

# **The Implications of Digital Business Transformation for Corporate Leadership, the IT Function, and Business-IT Alignment**

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TECHNISCHE  
UNIVERSITÄT  
DARMSTADT

## **Dissertation**

approved by the

Faculty for Law and Economics  
of Darmstadt University of Technology

in fulfillment of the requirements  
for the degree Doctor rerum politicarum (Dr. rer. pol.)

by

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Submission date: November 23, 2016

Examination date: February 9, 2017

Darmstadt 2017

D17

## **Declaration**

I declare that this dissertation was composed by myself (or with others as specified in articles with coauthors), that the work contained herein is my own except where explicitly stated otherwise in the text, and that this work has not been submitted for any other degree or professional qualification.

A handwritten signature in black ink, appearing to read 'J. Haffke'. The signature is written in a cursive style with a large initial 'J'.

Darmstadt, February 9, 2017

## **Dissertation Summary**

Mastering digital business transformation is a strategic imperative for senior executives but often constitutes a challenging task for firms across industries. With the growing importance of information technology (IT) over the recent decades, the role of the Chief Information Officer (CIO), the head of the IT function, has become increasingly important. However, both research and practice acknowledge that establishing alignment between business and IT is difficult due to significant social factors that often arise. Research has shown that Chief Executive Officers (CEOs) and Chief Information Officers need to develop mutual understanding of their environments, views, and goals in order to promote a successful business-IT partnership. In the context of digital business transformation, which is driven by digital innovation occurring at the interface of business and IT, alignment is imperative. The creation of new executive roles, such as that of the Chief Digital Officer (CDO), indicate that social alignment between CEOs and CIOs remains an issue.

This dissertation investigates the implications of digital business transformation for business-IT alignment, the evolution of digital leadership roles (especially the CIO and the CDO role), and the IT function in general. The results presented in this dissertation are grounded in the results from two extensive studies, a quantitative study based on responses from 102 matched pairs of CEOs and CIOs and a qualitative study based on interviews with matched pairs of business and IT executives from 19 companies. The study results were published in three academic articles, which are part of this dissertation. Additional articles that build upon the already published findings are currently under review and due to be published in 2017. The quantitative study examines perceptual congruence between CEOs and CIOs in a social alignment context, utilizing a combination of two hitherto largely separately applied models from social and personal relationship research. One of the major findings of this quantitative study is the recognition of bidirectional effects of active and passive understanding on the CEO-CIO relationship, whereas the concept of mutual understanding has thus far mostly been treated unitarily without differentiation between the two directions. The interview-based qualitative study examines the role of the CDO and the CIO and investigates the bimodal IT phenomenon that has gained increased visibility in practice with digital business transformation putting enormous pressure on the IT function and its leadership. This second study finds four different CDO role types to exist and highlights the implications for the development of the CIO role, which finds itself at an inflection point, returning somewhat to its traditional technical orientation, hence losing its strategic focus to CDOs and others. Furthermore, the second study

explains the role of bimodal IT as a transitional stage in a larger transformation of the IT function in order to foster IT agility and IT exploration. Implemented as one of three archetypes that the study describes, bimodal IT introduces organizational structures, methods of working, and a culture that are critical for effective business support of digitization initiatives. Ultimately, however, the study finds that companies, which have successfully operated under a bimodal IT design, revert their IT function structure and processes to a unimodal design in the long term.

Overall, this dissertation sheds light on crucial topics for companies' executive leadership, the IT function, and business-IT alignment today. The studies conducted provide valuable insights for both practitioners and academics by drawing a conceptual distinction between the two directions and CEO-CIO understanding, explaining the CDO role and its influence on the development of the CIO role, and calling attention to the transformative role of bimodal IT. Practitioners are advised to promote CIOs' understanding of current business topics, carefully delimit the CDO role (should such be needed) from the CIO role, and harness the learnings from bimodal IT on their digital transformation journey. The two studies add to the academic body of knowledge by answering calls for a more fine-grained conceptualization of CEO-CIO mutual understanding, providing initial insights into the emerging Chief Digital Officer role and its creation, and preparing a research framework for bimodal IT and explaining its relevance for IT transformation. The articles contained in this dissertation encourage IS scholars to utilize the findings described and further advance our knowledge in these domains. Moreover, this research can assist business and IT executives with improving alignment and avoiding the pitfalls that digital business transformation brings about for corporate leadership.

## **Dissertation Summary (German Translation)**

Die Bewältigung von digitaler Geschäftstransformation ist von strategischer Wichtigkeit für Executives, stellt aber häufig eine große Herausforderung für Firmen nahezu aller Industrien dar. Mit der wachsenden Bedeutung von Informationstechnologie (IT) in den letzten Jahrzehnten ist auch die Rolle des Chief Information Officer (CIO), dem Leiter des IT-Bereichs, immer wichtiger geworden. Sowohl die Forschung als auch die Praxis haben jedoch eingestanden, dass das Herstellen von Alignment zwischen Geschäftsbereich und IT-Bereich aufgrund erheblicher sozialer Faktoren, die dabei eine Rolle spielen, schwierig ist. Die bisherige Forschung hat aufgezeigt, dass Chief Executive Officers (CEOs) und Chief Information Officers ein gemeinsames Verständnis ihrer Umgebungen, Ansichten und Ziele entwickeln müssen, um eine erfolgreiche Geschäfts-IT-Partnerschaft zu fördern. Im Kontext von digitaler Geschäftstransformation, die von Innovation an der Schnittstelle zwischen Geschäft und IT getrieben ist, ist Alignment unerlässlich. Die Kreierung neuer Executive-Rollen, wie die des Chief Digital Officer (CDO), deuten darauf hin, dass soziales Alignment zwischen CEOs und CIOs ein bedeutendes Thema bleibt.

