The Role of the CIO and the CDO in an Organization's Digital Transformation

Completed Research Paper

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Abstract

The CIO role often embodies both strategic as well as operational elements. However, the penetration of digital technologies into nearly every aspect of business has led many firms to create the role of a Chief Digital Officer (CDO) to oversee the establishment of digital capabilities in the company. This development has the potential for considerable redundancy between CIO and CDO roles and brings the CIO role to an inflection point. Through multiple interviews with executives of 19 firms, seven of which have a CDO, this paper explores the reasoning behind the CDO role, the need for which is often driven by digitization pressure, demand for organizational orchestration, aspects of the CIO role profile, and the digitization focus areas of the company. Moreover, this paper identifies four distinct CDO role-types (Evangelist, Coordinator, Innovator, and Advocate) and assesses the implications for the CIO role in the context of digital transformation.

Keywords: Chief Information Officer, CIO, Chief Digital Officer, CDO, Executive Roles and Responsibilities, Digital Leadership, IT Leadership, Ambidexterity

Introduction

Rapid technological advancements have fundamentally transformed industries, creating opportunities and threats for new firms, as well as established firms. Ubiquitous connectivity, more powerful and ever-cheaper computing power, and changes in the behavior of digitally connected customers are shaping a new digital era. Many industries have been disrupted by innovations from fast growing start-ups—such as Airbnb, Uber, or Netflix—which position themselves with digital business models (i.e., business models with minimal physical components) and quickly obtain market share from established industry players with traditional business models (Christensen and Overdorf 2000). At the same time, information technology (IT) has become a strategic differentiator for many established firms over the last decades (Bassellier and Benbasat 2004) and the role of the Chief Information Officer[1] (CIO) has gained importance for the same reason (Matt et al. 2015; Weill and Woerner 2013a).

[1] Throughout this paper, we view the Chief Information Officer (CIO) as a company's most senior IT executive, irrespective of his or her actual job title.

IT is commonly understood within professional organizations as the technology and its management required to employ and maintain information systems (IS) that support internal operations. The "*informatization*" era describes the recent decades, in which information has become a core asset for businesses and virtually every organization has established an IT function as an integral business support function (Laudon and Laudon 2015). Although not always distinctly different from IT, the term "digital" has been recently coined to describe internet-based, typically outward-facing technology with direct implications for a firm's business model (Matt et al. 2015). Commonly, "*digitization*" initiatives in organizations originate in the functional area of marketing, sales, customer service, or operations, while supported but rarely driven by the IT function. Recently, firms' digital realm has expanded quickly, both in terms of importance (from being a communication medium to being a revenue-driving route to market) as well as in terms of channels (social networks, smartphones, tablet computers, etc.), hence increasingly perceived by the top management as strategically important. Bharadwaj et al. (2013) define the term "*digital business strategy*" as the infusion of digital technology aspects into business strategy, whereas IT strategy has typically been viewed as a separate functional-level strategy—aligned with, but usually subordinate to, business strategy.

The term "*digital transformation*", which is often used interchangeably with "*digitization*", has become a popular phrase among practitioners in recent years. While the term lacks a clear definition, it highlights the transformational nature of digital technologies for businesses, especially in large corporations with a long non-digital history. Specifically, digital transformation encompasses the digitization of sales and communication channels, which provide novel ways to interact and engage with customers, and the digitization of a firm's offerings (products and services), which replace or augment physical offerings. Digital transformation also describes the triggering of tactical or strategic business moves by data-driven insights and the launch of digital business models that allow new ways to capture value (Bharadwaj et al. 2013a; Pagani 2013; Setia et al. 2013). Disruptive digital innovation by new entrants provides threats to incumbent businesses along their industries' value chains, even in industries that have been largely unaffected by disruptive forces in the past, such as health care and financial services (Christensen et al. 2000; Dobni 2006; Hwang and Christensen 2008). In order to respond to these trends, some companies have implemented digitization initiatives in recent years as well as revised their organizational setup and executive roles. In particular, an increasing number of firms have established the role of a Chief Digital Officer (CDO) to take charge of digitally transforming businesses (Rickards et al. 2015). Unlike the CIO who heads the IT function and takes responsibility for traditional IT strategy and its execution, the CDO fills a business role that addresses the outbound-facing employment of digital technologies, typically involving the company's products and services as well as interface points with customers and partners (Hess et al. 2016). CDOs' responsibilities tend to vary, but commonly include the development, refinement, and execution of an overarching digital strategy for the company and leading the required change management efforts to prepare the business for the digital era, which often demands the CDO's ability to drive a shift in thinking and cultural changes without provoking harmful internal disruption.

Although research on digital business strategy and its implications for the IT function is burgeoning (Drnevich and Croson 2013), extant IS research has not yet sufficiently discussed new executive roles such as the one of the CDO and the implications for the CIO role. Prior research describes the evolution of the CIO role (Chun and Mooney 2009; Peppard et al. 2011) while firms have historically struggled to realize value from their IT investments and, at the same time, competitive differentiation in the market through IT has become a critical C-level topic. Organizational ambidexterity has become a popular research framework that describes the CIO's capability to manage the conflicting goals of exploiting current IT resources and capabilities to realize value (IT exploitation) and exploring new opportunities for the innovative use of IT (IT exploration). Chen et al. (2010) describe the maturity process between CIO supply-side leadership (i.e., the traditional CIO responsibilities around IT exploitation) and demand-side leadership (i.e., effective business leadership around IT exploration for business innovation and transformation) and their respective positive influence on organizational outcomes, indicating that achieving both is desirable. Alignment research has produced well-understood business-IT alignment concepts that help us comprehend the process of aligning functional IT strategy with business strategy, both on the intellectual as well as the social level (Henderson and Venkatraman 1993; Reich and Benbasat 2000). Yet, alignment between, and the split of, potentially duplicate responsibilities between CIOs and CDOs is largely under-researched thus far. Until today, extant literature has merely recognized the scenario that the CIO role loses its strategic component

(Chun and Mooney 2009; Peppard et al. 2011) and that Chief Executive Officers (CEOs) might appoint other executives to drive the strategic value of digitization (Chun and Mooney 2009; Weill and Woerner 2013b).

In our study, we aim to address this research gap by answering the following research questions:

- *How do companies delimit the role of the Chief Digital Officer from the role of the Chief Information Officer and what drives the initial need for a Chief Digital Officer?*
- *How does the role of the Chief Information Officer continue to evolve in the digital business era?*

We approached these research questions by conducting multiple interviews with matched pairs of CIOs and business executives of 19 firms. Across our sample of firms, we derived three major findings: A delineation of CDO role-types, factors influencing the need for a CDO, and implications for the CIO role. Along with four distinct CDO role-types, we identified two primary factors, CIO ambidexterity and the implications of digitization as perceived by the organization, that affect the appropriate CDO role-type for a firm that experiences the need for a CDO. Implications for the CIO role are manifold; yet, our study highlights the three most significant consequences: CDO IT ambassadorship, a split in IT leadership roles, and the need for tight CIO-CDO alignment.

The following sections describe the conceptual background, our research methodology and study design, and our detailed findings. We then discuss the results and their implications for theory and practice.

