11.66 years. The participants came from a variety of industries, including professional services (18%), public services (12%), and electronics and high-tech (10%). Their length of employment at the company was more than 5 years for over 50% of the respondents.

4.2 Measures

We measured personality with the Big Five Inventory 2 (BFI-2) developed by Soto and John, (2007). The BFI-2, which assesses the prototypical features of each of the Big Five domains (i.e., conscientiousness, neuroticism, extraversion, openness to experience, and agreeableness), is based on the Big Five Inventory (BFI), (John & Srivastava, 1999). The BFI-2 is seen to provide greater bandwidth, fidelity, and predictive power than the original BFI questionnaire (Soto & John, 2007). It consists of 60 items that offer a general measure of the Big Five personality factors. Each factor is assessed using 12 items that
describe a person’s habitual behavior. In this survey, the respondents were asked to indicate the extent to which they agree or disagree with a given statement. We use the German BFI-2 instrument by Danner et al. (2019), who translated the items from English into German and established factor reliability (extraversion $\alpha=.86$, agreeableness $\alpha=.80$, consciousness $\alpha=.89$, neuroticism $\alpha=.88$, openness to experience $\alpha=.84$).

In order to measure work environment ambidexterity, we use the two seven-item scales from Mom et al. (2009), who had validated these scales in the financial services industry (exploration $\alpha=.85$ and exploitation $\alpha=.81$). The authors developed a measure of exploration and exploitation at the manager level that consists of exploration activity items and exploitation activity items. Thus, we asked the respondents to what extent they engage in certain work-related activities (e.g., activities in which a lot of experience has been accumulated). We measured the answers on a five-point scale ranging from 1 (= never) to 5 (= always). We translated the items from English to German in a collaborative, iterative procedure as proposed by Douglas and Craig (2007) and tested their applicability to the level of an IT employee. This approach is superior to the method of backtranslation, accounting also for issues of conceptual equivalence (Douglas & Craig, 2007). To determine the work environment mode, in line with our dichotomous conceptualization, we calculated the levels of exploration ($x$) and exploitation ($y$) and assessed whether an employee’s work environment rather tended towards exploration ($x>y$) or towards exploitation ($x<y$).

We measured person-job fit ($\alpha=.89$) with a scale developed by Lauver and Kristof-Brown (2001). The items contained questions about fit with the job in terms of skills (e.g., "My abilities fit the demands of this job," and personality/temperament (e.g., "I am the right type of person for this type of work"). Respondents indicated their level of agreement with each statement on five-point Likert scales ranging from strongly disagree to strongly agree.

In order to check for common method variance, a Harman’s single-factor test was applied. The results of the factor analysis (33.9%) is below the threshold of 50%, which suggest that common method bias is not an issue in our data.
5 Results

First, we present descriptive statistics in Table 6-1, for each of the investigated constructs.

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuroticism</td>
<td>1.00</td>
<td>4.42</td>
<td>2.33</td>
<td>.68</td>
</tr>
<tr>
<td>Extraversion</td>
<td>1.67</td>
<td>4.92</td>
<td>3.36</td>
<td>.67</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>2.00</td>
<td>4.92</td>
<td>3.82</td>
<td>.54</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>2.00</td>
<td>5.00</td>
<td>3.96</td>
<td>.65</td>
</tr>
<tr>
<td>Openness to experience</td>
<td>1.75</td>
<td>5.00</td>
<td>3.76</td>
<td>.66</td>
</tr>
<tr>
<td>P-J fit</td>
<td>2.20</td>
<td>5.00</td>
<td>4.36</td>
<td>.64</td>
</tr>
<tr>
<td>Level of exploration</td>
<td>1.00</td>
<td>5.00</td>
<td>3.29</td>
<td>.72</td>
</tr>
<tr>
<td>Level of exploitation</td>
<td>2.14</td>
<td>5.00</td>
<td>3.86</td>
<td>.56</td>
</tr>
</tbody>
</table>

Table 6-1. Descriptive Statistics

Hypotheses 1-5 predicted that the level of the personality traits is higher in one environment and lower in another. We calculated the means for each personality trait per work environment subgroup and tested the hypotheses through independent t-tests. The results are reported in Table 6-2.
Personality Traits and Ambidextrous Work Environments in IT Organizations – A Person-Job Fit Perspective

<table>
<thead>
<tr>
<th>Trait</th>
<th>Work-environment</th>
<th>Mean</th>
<th>SE</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuroticism (N)</td>
<td>Explorative</td>
<td>2.42</td>
<td>.08</td>
<td>1.42*</td>
</tr>
<tr>
<td></td>
<td>Exploitative</td>
<td>2.29</td>
<td>.04</td>
<td></td>
</tr>
<tr>
<td>Extraversion (E)</td>
<td>Explorative</td>
<td>3.45</td>
<td>.07</td>
<td>1.40*</td>
</tr>
<tr>
<td></td>
<td>Exploitative</td>
<td>3.32</td>
<td>.04</td>
<td></td>
</tr>
<tr>
<td>Agreeableness (A)</td>
<td>Explorative</td>
<td>3.75</td>
<td>.07</td>
<td>-1.37*</td>
</tr>
<tr>
<td></td>
<td>Exploitative</td>
<td>3.85</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>Conscientiousness (C)</td>
<td>Explorative</td>
<td>3.91</td>
<td>.08</td>
<td>-0.67</td>
</tr>
<tr>
<td></td>
<td>Exploitative</td>
<td>3.98</td>
<td>.04</td>
<td></td>
</tr>
<tr>
<td>Openness to Experience (O)</td>
<td>Explorative</td>
<td>3.75</td>
<td>.07</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>Exploitative</td>
<td>3.75</td>
<td>.05</td>
<td></td>
</tr>
</tbody>
</table>

Table 6-2. Independent Samples t-Test

We see that trait levels for neuroticism, extraversion, and agreeableness are significantly different for employees in explorative and exploitative work environments. However, while the difference for extraversion (H2) is as was hypothesized (i.e., higher for employees in explorative work environments), it is reversed for neuroticism (H1) (i.e., higher in explorative environments) and also reversed for agreeableness (H3) (i.e., higher in exploitative work environments). This means only H2 is supported.

Further, H6 and H7 predicted that the relationships of the examined personality traits on person-job fit depend on the work environment.
To examine the question whether personality traits influence P-J fit in different work environments, calculations with the PROCESS macro available for SPSS (Hayes, 2013) were performed. PROCESS has become widely used by researchers interested in testing hypotheses about moderation (Hayes & Rockwood, 2017). The method of testing each relation separately, rather than with a hierarchical regression analysis, was used because of insufficient support from prior findings to indicate the precedence of one trait over another in predicting work outcomes (Lounsbury et al., 2007).

We calculated the individual mean values for the items measuring each personality trait and person-job fit. Work environment was again operationalized as a dichotomous variable. First, Figure 6-1 shows that all personality traits have a significant effect on person-job fit (coefficients N=-.41, E=.28, A=.37, C=.36 and O=.27) with significant levels p<.01.

Significant moderation effects were only found for extraversion (.21), conscientiousness (.26), and openness to experience (.24). For these three moderated relationships, we
observed the same direction of effects: The relationship between extraversion and P-E fit increases from .22 in exploitative environments to .45 in explorative environments. The relationship between conscientiousness and P-E fit increases from .28 in exploitative environments to .54 in explorative environments. The relationship between openness to experience and P-E fit increases from .19 in exploitative environments to .44 in explorative environments. Thus, while H6 is partially supported for extraversion and openness to experience, the direction of the moderation of the conscientiousness-P-E-fit relationship (H7) is reverse to what was hypothesized.

We controlled for potential biases of age and gender within the analyses. Gender and age did not significantly relate to P-E fit in our analyses.

6 Discussion, Limitations and Outlook

Ambidexterity and personality as a phenomenon and research object have already been addressed in IS research. While previous studies that investigate both constructs together were mostly of qualitative nature and primarily focused on the explorative side of ambidexterity, or on specific roles within IT organizations (e.g., Balijepally et al., 2006; Capretz, 2003), our research broadens this scope. Accordingly, we first look to validate the relationship of the level of certain personality traits of employees in ambidextrous IT work environments, such as those typically found in bimodal IT organizations (H1-H5) (Haffke et al., 2017). Second, we study the moderating effect of the potential relationship of personality traits on person-job fit in explorative and exploitative work environments (H6-H7). Consequently, the insights derived from this study are twofold.

First, our study indicates that the levels of extraversion, agreeableness, and neuroticism are significantly different for employees working in mostly explorative vs. exploitative work environments. In line with the person-job fit theory (Kristof-Brown et al., 2005), which postulates that people seek out (work) environments that allow them to behaviorally manifest their traits, the results of this study lead to the assumption that the personality of an IT employee does indeed differ depending on their work environment. For the extraversion trait, the data supports the hypothesis that IT workers in explorative work environments tend to score higher than those in exploitative environments (H2). The underlying explanation is straightforward. While the dimension of extraversion is associated with being outgoing, enjoying interaction with others, and
seeking out new opportunities and excitement (McCrae & John, 1992), explorative work environments are often characterized by collaborative teamwork emphasizing the search for new possibilities and the adoption of new skills (Mom et al., 2009).

Although we see that IT workers’ level of agreeableness significantly differs across ambidextrous work environments, the data implies that, contrary to our hypothesis, the level of agreeableness is higher for people in exploitative environments. While agreeableness is a measure of the degree of being trusting and cooperative, it is also associated with being non-critical (McCrae et al., 1987). The results may lead to the assumption that, in a work-related context, this dimension might be reflected in not striving to challenge the status quo and rather emphasizing experience, routine and present knowledge (Mom et al., 2009). Consequently, IT workers scoring higher in agreeableness might tend to seek exploitative environments. Finally, we see that, although IT workers’ level of neuroticism significantly differs across ambidextrous work environments, the data surprisingly implies that the level of neuroticism is higher for people in explorative environments. One explanation could be the level of abstraction in our research and that, within our research context, the neuroticism trait needs to be studied as one constituent feature of personality profiles, rather than as an individual trait (Pfluegner et al., 2021).

Second, our motivation to shift the focus in organizational design choices towards an individual-level perspective is rooted in sensitizing IT professionals and organizations to the areas of IT in which IT workers are likely to have the best individual fit. Understanding person-job fit, as one aspect of the person-environment fit, is important because it influences outcomes at each phase of an employee’s organizational life cycle (Su et al., 2015). Therefore, insights on fit perceptions, and the influence thereof, can be meaningful to both theory and practice. The data does indeed show that there is a difference in magnitude which personality traits impact person-job fit depending on the work environment. The data suggests that the work environment, in terms of exploration and exploitation, moderates the relationships of extraversion, conscientiousness, and openness to experience on person-job fit. The effect of these traits on person-job fit increases in explorative environments and decreases in exploitative environments. While we see that the levels of conscientiousness and openness to experience are not significantly different between the examined work environments per se (H4-H5 n/s),
work environment moderates the relation between these traits and P-J fit. From this we might infer that these traits do not necessarily prompt people to seek out certain work environments but nonetheless impact their perceived job fit with all the attributed consequences of fit and misfit (Follmer et al., 2018). These results might add groundwork that can be further developed into insights that answer calls for measures that counteract the resignation of employees (Prommegger et al., 2019).

Additional noteworthy observations can be derived from the descriptive statistics. Our sample of IT workers score rather low on neuroticism, with a mean of 2.3 and a median of 2.2. In a recent study of the effects of personality traits on digital transformation, Diller et al. (2020) show a correlation of neuroticism with the level of overall digitization and business transformation. Thus, we might infer that, within an IT context, the obvious high levels of digitization and contact points with transformative topics lead to attracting a workforce scoring rather low on neuroticism. Moreover, the personality trait with the highest score is conscientiousness (M=4.0). This can be seen as a desirable outcome, as conscientiousness is commonly reported to be the most reliable predictor of job performance (e.g., Barrick et al., 1991). The level of conscientiousness might also add to the explanation of high person-job fit level (M=4.4). Due to the tendencies associated with this trait, highly conscientious employees should be likely to seek a thorough understanding of potential employers and job offers, to ensure that they will fit in and be successful (Resick et al., 2007).