Diese Dissertation untersucht die Implikationen von digitaler Geschäftstransformation für Geschäfts-IT-Alignment, die Evolution von digitalen Führungsrollen (insbesondere die CIO- und die CDO-Rolle) und den IT-Bereich in Unternehmen im Allgemeinen. Die in dieser Dissertation dargestellten Ergebnisse beruhen auf der Grundlage der Ergebnisse zweier umfangreicher Studien, einer quantitativen Studie basierend auf den Antworten von 102 gekoppelten Paaren von CEOs und CIOs und einer qualitativen Studie basierend auf Interviews mit gekoppelten Paaren von Geschäftsbereich- und IT-Bereich-Executives von 19 Unternehmen. Die Studienergebnisse sind in drei akademischen Artikeln veröffentlicht, die Teil dieser Dissertation sind. Weitere Artikel, die auf den bereits veröffentlichten Erkenntnissen aufbauen, befinden sich derzeit unter Review und stehen 2017 zur Veröffentlichung. Die quantitative Studie untersucht die Wahrnehmungskongruenz zwischen CEOs und CIOs im sozialen Alignment-Kontext unter Zuhilfenahme einer Kombination zweier bislang nur separat angewendeter Modelle aus dem Gebiet der Sozialbeziehungsforschung. Eines der wichtigsten Ergebnisse dieser quantitativen Studie ist die Erkenntnis bidirektionaler Effekte aktiven und passiven Verstehens, wohingegen das Konzept von gegenseitigem Verständnis bislang weitgehend als unitär betrachtet wurde und eine Differenzierung zwischen den zwei Richtungen ausgeblieben ist. Die Interview-basierte qualitative Studie untersucht die Rolle des CDO und die Rolle des CIO und analysiert das Phänomen der bimodalen IT, das in der Praxis zunehmend

an Sichtbarkeit gewonnen hat, insbesondere begründet durch den enormen Druck, den digitale Geschäftstransformation auf den IT-Bereich und seine Führung ausübt.

Diese zweite Studie stellt die Existenz vier verschiedener CDO-Rollentypen fest und zeigt die Implikationen für die Entwicklung der CIO-Rolle auf, welche sich mit zunehmender Rückkehr zu ihrer traditionellen technischen Orientierung an einem Scheidepunkt befindet, wobei der strategische Fokus der CIO-Rolle an den CDO und andere übergeht. Des Weiteren erklärt die zweite Studie die Rolle der bimodalen IT als Übergangsstufe innerhalb einer größeren Transformation des IT-Bereichs, die dazu beiträgt, IT-Agilität und IT-Exploration zu fördern. Bimodale IT, die als eine von drei in der Studie beschriebenen Archetypen implementiert ist, führt organisationale Strukturen, Arbeitsmethoden und eine Kultur ein, die kritisch für die effektive Unterstützung von Digitalisierungsmaßnahmen im Geschäftsbereich sind. Die Studie stellt jedoch fest, dass Unternehmen, die erfolgreich mit einem bimodalen IT-Design operiert haben, ihre Strukturen und Prozesse im IT-Bereich letztendlich langfristig zu einem unimodalen Design zurückführen.

Insgesamt gibt diese Dissertation Aufschluss über heutige entscheidende Themen für die Unternehmensführung, den IT-Bereich und das Alignment zwischen Geschäftsbereich und IT-Bereich. Die durchgeführten Studien gewähren sowohl für Praktiker als auch für Akademiker wertvolle Erkenntnisse, indem eine konzeptionelle Unterscheidung zwischen den zwei Richtungen von CEO-CIO Verständnis getroffen, die CDO-Rolle und ihr Einfluss auf die Entwicklung der CIO-Rolle erklärt, und Aufmerksamkeit auf die transformative Rolle der bimodalen IT gelenkt wird. Praktiker sind angewiesen, das Verständnis von CIOs zu derzeitigen Geschäftsthemen zu fördern, die Rolle des CDO (sollte eine solche erforderlich sein) mit Sorgfalt von der CIO-Rolle abzugrenzen und das Gelernte aus dem Einsatz bimodaler IT für die digitale Transformation ihres Unternehmens nutzbar zu machen. Die beiden Studien tragen zum akademischen Wissensfundus bei, indem Rufe nach einer feiner granulierten Konzeptualisierung von gegenseitigem CEO-CIO Verständnis beantwortet, erste Erkenntnisse zu der sich entwickelnden Rolle des Chief Digital Officer und ihrer Entstehung bereitgestellt, ein Forschungsrahmen für bimodale IT geschaffen und dessen Relevanz für IT-Transformation erklärt werden. Die in dieser Dissertation beinhalteten Artikel regen IS-Forscher dazu an, die beschriebenen Forschungsergebnisse weiter zu nutzen, und treiben unsere Kenntnisse in diesen Forschungsdomänen voran. Des Weiteren kann diese Forschungsarbeit dabei assistieren, das Alignment zwischen Geschäfts- und IT-Executives zu verbessern und die Schwierigkeiten zu meiden, die digitale Geschäftstransformation für die Führung von Unternehmen birgt.

# **Acknowledgements**

I wish to thank Professor Alexander Benlian for his encouragement, friendship, and direction in the development of this dissertation. I would also like to thank Professor Yolande Chan, Professor Dorothy Leidner, and the other (anonymous) reviewers of my conference and journal papers for their efforts in guiding and assisting with this research.

I would also like to thank the numerous participants in the two studies who generously took the time to provide the information that ultimately yielded the insights that are available from this dissertation and the associated publications.

I furthermore thank Bradley Kalgovas, friend and coauthor of two of the articles in this dissertation, with whom I shared the pleasure of conducting this research.

I would further like to thank my wife, Guanfu, who provided words of encouragement and support to pursue this degree.