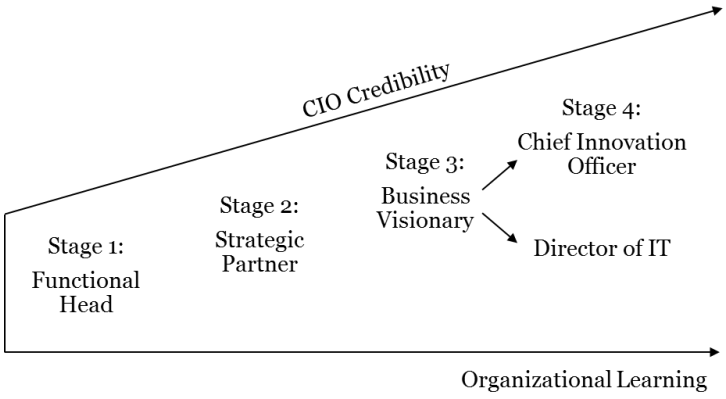
Conceptual Background

Conceptually, we are building upon the literature concerned with the CIO role and its evolution over the past decades with a recent focus on CIO ambidexterity, the transformational character of digitization, and the distribution of leadership roles and responsibilities in an era of digital business.

The Evolution of the CIO Role

The role of the CIO has been continually challenged (King 2011; Rothfeder 1990) with both practitioners and academics indicating that the role is currently one which is readily associated with evolution, pressure, complexity and tension. The explicit expectations encompassed within the CIO role have grown over the decades that the CIO has been in existence (Chun and Mooney 2009; Fortino 2008), with the number of implicit assumptions increasing rapidly. This has resulted in considerable ambiguity in relation to the CIO role (Peppard et al. 2011) and consequently a lack of consensus on the actions to be undertaken to ensure that IT leadership operates effectively and contributes to the long term growth of the business.

The only central tenet that has defined the role of the CIO has been one of change. Changing titles, role definitions, and expectations have all contributed to a role that is riddled with ambiguity (Peppard et al. 2011). To illustrate this dynamism, it is worth acknowledging that the role of the CIO began as one of a data processing manager (Martin 1982) and then evolved to an "*IS Manager*" (Ives and Olson 1981), with the role resembling little more than an IT director with minimal strategic focus. Ross and Feeny (1999) describe this as the first stage in the evolution of the CIO role, where the CIO's focus as the head of the IT function is on providing reliable IT operations, which requires solid technical knowledge and experience. The focus in this stage is on operating the information systems portfolio to agreed service levels and ensuring user satisfaction. However, over time, many organizations began to value the strategic importance of IT, causing an expansion of the CIO role to include these additional strategic expectations (Fortino 2008). The CIO role in this second stage transformed from that of a technical manager to that of a business manager (albeit still with considerable technical focus) capable of deploying value-adding information systems and processes as a strategic partner to the business (Chun and Mooney 2009). This paved the way for the third stage, where the CIO role transformed into that of a proactive business visionary who drives strategy by recognizing the value of emerging IT capabilities and new applications of IT for the business (Ross and Feeny 1999). With the introduction of the actual title of CIO, the most senior IS executive formed part of the C-suite, though rarely reporting directly to the CEO. Figure 1 describes this evolution of the CIO role through its stages as CIO credibility grows with the organizational learning about IT. Mastering one stage is generally considered a prerequisite for the CIO to progress to the next stage (Ross and Feeny 1999). This understanding is shared by other research in this field, for example, Chen et al.'s (2010) staged maturity model of CIO leadership and Peppard et al.'s (2011) description of five states of the CIO role.



Adapted from: Ross and Feeny (1999), Chun and Mooney (2009)

Figure 1. The Evolving Role of the CIO

Along its evolution, the CIO role has been associated with significant pressure, reflecting the constantly changing role expectations, advent of new technologies, as well as significant changes in the environment that firms reside in (IBM 2010; Patten et al. 2009). There are many sources of uncertainty for CIOs, for example, poorly performing and risky projects (Chapman and Ward 2003; Kappelman et al. 2006), IT outsourcing challenges (Aubert et al. 2005; Dibbern et al. 2004; Lacity et al. 2009), and information security (Choobineh et al. 2007). While being charged by other top management team[2] (TMT) members with pursuing strategic objectives, CIOs often report to the Chief Financial Officer (CFO) with a focus on containing IT costs (Muse 2016; Thibodeau 2011)—a practice that can create significant barriers for CIOs attempting to fulfil strategic expectations (Kalgovas et al. 2014; Raghunathan and Raghunathan 1989). Simultaneously, CIOs often compete at the board table for the funding needed to complete their projects. However, in many firms, a history of failed IT-related projects results in little commitment from the board to IT projects (Enns et al. 2011). Coupling this with the aforementioned evolution of the role and the associated complexity, CIOs are often perceived to be unsuccessful at navigating their landscape (Spitze and Lee 2012) and in charge of a function that is perceived to add minimal value (Earl 1996).

In light of the pressure to achieve both effective supply-side leadership and demand-side leadership, recent research predicts the bifurcation of the CIO role into two roles (Chun and Mooney 2009), with one role encompassing the traditional focus of an "*IS Manager*" and the other role enabling strategy, process, and information innovations (see stage 4 in Figure 1). Along the same lines, Peppard et al. (2011) envision the CIO role reverting to the original technical view of the role, while other business executives assume ownership of overseeing the use of IT for innovation and strategic differentiation.

The theory of CIO ambidexterity, on the other hand, suggests that CIOs can master both supply-side and demand-side leadership effectively (Gibson and Birkinshaw 2004; Vidgen et al. 2011). Specifically, ambidexterity is conceptualized as being able to balance competing and conflicting objectives, typically identified as exploration and exploitation, where exploration is defined as "*search, variation, risk taking, experimentation, play, flexibility, discovery and innovation*" while exploitation is defined as "*refinement, choice, production, efficiency, selection, implementation and execution*" (March 1991). Initially, it was argued that ambidexterity is achieved through "*structural differentiation*" where certain organizational units are tasked with exploratory or exploitative acts, but are not required to achieve both tasks within the unit (O'Reilly and Tushman 2004). However, due to the significant costs associated with implementing the type of mechanisms required to achieve this, the approach of "*contextual ambidexterity*" has received significant attention as a means of empowering individuals to use their "*behavioral capacity*" to effectively balance both activities (Gibson and Birkinshaw 2004). The application of ambidexterity to the field of IT

[2] We define the top management team as the Chief Executive Officer and those senior-most executives who report directly to the CEO (Finkelstein and Hambrick 1996).

leadership has resulted in the assertion that CIO ambidexterity is desirable and that the pathway to achieving this goal is described by a staged maturity model, whereby supply-side leadership is achieved first, before the CIO is in the position to undertake effective demand-side leadership (Chen et al. 2010). However, achieving high levels of CIO ambidexterity is onerous in practice (Kalgovas et al. 2014), which fuels arguments for a split of the CIO role (Chun and Mooney 2009; Peppard et al. 2011).

Digital Transformation

IT innovation has historically been viewed as one of the contributors to the creation and maintenance of a firm's competitive advantage (Bharadwaj 2000; Melville et al. 2004; Porter 2008). However, with the increasing pace of technological change and innovation, coupled with the rapid adoption of digital end-customer products and services (Setia et al. 2013), there is now an intense focus from the business side on effectively harnessing the power of digital innovation (Bharadwaj et al. 2013a). Specifically, this is often conceptualized as various permutations and combinations of information, computing, communication, and connectivity technologies, which have impacts and influence in the areas of business strategies, business processes, firm capabilities, product and service offerings, and key inter-firm relationships, which enable the business to secure and maintain competitive advantage (Bharadwaj et al. 2013a). This represents a fundamental shift in the orientation of business strategy with respect to IT strategy (Horlacher 2016), where historically it was perceived that alignment occurred by first formulating business strategy, with the IT strategy being formulated subsequently (Henderson and Venkatraman 1993). In contrast, the recent focus on using digital technologies to guide the firm's strategic direction represents a shift away from this approach, with the focus on establishing an attractive position in the digital ecosystem, which effectively enables companies to explore and exploit digital technologies (Pagani 2013).