Our analysis makes theoretical and practical contributions in the field of individual ambidexterity. While organizational structures, such as bimodal IT departments and companies, may support ambidexterity (Haffke et al., 2017), research indicates that ambidexterity also depends on individuals who are able to combine exploration and exploitation, and thus engage in individual ambidexterity (Raisch et al., 2009). Our results regarding the fit between personality and work environment characteristic can inform managers and HR departments about the specific profiles that may be needed in different IT roles. For example, recruiters could advertise IT jobs in exploitative working environments more explicitly by alluding to the agreeableness of the applicant and focus their attention on this personality trait when recruiting, in order to improve the likelihood of a good person-job fit.
This study does not come without limitations. Our analysis has neglected the potential interactive nature of coexisting personality profiles (Pflügner et al., 2021). In addition, we follow the assumption that personality is a stable and enduring pattern of characteristics and tendencies (Mayer, 2005). Nevertheless, recent studies have implied that people change their Big-Five traits across their life span, even in adulthood, and that work environment and experiences are factors in driving this evolution (Wu, 2016).

Consequently, future research might further investigate in which ways work environments influence personality traits in fit and misfit scenarios. Moreover, further research should presume a more granular view of levels of ambidexterity and account for potential interaction effects of personality traits by incorporating personality profiles. In addition, the research model should include more variables that could potentially impact the relationship between personality traits, ambidexterity and P-J fit, such as organizational IT set up, job position, leadership style, and account for more control variables, such as performance.

7 Conclusion

IT functions adopt agile practices and build ambidextrous organizational structures which, in turn, affect the work environment of individual IT employees. Based on person-environment fit theory, we studied whether and how personality traits of IT employees and work environment characteristics, measured at the individual task-related level of ambidexterity, relate to and affect person-job fit (P-J fit). These findings contribute to existing research by demonstrating that IT employees’ personalities indeed differ depending on their work environment. In addition, our data suggests that the work environment, in terms of exploration and exploitation, moderates the relationships between extraversion, conscientiousness, and openness to experience on person-job fit, and that their effects increase in explorative work environments.
8 References


Essay 6: Personality Traits and Ambidextrous Work Environments in IT Organizations – A Person-Job Fit Perspective


Essay 7: Delineating the Gender and Skills Gap in IT: Insights into the Recruitment and Onboarding of Women in Career Transitions*

Abstract

Grounded in the theories of boundaryless and protean careers, along with signaling theory, this research aims to address two critical industry challenges: the escalating IT skills shortage and the gender gap in technology roles, by facilitating the integration of non-IT professionals, especially women, into IT careers. Meanwhile, the anticipated doubling of the IT professional gap in the coming years is causing alarm among companies, significantly impacting their recruitment strategies. Adopting a qualitative, descriptive, case study research approach, we analyzed job postings and conducted interviews at a medium-sized German IT services company. This company is renowned for successfully integrating female career changers over several decades, effectively navigating the entire redeployment process – from initial awareness through recruitment and onboarding to outlining viable IT career paths. Informed by these theoretical frameworks, our research offers a deeper understanding of dynamic, self-directed career aspirations and cross-boundary career movements. It also considers how organizations signal their values and culture to attract potential employees. The findings provide valuable insights for both academic understanding and practical guidance, aiding organizations in effectively navigating the career transition landscape, especially in the context of the looming IT talent crisis.

Keywords: Job Reorientation, Career Transitions, Gender, IT Sector.

* This essay was co-authored with Kathrin Heinle (University of Hagen), Jennifer Kendziorra (University of Hagen), Rizana Joers (University of Hagen), and Till J. Winkler (University of Hagen). The interview guide is included in the appendix. The essay is currently under review at a scientific journal (minor changes are possible).

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1 Introduction

"I was worried at first - oh dear, IT. Lots of numbers and what's in store for me? But at the end of the day, I'm really glad that I took the path that I did." (IP11)

The information technology (IT) industry is booming, with full-order books and a gold rush atmosphere. Nevertheless, one glaring problem threatens to derail its progress: a need for more digital talent. Companies are struggling to meet the growing demand for digital solutions and automation while facing a critical shortage of skilled professionals (Breaux & Moritz 2021; Oehlhorn et al. 2019). In tandem with this talent shortfall, the IT workforce exhibits a pronounced gender imbalance, with women markedly underrepresented in the field (Frieze & Quesenberry, 2019; Russo, 2015). Currently in Europe, for instance, only 22% of tech roles are occupied by women, which has significant implications for the industry's future competitiveness and technological growth (Blumberg et al., 2023). This recent analysis by McKinsey underscores this issue by projecting a tech talent gap ranging from 1.4 million to 3.9 million individuals by 2027 within EU-27 countries. Notably, this gap could be mitigated by doubling the proportion of women in the tech workforce (Blumberg et al., 2023).

However, the potential to harness a larger talent pool through increased female participation is not fully realized, primarily due to two significant 'loss points' that curtail the entry and retention of women in the IT sector (Blumberg et al., 2023). The first loss point occurs during the transition from primary and secondary education to university, where there is a noticeable drop in the number of women pursuing tech-related higher education. The second loss point is evident during the transition from university to the workforce, where many women do not enter or remain in the tech industry (Blumberg et al., 2023). Addressing these loss points is crucial for unlocking the untapped potential of the female workforce, thereby not only narrowing the gender gap but also significantly contributing to bridging the existing talent shortfall in the IT industry (Gartner, 2021).

One measure specifically designed to address the imbalance in the entry and retention of women and its consequences is career transition to the IT sector. Someone who has undergone career transition or redeployment is a person who, in the course of their life, has consciously chosen a different activity to earn a living than the one they originally
learned (Coppola & Young, 2022; Knecht, 2014). In other scientific publications or practical outlets, these individuals are also called career changers or, within information systems research, late-entry IT professionals (e.g., Joseph et al., 2012). Companies are trying to reach this target group through specific wording in job advertisements (‘career changer welcome’) or even targeted programs such as "Future in IT (FIT)" from the company Bechtle⁴ or various programs on all entry levels of Accenture⁵. While the practice has realized the value and need for redeployment and initiatives are sprouting out of the ground, information systems research has just yet begun to take the first steps to add this measure to the canon of scientifically studied interventions (Prommegger et al., 2023).

As noted above, given the growing skills shortage and gender imbalance in the IT sector, the largely untapped female talent pool could be an important target group for possible external-to-internal redeployment in the IT environment. In the context of this work, we will pursue the research question of how to recruit and integrate job-seeking women from fields other than IT as potential career changers to address the shortage of skilled workers and as a byproduct reduce the gender gap. In doing so, we will also outline possible career paths after a successful career transition within an IT service company.

Based on a single case study of a medium-sized German IT services company with insights from twelve interviews with successful female career changers, we can draw initial lessons about different phases of the transition process into IT (i.e., initial awareness, recruitment, and onboarding) and possible IT career paths resulting of career transition. The selected case company has been recruiting and integrating female career changers for over a decade. In addition, they have an innovative approach to job advertising that will be the subject of our analysis. The analysis conducted with the case company will provide rich insights for both academics and practitioners for the following reasons: it is considered a small and medium-sized enterprise (SME), which is representative of about 99% of German companies (BMWK, 2021), and it operates in the IT services sector, which is a growing market with a high demand for skilled workers (Statista, 2024).

⁴ https://www.bechtle.com/de-en/career/entry-level/professionals/careerchanger
⁵ https://www.accenture.com/de-de/careers/local/lateral-entry
As a theoretical contribution, our research enriches the field of management and information systems career studies by offering new perspectives on the strategic recruitment of career changers, including an in-depth analysis of intervention strategies. It also contributes to the research on IT professionals and IT careers by focusing on the trajectories of individuals transitioning into the IT sector, thus adding to the four distinct patterns that non-IT professionals follow when entering the IT sector as identified by Prommegger et al. (2023). In addition, our findings add to the body of research on intervention strategies to reduce the gender gap in the IT sector.

As a practical contribution, our initial findings and lessons learned can be used as a starting point to guide organizations through the career transition process. It offers insights and guidance on how to reach the relevant target group, insights into reasons for career change, motivational drivers for application, and helpful attributes and measures during onboarding and development. Our findings can be seen as an additional answer to the need for effective actions to attract IT professionals with the help of applicable interventions in practice (Weitzel et al., 2009).

This paper first explains the theoretical and practical foundations of this study. Then, it details the methods and results. Finally, the paper discusses the findings and concludes with this study's limitations and future research directions.

2 Theoretical Background

2.1 Gender Gap in IT

In the work context, the gender gap is an expression of the division of labor between the sexes, partly due to entrenched structures of past processes of exclusion, segregation, or discrimination, which contradicts modern concepts of equality (Kreimer, 2008).

The factors contributing to the underrepresentation of women in IT have been extensively examined, with possible explanations including stereotypes, social norms, lack of role models, structural barriers, the work environment, and differences in perceived abilities (Ahuja, 2002; Armstrong et al., 2018; Klinger & Svensson, 2021; Serenko & Turel, 2021; Wang et al., 2013). Several theories, including expectancy-value theory (Eccles et al., 1998), role congruence theory (Diekman et al., 2010), and field-specific ability belief
theory (Bian et al., 2017), have sought to explain the gender gap in IT careers by emphasizing the influence of individuals' beliefs, attitudes, and expectations on career choices (Galyani Moghaddam, 2010; Harmon & Walden, 2021). The benefits of closing the gender gap in IT are far-reaching, such as creating a more diverse workforce with varied perspectives, leading to a larger talent pool, increased inclusivity, more innovations, and improved team performance (Gorbacheva et al., 2019; Klinger & Svensson, 2021; D. Russo & Stol, 2022; Woolley et al., 2010). This diversity is also crucial in preventing the introduction of bias or sexism into technological developments, particularly in IT design (Klinger & Svensson, 2021; Zhou & Li, 2014).

McKinsey's comprehensive analysis of the development pipeline in Europe reveals a significant drop in the percentage of women in STEM classes during transitions, particularly from primary to secondary education and from university to the workforce. The gap will likely worsen as women’s graduation rate in STEM disciplines during higher education declines (Blumberg et al., 2023).

Efforts to address the gender imbalance and research focused on practice-oriented intervention strategies to attract and retain female IT professionals are gaining interest, with a focus on increasing familiarity, upskilling, and professional and personal development (Annabi & Lebovitz, 2018; Aufschläger et al., 2023; Heinle et al., 2023). However, while women's representation in technology companies is approaching parity across departments in general, women are much less represented in technical roles such as developers and data engineers. While this is well-known, current measures and intervention strategies do not seem sufficient, with a share of women in tech roles in Europe on track to decline to 21 percent by 2027 (Blumberg et al., 2023). This underrepresentation of women in the IT sector amounts to a large pool of untapped talent, and the industry can not realize its full potential as a result (Buckman et al., 2021; Harmon & Walden, 2021; Peichl et al., 2022).

**2.2 Recruitment and Skills**

In scholarly literature, recruitment is fundamentally the suite of actions and activities an organization undertakes to identify and attract potential employees (Barber, 1998). Barber delineates three phases in the recruitment process: generating applications, maintaining
the interest and engagement of applicants, and influencing their eventual job choice. Given the scarcity of skilled professionals, recruiting IT personnel is a particularly daunting challenge for organizations (Luftman et al., 2009).

Job advertisements are pivotal in sculpting the composition of a company's workforce, acting as the primary interface between organizations and prospective employees. They initiate the recruitment process and send out signals intended to draw in potential applicants (Chapman et al., 2005; Goldberg & Allen, 2008; Rynes, 1991). The framework of signaling theory, introduced by Spence (1973), posits that job seekers interpret these signals to deduce organizational attributes and intentions (Connelly et al., 2011; Rynes et al., 1991). Among various elements of job advertisements, the choice of language and phrasing is particularly instrumental. A job advertisement's wording and textual nuances profoundly shape applicants' perceptions of the organization and significantly influence how they perceive the role's gender inclusivity, required competencies, and overall appeal (Born & Taris, 2010; Feldman et al., 2006; Lievens & Chapman, 2010; Rynes & Cable, 2003; Wille & Derous, 2018).