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## List of Acronyms

APIM.....	Actor-Partner Interdependence Model
AVE.....	Average Variance Extracted
BPO .....	Business Process Outsourcing
CDO .....	Chief Digital Officer
CEO .....	Chief Executive Officer
CFO .....	Chief Financial Officer
CIO .....	Chief Information Officer
COO .....	Chief Operating Officer
CxO .....	Chief X Officer (other C-level executive)
IS .....	Information System
IT .....	Information Technology
MIS.....	Management Information Systems
PCM .....	Perceptual Congruence Model
PLS .....	Partial Least Squares
RQ .....	Research Question
SD.....	Standard Deviation
SEM.....	Structural Equation Modeling
SIM.....	Society for Information Management
TMT .....	Top Management Team
U.K. ....	United Kingdom
U.S.....	United States (of America)
VP.....	Vice President

# 1 Introduction

## 1.1 Motivation and Research Questions

Rapid advancements in the development of information technology (IT), the rise of near ubiquitous availability of connectivity, and the increasing penetration of digital technologies in our lives are having a powerful impact on our society in the 21<sup>st</sup> century, including how we undertake business. Information systems (IS) have become a key component of nearly every company and operating efficiently without IT seems unimaginable today. Over the course of the recent decades, many firms have embraced IT not only as a source of operational efficiency but also as a means of differentiation to gain competitive advantage over other players in the market (Bharadwaj et al. 2013a). In most large corporations, IT is established as a distinct functional division (IT function), often represented on top management level by a Chief Information Officer (CIO), especially in firms where IT is of strategic importance.

Concurrently, companies frequently experience problems and dissatisfaction with their IT design. The proliferation of (legacy) information systems result in major consolidation and migration efforts (Gholami et al. 2016), IS users are often dissatisfied with cumbersome IT applications and IT processes (Woodroof and Burg 2003), threats to data security and system integrity demand continuous monitoring and maintenance (Choobineh et al. 2007), and IT cost containment is a challenge (Luftman and Ben-Zvi 2010; Thibodeau 2011). Moreover, despite most executives' view that IT is a resource critical to firm success, researchers have mixed opinions on the business value of IT and some even suggest that greater IT investments do not translate into superior financial performance of firms (e.g., Carr 2003).

However, in recent years, the significant implications of digital technology for businesses have underpinned the strategic role of information technology in firms (Bharadwaj et al. 2013a; Fitzgerald et al. 2014). Digital technology has become integrated into firms' products and services, physical products are augmented by digital features, sales and customer service channels have become digital, and the value of data itself is unleashed through advanced data analytics (Loebbecke and Picot 2015; Lucas et al. 2013). New technology-driven market players who enter with non-traditional digital business models frequently outpace established firms with digital innovations and cause disruption in many industries (Christensen and Overdorf 2000). Large corporate firms respond by launching what is commonly referred to as

“digital business transformation” initiatives, which often begin with formulating a digital business strategy and ultimately have far-reaching impacts on organizational structure, culture, leadership roles, and methods of working. Being said to “blur the lines between business and IT” (Bharadwaj et al. 2013a), digital transformation causes IT to shift even stronger into the focus as a driver of business innovation. However, the traditional IT function of a firm is not always viewed as a suitable environment for digital business innovation and business executives often express concerns over giving CIOs the lead on digital business initiatives (Weill and Woerner 2013b). It is not surprising that in most companies, the terms “digital” and “IT” are used non-synonymously, as “IT” is still associated with the legacy landscape of internal information systems and services whereas “digital” typically represents innovative outward-facing technology which has direct business implications (Matt et al. 2015). On the leadership level, the CIO role is losing rather than increasing in strategic importance and CEOs increasingly entrust digital topics to other executives, even creating new roles such as the Chief Digital Officer (CDO).

The reasons for this might be manifold, but challenges in the alignment between business and IT have concerned management for more than 30 years (Gerow et al. 2014). Business-IT alignment is in fact a major IS research domain, which focuses on identifying the factors and mechanisms which drive alignment and the power of alignment to improve firm performance (Byrd et al. 2006; Charoensuk et al. 2014). This study is motivated particularly by the need to achieve social alignment between top management executives on both the business and the IT side. The development of mutual understanding between the individuals involved is commonly viewed as a central cornerstone of social alignment, as being able to understand each other’s viewpoints and priorities is critical to the creation of an effective and efficient business-IT partnership. Despite the large number of studies in this field, however, the different facets of mutual understanding and the impact of underlying mechanisms on the business-IT partnership are still under-researched.

Given the challenges with achieving mutual understanding between business and IT executives and the rapidly growing digital opportunities and threats in many industries, it is not surprising that CEOs are appointing digital leadership responsibilities to other executives, effectively bypassing the CIO. The role of the Chief Digital Officer is a particularly relevant one with the number of CDOs in practice growing rapidly and CDOs frequently being given the digital leadership responsibilities that CIOs are being overlooked for (CDO Club 2015). IS research has acknowledged this development but not sufficiently clarified how the CDO role is defined

and what factors influence its creation. There is also scant attention given to how the CIO role continues to evolve considering the creation of the CDO role and how the interaction between the two roles is operating.

In addition to the changes at the leadership level, digital transformation is also invoking a transformation of the IT function to foster more effective digitization support for the business. To achieve this, some companies have implemented a bimodal IT design, which creates two modes to operate for IT: Mode 1 to exploit what is known while redesigning and eliminating the environment of legacy systems and processes and Mode 2 to explore and experiment with arising digital opportunities. However, the defining characteristics of different types of bimodal IT designs and the benefits of employing bimodal IT have so far received little academic attention.

Thus, this dissertation is motivated by the following three research questions (RQs):

***RQ1:** How does the ability of mutual perspective-taking between CEOs and CIOs affect the business-IT relationship in the context of social alignment?*

***RQ2:** How is the emerging CDO role different from the CIO role, what drives the need for a CDO, and what are the implications for the continued evolution of the CIO role?*

***RQ3:** How does the implementation of different forms of bimodal IT contribute to the transformation of the IT function?*

In order to address these research questions, two comprehensive empirical studies – one quantitative and one qualitative – were conducted and the results published in three scientific articles.<sup>1</sup>

## 1.2 Theoretical Foundation

The theoretical foundation for the work presented in this dissertation lies in the burgeoning field of research on digital business transformation as well as the established research areas of business-IT alignment, IT agility, IT ambidexterity, and the evolution of executive leadership roles, in particular the CIO role. The following subsections provide an overview of the current state of research in these areas and reference the most important studies in these fields.

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<sup>1</sup> A fourth article was published at the International Conference on Information Systems 2013, but is not part of this dissertation. Further conference and journal articles were submitted and are currently under review.