This creates challenges and opportunities for new as well as established firms, specifically in regards to the formation, establishment, and disruption of business models where the boundary between business and IT strategy is increasingly blurred (Bharadwaj et al. 2013a). In order for incumbent businesses to take advantage of the opportunities that an increased focus on digitization affords them, they must undertake a digital transformation journey, often altering corporate culture in order to open the organization to new digital opportunities (Fitzgerald et al. 2014). IS research has not yet thoroughly examined how organizations are able to take advantage of this digital focus, especially from an IT leadership perspective, with the extant literature, as discussed above, still lacking clarity concerning the role of the CIO as well as lacking firm guidance on how CIOs should respond.

The Emerging CDO Role

Despite there being no clear guidance on the approach an organization should take to leverage the power of digitization to achieve sustained competitive advantage, this has not inhibited practitioners from developing their own strategies, leading to a situation where practice is leading research. Principally, this has resulted in organizations adopting several governance initiatives in order to foster digital transformation, including the establishment of cross-functional digital leadership committees, cross-functional innovation groups, and the role of a Chief Digital Officer as a new C-level role (Fitzgerald et al. 2014). While the role of the Chief Information Officer has experienced many changes in the past, it appears that the presence of a distinct CDO role represents a marked difference from the way the CIO role has historically evolved, traditionally by expanding in scope and variety (Horlacher 2016). Interestingly, CDO positions are frequently created with a direct reporting relationship to the CEO (Horlacher and Hess 2016), which is something that CIOs have traditionally failed to obtain (Thibodeau 2011). The presence of a CDO represents a potential situation in which there may be duplication in the transformational aspects of the CIO role and the CDO role, potentially creating an inflection point in the role of the CIO. The coexistence of CDO and CIO also demands a demarcation of responsibilities, many of which would have traditionally become part or continued to be part of the CIO role.

Thus, we believe it is of significant importance that the logic behind the creation of the CDO role and the delimitation of roles and responsibilities between CIOs and CDOs is explored and explained. Existing research on the evolution of the CIO role over the past decades served as guidance and motivation for our research study, which puts the two roles in perspective and examines their future paths.

Research Methodology

Research Design

We use an exploratory approach to investigate current developments around digitization, the split of digital leadership responsibilities among executives, and governance setups in 19 European companies. The use of qualitative interview methods is well established in IS research and has helped exploring various managerial research topics in the past (Eisenhardt and Graebner 2007), particularly in areas where little a priori research exists (Siggelkow 2007). Utilizing interview data from multiple firms across a variety of contexts rather than analyzing a single case allows us to derive more general results with a stronger foundation (Eisenhardt 1989; Yin 2013).

We examined firms with similar organizational characteristics (i.e., large and very large European firms) in various industries. Companies participating in our study had to have at least 250 employees, annual revenues of 50 million Euros or more, and a history of at least 15 years with an established IT function. We approached CIOs of 60 companies and received confirmations for interview appointments from 20 CIOs[3] who were subsequently interviewed either by phone or in person. After the interview, CIOs were requested to refer us to an executive on the business side who is particularly concerned with digital topics. We also consulted company-internal and external documentation to add to the richness of information collected. In firms where a CDO existed, we specifically asked to interview this person or someone directly reporting to the CDO. In one firm, we were unsuccessful at obtaining a second interviewee on the business side, which reduced the number of investigated firms to 19. Table 1 lists the 19 firms and provides information on firm size, industry affiliation, whether or not a CDO existed at the time the interview was conducted, as well as the reporting level and functional role of both interview partners.[4]

Data Collection and Analysis

In order to ensure reliability and comparability of the results, we utilized an interview guide for conducting the semi-structure interviews with both business and IT executives. The interviews were conducted between February and May 2016. All interviews were scheduled for 60 minutes, while the actual interviews lasted between 45 and 100 minutes. The specific interview questions depended on the role of the interviewed executive, although topics areas were the same for both business and IT executives. For example, CIOs were asked to assess their own role, the role of the IT function as a whole, and their collaboration with other executives on digital topics from their point of view. Business executives were asked to talk about their perception of the CIO role, the role of the IT function, and how they viewed the cooperation between the various business functions and the IT department on digital topics.

We also gathered complementary quantitative data from business and IT executives using a questionnaire after the interview in order to increase the reliability and validity of our findings. The questionnaire items covered the distribution of CIO activities, organizational support for IT (as perceived by the CIO), the organization's senior management's digital literacy (as perceived by the CIO), CIO ambidexterity (as perceived by both the CIO and the matching business executive), as well as IT vision and IT contribution (as perceived by the business executive).[5]

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[3] In three firms, the CIO delegated the interview to a direct report due to the CIO's unavailability.

[4] Additional descriptive statistics on the interviewees (e.g., distribution of age, gender, years of experiences, etc.) as well as information on the represented companies (e.g., distribution of revenues, number of employees, size of the IT organization, etc.) can be provided by the authors upon request.

[5] For the sake of brevity, we did not append the interview guide nor the follow-up questionnaire. Both can be made available by the authors upon request. Sources for the questionnaire items were Jansen et al. (2006.), Chen et al. (2010), and Johnson and Lederer (2010).

Table 1. Overview of Investigated Firms

Firm ID	Firm Size [A]	Industry	CDO	Interviewee's Reporting Level to CEO [B]	
				IT Executive	Business Executive
Firm 1	Very large	Retail	Yes	+ 2 (CIO)	+ 1 (CDO)
Firm 2	Very large	Automotive	Yes	+ 2 (Group CIO)	+ 2 (CDO + 1)
Firm 3	Very large	Health Care	Yes	+ 3 (CIO + 1)	+ 2 (CDO + 1)
Firm 4	Very large	Banking	No	+ 3 (CIO + 1)	+ 2 (Digital Channels)
Firm 5	Large	Professional Services	No	+ 1 (CIO)	+ 1 (Sales)
Firm 6	Very large	Wholesale/Trade	Yes	+ 2 (Group CIO)	+ 1 (CDO)
Firm 7	Large	Travel/Transport	No [C]	+ 1 (CIO)	+ 1 (Operations)
Firm 8	Very large	Travel/Transport	Yes	+ 2 (CIO)	+ 1 (CDO)
Firm 9	Large	Banking	No [D]	+ 1 (CIO)	+ 1 (Strategy)
Firm 10	Very large	Utilities	No	+ 2 (CIO)	+ 1 (Marketing)
Firm 11	Very large	Retail	Yes	+ 1 (CIO)	+ 1 (CDO)
Firm 12	Large	Professional Services	Yes	+ 1 (CIO)	+ 1 (CDO)
Firm 13	Very large	Insurance	No	+ 1 (CIO)	+ 1 (Operations)
Firm 14	Very large	Manufacturing	No	+ 3 (CIO + 1)	+ 3 (Operations)
Firm 15	Very large	Media	No	+ 2 (CIO)	+ 2 (Digital Channels)
Firm 16	Large	Banking	No	+ 2 (CIO)	+ 1 (Operations)
Firm 17	Very large	Media	No	+ 2 (CIO)	+ 2 (Strategy)
Firm 18	Large	Health Care	No	+ 2 (CIO)	+ 3 (Innovation)
Firm 19	Large	Media	No	+ 2 (CIO)	+ 2 (Digital Channels)