Research by Gaucher et al. (2011) highlights that job advertisements can inadvertently reinforce gender stereotypes and create an impression of the workplace environment. Concrete words and phrases in job ads can signal a male-dominated culture, making women feel less included and discouraging applications (Gaucher et al., 2011). In addition, women, in particular, may be less likely to apply for jobs if they feel they need to meet all the listed requirements due to a fear of rejection and a perception of high rejection probability (Mohr, 2014). Therefore, we will begin our case study by analyzing the successful job advertisements that successfully attracted attention and triggered the intention to apply, in order to derive practical implications for the recruitment and integration of female career changers.

A further prominent stream of IT workforce research is the identification, classification, and analysis of skill requirements for IT professionals (Ang & Slaughter, 2000; Kaarst-Brown & Guzman, 2023; Ngo-Ye & Choi, 2021; Singh Dubey & Tiwari, 2020).

In general, research in the area of skills in the IT sector distinguishes between two broad skill categories: technical and non-technical. Technical or hard skills are specific to the
IT field, including but not limited to knowledge and skills related to hardware, systems and application software, and telecommunications (Cash et al., 2004). The definition of non-technical skills is less precise but generally includes business, management, and interpersonal/soft skills (Cash et al., 2004).

It is well known that advances in technology and developments in the business environment are continuously leading to changes in the desired skill set of IT professionals, with the half-life of (technical) knowledge in the IT industry being expected to be one year (Jendrosch et al., 2011). This is due to the rapid pace of technological development, which requires constant updating of knowledge. Thus, training framework, plans for vocational training and curricula for higher education in the IT sector can only reflect the current state of the art to a limited extent. For example, topics such as digitalization, cloud, DevOps, or AI are not covered or are covered only to a minimal extent in the current certified and nationally valid German training framework for IT specialists (IHK, 2023).

Assuming that continuous training is generally required in the dynamic IT environment (Niederman et al., 2016), it is worth examining the opportunities for professional development and advancement within IT after a successful career change without prior formalized vocational or academic training. Therefore, our analysis does not focus on IT-specific hard (technical) skills but rather on soft (non-technical) skills that can be considered beneficial for the career transition of women into the IT sector.

As digital transformation is disrupting old structures and perspectives, innovative company cultures characterized by a willingness to learn, overall curiosity, and customer orientation, including their respective skills and competencies among the employees, are considered particularly relevant and essential (Glaser, 2022) Ebert (2020) adds goal-oriented communication as an important social competence for distributed work, and Aengenheyster & Dörr (2019) consider IT communication as a central, enabling, and controlling component of transformation. According to the research of Trauth et al. (2010), both internal and external IT communication must be proactive rather than reactive - or become so if it does not meet these requirements. Given that traits such as communication, relational, and team skills are classified as typically female (Trauth et
al., 2020), and that the aforementioned soft skills are considered particularly important for jobs in the service sector (Salvisberg, 2010), female candidates with a track record in the service sector may be a suitable target group for redeployment.

2.3 Career Transitions/Redeployment

Due to the accompanying economic transformation, career transition is becoming increasingly necessary for employees and an opportunity for IT organizations equally (Coppolla & Young, 2022). While the career transition of IT professionals leaving IT is on the radar of academic research interest (e.g., Zaza et al., 2023), career transitions from outside to within the IT organization have been largely neglected and studied to a far lesser extent (Prommegger et al., 2023). In the aforementioned practitioner-oriented study, McKinsey proposed four interventions that could raise women’s total share of tech roles across Europe to 45% in 2027, with the most significant potential seen in redeployment strategies (Blumberg et al., 2023). Regarding redeployment to encourage career transition into IT, one can observe an immense increase in awareness, design of designated programs and initiatives, and communication about and with career changers in practice.

Career changers or people seeking career transition are people who, in the course of their lives, consciously choose a different activity as a means of earning a living than the one they originally learned (Knecht, 2014). Career transition refers to the phase where an individual moves to a new job or assumes a different role (Greer & Kirk, 2022). According to van Rensburg & Ukpere (2014) and Masdonati et al. (2022) such transitions can span various scopes, ranging from minor adjustments to significant shifts, and may involve changing jobs, companies, and industries or exiting the workforce entirely. Our study focuses on transitions that involve moving into IT from another industry.

Within the scope of IS, these people are also referred to as late-entry IT professionals (Joseph et al., 2012; Prommegger et al., 2023). According to Knecht (2014), companies should consider taking a step toward the candidate in areas where there is and will be a

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6 https://www.bechtle.com/de-en/career/entry-level/professionals/careerchanger
6 https://www.accenture.com/de-de/careers/local/lateral-entry
shortage of skilled workers. However, the question of how to attract female career changers who initially chose careers outside of IT still needs to be answered.

The protean career (Hall, 2004) and the boundaryless career (Arthur & Rousseau, 2001) have emerged as the most influential and widely studied contemporary career models and theories (Wiernik & Kostal, 2019). Previous research on IT careers has also drawn on these concepts (Joseph et al., 2012; Prommegger et al., 2023). Both concepts assume that individuals' career preferences and motivations relate to their career paths. A boundaryless career transcends the boundaries of individual employment settings, meaning that an individual's career path is not tied to a specific organization but spans different organizations and work sectors (Arthur & Rousseau, 2001).

A protean career is self-directed and focused on personal growth and psychological success rather than traditional measures such as position or salary. It's characterized by continuous self-evaluation and adaptation based on personal values and the changing demands of the workplace (Hall, 2004).

Both concepts are similar in that they emphasize individual autonomy, flexibility, and adaptability in a changing work environment. However, while the boundaryless career focuses more on external career mobility and the importance of networks and external opportunities, the protean career is more inwardly focused, emphasizing personal values, self-directed career management, and internal motivation. Building on this theoretical foundation, a recent study by Prommegger et al. (2023) with insights from interviews with male and female late-career IT professionals, presents four career patterns based on their pathways that can help organizations target and recruit these professionals. While their study seeks to provide insights into the changes in knowledge, skills, and abilities signals that lower barriers to IT careers and explain how behavioral and practice signals act as door openers to IT, we aim to expand the current knowledge base by analyzing job advertisements and understanding motivations and experiences during and after the transition period to provide insights and practical implications for recruiting and successfully onboarding career changers, particularly women.

In other sectors, such as medicine, the research, and practice of recruiting career changers to address skill shortages is more advanced (Schwill et al., 2016). For example,
redeployment has been adopted by the German Medical Association as a tool to address the growing shortage of general practitioners. These lessons could also be applied to the IT environment.

While the IT sector is facing an urgent need for skilled workers, numerous industries, particularly those dominated by female employees such as tourism, personal services, and certain contact-intensive occupations like hairdressing and restaurants, have experienced significant cutbacks due to the COVID pandemic (Bluedorn et al., 2021). These sectors have traditionally employed a high proportion of women, and with the pandemic exacerbating layoffs and driving the need for occupational reorientation, there emerges a critical opportunity to address the gender imbalance in technical fields. Historical trends have shown that women are disproportionately overrepresented in sectors such as healthcare, education, media, advertising, sales, and tourism. Yet, their presence in IT-related occupations has been notably low (Schönfeld & Tschirner, 2017).

The current situation, however, presents a potential inflection point. The widespread disruptions caused by the pandemic have led to reevaluating career paths, particularly among those from sectors heavily impacted by layoffs and economic downturns (Coppola & Young, 2022). This reevaluation is not just a response to the immediate crisis but also a proactive step towards safeguarding against the risks of future recessions and technological changes, which have historically entrenched unemployment among low-skilled workers and are increasingly affecting middle-skilled roles (Hutter & Weber, 2020).

By tapping into this reservoir of talent, the IT sector can not only address its immediate workforce needs but also promote gender diversity and drive innovation (Tertilt, 2022). The convergence of these factors underscores the potential benefits of encouraging individuals from these affected sectors to consider careers in IT. This approach not only offers a constructive response to the challenge of cutbacks but also presents an opportunity to foster growth and diversification within the tech industry.
3 Method

3.1 Methodological Approach

In this paper, we aim to contribute to academia and practice by providing insights into how the IT skills shortage and the gender gap in the IT sector can potentially be reduced through targeted and proactive promotion of women's career transitions. To this end, we chose a qualitative, descriptive, case study research approach, consisting of an analysis of the job advertisements used for career changers and interviews with women successfully recruited through these advertisements (Miles & Huberman, 1994). In general, case studies are a research method that allows researchers to study real-life phenomena in their "natural setting(s), using multiple data collection methods [such as interviews, observations, document, and text analysis] to gather information from one or a few units..." (Benbasat et al., 1987, p. 370). In particular, descriptive case studies allow researchers to conduct in-depth observation, including its process and outcomes, making case studies well suited to addressing 'how' and 'why' questions (Yin, 2009). This study delves into the practices of a medium-sized German IT services company catering to the needs of global corporations and small to medium-sized enterprises for over two decades. The selection of this company is grounded in its innovative job advertising strategies and decade-long successful track record in recruiting and integrating female career changers.

Moreover, the company represents an intriguing case for analysis, offering insights to scholars and industry professionals. Primarily, its status as a small to medium-sized enterprise (SME) aligns with the characteristics of approximately 99% of German businesses (BMWK, 2021), making its experiences and strategies highly relevant and reflective of the broader business landscape in Germany. Additionally, its operation within the IT services sector positions it at the heart of a burgeoning market that is experiencing a pronounced surge in demand for skilled professionals (Statista, 2024). This dual significance accentuates the company's role as a valuable source of learning and adaptation in addressing the evolving needs of the IT industry. Moreover, the context in Germany, where merely 19% of the IT workforce comprises women, presents a more pronounced gender disparity within SMEs (get in IT, 2022). This scenario is particularly critical given the dominant influence of SMEs in the German business ecosystem, both in terms of sheer numbers and their contribution to the economy. At the same time, these
SMEs often face the challenge of attracting qualified IT talent (Vinten, 1998). In light of these factors, it becomes imperative for SMEs to amplify their initiatives to incentivize women’s participation in the IT domain, thereby addressing the critical shortage of skilled IT personnel (get in IT, 2022). Furthermore, software and IT service providers have historically favored hiring professionals with immediate technical skills relevant to Information System product and service development (Aasheim et al., 2012). This preference prioritizes candidates with expertise and formal education in specific technical domains.

The case company currently employs about 50 people in various departments. Before the recruitment of female career changers, approximately 80% of the employees were male. The organizational structure of the case company is briefly described in the following. The back-office handles administration, sales, and new customer onboarding. It also converts sales leads into quotes and, ideally, orders. Service management supports new and existing customers by discussing reports, issues, and optimizations. Project management plans and executes various customer initiatives, monitors progress, and ensures timely preparation. First-level support is the first point of customer contact, creating tickets for reported issues using updated solution articles. If necessary, complex problems are escalated to 2nd/3rd level support. Specialist departments optimize infrastructure and workflows and develop custom software. They also provide training to ensure smooth IT operations. Female IT transitioners have already been hired for various roles in different areas of the case company.

### 3.2 Data Collection and Analysis

Interviews were conducted with twelve women who had previously been hired by the case company and are still employed there. Except for IP 5, who started as an intern, and IP 12 who applied 23 years ago, they were recruited as career changers through the company-specific job advertisement described in Section 4.1. Women's ages range from 23 to 58 years, with average age of 33.2 years, as shown in Table 7-1. These women have been with the case company for at least four months and, in the longest cases, for over 23 years. Based on this, we consider the interview participants to be successful recruits.