### **1.2.1 Digital Business Transformation and the IT Function**

Digital business transformation, also frequently referred to as “digital transformation” or “digitization”, is understood as fundamental changes for organizations across industries, driven by the increasing penetration of digital technologies into business processes, products, services, and business models. As part of this transformation, digital technologies are dominating the focus of business strategy, revenue models, organizational culture, and corporate innovation (Besson and Rowe 2012; Brynjolfsson and McAfee 2014; Lucas et al. 2013). Loebbecke and Picot (2015) describe it as the organizational change journey of adopting new technologies and business models as digital disruption challenges prior success factors and value drivers, with data and their analytics providing new ways of capturing value (Pagani 2013; Setia et al. 2013). Rapid technological change and the rapid adoption of digital products and services by consumers in recent years are key forces of digitization, demanding companies to further digitize their sales and communication channels and digitally augment or replace physical product and service offerings (Setia et al. 2013).

IT’s contribution to create business value has long been in the focus of IS research (see Schreyn 2013 for a review). Historically, firms have tended to struggle with realizing the value from their IT investments (Oz 2005) and many view IT as a cost burden rather than a means to gaining competitive advantage (Dehning et al. 2003). Digital transformation, however, has blurred the functional boundaries between business and IT, with digital technologies pervading virtually every aspect of business (Bharadwaj et al. 2013a, Pagani 2013). With the value creation happening at the nexus between business and IT, the attention of top management, as well as recent IS research (e.g., Chakravarty et al. 2013), has been drawn to redefining the IT function’s role and competencies needed to enable digitization. For many companies, the IT function’s involvement in designing a digital business strategy and playing an active role in large digital transformation programs is integral to their success (Loebbecke and Picot 2015). However, many firms often do not actively involve their IT function when pursuing digital business transformation, mostly due to existing perceptions that traditional IT departments do not possess enough business understanding and are hindering digital innovation rather than fostering it (Colella et al. 2014). Consequently, the IT function often undergoes its own transformation process in the larger context of the organization’s digital transformation in order to establish a suitable design, which effectively supports the firm’s digitization initiatives.

### 1.2.2 Business-IT Alignment

The business-IT alignment domain – also simply referred to as “alignment” in IS research – consists of two major subdomains: structural alignment and strategic alignment (Reich and Benbasat 1996). Structural alignment describes the degree of structural fit between business and IT and is generally influenced by the structural organization of the IT function (see Earl 1989), reporting relationships, the location of IT decision-making rights, and the deployment of IT staff (Chan 2002). Strategic alignment is focused on the fit between IT strategy and business strategy, involving both the strategy itself and its creation (Chan 2002). Within the subdomain of strategic business-IT alignment, IS researchers distinguish between the intellectual and the social alignment dimensions (Reich and Benbasat 1996). The intellectual dimension is concerned with the alignment of the strategic plans, contents, and strategic planning methodologies (Chan et al. 1997; Hirschheim and Sabherwal 2001), whereas the social dimension concentrates on the people involved in the creation of strategic alignment (Reich and Benbasat 1996). Both dimensions are important for organizations to achieve high levels of alignment; however, scholars are calling for increased attention to be paid to the social dimension (e.g., Reich and Benbasat 2000; Tan and Gallupe 2006; Wu et al. 2015).

From a review of the literature on social alignment (see Table 5 in the Appendix to Chapter 2), it is apparent that researchers prevalently see “mutual understanding” as the pivotal element that determines the success of the CEO-CIO partnership. Past studies have put an emphasis on identifying antecedents of mutual understanding and linking it to other important social alignment constructs such as shared domain knowledge, shared language, frequency of communication, CIO educational mechanisms, and relational similarities between business and IT executives (e.g., Preston and Karahanna 2009a; Reich and Benbasat 2000). Few studies take a deeper look into the complexities of mutual understanding itself. Tan and Gallupe’s (2006) cognitive mapping technique and Feeny et al.’s (1992) separation of CEO-CIO agreement and understanding are exceptions to the otherwise rather simple conceptualizations of mutual understanding. A more nuanced view on the critical underlying facets of perceptual congruence, such as those commonly used in social and personal relations research (e.g., Acitelli et al. 1993; White 1985), has not yet been applied in empirical research on social alignment between business and IT executives.

### 1.2.3 IT Agility and Ambidexterity

IT agility and IT ambidexterity are two well-established theoretical concepts in IS research. Both are generally considered desirable for organizations, especially in the context of digital transformation.

Sambamurthy et al. (2003) introduced agility to the IS literature as a dynamic organizational capability that allows firms to swiftly detect and seize opportunities that arise from the markets around it, with IT being an antecedent of enterprise agility. According to Overby et al. (2006) and Lee et al. (2009), agility does not only refer to entrepreneurial or offensive actions (i.e., the ability to act on opportunities to innovate and extend the firm's current market position), but also to adaptive or defensive actions (i.e., the enhancement of the firm's resilience and ability to withstand external pressure from emerging changes). IS scholars achieved limited consensus on the role of information technology in this context, with some viewing IT as a platform for organizational agility (e.g., Lu and Ramamurthy 2011; Sambamurthy et al. 2003) while others view IT agility itself as a capacity firms should pursue (e.g., Nambisan 2013; Tiwana and Konsynski 2010; Yoo et al. 2012). With digital business transformation creating high expectations for IT innovation to become a source of competitive advantage (Bharadwaj et al. 2013), the latter view has gained popularity. Accordingly, IT agility is often viewed as a means for the IT function to adapt rapidly to changing business needs and arising digital opportunities. A modular IT architecture and decentralized IT governance, for example, enable high levels of IT agility (Tiwana and Konsynski 2010). Several papers link IT agility or IT-enabled organizational agility to business-IT alignment as well as IT ambidexterity (e.g., Lee et al. 2015; Tiwana and Konsynski 2010), arguing that an IT function which can rapidly sense and respond to emerging opportunities and threats can also swiftly correct misalignment and restore a balanced focus of the IT function.

The concept of ambidexterity describes the ability to overcome conflicting dimensions – or in other words: the capability to pursue multiple disparate things at once (Cao et al. 2009; Gibson and Birkinshaw 2004; Tushman and O'Reilly 1996). In a business context, organizational learning theory describes exploration (i.e., the discovery of how to combine resources and capabilities in new ways) and exploitation (i.e., the efficient utilization of existing resources and competencies through known processes) as the two competing goals that firms typically face (March 1991).