[A] Firm size: Large = employees > 250 & annual revenue > EUR 50 mil. ; Very large = employees > 1,000 & annual revenue > EUR 500 mil.
[B] Reporting level to CEO: +1 = direct report; +2 = 2 levels below CEO; +3 = 3 levels below CEO; (CIO/CDO + 1) = 1 level below CIO/CDO
[C] CDO role existed but the position was recently terminated
[D] However, Corporate CDO exists in parent company

The interviews were recorded and transcribed. In cases where the interview language was not English, we translated the interview transcript into English before coding the data. The coding approach was data-led and inductive with the first round of coding using prior research on CIOs, the challenges they face, and the nature of such challenges to help interpret the data. The coding procedure involved two coders who processed the interview data independently after discussing coding inconsistencies during a coding pretest. Utilizing Krippendorff's alpha (Hayes and Krippendorff 2007) and Cohen's kappa (Cohen 1960), we assessed objectivity and inter-coder reliability based on a sample of coded matched-pair interview data. Both metrics exceeded their respective recommended minimum values, implying sufficient reliability and objectivity of our coding instrument (Krippendorff 2004). Interview and questionnaire data were supplemented with secondary data, including publicly available reports and press releases of the companies as well as internal documents that were made available to us by some firms. The coded interview data, questionnaire data, and supplemental data then served as an input for our analysis.

We coupled the quantitative data from the questionnaires with the thematically coded interview data that originated from the qualitative responses of interviewees and supplemental materials. We then prepared the data using data reduction methodology (Miles and Huberman 1994), with the reason why a company does or does not have a CDO serving as seed categories (see Appendix A). As part of our analysis, we compared the firms with regards to similarities of relationships and facts. Corroboration for many of our early conclusions came from relating firm characteristics with coded CIO characteristics and role profiles, and (where applicable) coded CDO characteristics and role profiles. Eventually, we aggregated our key findings into concepts that are grounded in the data we collected.

Results

Seven of the 19 companies of which we interviewed executives had a CDO at the time of the interview (see Table 1). The majority of these CDO positions were created very recently (in the years of 2014 and 2015); some CDOs were still in the process of building up their teams and establishing a modus operandi with executives of other functions in their company. Without exception, the CDOs of all seven companies reported directly to the CEO. One company (Firm 7) had a CDO at an earlier point in time, but the person filling the CDO position had left the company and the CDO role had since been eliminated. In the following subsections, we report and elaborate on three major findings from our cross-firm analysis: The CDO role definition, the factors that influence the need for a CDO role, and the implications for the CIO role.

Finding 1: How the CDO Role is defined

Upon analyzing the interview data, it quickly became apparent that there is no homogeneous understanding of the CDO role. "*Firms bundle a variety of responsibilities under this role […]; everyone defines the CDO role and its scope differently*" (CIO, firm 15). However, among all of our interview partners, there was consensus that the CDO role is a business role with the mandate to understand the industry-specific aspects of digitization, determine the implications for the company, develop and communicate a holistic digital strategy across the firm, and lead the required change efforts. Other aspects of the role that are often—but not always—included are the evangelistic communication of upcoming digital opportunities and threats, the fostering of cultural change across the company, the introduction of digital collaboration tools, the establishment and leadership of digital innovation labs, and business responsibilities for digital marketing or digital sales channels. The CDO is a "*digital business strategist who holistically understands and communicates the implications of digitization across the organization*" (Chief Operating Officer (COO), firm 7), often with added responsibilities as described above, whose role profile can overlap to some extent with the traditional CIO role profile, especially when it comes to aspects of CIO demand-side leadership.

Given the above description of the core CDO role and the spectrum of often-added responsibilities, we found different CDO role-types to exist. Although the CDO roles we observe in practice are often a blend between these types, we were able to identify four distinct CDO role-types from our interview data.

Although there is certainly a magnitude of factors influencing the manifestation of a CDO role-type, our cross-firm data analysis highlights two factors that primarily determine the CDO role-type most suitable for a firm: The implications of digitization as perceived by the organization and the CIO role orientation. The implications of digitization for the firm primarily affect the foundation on which the CDO can develop strategic digital initiatives. If a company already realizes the importance of digitally transforming itself (and has perhaps already started to do so), more of the CDO's focus is on ensuring that there is a holistic digital vision and digitization initiatives are aligned with the digital business strategy, rather than on education. The CIO role orientation heavily affects the role split between CIO and CDO. In companies where the CIO has a strong focus on supply-side leadership, the CDO often takes on the demand-side aspects of the CIO role. If the CIO already has a sufficiently ambidextrous profile, the CDO role is often reduced in scope with regards to this aspect. It is important to note that both factors also affect the need for a CDO role to begin with (see Finding 2).

Figure 2 summarizes the four CDO role-types we derived from our cross-firm data analysis. We also indicated where each of the firms that had a CDO falls on the two dimensions of this chart, and the blend of CDO role-type characteristics in those cases. The following subsections describe the four role-types, referencing the investigated firms where we found considerable manifestations of each role-type existing.