As an example, two employees were recruited as career changers from the hotel industry for the back office and first-level support - via the job titles "Office Communications Clerk" (IP 1), "Hotel Specialist" (IP 3), and "Tourism Management Assistant" (IP 4).
new employee was recruited for the IT sales department in the back office via the job title "Management Assistant" (IP 7). An employee in first-level support who previously worked as a trained PTA (pharmaceutical technician assistant) was successfully recruited via the job title "customer advisor" (IP 6). A student assistant from the field of biology, an industrial clerk from the automotive supplier sector, a graduate from a different STEM (mathematics, IT, natural sciences, technology) field, and a car saleswoman were also recruited for first-level support via the job title "Junior Project Manager" (IP 2, IP 8, IP 9, IP 11).

Another IT project employee has been employed for over ten years, having gained insight into the IT company during an internship while studying business administration with a focus on management and marketing (IP 5). IP 10, working in first-level support, has been with the company for just as long and was recruited through the job title "Marketing Communications Specialist".

Since their recruiting, some interviewees have taken on more responsibility in their roles and/or moved into new positions. IP 1, who had applied for a position as assistant to the management after working as a hotel manager, was trained in the area of SAP MDM (master data management) by a customer's internal IT department after about a year with the company and then took on full responsibility for these tasks. IP 2 became the responsible project manager for introducing a new project management tool that is now in use.

IP 3, who is also a trained hotel clerk and works in the IT service desk (first-level support), started to train other new employees after about 1.5 years.

IP 6, who previously worked as a pharmaceutical employee, is now responsible for updating and expanding help articles and documentation in the ITSM system used in the IT service desk after just six months with the company. Some pieces are used internally, but hundreds of self-service articles she wrote are made available to the company's customers 24/7 via an online portal. IP 7, who initially started as an assistant to the management in the back office, has also gradually familiarized herself with IT topics over the months and is now responsible for all tasks in the "Sales" area (e.g., preparation of offers and orders, sales pitches). IP 8 is currently working as a Junior Project Manager in
low-code programming after appropriate training, less than a year after joining the company. IP 9 generally considers the career opportunities offered in IT so reasonable that, after several years of studying biology, she is now reorienting herself professionally and will turn her part-time job at the IT service desk into her primary job. As a student assistant, IP 9 has already been primarily responsible for projects within the department (e.g., onboarding new customers) over the last three years. With the company and is now mainly responsible for mentoring in this area. IP 4, who started at the service desk and ventured out of the tourism industry around 2.5 years ago during the COVID-19 pandemic, has since been promoted to the team leader of the service desk. The reason for this was the professional development of IP 10, who, as the previous team leader, could move up to the second-level support area within the company after around six years with IT service desk responsibilities. In addition to IT service management and her work as a trainer for IT specialists (system integration/application development), her new place of responsibility includes low-code programming to create service catalogs (requesting possible services, e.g., in the area of onboarding and offboarding, desired accounts/access authorizations, ...), which are made available to customers via an online service portal of the ITSM tool used. The first part of the analysis focuses on describing and analyzing the job advertisements used to recruit our interview partners.

The second part of the analysis consists of interviews with female employees who had already been hired and transitioned into IT. The interview questions were selected to provide insight into 1) the reason for seeking a new job, 2) the motivation for applying to the specific job posting, 3) prior assumptions about working in IT, 4) experiences and intrinsic rewards gained, and 5) measure that facilitate onboarding and integration. We chose a guided interview style based on pre-defined questions to ensure that key topics were covered in the interview. This allowed for a dynamic response during the interview, to consider further issues, and to obtain more detailed information through additional questions to gain deeper insights (Magaldi & Berler, 2020). The interviews were recorded with the interviewees’ consent and then transcribed, according to Oliver et al. (2005). All questions were open-ended and could be answered freely. Open-ended questions were considered appropriate in conducting the interviews, as the possible answers to the selected questions were not known in advance, and there were unlimited possible solutions (Magaldi & Berler, 2020).
<table>
<thead>
<tr>
<th>IP No.</th>
<th>Recruited job title</th>
<th>Area</th>
<th>Start year</th>
<th>Age</th>
<th>Education</th>
<th>Current (additional) responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Office Management Assistance</td>
<td>Back Office</td>
<td>2022</td>
<td>42</td>
<td>Hotel Clerk, Hotel Manager, Accountant</td>
<td>SAP MDM</td>
</tr>
<tr>
<td>2</td>
<td>Junior Project Manager</td>
<td>IT Project Management</td>
<td>2021</td>
<td>32</td>
<td>Chemical Laboratory Technician, Chemical Technology degree</td>
<td>Introduction of a new Project Management Tool</td>
</tr>
<tr>
<td>3</td>
<td>Hotel Clerk</td>
<td>IT Service Desk (First-Level Support)</td>
<td>2020</td>
<td>23</td>
<td>Hotel Clerk</td>
<td>Training of New Employees</td>
</tr>
<tr>
<td>4</td>
<td>Tourism Management Assistant</td>
<td>IT Service Desk (First-Level Support)</td>
<td>2021</td>
<td>26</td>
<td>Tourism Agent, Florist</td>
<td>Head of Service Desk</td>
</tr>
<tr>
<td>5</td>
<td>Quality Manager</td>
<td>Project Management</td>
<td>2012</td>
<td>33</td>
<td>Economics graduate, (focus: Management &amp; Marketing)</td>
<td>Project Manager</td>
</tr>
<tr>
<td>6</td>
<td>Customer Advisor</td>
<td>IT Service Desk (First-Level Support)</td>
<td>2023</td>
<td>31</td>
<td>Pharmaceutical-Technical Assistant</td>
<td>Service Help Articles (Quality Management)</td>
</tr>
<tr>
<td>7</td>
<td>Management Assistance</td>
<td>Back Office</td>
<td>2022</td>
<td>27</td>
<td>Economics graduate, Business Management with a focus on HR, Marketing graduate,</td>
<td>Sales Responsible</td>
</tr>
<tr>
<td>8</td>
<td>Junior Project Manager</td>
<td>IT Project Management</td>
<td>2022</td>
<td>43</td>
<td>Industrial clerk</td>
<td>Low Code Programming</td>
</tr>
<tr>
<td>9</td>
<td>Junior Project Manager / Trainee IT</td>
<td>IT Service Desk (First-Level Support)</td>
<td>2020</td>
<td>24</td>
<td>Industrial clerk, biological sciences graduate</td>
<td>Projects within the Service Desk (new Customer Onboarding, etc.)</td>
</tr>
<tr>
<td>10</td>
<td>Marketing Communications Specialist</td>
<td>IT Service Desk (First-Level Support, team leader)</td>
<td>2012</td>
<td>36</td>
<td>Foreign language assistant, Marketing communications specialist, Economics graduate</td>
<td>IT Service Management and Low Code Programming; registered trainer for IT Specialists in System Integration / Application Development</td>
</tr>
<tr>
<td>11</td>
<td>Junior Project Management</td>
<td>IT Service Desk (First-Level Support)</td>
<td>2023</td>
<td>24</td>
<td>Car saleswoman, Economics student</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Office Clerk</td>
<td>Commercial Position</td>
<td>2000</td>
<td>58</td>
<td>Office Clerk</td>
<td>IT Purchasing (client-focused)</td>
</tr>
</tbody>
</table>

Table 7-1. Interview Participants
The interviews were conducted in three waves via Microsoft Teams between December 2022 and January 2024. The interviews lasted 13-41 minutes and were guided by a 15-question questionnaire.

We used an iterative coding process conducted independently by two researchers on the team and established interpretive research guidelines to guide the process (Walsham, 2006). The results were then presented to an additional team member, and the results became progressively more abstract during a second round of coding conducted by the three researchers.

4 Results

4.1 Analysis of Job Advertisements

The design choices of the job advertisements studied were based on the assumption that knowledge and experience from other service sectors can be helpful for a career transition into the IT services sector and that women, in particular, are working in the selected industry or are looking for such job offers.

The positions were advertised, among others, under the following job titles - in each case with the suffix "m/f/d" and the note "career change possible": Office Management Assistant, Hotel Clerk, Tourism Management Assistant, Quality Manager, and Project Manager. Within the German language, these job titles entail the ending -men (-mann) or -women (-frau) as in the example of "Bürokauffrau". The German-language job titles were deliberately chosen in the female form to address potential career changers as directly as possible. The choice of job titles such as "Office Management Assistant" is intended to appeal to women looking for a new career across all sectors. The use of alternative job titles such as "Hotel Management Assistant" or "Tourism Management Assistant" is intended to reach female candidates who are looking for a new job within their current industry - and who, after reading the advertisement, may consider a change of direction as a result of the additional content. In both cases, the goal is to reach potential career changers who, unlike in the case of IT-specific job titles, are made aware of the possibility of working in the IT environment.
Within the job postings of the case company, potential applicants are addressed directly, e.g., "We miss you as ...", "We need you," or "We are looking forward to you!". In addition, the job posting is written in a deliberately relaxed style to reduce possible reservations or fear of contact. For example, "At the end of each day, ask yourself: ‘Are you done yet?’" and "You want to switch? That’s between us". At the same time, the job advertisement conveys a sense of professionalism, including the apparent partnerships (e.g., with Microsoft). The target group is again directly encouraged to consider a career change, and potential emotional barriers are reduced by statements such as "Every week, you will get to know the system better and be able to solve customer problems independently".

From the job description and the selected requirements, it is clear that all advertised jobs require good communication skills and a focused and structured way of working. These skills are important in several areas of the IT service company under consideration, e.g., in the back office, in project management, and first-level support. Under the heading "Onboarding" - appropriate measures to facilitate the start are described. In a job advertisement for the position of first-level support it is stated as follows:

"...For the first two weeks, your daily routine will consist of the following:

- Watch webinar recordings and try what you have learned at your modern workstation."

- Listening to live calls from your team members using our learning headsets.

- Taking your first calls from our users."

This is to assure the target group that they will be supported, especially in the initial phase, and that structured training will be provided with the help of appropriate measures. In addition to attractive conditions such as a permanent employment contract and work-life balance thanks to flexible working hours, there are other benefits mentioned. These include competitions linked to possible e-learning courses and lectures, including free lunches, for continuing education in everyday working life. An innovative working environment and a reasonable working atmosphere are also promoted. Finally, there is an
invitation and encouragement to apply, including details of how to proceed. Short telephone interviews are also possible, including time slots after work or on weekends.

4.2 Initial Awareness and Recruitment

All twelve female respondents did not specifically look for a job in the IT sector when looking for employment, nor did they consider working in this field. At the same time, however, the interviews revealed that it was possible to address them because the job title was oriented towards their previous occupation (e.g., IP 3: "Hotel Specialist"; IP 4: "Travel Agent"), was deliberately kept general (e.g., IP 1: "Office Management Assistant") or used cross-industry generic job titles (e.g., IP 2: "Junior Project Manager"; IP5: "Quality Manager"). Consequently, the insights derived from the analyses of the job advertisement wording and the insights from the interviews can bring up valuable and actionable measures to recruit and onboard career changers, as shown in Table 7-2. In the following, we will present the insights derived from the interviews about the reasons for seeking a new job, the motivation to apply to that specific job posting, and the previous assumptions and experience working in IT.
The reasons for seeking a new job varied among the interviewees. However, it was clear from the interviews that, in most cases, external factors significantly influenced current events. Especially since the beginning of the COVID-19 pandemic, hotel, catering, and tourism employees have been forced to look for other jobs (IP 3 and IP 4) and, simultaneously, have been open to possible entry into other sectors. In other sectors, such as mechanical engineering or automotive suppliers, there were also redundancies for economic reasons, which were decisive in the search for a new professional activity (IP 2, IP 8). IP 1, like IP 3, came from the hotel industry but proactively decided to change jobs. The desire for a better work-life balance was the main reason for the change (IP 1: "More personal, private, family reasons - to have more time for my two children.").