In IS research, IT ambidexterity is viewed as the ability of the IT function to simultaneously exploit current IT resources and practices (IT exploitation) as well as explore new ways of leveraging IT (IT exploration) (Gregory et al. 2015; Lee et al. 2015; Napier et al. 2011). IT exploitation reflects the IT function's capability to enhance the efficiency and effectiveness of employed IT resources in order to utilize existing IT assets to the maximum extent. IT exploration, on the other hand, describes the IT function's ability to identify emerging technologies and methodologies and experiment with them in order to select those that are of highest relevance for the firm. Consequently, high levels of IT ambidexterity are desirable as they allow for cost effective and flexible provision of IT services, whereas excessive focus on either IT exploitation or IT exploration tends to lead to inferior outcomes (He and Wong 2004).

The theory of ambidexterity has also been applied to the field of IT leadership (Chen et al. 2010; Vidgen et al. 2011), coining the term "CIO ambidexterity" (Kalgovas et al. 2014). CIO ambidexterity describes the CIO's capacity to achieve both exploitative and exploratory tasks as the head of the IT function. The concept of CIO supply-side leadership and CIO demand-side leadership describes the ambidexterity challenge for IT leadership confronted to balance ongoing known business needs with exploring novel IT-enabled opportunities (Chen et al. 2010).

### **1.2.4 Digital Leadership Roles in Corporations**

The IT function in organizations has long been recognized for leading firms into an IT-enabled future, from the early days of data processing to now managing a complex landscape of information systems. Accordingly, the CIO role has developed from that of an "IS Manager" (Ives and Olson 1981) to that of a strategic executive who is often part of the firm's top management team (TMT) (Fortino 2008). More recently, however, CEOs themselves as well as other business executives have taken on the ownership of digital topics after realizing the enormous potential and risk involved in the changes digitization brings about for the company (Weill and Woerner 2013b). Given the magnitude of change ahead, as well as the complexity in the topics, many firms' CEOs have created new roles such as that of the Chief Digital Officer, the Chief Innovation Officer, and the Chief Data Officer (Di Fiore 2014; Maycotte 2015). One might argue that the responsibilities associated with these new roles have formerly been part of the CIO role; however, it must be noted that digital business aspects often demand these roles to be more business than information technology focused.

However, due to the challenges with establishing alignment in the past and the dissatisfaction with many IT investments, which did not pay off, there has been growing demand for digital leadership to be established in roles outside the CIO role. Prior research has examined a variety of factors which have put increasing pressure on the CIO role (e.g., Earl 1996; Patten et al. 2009; Spitze and Lee 2012), which is frequently perceived as unsuccessful at managing changing role expectations, harnessing new technological options, and coping with environmental changes.

Unlike other digital leadership roles, the CIO role and its evolution have received a significant amount of attention from IS research since its advent as the functional head of IT. Various models exist, which attempt to explain the relationship between CIOs and other C-level executives, as well as the skills a CIO is expected to master (Enns et al. 2003; Feeny et al. 1992; Jones et al. 1995). It has been acknowledged that the CIO role encompasses four (Chun and Mooney 2009) or five (Peppard et al. 2011) distinct role-types, with the exact role-type selected depending on the maturity of the business. Models of similar level of detail for other digital leadership roles do not exist, although the role of the Chief Digital Officer has begun to receive attention from IS research (e.g., Horlacher 2016; Horlacher and Hess 2016). Given the rapid growth in the number of CDOs in recent years and its increasing importance for businesses worldwide (CDO Club 2015), a closer investigation of this role as well as its interplay with the CIO role is warranted.

### **1.3 Structure of the Dissertation**

In order to contribute to the research questions listed in section 1.1 above, two extensive studies were conducted, which resulted in four scientific publications, three of which are part of this dissertation. The manuscripts of additional articles related to the second study were submitted for publication in the MIS Quarterly Executive special issue on digital transformation and the European Conference on Information Systems in Guimarães, Portugal, which (assuming acceptance) will both be released in June 2017. Table 1 provides an overview of the studies and already published articles that constitute the core of this dissertation.

**Table 1.** Overview of Studies and Articles in This Dissertation

<b>Study 1</b>	<b>Chapter 2</b> Article 1	<b>The Bidirectionality of CEO-CIO Mutual Understanding</b> Benlian, A. and Haffke, I. (2016): “Does mutuality matter? Examining the bilateral nature and effects of CEO-CIO mutual understanding,” in <i>Journal of Strategic Information Systems</i> 25 (2), pp. 104-126. (Benlian and Haffke 2016)
	<i>Not part of this dissertation</i>	<b>Perceptual Congruence and Interdependence between CEOs and CIOs</b> Haffke, I. and Benlian, A. (2013): “To understand or to be understood? – A dyadic analysis of perceptual congruence and interdependence between CEOs and CIOs,” in <i>Proceedings of the 34<sup>th</sup> International Conference on Information Systems</i> , Milan, Italy. (Haffke and Benlian 2013)
<b>Study 2</b>	<b>Chapter 3</b> Article 2	<b>The Role of the CDO and Its Interdependencies with the CIO Role</b> Haffke, I., Kalgovas, B., and Benlian, A. (2016): “The role of the CIO and the CDO in an organization’s digital transformation,” in <i>Proceedings of the 37<sup>th</sup> International Conference on Information Systems</i> , Dublin, Ireland. (Haffke et al. 2016)
	<b>Chapter 4</b> Article 3	<b>The Role of Bimodal IT in Transforming the IT Function</b> Haffke, I., Kalgovas, B., and Benlian, A. (2017): “The transformative role of bimodal IT in an era of digital business,” in <i>Proceedings of the 50<sup>th</sup> Hawaii International Conference on System Sciences</i> , Honolulu, Hawaii. (Haffke et al. 2017)

The following paragraphs briefly summarize each research article and explain the motivation of the articles, their contributions to the research questions, and the linkages between the articles.