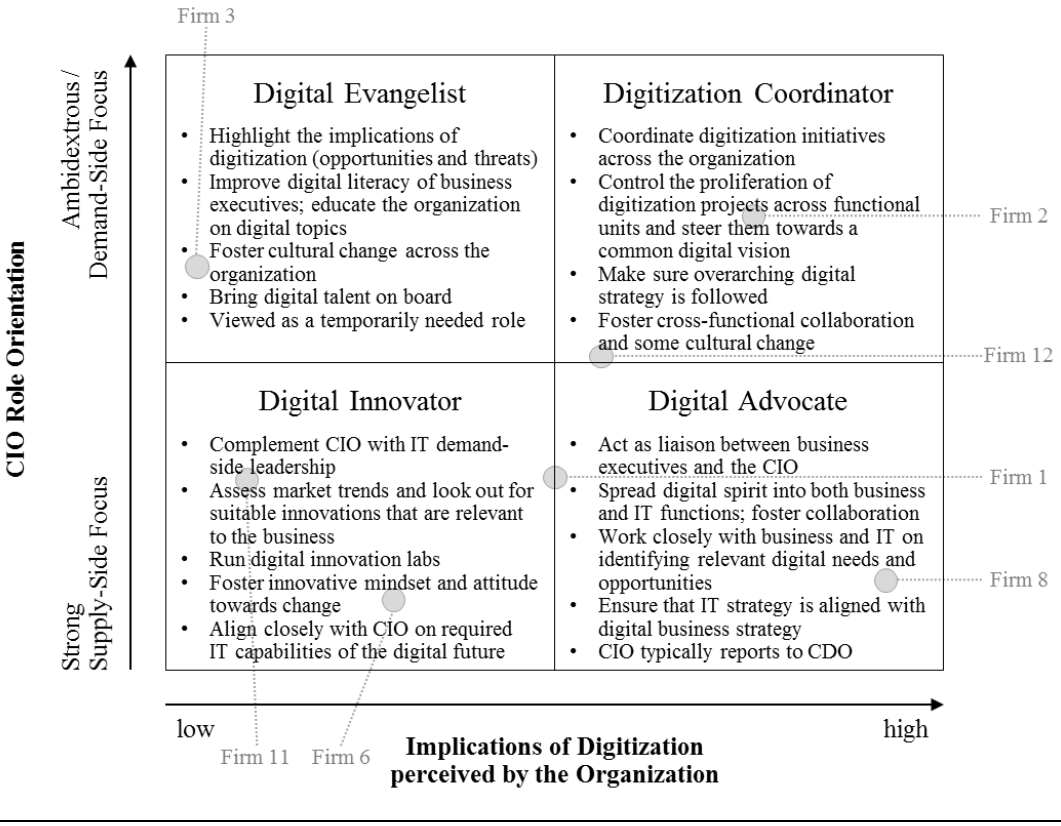

Figure 2. CDO Role-Types

The 'Digital Innovator' type CDO

CDOs who act as Digital Innovators typically complement a strongly supply-side focused CIO. Firm 11, for example, is a multi-divisional retail company that perceived itself as challenged by stagnating traditional revenue streams and consequently designed its digital business strategy to enable it to diversify into offering ancillary digital services through digital channels and digital customer touchpoints at its thousands of small retail outlets. With minimal experience in digital end-customer services and a strongly supply-side-oriented IT function, the company created digital laboratories under the leadership of a newly appointed CDO. "*We intentionally wanted to cause [internal] disruption by forming a new unit,*" stated the CDO as he articulated his mission to "*foster a more innovative mindset and culture across the organization*". The CIO perceives himself as complemented by the CDO and his digital labs. "*Insufficient knowledge of our core business and a cost-driven focus on keeping our legacy IT operational*" are the key reasons stated by the CIO for why his division has so far been unable to explore and experiment with innovative digital end-customer services. Yet, the CDO and CIO are working closely together to cultivate a demand-side focus within the IT function, so the CDO can move into a more evangelistic role. Similarly, the CDO of firm 6 describes himself as "*a catalyst for digital innovation with direct business ties*" as he leads the company's "*digital workbench*" which acts as a hub for experimentation with and prototyping of digital innovations.

The 'Digital Evangelist' type CDO

Representative of this CDO role-type, firm 3 is a multi-national company in the sector of pharmaceuticals and life sciences. The company recently made a strategic acquisition to gain digital talent, knowledge, and capabilities. As a result, a key executive of the acquired company became the CDO for the corporate organization. "*Top management is beginning to understand some implications of a dawning digital era*" stated the interviewed IT executive; yet, the heavily regulated pharmaceutical sector limits the impact digital disruption has on their business. The CDO is primarily an evangelist whose mission it is to "*take the*

organization on a digital change journey and sensitize people that the world as we know it will not exist for long," stated his direct report, adding that "*executives across the company need to understand the opportunities and threats of digitization trends in their respective markets*." Cultural change is another important aspect of the Evangelistic CDO role. "*Our company's current culture discourages risk taking,*" stated the CIO's direct report, adding, "*[…] this hinders experimentation with digital innovations because failure is largely not accepted.*" It is part of the CDO's mission to bring a "*fresh digital spirit*" to the corporation as a whole and obtain buy-in on the newly developed digital business strategy from executives across all business units and departments. The corporate CIO and CDO of the company are working in alignment, yet mostly independent. The CIO has built an ambidextrous IT function over the past years and is expecting to take on more digital leadership responsibilities in the future, as the CDO will eventually make himself redundant once he successfully accomplishes his mission as a Digital Evangelist CDO.

The 'Digitization Coordinator' type CDO

The Digitization Coordinator CDO role-type embraces primarily an orchestration function. In firm 2, a multi-national automotive company, a CDO was appointed when the corporate office saw the need to align various digitization initiatives, which had originated in different business units and functions of the organization and had begun to proliferate. The company is well aware of the implications of digitization and has initiated large programs around "*smart factories*" and "*connected cars*" as well as initiatives on digital sales, digital marketing, digital ancillary car services, and partnerships with leading digital players. "*Digitization will alter the nature of our product*," stated the interviewed Group CIO, arguing, "*[…] competitors like Tesla Motors are leading the automotive industry into a new digital era*." This has invoked management attention on nearly all levels of the organization. The Chief Customer Officer, a direct report to the CDO, described how "*digital labs*, *innovation labs*, *IT labs*, and *incubators—sponsored by executives in various functions [including IT]—have emerged across the company to foster digital innovation*". Besides developing the foundation for an overarching digital strategy, it is the CDO's task to coordinate and align digitization initiatives across the firm to ensure the common digital vision is pursued globally by all divisions of the firm. The company's IT function and its leadership team are doing their part to support the CDO with a balance of IT supply-side and demand-side activities.

The 'Digital Advocate' type CDO

A CDO with Digital Advocate characteristics acts as a liaison between business functions and the CIO, with the CIO typically reporting directly to the CDO. Representing this role-type, firm 8 is a passenger transport provider, whose management board realized the need to offer digital services to the company's customers primarily due to changes in customer behavior and disruptive digital mobility service offerings from new market entrants as well as traditional competitors. Yet, "*IT was mainly viewed as a cost factor in the past and IT infrastructure projects had been deprioritized to the extent that digital customer-facing services [were] currently running on a backend of outdated legacy systems*" (CIO, firm 8). The top management team had to react to the rapidly growing importance of digitization, yet did not perceive it as a suitable option to add the strongly supply-side-focused CIO to its ranks. Instead, the CEO appointed a CDO to his leadership team who acts as a facilitator between other TMT members and the CIO. "*IT has always been viewed as something separate in our company,*" stated the CDO and described it as part of his mission to "*foster stronger business-IT collaboration and remove siloed thinking from people's heads*". In close cooperation, CIO and CDO are jointly responding to the previous lack of IT exploration by adding such capabilities to the organization. The CIO sees the current setup as a considerable advantage compared to previous setups because "*the CDO acts as an advocate for IT topics at the top management level, where my voice was not heard before*".

In conclusion, our data identifies four distinct CDO role-types, the manifestation of which is primarily determined by the CIO role orientation and the perceived implications of digitization. Having developed an understanding of what the CDO role comprises, we then researched the factors that determine the need for companies to create a CDO role in the first place.

Finding 2: The Need for a Chief Digital Officer

Although the creation of CDO positions is clearly a trend that has been observed over recent years, "*not every company needs a CDO*" (CDO, firm 12). During our data collection, all participating firms reported some form of ongoing digitization initiatives. However, the majority of firms do not have nor feel a need to create a CDO role. One could conclude that these companies may not have realized the need yet and will implement a CDO role in the future; however, indications from the data collected do not support this. After analyzing the interview data and associated documents, it was determined that the need for a CDO role depends primarily on four factors, which are described below. If the combined force from these four factors is not strong enough, a company may not perceive a need for a CDO.

Factor 1: Pressure for Digitization

The pressure to include digital elements in a company's business strategy is primarily driven by the external environment. Changes in customer behavior and needs, competitors' demonstration of digital advances, new market entrants with disruptive digital business models, and the technological progress in general create opportunities and threats to established firms. Additionally, some firms feel intrinsically motivated to become a digital leader or defend their digital leadership position in their industry.

The more intense the pressure and the more rapidly this pressure accumulates (e.g., due to disruptive digital innovation in the market, past ignorance, or changes in the company's leadership) the higher the need to express one's digital ambitions in a role that is exclusively designed to drive digital topics. "*We had to spin off our digital unit as an autonomous entity in order to gain speed and respond to the rapidly evolving e-commerce trend,*" commented one of the CDOs (firm 1), describing the initial period following the creation of the company's digital division when the retail company perceived heavy pressure from online competitors.