Respondents were further asked for their concrete reasons and motivation to apply to the job advertisement. In addition to the appealing language style and the relatable job title in the job advertisement, corporate benefits were also mentioned as triggers for the application. According to the responses within the interviews, a clear indication that an application is also possible for career changers - combined with necessary training – was perceived as being particularly decisive (IP6: "So when I read the job advertisement, I also thought wow, career change in IT, I was not aware that this was possible."); IP9:
"Because the job was also written in such a way that you had the feeling that you also have the chance as a career changer and that you are well looked after there and also get the opportunity to learn something new. It was very appealing.". After the attention was drawn to the IT sector, economic safety was perceived as positive by the career changers (IP 8: "(...) because IT is simply a future-proof sector"; IP 11: "(...) at the end of the day, IT is the future"; IP9: "I was looking for a future-oriented job. I could also learn new things in the long term. Then I came across a job that also allows career changers to familiarize themselves with IT with certifications, for example, and allows them to work in IT, which is also super interesting, very future-oriented, and a secure job itself.").

For most of the interviewees, the motivation arose from the desire for professional development (IP 6: "So I was at a certain level of knowledge in the pharmacy. I also realized that I was not making any more progress (...)"; IP 11: "In the car dealership, I just had the feeling that (...) you cannot work your way up. In the sense of learning more, taking on more tasks, and that at some point there was a stop, a limit, where I said, it is nice, but I would like to have the opportunity to get as far as I want or as far as I can get. (...) I would like to take on a new challenge.").

During the interviews, the participants were asked about their assumptions about IT jobs. It was mentioned that they assumed that these jobs would often involve software development and programming. IP 4 further said that she held the assumption that the IT field is "(...) very complex and you cannot get into it without prior knowledge and training". IP5 also imagined an IT job to be monotonous "in the sense that it's purely based on code and stuff, and there is not much interaction going on." At the same time, according to IP3, the following impression emerged from personal interviews: "When you say you work in IT, nobody thinks of a specific area. Everybody thinks you can also set up hardware or program, everybody can do everything.". According to IP 2, people “always picture this nerd sitting at his or her computer 24/7, tinkering away and being uncommunicative”. IP2 added that it had been shown that "exactly the opposite is true." A very similar assumption and contrasting impressions of reality was shared by IP 1: "Sitting in a cubicle hammering on the keyboard... Not what I have experienced here".

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The interviews further revealed that the work experience in IT and intrinsic rewards gained through work in IT, in reality, contradict the image described before. IP2, who works at the IT service desk, replied when asked what she particularly likes about working in IT, "It is very varied, and there is always something new to do. And you still have customer contact - without having to sit face-to-face with the customer, which was not always pleasant." This comparison referred to her previous job in a travel agency. IP3, a service desk team member, likes "the variety, the customer contact, and that you can help with problems". IP5 added, "It is very versatile. You have contact with people who are not IT-savvy; you bring understanding and look at how you can make life easier for these people through automation and things like that. I enjoy looking for those solutions". IP6, a trained PTA who also ventured into the IT service desk, said: "To be honest, I am surprised that I enjoy it so much. Yes, I solve software problems and fix bugs. You can also work more independently, which is just fun: what you do for self-development or how you develop your personality. So, it is nice". IP8 adds to this:"I like the fact that I see daily how things work, how things interlock, and what requirements are needed to achieve a result."

In addition to IT projects, hardware sales, network setups, and software development, day-to-day work focuses on recurring, non-technical issues that determine the success of the interviewee's career. IP10 stated: "I just realized through these activities and contacts that IT is not just about software development and programming. Of course, that is part of it. However, it is also about gathering requirements and understanding the processes to support users' daily lives and ensure they can work as effectively without restrictions".

Overall, it became clear that the interviewees appreciate the good opportunities for further professional development within the IT environment (IP10: "I like that you can develop very well. For example, I can develop myself internally by shifting my focus from the service desk to project work (...). I can get more involved in and contribute to the technical side of projects. I find this very exciting, and it is great to have the opportunity to develop. (...) In addition, studying at the distance learning university, which I do on the side, helps me immensely in my everyday work, and what I learn in my everyday life helps me in my studies. And that is great." ). IP9 added the following,"It is never boring. It is very varied. The fact that it changes so quickly means you can always learn new things. You also have
to keep yourself up to date. The keyword "lifelong learning" is very much in focus, and I think that is great. If you are also interested in continuing your education, that is right for you".

Particularly noteworthy are the perceived career opportunities for working mothers, who can achieve personal and professional goals in the IT environment despite parental leave/part-time/agile working, and at the same time are regarded as contributing to the company's success (IP 8: "I was on maternity leave for a year or two, and then I set up the service desk. It is been running for six years now. It is very well established."); IP 10: "I had two children myself and was still able to develop very well in the management position; thanks to the pandemic, I was able to lead the team in an agile way while raising and looking after my children and working from home. It is not always possible. It is easy to balance work and personal life and manage both well. At the same time, it is a good role model for the kids. My boys, aged nine and seven, are also interested in programming and find it all very exciting"). The opportunities for professional development in the above situation are also perceived positively by other employees without children. IP 9 noted, "The flexibility offered in IT regarding parental or maternity leave is truly commendable. The ability to seamlessly reintegrate into the workforce, adjusting work hours according to one's needs, significantly eases the transition. While this largely hinges on the employer's policies, the innovative and progressive IT environment inherently facilitates a more modern approach to balancing work and motherhood."

4.3 Onboarding and Integration

As shown in Table 7-3, when it comes to onboarding, the interviews revealed that on-the-job learning, such as knowledge sharing from other team members, plays a critical role. (IP 12: "It always helps me to be able to ask questions, to exchange ideas with colleagues who are more deeply involved in the topic than I am.", IP 7: "The employees here at the company have also contributed greatly to this because they have always been very patient in explaining things to you. And so, you gradually get more and more into the topics, and I think you understand the overall concept more and more.").

IP7, who has a degree in economics and works in the back office / IT sales department, considers an open attitude and an interest in new topics to be particularly important -
regardless of whether one has any previous knowledge or not (IP 7: "I did not consider myself to be very IT-savvy. Of course. You always have points of contact, even during your studies. However, somehow, I did not shy away from it, because I think I can familiarize myself quite well with other topics and am open to them (...) I think you just have to be curious, open, and somehow not shy away, maybe from some technical terms."). IP 12 adds to that: "I think you always have to give yourself a chance, even if you are afraid of failure. You have to try, I think. It is always better than not trying at all. That is my attitude."

It also became clear that knowledge databases and documentation (also referred to as "solution articles" in the interviews) are perceived as helpful within the onboarding process, particularly in the first level area (P 3 and P 4). In addition to the points already mentioned, further training through e-learning/certifications, etc., should take place according to the findings gained in the interviews (IP 10: "For example, I also acquired Microsoft certificates through the company, which you can complete online, as well as further training and credentials, such as the ITIL® certification for IT service management. That also helps me greatly in my work regarding customer contact and topics such as customer success. And secondly, documentation that we have gradually created in addition to what we already had.").

Interviewees agreed that knowledge and skills from previous jobs aid in the transitioning process. According to IP 10, a trained foreign language assistant, language skills can be necessary across all industries: "Firstly, the languages. This is very helpful because we also support users worldwide at the service desk. And we also have to deal with Mexico, Hungary, France and so on every day, for example."

In project management, existing non-IT-related knowledge is also perceived as being helpful. IP 2 gives an example: "I think this background in chemistry in particular - the analytical thinking with the protocols helped me to bring structure to everything and to prioritize things - to see where the focus lies. That was very helpful". Role models and, as such, the realization that other colleagues have also succeeded in making a career change beforehand encourages new employees, especially in the initial phase - as IP 9, among others, said: "What helped me very, very much was the mentoring program. I also want to see that other career changers have also leaped to exchange ideas with them and,
of course, to have a corresponding learning phase. But above all, the exchange with employees who have already made the career transition into IT at one of our companies."

<table>
<thead>
<tr>
<th>Learning-on-the-job (e.g., Training by team members)</th>
<th>IP 1</th>
<th>IP 2</th>
<th>IP 3</th>
<th>IP 4</th>
<th>IP 5</th>
<th>IP 6</th>
<th>IP 7</th>
<th>IP 8</th>
<th>IP 9</th>
<th>IP 10</th>
<th>IP 11</th>
<th>IP 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personality (e.g., Openness to experience)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Knowledge database documentation</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>External training (e.g., E-learning)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Existing knowledge (e.g., Language skills)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Soft skills (e.g., Analytical thinking skills)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Role models/mentoring program</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Supportive company culture</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Table 7-3. Attributes and Measures for Successful Onboarding and Integration

Overall, a culture that fosters teamwork encourages growth and allows for questioning while not fearing mistakes is seen as critical (e.g., IP 8: "(...) I was met with understanding and patience in all areas. A lot is explained, even in a language I can understand without an IT background. That helped me tremendously.", IP 10: "Firstly, [what helped was] the support from colleagues and the management. I was able to learn a lot and was always encouraged when it came to further training."

5 Discussion

While research in IS has been conducted looking at career transitions (Brooks et al., 2015; Joia & Mangia, 2017), the direction of movement under investigation is largely focusing on career changes of IT professionals moving out of the IT profession (e.g., Brooks et al., 2023). Our study is firstly motivated by the trend seen in IT career literature that traditional IT career paths are somewhat blurring towards so-called boundaryless or protean careers (Prommegger et al., 2020, 2023) and secondly, the urgent need to increase the pipeline of IT professionals (Gartner, 2021). Based on the assumption that the internal pipeline of IT specialists will not be sufficient to meet the needs of the IT sector, our research objective was to contribute to theory and practice by analyzing the extent to
which potential IT workers are recruited from outside the IT sector, charting their career paths, and deriving insights to help understand and support the career transition process.

To understand how and why career transitions occur, we first analyzed the job advertisements through which our respondents were recruited to the case company. In addition, based on our single case study, we seek to understand the motivation for a career change, what helped during the onboarding process, and how they evaluate their career move after some time.

The first step in this study was to investigate whether job advertisements that specifically target and encourage potential female career changers can help close the gender gap. The results suggest that advertisements can attract potential female career changers by choosing appropriate job titles. The interviewed female career changers did not previously consider working in IT to be possible without specific knowledge and had not consciously thought about it (e.g., IP 9: "And the fact that it is so open and that you also have an opportunity as a career changer, I would never have imagined that."). In one case, it was also possible to recruit a candidate after the career aspiration had existed in the past but had been discarded and not consciously considered again (IP 2).

The strategic design of job advertisements can be insightfully analyzed through the lens of signaling theory, which posits that entities or individuals send signals to convey information about themselves or their intentions to observers, mainly when information asymmetry exists. In this context, job advertisements serve as a signal from the company to potential applicants, aiming to reduce information asymmetry regarding the company's culture, values, and the nature of the job roles (Feldman et al., 2006; Lievens & Chapman, 2010; Rynes & Cable, 2003).

By consciously choosing job titles in the female form (e.g., "Bürokauffrau") and incorporating inclusive language (m/f/d), the company sends a strong, positive signal that it values diversity and inclusivity. This deliberate signaling can effectively attract a broader pool of candidates, especially women, by directly addressing them and acknowledging the gender disparities in the workplace. This approach aligns with the findings of Lewis et al. (2003), which emphasize the significant influence of individual beliefs on technology-related behaviors. The inclusive and welcoming language in job
advertisements can help mitigate self-doubt and build confidence among women, addressing findings by Joshi & Schmidt (2006) and Joshi & Kuhn (2011) that self-doubt can undermine women's confidence in acquiring and utilizing IT skills.

In addition, interviews confirmed that the relaxed yet professional tone of the ads signals a supportive and understanding corporate culture. As a result, this nuanced communication strategy can effectively lower emotional barriers.

This approach is particularly pertinent given the connection between self-efficacy and confidence, as identified by Dickhäuser & Stiensmeier-Pelster (2002) and Hackett & Betz (1981). By signaling a supportive environment and highlighting structured training and attractive benefits, the company enhances the perceived self-efficacy of potential female applicants. This aligns with Bandura’s (1994) assertion that enhancing self-efficacy involves convincing individuals of their capabilities and the availability of resources and strategies to succeed.