**Chapter 2 (Article 1):** This article responds to *RQ1* by drawing on two established theoretical models in social and personal relationship research, the perceptual congruence model (PCM) and the actor-partner interdependence model (APIM), in order to assess CEOs’ and CIOs’ abilities of mutual perspective-taking and its effects on their collaboration quality. The study that provides the foundation for this article employs Structural Equation Modelling (SEM) to analyze survey data of 102 matched pairs of CEOs and CIOs. This methodology allows the research to delve into the cognitive mechanisms that are assumed to affect the quality of social relationships between executives. The study not only finds a discrepancy between the levels of executives’ perceived agreement and actual agreement, it also highlights the disparate importance of an active and passive role of understanding in the CEO-CIO partnership,

providing empirical support that CIOs' understanding of their CEO plays a more pivotal role in the CEO-CIO relationship than CEOs' understanding of their CIO. The article contributes to research on interpersonal relations by combining two theoretical models of intra-/interpersonal perceptions and interdependence, which have thus far largely been applied separately. It also contributes to research on IS social alignment by proposing a differentiated perspective on CEO-CIO understanding, which has thus far mostly been examined in aggregation (e.g., "mutual understanding", "shared understanding"). In the context of digital business transformation, it is particularly important to understand the mechanisms behind social alignment. The lack of social alignment between business and IT executives in companies that are pressured by digital disruption and the related market forces often leads to CEOs entrusting other executives with digital leadership responsibilities (see article 2) and potentially even introducing a second IT mode in an organizational unit outside the traditional IT function (see article 3).

**Chapter 3 (Article 2):** This article sheds light on the role of the Chief Digital Officer, as this role is frequently created in response to the overwhelmingly large implications that advancements in digital technologies have for many companies. Using qualitative research methods, based on the analysis of interview data from 19 matched pairs of business and IT executives, the article explains the four factors that drive the establishment of a CDO role and provides insights into four distinct CDO role-types that serve different purposes in practice. With the CIO role assuming an increasingly strategic focus in the recent decades, the study that provides the foundation for this article finds that the appointment of a CDO has the potential for considerable redundancy between the two roles and brings the CIO role to an inflection point. Responding to *RQ2*, the article assesses the emerging CDO role in the context of the evolution of the CIO role and highlights three key implications for the development of the CIO role. In doing so, the article contributes to the emerging field of research on digital leadership roles and responsibilities in corporations and is among the first to contrast CIO and CDO roles, supporting previous research in this field that has predicted an imminent split in the CIO role. Generally, misalignment between the focus areas of the CIO and those demanded by the business, be it actual or perceived (see article 1), is one of the reasons for companies to appoint a CDO in addition to the existing CIO and frequently results in IT demand-side leadership being assumed by the CDO. The article also considers the split between IT and digital leadership roles as a catalyst for a potentially bimodal setup of IT within the firm (see article 3).

**Chapter 4 (Article 3):** In response to *RQ3*, this third article investigates the bimodal approach to designing an organization's IT function and delivering IT-related projects. Based on the analysis of interview data from 19 matched pairs of business and IT executives using qualitative research methods, the study underlying this article finds a growing demand for IT agility and IT exploration capabilities in a digital business context to largely explain the introduction of bimodal IT designs. The article uncovers the existence of three different archetypes of bimodal IT and explains how organizations at different stages of their IT function transformation journey utilize bimodal IT to advance the IT function both in terms of agility and ambidexterity. Ultimately, however, the study finds that the successful employment of bimodal IT leads to a state where both modes are reintegrated and a unimodal agile IT division meets the demands of the digital business. The article contributes to the body of IS knowledge by providing a framework of bimodal IT and introducing this nascent development around governing corporate IT in two modes – a trend which has thus far primarily played an important role in practitioner research – to the academic discourse. Although the article focuses more on the IT function transformation in terms of organizational structure, culture, methods of working, as well as governance and less on executive roles and their interrelationships, the implications of bimodal IT for business-IT alignment (see article 1) and digital leadership roles (see article 2) are discussed.

The three articles have been modified to follow consistent formatting and referencing styles. Since all three articles were coauthored by at least one other author, first person plural (i.e., “we”) is used throughout the next three chapters (Chapters 2, 3, and 4), as it appears in the original published versions of these articles.



## 2 Article 1: The Bidirectionality of CEO-CIO Mutual Understanding

**Title:** Does mutuality matter? Examining the bilateral nature and effects of CEO-CIO mutual understanding

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**Published in:** Journal of Strategic Information Systems 25 (2), pp. 104-126

**Available at:** <http://www.sciencedirect.com/science/article/pii/S0963868716000020>

**Abstract:** Despite the criticality of a healthy partnership between CEOs and CIOs in organizations for effective business-IT alignment, we still know little about how crucial yet under-researched facets of mutual understanding compare between CEOs and CIOs and how their ability of mutual perspective-taking affects the quality of collaboration in their partnership. Drawing on two established theoretical models in social and personal relationship research, the perceptual congruence model (PCM) and the actor-partner interdependence model (APIM), our study examines 102 matched-pair survey responses of CEOs and CIOs using dyadic data analysis. Our findings show that both executives' actual opinions on important business and IT topics are more similar than both perceive them to be. Accordingly, perceptions of each other's opinions are negatively biased away from their real opinions. Moreover, our study demonstrates that CIOs' understanding of their CEO plays a more pivotal role in predicting the quality of CEO-CIO collaboration than CEOs' understanding of their CIO; this highlights the disparate importance of an active and passive role of understanding in the CEO-CIO partnership. Implications for research and practice are discussed.

**Keywords:** CIO-CEO partnership, social alignment, mutual understanding, perspective-taking, agreement, perceptual congruence model, actor-partner interdependence model, bidirectionality, dyadic data analysis

## 2.1 Introduction

Fostering the business-IT partnership is a perennial challenge for corporate executives. In fact, the latest Society for Information Management's (SIM) IT Key Issues and Trends survey reported that strategic alignment of IS with the business was regarded as the topmost priority in eight out of the last 12 years and among the top two in all but one year (Kappelman 2014; Luftman 2005). Alignment clearly remains a persistent and pervasive managerial issue, particularly as organizations, markets, and technologies are constantly evolving (Coltman et al. 2015). A good working relationship between the Chief Executive Officer (CEO) and the Chief Information Officer (CIO) is central to a healthy business-IT partnership. This, in turn, facilitates the process of blending IT assets and complementary business capabilities to derive strategic value from IS (Bassellier and Benbasat 2004; Preston and Karahanna 2009b). Regardless of its importance, however, this relationship is frequently observed as bumpy, which contributes to the ineffectual use of information systems (IS) and to poor IS strategic alignment (Karahanna and Preston 2013).