Factor 2: Need for Orchestration of Changes within the Firm

Besides external and internal pressure for digitization, a second factor is the need for orchestrating the changes that digitization brings about. The head of digital channels of a European bank (firm 4) described how "*the company had been founded as a direct bank without any physical branches, primarily relying on mail and telephone banking, then quickly realized the strategic implications of online and mobile banking trends, and [is] now widely considered a digital leader in [its] market*". The company's "*digital strategy has become an integral component of [its] overall business strategy*", a steering committee of key executives decides jointly on strategic and tactical digital business moves, and cross-functional teams consisting of business and IT personnel work nearly boundary-less on implementing changes, without feeling that the current setup requires the presence of a CDO. Despite high digitization pressure in the financial services industry and its perceived importance by executives of firm 4, the bank views a CDO role as ill-suited because the extent of change management required is relatively small due to the firm's early digital advancements in the past and the established decision making culture in the company.

The CIO of a European media conglomerate (firm 15) stated that the company's "*decentralized setup and mature digital business components do not require a CDO at the corporate level*". Instead, the company orchestrates strategic and operational changes under a decentralized setup, led by divisional executives who possess a high level of digital acumen. "*The corporate head of digital business is commercially responsible for the various subdivisions, but we would not consider him a Chief Digital Officer*."

Company size, prior experiences with digitization initiatives, the degree of fragmentation, company culture, and the level of cross-functional collaboration also affect the need for orchestration of digital change. A common setup for medium to large size organizations with effective cross-functional collaboration and a culture that is innovation-friendly is to establish a 'Digital Committee', consisting of executives across business units and functional areas, effectively sharing the CDO role among each other (e.g., firm 7, 9, 19).

Factor 3: CIO Role Profile and Reputation

We already discussed the CIO role orientation as a decisive factor on CDO role-types. Moreover, we found the CIO profile—not just with respect to the extent to which the CIO is ambidextrous—is affecting the need for a CDO. The more the CIO role encompasses customer-oriented elements and the deeper the CIO role is

embedded in the strategic management of the company, the lesser is the need to create a separate new role that takes on the aspects of exploring the innovative use of IT as part of digital business strategy. The CIO of a large pharmaceutical company (firm 18) stated that in his eyes "*the introduction of a CDO role often constitutes failure of the CIO or failure of the top management to empower the CIO*." Although the CDO role—as it is primarily a business role—is generally unlikely to be fully filled by an IT executive, a business-minded CIO with effective demand-side leadership can—in combination with the other factors—reduce the need for a separate CDO role to the point that it is deemed unnecessary.

Besides the CIO role profile, the CIO's reputation in the company also plays an important role. Business executives across firms often perceived that their CIOs (would) insufficiently meet expectations on a significant number of aspects that a CDO role encompasses (if their company created one). The most frequently identified areas of concern were the CIO's non-customer-centric viewpoint, the CIO's low credibility on digital business topics within the business community, the cultivation of a culture within the IT organization that is not desirable for invoking digital change, and the commonly held opinion that the IT function is not agile enough.

Factor 4: Digitization Focus Areas

The fourth factor identified in the data analysis is the focus areas of the company that are affected by digitization. Although digitization is usually understood as the provision of (external) customer-oriented digital products or services or digital customer engagement, digitization can have far-reaching implications for a company's internal operations. The CIO and COO of an international European airport (firm 7) described how the majority of current digitization projects affect the operations group. "*Sensors, IT infrastructure, big data analytics capabilities, and IT-supported organizational processes need to be put in place*" (CIO) before the airport's passengers can experience a "*seamless digital customer journey from the parking garage to the gate*" (COO).

In general, companies for which digitization has comparatively strong implications for internally focused areas (operations, logistics, etc.) as opposed to externally focused areas (sales, marketing, customer service, etc.) tend to experience a reduced need for a CDO. This is mostly true for companies that follow business-to-business (B2B) type of business models. In these firms, the CIO can often fill large parts of the CDO role, reducing the need for a separate CDO role.

Overall, our cross-firm analysis indicated that these four factors primarily determine the need for a CDO, taking into account both the reasons why in seven of our 19 firms a CDO role was implemented and why in the remaining 12 firms no such role existed.

Finding 3: Implications for the CIO Role

Just as digital strategy describes a fusion of business and IT strategy (Bharadwaj et al. 2013a), digitization implies business and IT functions are becoming deeply intertwined. Although it appears to some CIOs as if the creation of a CDO role brings up an "*internal competitor*" to their own role, the CDO role is largely viewed as complementary (not supplementary) to the CIO role. However, as we indicated in Finding 1, a CIO who has not been effective at (attempting to) building up demand-side leadership capabilities may feel reticent of a CDO (especially the Innovator role-type) who takes over this aspect.

The specific implications for the CIO role depend on whether or not the CDO role exists and which CDO role-type is reflected by it. We summarize the three most dominant implications for the CIO role under the existence of a CDO role as follows.

Implication 1: CDO becomes Ambassador for the IT Function

Especially under the Digital Advocate and the Digital Evangelist CDO role-types, the CIO tends to find his or her own role augmented by an ambassador for digital topics on the business side. CIO interview partners who experienced this reported that "*the introduction of the CDO role has strengthened the role of IT in [the company]*" (CIO, firm 8) as well as their own role as CIOs. This is particularly the case for CIOs who do not report directly to the CEO. The CDO with a holistic business understanding as well as a deep technical understanding is "*well received by other business executives and IT executives alike*" (CIO, firm 12). The

CDO works closely with the CIO on laying out an IT systems landscape that meets the needs of the digital vision for the company.

Implication 2: Split of the CIO Role

As mentioned earlier, the existence of a CDO role can imply a split of the previously ambidextrous CIO role, especially in firms where the CIO has failed to develop effective demand-side leadership. This is mainly the case under the Digital Innovator and Digital Advocate CDO role-types and can lead to tension. However, some CIOs in the study reported feeling relieved by now being able to "*focus [predominantly] on delivering cost-effective high quality IT services and prepare the IT systems landscape for the needs of an upcoming digital business era*" (CIO, firm 6). In the past, some CIOs were not effective supply-side leaders due to pressure for demand-side leadership, which is now largely the responsibly of the CDO.

Implication 3: Tight CIO-CDO Alignment needed

Under all CDO role-types, the CDO and CIO have to work together in tight alignment. Particularly under the Digitization Coordinator or Digital Advocate role-types, the CDO becomes a key partner to the CIO. This can lead to prioritization conflicts between the CDO's and other IT stakeholders' demands from the IT function, which the CIO and CDO need to tackle jointly. "*Our CDO has an e-commerce background and does not always fully understand the IT world of our traditional brick-and-mortar business […]; our close partnership enables both of us to think more broadly as we are jointly designing [our company's] multi-channel environment,*" stated one CIO (firm 1) who established a separate weekly one-on-one alignment meeting with the CDO of the company. Tight CIO-CDO alignment is a key determinant for business-IT alignment, which—through the addition of the CDO to the leadership team—can become more complex to achieve, but when achieved, a tighter alignment is the result. Part of tight CIO-CDO alignment requires the development of mutual understanding of each other's roles and responsibilities.