Consequently, our research adds to the four distinct patterns that late-entry IT professionals follow when entering the IT sector, as identified by Prommegger et al. (2023). These patterns are characterized by differences in the reasons for their career transitions between planned and unplanned transitions and the interplay of push and pull factors that drive careers into the IT domain. We add to this by extending the identified career transition paths and find that "pull" can also occur by enticing career plans through targeted recruiting in sectors other than IT. Specifically, we show that successful transitions to IT can occur even when there was no prior exposure to IT at any point in their careers. In other words, even without prior triggers that led to an interest in IT work and/or technology.

Subsequent research should investigate the extent to which the beneficial effects of these advertising strategies, initially noted in female career changers, apply to a more diverse audience, encompassing men and non-binary individuals.

The journey of these career changers, from their initial integration to their progressive assumption of complex responsibilities, exemplifies the potential of career changers in IT. For instance, individuals who initially lacked IT-specific training have, post-training, successfully navigated their way to roles demanding higher levels of technical knowledge,
such as SAP MDM (IP1). Career changers who have been with the company for a more extended period were able to become active in the area of development, for example, thanks to "Low Code - No Code" (IP 8, IP 10) and, in some cases, switched from first level to second level support (IP 10). The knowledge gained can, in turn, be passed on to other new employees via mentoring (IP 3) and as part of the training of future IT specialists (IP 10). This trajectory is a testament to the individuals' adaptability and reflects the case companies' supportive structure, facilitating continuous learning and growth.

Thus, our research shows various opportunities for further professional development after a successful career transition, for example, by taking on additional responsibilities (trainer activities, expansion of the initial scope of activities) or even through promotion within the IT company. Two interviewees expanded their area of responsibility by using low-code/no-code (LCNC) approaches. LCNC enables individuals without an IT background to complete specific IT tasks independently by providing advanced graphical user interfaces, drag-and-drop functionality, reusable components, and declarative languages (Carroll et al., 2021; Di Ruscio et al., 2022; Luo et al., 2021). By doing so they hide the coding complexity through abstraction, allowing individuals with minimal coding skills to design, develop, and deploy lightweight applications (Sahay et al., 2020; Tisi et al., 2019; Binzer & Winkler, 2022). With predictions that more than two-thirds of all new applications in organizations will be based on LCNC platforms by 2025, the importance of these tools is evident (Gartner, 2022). In practice, there is a prominent discussion revolving around using low-code/no-code platforms as an additional measure to close the skills gap and reduce the gender imbalance (e.g., Microsoft, 2022). Despite the growing interest and adoption of these platforms in practice, the lack of academic literature on using these advances to close the skills and gender gap is surprising. Therefore, a comprehensive investigation of the effectiveness of LCNC platforms, their role in promoting IT literacy among non-IT professionals, and their potential to contribute to digital transformation efforts in this light is urgently needed.

This second part of the analysis, focusing on interviews with female employees who successfully transitioned into IT, offers invaluable insights into the motives and experiences shaping their career trajectories. The interview questions were selected to
provide insight into 1) the reason for seeking a new job, 2) the motivation for applying to the specific job posting, 3) prior assumptions about working in IT, 4) experiences and intrinsic rewards gained, and 5) attributes and measures supporting the onboarding and development process.

Economic factors, such as layoffs or the shifting work landscape during the COVID-19 pandemic, emerged as significant drivers, underscoring the need for organizations to remain cognizant of industry-specific fluctuations and downturns. The allure of the IT sector, perceived as a bastion of economic safety and a conduit for professional growth, resonates strongly with the aspirations of career changers. While in the context of our case study, an IT services company in Germany, the image of the IT sector as secure and independent of the economy is important, future research should evaluate these context-specific factors in a cross-national study.

Our interviewees (except for IP 5, who started through an internship, and IP 12, who was recruited 23 years ago) were recruited because of the tailored and carefully worded job advertisements. Thus, the strategic crafting of job advertisements, in line with the findings of Tertilt (2022), and Rippler & Woischwill (2014), emphasizes the importance of direct, action-oriented, and professional language in attracting potential candidates. This leads to the assumption that the mere inclusion of phrases like "career changers welcome" or promises of support during the onboarding process may not suffice and misses potential career changers. Companies intent on harnessing the full potential of candidates for a career transition into IT should delve deeper, leveraging the insights gleaned from these interviews to refine their recruitment strategies.

Contrary to the initial apprehensions about the IT sector being complex, monotonous, and devoid of interaction, the interviewees' narratives painted a picture of a vibrant, diverse, and rewarding work environment. They highlighted the richness of their work tasks, the opportunity for customer engagement, the autonomy afforded by a flexible work setup, and the intrinsic satisfaction derived from problem-solving.

These findings are particularly noteworthy when contrasted with commonly cited reasons for IT professional turnover, such as work overload and lack of work-life/family balance (e.g., Ahuja et al., 2007; Moore, 2000; Zaza et al., 2023). The interviewees' positive
experiences suggest that research on reasons for turnover may need more nuanced approaches regarding specific roles and/or career paths within IT organizations. These unexpected findings further call for subsequent research to delve into the turnover dynamics of career changers, examining if their behaviors align with those of 'traditional' IT careers and if they react similarly to measures to retain them within the IT industry.

One explanation for our findings may be the environment in which our case company operates. Young et al. (2023) found that individuals working in support occupations are less likely to have unexpected demands that interfere with their ability to attend to family/personal demands, leading to less stress and job satisfaction, because IT support work is often performed on a shift basis, with responsibility for problems passing to the next shift at the end of an individual's workday.

Moreover, recent studies indicate that the concept of work-life balance holds greater significance for female IT professionals compared to their male counterparts (Venkatesh et al., 2017; Young et al., 2023). When combined with insights gathered from interviews, it appears that the culture within the IT services organization, along with opportunities for career advancement, are perceived as supportive and appealing to women, irrespective of their familial commitments. It's advisable that organizations aiming to narrow their gender gap by attracting career changers actively communicate and endorse these benefits.

Our findings also resonate with the principles of protean and boundaryless career models, illustrating how individuals navigate their career paths by leveraging personal values and the unfolding opportunities in a boundaryless labor market. The emphasis on self-directed career management, reflected in the proactive search for suitable roles and the acquisition of transferable skills, is consistent with the protean career mindset. At the same time, the sector's openness to career changers and its focus on skills-based hiring reflects the boundaryless career landscape, where traditional career boundaries are increasingly permeable (Briscoe & Hall, 2006).

This paper presents practical implications not only for crafting targeted job advertisements but also outlines essential strategies for successful onboarding and integration, as detailed in Table 7-3. Companies aiming to hire individuals undergoing
career transitions should consider a multifaceted approach, addressing several key attributes and measures to smooth the transition process.

Interviewees highlighted the importance of specific personality traits (e.g., openness to change), soft skills (e.g., analytical thinking), and existing competencies (e.g., language skills) in facilitating career transitions. While companies may not directly influence these individual attributes, they can prioritize them during the recruitment process to ensure a good fit.

In addition, respondents identified several actionable measures within the company's control. These include supporting the onboarding phase with comprehensive documentation, such as maintaining a detailed knowledge base, offering external training tailored to the needs of career changers, providing opportunities for on-the-job learning from team members, and providing access to role models or structured mentoring programs.

Moreover, a broader, company-wide approach involves fostering a supportive culture. This encompasses promoting easy access to team members, encouraging professional development, and ensuring an environment where new hires feel welcome and valued.

While these strategies and measures are seen as helpful for onboarding and integration by the interviewees, i.e., career changers, the question arises as to the extent to which onboarding processes in general and the corporate culture are evolving and how traditional IT professionals perceive this. Consequently, further research is needed as to whether there is a need for communicative and procedural alignment when reskilled non-IT professionals and IT professionals work together.

Overall, in light of these findings, the discussion points toward a broader re-evaluation of the IT industry's potential as a fertile ground for career transition and growth. The insights gleaned challenge preconceived notions about the sector and highlight the transformative impact of thoughtful recruitment strategies, supportive learning environments, and progressive industry practices. As the IT landscape continues to evolve, the integration of career changers will undoubtedly play a pivotal role in shaping its future, making it a more inclusive, dynamic, and innovative space. In addition, the measure of discussion is a practice-oriented measure to increase women's involvement in IT.
While this research focuses specifically on how to encourage women to choose a career in IT, even if they may have previously selected a different path, we do not want to promote a mindset that favors one gender over the other. As in all other aspects of our lives, the corporate world should provide equal opportunities for all genders so that women are not favored over men in the search for suitable candidates. However, gender-sensitive recruitment can help increase the number of practical applications for qualified staff and motivate all potential candidates to apply (Gaucher et al., 2011).

6 Limitations and Further Research

During this study, several limitations emerged that shape the contours of our findings and point to areas for refinement in future research. The study's reliance on a limited number of interviews, confined to a single midsize IT services firm, limits the breadth and depth of insights, potentially limiting the applicability of our findings to the broader IT industry and other sectors and other regions around the world. This limitation calls for a more expansive approach in subsequent studies to enrich the understanding of career transitions in IT, in other sectors of IT, and in other countries.

The nuanced interplay between industry-specific situations and external factors, such as the COVID-19 pandemic, has emerged as a critical determinant of career pathways, particularly evident in the service sectors such as tourism, restaurants, and hotels. While the pandemic underscored the resilience of the IT sector, with its capacity for remote work and minimal reliance on face-to-face interactions, it also cast a shadow of uncertainty over whether the observed career changes were circumstantial or indicative of an underlying, enduring trend. A more detailed examination of industries that serve as reservoirs of potential talent for career transitions into IT, could reveal new pathways and strategies for attracting and integrating career changers, especially women.

By focusing on individuals who successfully transitioned into IT, this study may have overlooked the perspectives and experiences of those who considered but ultimately did not pursue such career changes or those who left the IT sector shortly after their transition. Future research can investigate what motivates those who transitioned to leave.
One important research venue is to investigate the climate of the workplace in terms of acceptance of these career changers as in-group among IT professionals and the impact of that on their satisfaction and commitment. In addition, further research should include not only different types and sizes of IT companies but also the different activities that can facilitate entry into the IT sector.

Another limitation and potential avenue for further research is the study's assumption of a binary representation of gender and sex, which contrasts sharply with the rich tapestry of gender identities that characterizes the modern workforce. Future research should move beyond this binary framework and adopt a more inclusive approach that reflects the diversity of identities and experiences.