Several factors have been found to account for poor relationships between CIOs and CEOs, and a key recurring theme has been that the CIO is perceived by the CEO as someone who operates in a service delivery capacity or in a support function rather than in a strategic advisory role (Fell 2013). All too often, and as an expression of a lopsided relationship, there has been little IT recognition on the part of the business with few opportunities for CIOs to engage in regular strategic conversations with their CEO (Luftman and Kempaiah 2007). Even worse, both IS and business leaders are often *“unaware of their respective assumptions and find it difficult – or even controversial – to discuss them”* (Hansen et al. 2011, p. 175). Overall, extant academic and practitioner research has long recognized this gap in mutual understanding as a major obstacle to IS strategic alignment (Reich and Benbasat 2000).

However, as IT-driven business topics proliferate and digital technologies fundamentally reshape traditional business strategies and models, the CIO as a strategic partner to the CEO has become more prevalent (Hansen et al. 2011; Matt et al. 2015; Weill and Woerner 2013b). Regular and frequent strategic conversations between CEOs and CIOs are no longer unusual, and the necessity of CEOs to understand the business value of IT becomes increasingly important for business success (Coltman et al. 2015). In recent years, extensive evidence has accumulated that senior executives (including business and IT executives) are cognitively limited and subject to different biases such as confirmation, overconfidence, availability,

anchoring, and self-preservation (Coltman et al. 2015; Kahneman et al. 2011; Vetter et al. 2011). Given the potential that cognitive biases may lead to perceptual blindness or distortion and given the pivotal role of mutual understanding for the health of the business-IT partnership, it is critical to fathom whether executives' *subjective perceptions* of each other's priorities, preferences, and opinions – as represented in implicit, intrapersonal assumptions – are in line with or depart from their *actual perceptions* (Benlian 2013; Hansen et al. 2011; Preston and Karahanna 2009b). In the same vein, gaining deeper insights into the question of *who needs to understand whom* in the CEO-CIO partnership and thus into bidirectional understanding, which we define as the ability of mutual perspective-taking, becomes more vital for positively affecting business-IT collaboration quality. Neglecting bidirectional differences in perceptions and understanding may otherwise not only impede the partnership between the two executives (e.g., by undermining each other's credibility or trustworthiness), but may also have far-reaching and profound effects (e.g., unnecessary delays or diverging priorities in IT investment decisions). Those can by far transcend the CEO-CIO partnership and trickle down to many other areas of the firm (Johnson and Lederer 2013; Tallon 2011).

Previous studies on social alignment have primarily focused on the pivotal role of “mutual” or “shared” understanding between business and IT executives (e.g., Reich and Benbasat 1996; Tan and Gallupe 2006), its antecedents (e.g., Preston and Karahanna 2009b; Reich and Benbasat 2000), and its effects on IS strategic alignment or the business value of IT (e.g., Gerow et al. 2014; Tallon et al. 2000). These insights are very valuable because they shed light on how CEO-CIO social alignment is formed and how it affects important alignment and performance outcomes. However, previous studies have thus far treated CEO-CIO mutual understanding largely as a unitary and undifferentiated concept (e.g., Johnson and Lederer 2010), neglecting to distinguish between intra- (i.e., self) and interpersonal (i.e., other) perceptions and to consider the bidirectional nature of understanding, or have limited their focus to only one side of the “understanding equation” (such as “business understanding of IT”) altogether (e.g., Wagner et al. 2014). This comes as a surprise, given that previous IS scholars have pointed to the importance of examining a more nuanced and fine-grained conceptualization of CEO-CIO understanding, rather than studying it from an aggregated or lopsided perspective (Coltman et al. 2015; Preston and Karahanna 2009b). In light of these limitations and calls for further research, our study addresses the following research questions:

- (1) *How do reciprocal perceptions of key business and IT topics compare in the CEO-CIO partnership?*

- (2) *Is there an imbalance between CEOs and CIOs in understanding one another's perspectives?*
- (3) *How do the two directions of understanding (i.e., CIOs understand CEOs vs. CEOs understand CIOs) differentially affect the collaboration quality between CEOs and CIOs?*

Gaining deeper insights into CEO-CIO understanding<sup>2</sup> and exploring its effects can help organizations carefully diagnose and shape the relationship between business and IT leaders (e.g., in terms of communication, collaboration, and coordination practices) in order to promote a healthy and successful business-IT partnership.

Besides these practical implications, our study also offers several research and theoretical contributions. First, while previous social business-IT alignment research has often limited its focus on just one single direction of understanding or has largely treated mutual understanding as a unitary and aggregated concept, obscuring intra- and interpersonal distinctions and the bidirectional nature of understanding, our study proposes and fleshes out a novel perspective on CEO-CIO understanding which allows differentiation between bidirectional effects on their relationship. In doing so, we particularly shed light on the crucial concept of mutual perspective-taking – the cognitive process of changing the viewpoint and putting oneself into the shoes of the other person (Grant and Berry 2011) – that has thus far received only scant attention in social alignment research. Second, social alignment research to date has not distinguished between an active and a passive role of CEO-CIO understanding (i.e., understanding vs. being understood) and their effects on important relational outcomes. By zooming in on the two directions of understanding and their differential effects, our study shows that it is the CIO's understanding of the CEO – not the CEO's understanding of the CIO – that matters for improving and strengthening collaboration quality. As such, our study is the first to highlight the relevance of the conceptual distinction into an active and passive form of understanding and its crucial implications for effective social alignment. Third, and more generally, our study contributes to interpersonal relations research by combining two hitherto largely separately applied theoretical models of intra-/interpersonal perceptions and interdependence. In so doing, we are able to gain a more comprehensive picture of the *bilateral*

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<sup>2</sup> We conceptualize CEO-CIO understanding as a facet of the broader umbrella concept of 'perceptual congruence' that we introduce and explain in more detail in the Theoretical Background section (see Figure 1 and Table 2).