Lastly, there are implications for the CIO role in companies that do not perceive the need for a CDO. As indicated before, CIOs in such firms are not expected to comprehensively meet all aspects of the CDO role. Interviewed business executives clearly communicated that the CDO role is a business role, not an IT role. In fact, firm 7 describes the failed attempt of a company that placed their CDO as a direct report to the CIO inside the IT function. With the intent to position this CDO as a hybrid between a Digital Evangelist and a Digitization Coordinator, the CIO of firm 7 expected his CDO to design a comprehensive digital strategy for the company, obtain buy-in from business executives, educate the company, and begin to coordinate scattered digitization initiatives across the company. Yet, this IT-sponsored CDO was "*not positioned right to break open the borders between business and IT*" (CIO). "Other *business executives did not perceive him as one of them and behaved non-collaborative [with the CDO]*" (COO). However, CIOs in companies which do not perceive the need for a CDO tend to still take on some specific aspects of the CDO role such as highlighting the opportunities and threats of digitization, increasing business executives' digital literacy, orchestrating internally focused digitization initiatives, and setting up digital innovation units. Yet, the CIO role profile often hinders CIOs in unifying their entire company behind a holistic digital business strategy, as customer-centric strategic thinking is seldom perceived as their domain.

Discussion

Before presenting practical implications, the study's limitations, and areas for future research, we discuss two major contributions to IS research directly related to the research questions posed at the paper's outset.

The Continued Evolution of the CIO Role

Throughout its evolution, the role of the CIO has been continually questioned by practitioners and academics alike (King 2011; Rothfeder 1990). Historically viewed as merely a functional head who evolved into a strategic partner and business visionary, the CIO role has encompassed an increasing number of strategic elements and gained creditability among business leaders along its path of development (Ross and Feeny 2003). More recently, though, the role has been conceptualized as one of multiple competing and conflicting requirements (Chun and Mooney 2009), with academic research utilizing the ambidexterity framework to explain its nature (Chen et al. 2010). The concept of supply-side and demand-side leadership

contrasts the IT exploitation and IT exploration aspects of IT leadership that CIOs are now expected to master (Chen et al. 2010). Figure 3 illustrates this pathway of the CIO role in multiple stages as suggested by Ross and Feeny (1999) and Chun and Mooney (2009), which we extended by adding a modified fourth stage, followed by an additional fifth stage that depicts the role of the CIO in the digital era.

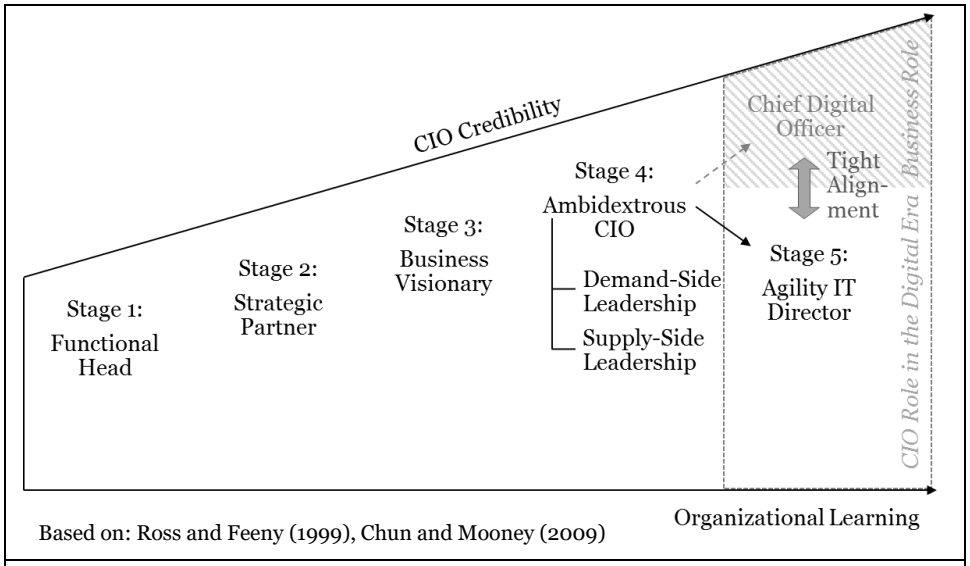

Figure 3. The Continued Evolutionary Pathway of the CIO Role

However, the CIO role is at an inflection point, where there are significant indications that the CIO role is about to be redefined once more. Chun and Mooney (2009) describe the need for an exploration-focused "*Chief Innovations Officer*" as well as a more exploitation-focused "*Chief Technology Officer*"—which can potentially be subsumed under the Ambidextrous CIO role (Stage 4 in Figure 3)—even arguing that under the pressure of ambidexterity, the CIO role eventually parts into two. According to Chun and Mooney (2009), one role continues to exhibit the traditional CIO focus with the primary function to "*maintain and manage the firm's existing legacy IS infrastructure and cost-cutting initiatives,*" which is close to what the CIO role was originally conceived as. The second role, to a greater extent, is focused on "*working with other C-level executives […] to change the firm's strategy and processes*", which suggests CDO-like responsibilities. In the same vein, Peppard et al. (2011) describe how the role of the CIO eventually "*resembles to that of a successful parent*" as the organization has the values and capabilities in place to leverage IT effectively. They describe it as the very nature of the CIO role to diminish once information capabilities are deeply embedded in the organization and IT leadership responsibilities have been migrated over to different business executives.

Our study contributes to this stream of research by providing an extension and a valuable update to the continued evolution of the CIO role. In the current era, which encompasses a significant shift towards digitization, we find that although the role of the CIO has until recently received significant emphasis on the strategic imperatives, other business executives (CxOs) are becoming increasingly focused on digital topics, as digital literacy becomes an indispensable CxO characteristic. The creation of a CDO role is the result of a need for orchestration of digitization initiatives, an insufficiently shaped CIO role profile, poor CIO reputation, significant pressure for digital transformation, and an increasingly external focus of the employment of digital technologies (see Finding 2). Specifically, with the CDO being responsible for digital business strategy and leading key transformational initiatives with power and credibility, the CIO is often relegated to focusing primarily on IT supply-side aspects. Although a CDO role may not be necessary for all companies and some CDO role-types take on less IT supply-side leadership than others, our study finds that digital transformation demands digital business leadership that a CDO role may be better positioned to manage than the current CIO role.

We follow Peppard et al. (2011) by naming the fifth evolutionary state of the CIO role "*Agility IT Director*" (see Figure 3). A digital era CIO is expected to orchestrate the IT landscape in a way that allows for agility and adaptiveness (Tiwana and Konsynski 2010). CIO ambidexterity remains of importance, however with a stronger technological focus by the CIO on IT exploration, because a significant portion of the business-strategic IT exploration aspects may sit within the remit of the CDO—or a CDO role shared among business executives where no CDO exists. To some extent, this marks a return to the original organizational response to the ambidexterity challenge, in which firms achieve ambidexterity through a version of structural differentiation, with CDO and CIO fulfilling markedly different roles in different organizational functions.

Nonetheless, a distinction exists between roles and the individuals who fulfill those roles. In particular, while the role of the CIO and its future trajectory have been discussed, that does not mean that the person fulfilling the CIO role cannot transition into a CDO role. In fact, successful CIOs more often than not become CDOs, even within the same company (as was the case in firm 6 and 8 of our study). However, this does not obfuscate the point that the role of the CIO—defined as the most senior IT executive—is gradually reverting to its original IT-director-type role.