7 Conclusion

In conclusion, this study highlights the underexplored potential of a career change or career transition as a strategic approach to diversifying the IT sector, particularly for women. Through analysis of job advertisements and in-depth interviews within a case company, we show that targeted job titles and structured reorientation strategies are critical to attracting a diverse talent pool and addressing the sector's skills shortage. These strategies are key to reducing barriers to entry and increasing inclusivity by actively engaging candidates, thereby reducing information asymmetry and reshaping perceptions of the IT field as a viable and rewarding career option.
8 References


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Essay 7: Delineating the Gender and Skills Gap in IT: Insights into the Recruitment and Onboarding of Women in Career Transitions


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Essay 7: Delineating the Gender and Skills Gap in IT: Insights into the Recruitment and Onboarding of Women in Career Transitions


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Essay 7: Delineating the Gender and Skills Gap in IT: Insights into the Recruitment and Onboarding of Women in Career Transitions


Essay 2 - Interview Guide

1) Welcome, introduction of the research team and the research project (~ 5-10 min)
   - Joint research project of CBS and Fraunhofer Project Group BISE (Germany)
   - Description of the research project and its context
   - Research context: Bimodal IT (mode 1, mode 2)
   - Aim: Identifying tensions, challenges, and suitable IT governance mechanisms
   - Current progress: understanding of bimodal IT in general, initial case study in Germany
     - Relevant definitions
   - IT governance: "The leadership and organizational structures and processes that ensure that the organization’s IT sustains and extends the organization’s strategies and objectives."
   - IT governance mechanisms: "Specific measures that contribute to IT governance at the structural, procedural, and relational level."
     - Interview procedure
   - three content-related question blocks (introduction, bimodal IT, IT governance mechanisms)
   - There is always the flexibility to address other topics of interest during interview
   - Permission to record the interview for subsequent analysis, anonymity is guaranteed

2) Introduction of the interviewee (~5 min)
   - Professional career path of the interviewee (background)
   - Level/years of experience within the position, industry, and organization
   - Position and tasks within the organization
   - Organization’s size (employees, turnover)

3) Bimodal IT (~ 10 min)
   - Delineate the overall organizational setup regarding bimodal IT (four archetypes of Haffke et al. (2017))
Appendices

- Identify and characterize mode 1 and mode 2 in the organization
- Division of tasks between the two modes
- Composition of the two modes (e.g., number of employees, skill set/knowledge/experience, location, roles)
- Interaction between the two modes
- Standing/status within the organization of the two modes
- Name and describe tensions between mode 1 and mode 2 and/or other challenges related to bimodal IT, e.g.:
  - Impact on business/IT alignment and IT/IT alignment
  - Business value delivery
  - Strategic planning, prioritization, project portfolio management, release planning
  - Budget and resource allocation/usage
  - Program management, project dependencies
  - IT infrastructure (during the development phase, during handover in operation/during maintenance)
  - Quality and risk management
  - Performance measurement, definition of goals, progress assessment
  - Communication, subgroup culture, mindset

4) **IT governance mechanisms** (~ 30 min, asked in conjunction with question block)

a) **Assessment of the current situation**
- Refer to the identified tensions from question block 3
- Name and describe measures (i.e., prevalent IT governance mechanisms) to balance the tensions and address the challenges
- Evaluate the current situation and suitability of these measures (i.e., IT governance mechanisms) and their impact on strategic alignment of business/IT and IT/IT
- --- probe for governance mechanisms from existing literature, evaluation of their suitability/impact ---
b) **Structural level**
- Structural level includes "structural (formal) devices and mechanisms for connecting and enabling horizontal, or liaison, contacts between business and IT management (decision-making) functions" (Peterson, 2003), e.g.:
  - S1: IT strategy committee at level of the board of directors
  - S4: CIO on executive committee
  - S6: IT steering committee (IT investment evaluation/prioritization at executive/senior management level)
  - S9: IT project steering committee
  - S11: Architecture steering committee

c) **Procedural level**
- Procedural level includes "formalization and institutionalization of strategic IT decision making or IT monitoring procedures" (Peterson, 2003), e.g.:
  - P1: Strategic information systems planning
  - P3: Portfolio management (incl. business cases, information economics, ROI, payback)
  - P8: Project governance/management methodologies
  - P9: IT budget control and reporting
  - P10: Benefits management and reporting

d) **Relational level**
- Relational level includes "the active participation of, and collaborative relationship among, corporate executives, IT management, and business management" (Peterson, 2003), e.g.:
  - R1: Job-rotation
  - R2: Co-location
  - R5: Business/IT account management
  - R7: Informal meetings between business and IT executive/senior management
  - R8: IT leadership
Appendices

e) **Outlook**
   - Name and describe areas for improvement, their expected contribution and if possible, specific steps/measures

5) **Interview closing (~ 5 min)**
   - Any remarks or feedback for the research project overall
   - Provisioning of the final results (paper or presentation with key insights), practical implications, and suitable governance mechanisms for bimodal IT organizations
   - Information on the further procedure (several interviews, within and cross-case analysis, paper write-up)
   - Recommendation of additional interviewees

6) **Documentation** (after the interview)
   - Duration of the Interview (start – end)
   - Describe the interview process (disruptions, interview atmosphere, …)
   - Write down noteworthy remarks or examples of the interviewee
   - Revise the interview guide
Essay 3 - Additional Statistics

Factor Analysis

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KMO > 0.7 → sufficient

Table. KMO and Bartlett’s Test
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The Cronbach's Alpha for the construct of Empowering Leadership was rather high. Therefore, we run additional test.
### Descriptives

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<sup>a</sup> Lilliefors Significance Correction
Essay 3 and Essay 6 - Online Questionnaire

FernUniversität in Hagen

UMFRAGE

Essay 3

Studie zur Arbeit in der IT

Lieber Teilnehmer, lieber Teilnehmer,

herzlich willkommen und vielen Dank für Ihr Interesse an unserer Studie zur Arbeit in der IT.

Die Arbeit in der IT stellt häufig besondere Herausforderungen an Arbeitnehmerinnen und Arbeitnehmer und hält gleichzeitig eine Vielzahl an möglichen Tätigkeitsfeldern bereit. Vielleicht haben Sie sich selbst schon einmal gefragt, welche Tätigkeit am besten zu Ihnen passt?

Mit dieser Studie untersuchen wir, ob die Passung zwischen Tätigkeitsmerkmalen und individuellen Persönlichkeitsmerkmalen einer Arbeitnehmerin oder eines Arbeitnehmers maßgeblich für die Zufriedenheit am Arbeitsplatz ist. Dazu bitten wir Sie zunächst einige Fragen zu Ihrer Persönlichkeit zu beantworten. Im Folgenden erwarten Sie dann Fragen zu Ihrer Tätigkeit und Arbeits situation. Abschließend benötigen wir noch einige demografische Angaben.

Bei den nachfolgenden Fragen gibt es keine richtige oder falsche Antwort, kein gewünscht oder weniger erwünscht. Bitte antworten Sie bei der Bearbeitung so, wie es Ihrer Person am ehesten entspricht bzw. so wie es Ihre Einschätzung ist.

Die Umfrage dauert etwa 20 Minuten.

Diese Umfrage wird anonym durchgeführt. Ihre Daten dienen ausschließlich zu Forschungszwecken und werden nicht an Dritte weitergegeben. Die Datenschutz-erklärung zur Verwendung von "Limesurvey“ an der FernUniversität in Hagen finden Sie hier:

Vielen Dank für Ihre Unterstützung.

Ihre Ansprechpartnerin für diese Studie:

Kristina Kusanke
Wissenschaftliche Mitarbeiterin
FernUniversität in Hagen
Fakultät für Wirtschaftswissenschaft
Lehrstuhl für Betriebswirtschaftslehre, insbesondere Informationsmanagement
kristina.kusanke@fumuh-hagen.de

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<td>Ich bin einfühlsam, warmherzig.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ich bin eher unordentlich.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ich bleibe auch in stressigen Situationen gelassen.</td>
<td>5 Punkte Likert Skala (stimme nicht zu – stimme zu)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ich bin nicht sonderlich kunstinteressiert.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ich bin durchsetzungsfähig, energisch.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ich begegne anderen mit Respekt.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin bequem, neige zu Faulheit.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bleibe auch bei Rückschlägen zuversichtlich.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin vielseitig interessiert.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich schäume selten vor Begeisterung über.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich neige dazu, andere zu kritisieren.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin stetig, beständig.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich kann launisch sein, habe schwankende Stimmungen.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin erfinderisch, mir fallen raffinierte Lösungen ein.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin eher ruhig.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich habe mit anderen wenig Mitgefühl.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin systematisch, halte meine Sachen in Ordnung.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich reagiere leicht angespannt.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich kann mich für Kunst, Musik und Literatur begeistern.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich neige dazu, die Führung zu übernehmen.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich habe oft Streit mit anderen.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich neige dazu, Aufgaben vor mir herzuschieben.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin selbstsicher, mit mir zufrieden.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich meide philosophische Diskussionen.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin weniger aktiv und unternehmungslustig als andere.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin nachsichtig, vergebe anderen leicht.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin manchmal ziemlich nachlässig.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin ausgeglichen, nicht leicht aus der Ruhe zu bringen.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin nicht besonders einflussreich.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin eher schüchtern.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin hilfsbereit und selbstlos.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich mag es sauber und aufgeräumt.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich mache mir oft Sorgen.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich weiß Kunst und Schönheit zu schätzen.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mir fällt es schwer, andere zu beeinflussen.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin manchmal unhöflich und schroff.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin effizient, erledige Dinge schnell.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich fühle mich oft bedrückt, freudlos.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Es macht mir Spaß, gründlich über komplexe Dinge nachzudenken und sie zu verstehen.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin voller Energie und Tatendrang.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin anderen gegenüber misstrauisch.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin verlässlich, auf mich kann man zählen.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich habe meine Gefühle unter Kontrolle, werde selten wütend.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin nicht sonderlich fantasievoll.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin gesprächig.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Andere sind mir eher gleichgültig, egal.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin eher der chaotische Typ, mache selten sauber.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich werde selten nervös und unsicher.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich finde Gedichte und Theaterstücke langweilig.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In einer Gruppe überlasse ich lieber anderen die Entscheidung.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin höflich und zuvorkommend.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bleibe an einer Aufgabe dran, bis sie erledigt ist.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin oft deprimiert, niedergeschlagen.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mich interessiere abstrakte Überlegungen wenig.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin begeisterungsfähig und kann andere leicht mitreißen.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich schenke anderen leicht Vertrauen, glaube an das Gute im Menschen.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manchmal verhalte ich mich verantwortungslos, leichtsinnig.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich reagiere schnell gereizt oder genervt.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ich bin originell, entwickle neue Ideen.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Aktuelle Tätigkeit

<table>
<thead>
<tr>
<th>Bitte geben Sie Ihre Berufsbezeichnung an.</th>
<th>Antwortfeld</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bitte wählen Sie welchem Bereich Sie sich am ehesten zuordnen.</td>
<td>Fachbereich/ IT</td>
</tr>
<tr>
<td>Bitte wählen Sie die Position innerhalb Ihrer Organisation, welche am besten auf Ihre Tätigkeit. (Bedingung: Fachbereich angekreuzt)</td>
<td>Geschäftsführer <em>in / Geschäftsbereichsleiter</em>in / Führungskraft in einem Fachbereich / Mitarbeiter*in in einem Fachbereich / Sonstiges</td>
</tr>
<tr>
<td>Bitte wählen Sie die Position innerhalb Ihrer Organisation, welche am besten auf Ihre Tätigkeit zutrifft. (Bedingung: IT angekreuzt)</td>
<td>Höchste(r) IT Entscheider<em>in / Bereichsleiter</em>in in der IT / Führungskraft in einem Fachbereich / Mitarbeiter*in in einem Fachbereich / Sonstiges</td>
</tr>
</tbody>
</table>

### Ambidexterity (Exploration)

Einleitungstext: Bitte bewerten Sie, wie oft Sie im letzten Jahr in Ihrem Job Tätigkeiten mit folgenden innovationsorientierten Merkmalen ausgeführt haben. (Sollten Sie weniger als ein Jahr in Ihrer aktuellen Tätigkeit sein, beziehen Sie sich bitte auf die bisherige Dauer Ihres Jobs.)

| Neue Möglichkeiten suchen in Bezug auf Produkte, (IT-)Dienstleistungen, Prozesse oder interne und externe Märkte. | 5 Punkte Likert Skala (Nie / Selten / Gelegentlich / Oft / Immer) |
| Verschiedene Optionen bezüglich Produkten, (IT-)Dienstleistungen oder Prozessen bewerten. | Mom et al. (2009) |
| Aktivitäten, die sich auf die starke Veränderung von Produkten oder Prozessen fokussieren. | |
| Tätigkeiten, deren Resultate, zugehörige Erträge bzw. Kosten derzeit noch unklar sind. | |
### Ambidexterity (Exploitation)

<table>
<thead>
<tr>
<th>Aktivitäten, die von Ihnen gewisse Anpassungsfähigkeit erfordern.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aktivitäten, bei denen Sie neue Fähigkeiten erlernen oder sich neues Wissen aneignen müssen.</td>
</tr>
<tr>
<td>Aktivitäten, die nicht eindeutig den üblichen Arbeitsweisen und Standards in Ihrer Organisation entsprechen.</td>
</tr>
</tbody>
</table>

Einleitungstext: Bitte bewerten Sie, wie oft Sie im letzten Jahr in Ihrem Job Tätigkeiten mit folgenden effizienzorientierten Merkmalen ausgeführt haben. (Sollten Sie weniger als ein Jahr in Ihrer aktuellen Tätigkeit sein, beziehen Sie sich bitte auf die bisherige Dauer Ihres Jobs.)

<table>
<thead>
<tr>
<th>Aktivitäten, in denen Sie bereits viele Erfahrungen gesammelt haben.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aktivitäten, die Sie routiniert ausführen.</td>
</tr>
<tr>
<td>Tätigkeiten, die bestehenden interen und externen Kunden mit bestehenden Dienstleistungen und Produkten dienen.</td>
</tr>
<tr>
<td>Aktivitäten, bei denen Ihnen klar ist, wie sie auszuführen sind.</td>
</tr>
<tr>
<td>Aktivitäten, die sich hauptsächlich auf das Erreichen kurzfristiger Ziele konzentrieren.</td>
</tr>
<tr>
<td>Aktivitäten, die Sie richtig ausführen können, indem Sie Ihr vorhandenes Wissen nutzen.</td>
</tr>
<tr>
<td>Aktivitäten, die eindeutig den üblichen Arbeitsweisen und Standards Ihrer Organisation entsprechen.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5 Punkte Likert Skala (stimme nicht zu – stimme zu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mom et al. (2009)</td>
</tr>
</tbody>
</table>

### Person-Job Fit

<table>
<thead>
<tr>
<th>Meine Fähigkeiten passen zu den Anforderungen meines Jobs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ich habe die richtigen Fähigkeiten und Fertigkeiten, um meinen Job auszuführen.</td>
</tr>
<tr>
<td>Die Anforderungen meines Jobs stimmen mit meinen Fähigkeiten überein.</td>
</tr>
<tr>
<td>Meine Persönlichkeit passt gut zu meinem Job.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5 Punkte Likert Skala (stimme nicht zu – stimme zu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lauver &amp; Brown (2001)</td>
</tr>
<tr>
<td>Appendixes</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td><strong>Work Exhaustion</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Zufriedenheit mit dem Gehalt</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Zufriedenheit Arbeitskollegen</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Zufriedenheit Arbeitszeit</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Zufriedenheit Trainings</strong></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
| **Empowering Leadership** | Einleitungstext: Die folgenden Aussagen beziehen sich auf Ihren direkten Vorgesetzten oder Ihre direkte Vorgesetzte. Mein Vorgesetzter/Meine Vorgesetzte ...
arbeitet so hart er/sie kann.
arbeitet so hart wie jede/r andere in meinem Team.
erklärt dem Team die Unternehmensziele.
erklärt meinem Team den Zweck von Unternehmensmaßnahmen.
interessiert sich für die Probleme der Teammitglieder. |
| | Arnold et al., (2020) |
| Appendices |
|---------------------|---------------------------------|-----------------------|
| sorgt sich um das Wohl seiner/ihrer Teammitglieder. | ermutigt Teammitglieder, Probleme gemeinsam zu lösen | ermutigt Teammitglieder zum Austausch von Informationen untereinander. |
| ermutigt Teammitglieder zum Austausch von Informationen untereinander. | ermutigt Teammitglieder, Ideen und Vorschläge zu äußern. | hört sich die Ideen und Vorschläge meines Teams an. |

<table>
<thead>
<tr>
<th>Demografische Angaben</th>
<th>Bitte geben Sie an mit welchem Geschlecht Sie sich identifizieren.</th>
<th>Männlich / Weiblich / Divers / Sonstiges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bitte geben Sie Ihr Alter an.</td>
<td>Ganzzahliger Wert</td>
<td>nA.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unternehmensdaten</th>
<th>Seit wie vielen Jahren sind Sie in Ihrem aktuellen Unternehmen angestellt?</th>
<th>&lt;1 / 1-2 / 2-5 / 5-10 / 10-20 / &gt;20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haben Sie in Ihrer aktuellen Position Führungsverantwortung?</td>
<td>Ja / Nein</td>
<td></td>
</tr>
<tr>
<td>Haben Sie in Ihrer aktuellen Position Budgetverantwortung?</td>
<td>Ja / Nein</td>
<td></td>
</tr>
<tr>
<td>Bitte geben Sie die Mitarbeiterzahl Ihres Unternehmens an. (Sollte Ihr Unternehmen global tätig sein, beziehen Sie sich bitte auf diese gesamte Mitarbeiterzahl.)</td>
<td>1-49 / 50-249 / 250-499 / 500-999 / 1.000-2.499 / 2.500-4.999 / 5.000-9.999 / 10.000 oder mehr</td>
<td>nA.</td>
</tr>
<tr>
<td>Bitte geben Sie die Mitarbeiterzahl der IT-Abteilung an.</td>
<td>0 / 1-4 / 5-14 / 15-24 / 25-49 / 50-99 / 100-249 / 250-499 / &gt;500</td>
<td></td>
</tr>
<tr>
<td>Bitte wählen Sie die Branche Ihres Unternehmens.</td>
<td>Automobilbau &amp; Zulieferer / Banken / Bauwesen &amp; Immobilien / Chemie &amp; Pharma / Dienstleistungen / Einzelhandel / Elektronik &amp; High-Tech / Energie &amp; Versorger /</td>
<td></td>
</tr>
<tr>
<td>Common Method Bias</td>
<td>Blau ist eine schöne Farbe.</td>
<td>Ich mag die Farbe Blau.</td>
</tr>
</tbody>
</table>
Appendices

Essay 5 – Interview guide

Hauptkategorie 1: Maßnahmen zur Führungskräfteentwicklung

Leitfrage

• Welche Maßnahmen sind aus Ihrer Sicht zu ergreifen, um Führungskräfte dazu zu befähigen, digitale Führungskräfte zu werden bzw. den besonderen Anforderungen des digitalen Wandels in der öffentlichen Verwaltung gerecht zu werden?

Detailfragen (konkretisierte Fragen)

• Welche konkreten Maßnahmen werden in Ihrer Behörde angeboten (z. B. Barcamps, Digitallotsen, IT-Berater usw.)? Welche dieser Maßnahmen halten Sie persönlich für besonders wertvoll, um Führungskräfte entsprechend zu befähigen? Warum?
• Werden Ihrer Meinung nach wichtige Maßnahmen vernachlässigt, die Sie persönlich als wertvoll erachten?
• An welchen Maßnahmen haben Sie bereits selbst teilgenommen?
• Haben Sie eine Idee, wie die Aus- bzw. Hochschulbildung gestaltet sein müsste, um Führungskräfte hervorzubringen, die den digitalen Wandel in der öffentlichen Verwaltung gemeinsam mit ihren Mitarbeitern erfolgreich vorantreiben?
Aufrechterhaltungs- und Steuerungsfragen

- Können Sie diese Aussage konkretisieren?
- Können Sie diesbezüglich ein Beispiel anführen?

Hauptkategorie 2: Gewinnung und Bindung digitaler Führungskräfte

Leitfrage

- Welche Möglichkeiten gibt es Ihrer Meinung nach, um geeignete Führungskräfte für den öffentlichen Sektor im digitalen Zeitalter zu gewinnen und zu binden?

Detailfragen (konkretisierte Fragen)

- Wie sollten die Auswahlverfahren im öffentlichen Dienst gestaltet sein, um potenziell geeignete digitale Führungskräfte auszuwählen?
- Wie kann ein möglicher Bedarf an guten Führungskräften in Zeiten des digitalen Wandels gedeckt werden?
- Wie können gute Führungskräfte in Zeiten des digitalen Wandels in der öffentlichen Verwaltung gehalten werden (z. B. im Hinblick auf die Konkurrenz durch die Privatwirtschaft)?

Aufrechterhaltungs- und Steuerungsfragen

- Können Sie dies näher erläutern?
- Haben Sie dafür ein weiteres Beispiel?

Abschluss des Interviews

- Möchten Sie zum Abschluss des Interviews noch etwas ergänzen, was Ihnen wichtig erscheint und noch nicht angesprochen wurde?
Essay 7 – Interview guide

1. Welche Ausbildung / Welche Studium hast du absolviert?
2. In welcher Branche warst du zuvor beruflich aktiv?
3. Welchen Job / Tätigkeit hast du dort ausgeführt?
4. Was hat dich dazu bewegt, nach einer neuen Stelle zu suchen?
5. Hast du bewusst nach einer Stelle im IT-Bereich gesucht / hier eine Mitarbeit in Betracht gezogen?
6. Nach welchen Stellen / Jobanzeigen hast du gesucht?
7. Unter welcher Jobbezeichnung war die Stelle ausgeschrieben, auf die du dich hier im Unternehmen beworben hast?
8. Was hat dich an dieser Stelle angesprochen und dazu bewegt, dich zu bewerben?
9. Hast du dich selbst zuvor als geeignet für eine Arbeit in der IT-Branche gehalten?
10. Wie lange arbeitest du nun bereits hier im IT-Unternehmen?
11. Was hat dir dabei geholfen, dich gut in die IT-Themen einzuarbeiten?
12. Welche zuvor erlangten Fähigkeiten oder Kenntnisse aus dem vorherigen Beruf sind für dich allgemein hilfreich im neuen Job in der IT?
13. Welche Vorstellungen hattest du zuvor von der IT-Branche?
14. Was gefällt dir an der Arbeit in der IT?
15. Würdest du weiteren Personen, insbesondere Frauen, ebenfalls einen Quereinstieg in die IT-Branche empfehlen? Begründe bitte die Antwort.
Date and place of birth: March 14th, 1988 in Lüdenscheid, Germany

ACADEMIC CAREER

<table>
<thead>
<tr>
<th>Date</th>
<th>Position/Role</th>
<th>Institution/Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>06/2021 – 06/2024</td>
<td>Research Assistant and Doctoral Candidate</td>
<td>Chair of Business Administration, especially Information Management, FernUniversität Hagen, Germany</td>
</tr>
<tr>
<td>09/2022 – ongoing</td>
<td>Lecturer (Lehrbeauftragte) of the module &quot;Grundlagen der Wirtschaftsinformatik&quot;</td>
<td>Fachhochschule Südwestfalen, Campus Hagen, Hagen</td>
</tr>
</tbody>
</table>

Student and research assistant at the Center for Health Care Management at the Leipzig Graduate School of Management, the Chair of Service Management at the University of Leipzig, the MOEZ-Fraunhofer Institute Leipzig and the School of Business and Economics at the University of Maastricht.

PROFESSIONAL CAREER

<table>
<thead>
<tr>
<th>Date</th>
<th>Position/Role</th>
<th>Institution/Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/2020 – 05/2021</td>
<td>Global Team Lead Sales Processes</td>
<td>Kostal Automobil Elektrik, Lüdenscheid, Germany</td>
</tr>
<tr>
<td>07/2017 – 09/2020</td>
<td>Expert Strategies, Structures and Processes</td>
<td>Kostal Automobil Elektrik, Lüdenscheid, Germany</td>
</tr>
<tr>
<td>05/2016 – 06/2017</td>
<td>Business Development Specialist – 3M Partner Portal</td>
<td>3M Deutschland GmbH, Neuss, Germany</td>
</tr>
<tr>
<td>10/2014 – 05/2016</td>
<td>Subject Matter Expert - Marketing Processes</td>
<td>3M Deutschland GmbH, Neuss, Germany</td>
</tr>
<tr>
<td>10/2013 – 10/2014</td>
<td>Management Trainee Marketing &amp; Sales</td>
<td>3M Deutschland GmbH, Neuss, Germany</td>
</tr>
</tbody>
</table>

EDUCATION

<table>
<thead>
<tr>
<th>Date</th>
<th>Institution/Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>09/2012 – 08/2013</td>
<td>School of Business and Economics, Maastricht University, Netherlands</td>
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<td></td>
<td>M.Sc. International Business</td>
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<tr>
<td>08/2011 – 12/2011</td>
<td>Umeå School of Business, Umeå University, Sweden</td>
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<td>Erasmus Semester</td>
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<tr>
<td>10/2008 – 03/2012</td>
<td>Universität Leipzig, Germany</td>
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<td>B.Sc. Business and Economics</td>
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Word of Honor/Eidesstattliche Versicherung


Lüdenscheid, 06.03.2024

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Kristina Kusanke