The Role of CIOs and CDOs in Governing Digital Transformation

Information technology has often been viewed by organizations as a commodity with little or no value-add (Carr 2003). With a focus on cost containment, CIOs frequently report to CFOs and IT outsourcing has become an integral component of most firms' IT strategies (Lacity et al. 2009). Although previous IS research has recognized the growing strategic importance of IT in an emerging digital era (Bharadwaj et al. 2013a; Bharadwaj et al. 2013b), the role of the CIO—as the head of the IT function—in governing the firm's digital transformation has not yet been sufficiently addressed by IS research. Our study contributes to the body of knowledge by shedding light on how business and IT leaders govern companies' digitization initiatives, which enhances our understanding of what is expected from CIOs in this respect.

Digital leadership is an item of strategic importance and unlike other business functions like legal, billing, or supply chain (Jacobovits - van Boetzelaer 2016), "»*digital*« *cannot be delegated in a way we delegate IT to the IT department*" (CDO, firm 11). The creation of a CDO role indicates increased business ownership of digitization initiatives; however, there are indications that the CDO role itself will eventually disperse into the role of other business executives as they gradually assume aspects of the CDO role once the organization fully understands and embraces its digital business capabilities. Our qualitative interviews, however, show significant consensus that digital transformation must be owned by the business—at times led by a CDO—rather than the IT function and the CIO.

However, regardless of whether a company has a CDO and whether the CDO role continues to exist in the long run, business and IT leaders need to establish a governance framework for digitization initiatives. This is especially important, considering that digital innovation projects often bypass the internal IT organization either by working with external support or establishing micro IT units within a business unit (Colella et al. 2014). Our study results show that for CIOs, their involvement in the strategy surrounding digital leadership and the organization's digital business strategy is expected to decline. While the role may still be ambidextrous from a technology standpoint, the strategic aspect is expected to be reduced, with their role representing that of an Agility IT Director with a focus on the provision of IT supply. CIOs will be charged with shifting focus to establishing the foundation for digital transformation by providing agile IT capabilities, thus allowing quick and nimble responses to changes in fast-paced markets and enabling digital innovation based on flexible yet stable information systems.

Yet, from a governance point of view, our study highlights that CIOs need to work in close alignment with CDOs, especially in specific areas, which are influenced by the CDO role-type and the circumstances within the firm. The CIO and CDO need to ensure that IT exploration capabilities are effectively utilized and IT exploitation prepares the ground for increasingly important digital business capabilities. Furthermore, it is imperative that the CIO and CDO establish common governance processes that meet the needs of business and IT stakeholders. Eventually, close CIO-CDO alignment has great potential to bring IT and business functions closer together. While business-IT alignment is traditionally viewed as an activity that occurs between the CEO and the CIO (Johnson and Lederer 2010), we propose CIO-CDO alignment as equally (if not more) important, as CIO-CDO collaboration shapes the digital capabilities of the firm and removes the distinction between business and IT.

Implications for Practitioners

Our research findings provide rich advice to CIOs, CDOs, and those responsible for implementing these roles and hiring executives for the respective positions, as they seek to clarify the different types of digital leadership roles in order to derive maximum long-term value for the firm. Our study can serve practitioners as a basis for discussion on whether their circumstances require the establishment of a CDO role and can assist organizations in understanding which CDO role-type is most appropriate for their situation. Additionally, CIOs and CDOs can utilize the study results as impetus for discussions with their peers on effective digital leadership and the challenges they are facing. Furthermore, our research can be used as a foundation for executive education courses and to facilitate discussion in communities of practice.

Companies that are digitally transforming their business should be particularly mindful about, and observant of, changes in the split of roles within their C-suite. Specifically, executive teams without a CDO in their ranks should discuss the need for a CDO (based on Finding 2) and periodically assess changes in the forces from the four driving factors that determine this need. In firms where a CDO exists, CIOs and CDOs, as well as individuals with appropriate oversight and knowledge of the organization, can use the matrix supplied in this research study (Figure 2) to discuss the delimitation of roles and the positioning of the CDO. Executive teams should review the split of digital leadership roles in regular intervals in order to avoid role ambiguity and duplication. Eventually, firms should have a plan to migrate digital leadership responsibilities over to different business executives, which implies deliberate continuous change to CDO and CIO roles.

Limitations and Future Research

We presented our findings from a multiple interview-based study on digital leadership roles in 19 large and very large European companies, which does not come without limitations, of which we want to highlight three. First, when collecting our interview data, we relied on two key informants per company—one on the IT side and one on the (digital) business side—with the business informant often chosen by the CIO. This choice might have been biased by the relationship quality between the CIO and his or her business partners, although we observed no specific evidence of such bias. Nonetheless, it would have been helpful to interview a third individual—perhaps from the human resource department—to obtain an additional (neutral) perspective on the executive roles. Moreover, the CEO's perspective would be very interesting to study, as he or she is typically the one who establishes these roles. Second, while the firms represented in our study displayed varying degrees of IT outsourcing, most of these companies utilized low levels of outsourcing. The findings from our study may not be generalizable to firms that have extensively outsourced their IT activities. While initial research on the implications of IT outsourcing on the CIO role exists (Gefen et al. 2011), future research should investigate potential correlations between IT outsourcing and the CDO role phenomenon. Third, and more generally, our research design focused on exploratory qualitative research methods to obtain and analyze data. Besides quantitative research on this topic, qualitative case studies that investigate fewer cases in more depth would be of value to substantiate and extend our findings. To understand the CDO role and its context better, we further suggest to include the CDO's department size (e.g., number of staff members) in future studies.

With research on the impact of digital transformation on executive roles still in its infancy, this study's contribution is an impetus for future research to investigate the concepts developed in more depth. Moreover, there is a broad range of additional research areas, such as business-IT alignment and IT governance, which might be affected significantly by the evolving changes around digital leadership responsibilities and executive roles.

Conclusion

Our study contributes to the existing body of IS research in several ways. First, we conceptualize different CDO role-types and identify the factors that determine the need for a company to implement a—thus far under-researched—CDO role. Second, we highlighted the implications for the CIO role and its future development. Our results confirm and extend previous research on the evolution of the CIO role, such as the studies by Chun and Mooney (2009), Chen et al. (2010), and Peppard et al. (2011). Our study adds to the body of research on IT leadership and IT strategic management by advancing our understanding of emerging leadership roles and the factors that shape these roles in an era of digital business strategy. This

gives impetus for further research in this area, as it remains to be understood which governance models and configurations of executive leadership roles are most effective to master digital transformation.

Appendix

Appendix A: Seed Categories for Data Reduction

Detailed list of reasons why a company does or does not have a CDO:

- Environmental factors
  - Speed and extent of technological progress
  - Competitors' digital advancements
  - Threat of new (digital) market entrants
  - Customer needs and behavior changes
  - Digital endeavors by suppliers and/or partners
- Strategic direction of the company
  - Future (digital) ambitions of the firm
  - Level of risk acceptance
  - Scope and ownership of innovation strategy
  - Past and present use of IT for strategic differentiation
- CIO characteristics
  - CIO's reputation among other executives
  - CIO's general business and business process competencies
  - CIO's strategic thinking capabilities
  - Extent of CIO customer interactions
- IT function characteristics
  - History of IT project delivery quality and timeliness
  - Culture within the IT function
  - Challenges with executing current IT strategy
  - Existing/missing capabilities within the IT function
  - Areas of success and failure of past IT projects
- Organizational characteristics
  - Decision making culture
  - Governance models and structures
  - Organization size and structure
  - Organizational culture

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