*nature and effects* of CEO-CIO understanding, which would not be possible by focusing on either model in isolation.

We begin this paper by providing a review of the relevant business-IT alignment literature. We then establish the theoretical foundations of the two models integral to this study along with the development of the hypotheses to be tested. Subsequently, our research methodology is described and the results of our study are presented. Lastly, this paper is concluded with a discussion of the findings and the implications thereof.

## 2.2 Theoretical Background

### 2.2.1 Literature Review

Research on business-IT alignment has become increasingly popular over the past two decades. Building upon seminal research and literature reviews on IT alignment (e.g., Avison et al. 2004; Chan and Reich 2007a; Chan and Reich 2007b; Henderson and Venkatraman 1993), Gerow et al. (2014) give a comprehensive overview of business-IT alignment studies between 1996 and 2014 and, inter alia, reveal an underrepresentation of research concerned with the social dimension of alignment, also referred to as ‘social alignment’. Social alignment is commonly defined as the “*the state in which business and IS executives within an organizational unit understand and are committed to each other’s mission, objectives, and plans*” (Reich and Benbasat 1996, p. 57). This underrepresentation goes hand in hand with calls in the literature for a stronger focus on social relations in the context of business-IT alignment (e.g., Preston and Karahanna 2009b; Reich and Benbasat 2000; Wu et al. 2015).

In Table 5 of the Appendix, we present a summary of prior studies on social alignment indicating study context, social alignment constructs and the operationalization thereof, key antecedents and consequents examined, and principal findings. The literature review clearly identifies mutual understanding between business and IT as a pivotal element, either as a key antecedent to business-IT alignment (e.g., Luftman 1999) or as part of the alignment construct itself (e.g., Li 2006). Although the number of research studies on this topic is relatively small (Chan et al. 2006), unfortunately, researchers do not follow a general definition of or a common terminology around the concept of ‘mutual understanding’ (Bittner and Leimeister 2014). Authors in this field use the terms “mutual”, “shared”, or “common understanding” (e.g., Preston and Karahanna 2009a), “mutual” or “shared knowledge” (e.g., Nelson and Coopridge

1996), “mutual” or “shared vision” (e.g., Reich and Benbasat 1996), “mutual” or “shared cognition” (e.g., Tan and Gallupe 2006), “perceptual congruence” (e.g., Huisman and Iivari 2006), “consensus” (e.g., Tallon 2014), “convergence” (e.g., Johnson and Lederer 2005), and “agreement” (e.g., Johnson and Lederer 2013) nearly interchangeably to indicate the state where involved individuals express similar views on certain topics (Johnson and Lederer 2005). The few distinctions noticeable throughout are that the term “vision” is primarily used to refer to “understanding” on future as opposed to present or past issues and the term “knowledge” embodies “understanding” on more objective rather than subjective topics.

Besides employing different terminology, the 22 references listed in our literature overview also operationalize their measurements of ‘mutual understanding’ in different ways. Whereas few authors deploy their own unique measures (e.g., Tallon 2014; Tan and Gallupe 2006), the most common operationalization of measuring ‘mutual understanding’ in prior studies are: (1) reversed absolute (or sum of squared) differences between individuals’ responses to the same set of questions (e.g., Johnson and Lederer 2005); (2) average of the individuals’ self-assessment of their level of ‘mutual understanding’ (e.g., Preston and Karahanna 2009a); and (3) individuals’ reciprocal rating of counterparty’s understanding of the individual’s own domain (e.g., Armstrong and Sambamurthy 1999). All three measures refer to the congruence (i.e., similarity) of views between individuals, which White (1985) suggests to conceptualize as agreement under the umbrella concept of perceptual congruence<sup>3</sup>. The similarity of intrapersonal perceptions, on the other hand, and the ability of mutual perspective-taking have not been addressed empirically in prior alignment research. Only Feeny et al. (1992) state to have measured agreement (i.e., similarity of CEO and CIO response) separately from understanding (i.e., ability to predict the other individual’s response). In their study, CIOs were asked to predict their CEO’s responses to IT-related questions and their predictions were compared for accuracy. Alas, numerical results of this analysis are not provided in their paper and the opposite direction (CEOs’ prediction of their CIO’s responses) is not considered. Taken together, a distinction between actual and perceived similarity of viewpoints, which accounts for mutual perspective-taking and thereby yields a multi-faceted perspective on perceptual congruence between CEOs and CIOs, has not been advanced in any prior study.

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<sup>3</sup> To avoid conceptual obscurity, our study consistently draws on the terms as defined in the perceptual congruence model that we introduce in the next section (see also Table 2).

Furthermore, only few studies have operationalized ‘mutual understanding’ between business and IT representatives as a bidirectional measure; those that do, fail to test their differentiated effects on social alignment. Of the 22 references listed in our literature overview, 14 studies neglect to account for the bidirectionality of business-IT understanding altogether, while eight studies consider it to some, yet limited, extent. In five studies (Boynton et al. 1994; Li et al. 2006; Reich and Benbasat 2000; Reich and Benbasat 1996; Stoel 2008), ‘mutual understanding’<sup>4</sup> is measured separately as “business’ understanding of IT” and “IT’s understanding of business”, but subsequently lumped together into a single, unitary ‘mutual understanding’ construct, either as a latent variable or as the mathematical average of the two directional measures. Two studies (Feeny et al. 1992; Wagner et al. 2014) measure and consequently analyze only the direction of “IT’s understanding of business”. In only one study (Armstrong and Sambamurthy 1999), bidirectionality is accounted for in the context of “shared knowledge”, but its differential effects are neither reflected in the research model nor in the hypotheses tested.

Finally, the most commonly found consequents of ‘mutual understanding’ in social alignment literature is either the level of alignment itself or some performance or success characteristics such as financial contribution of IS (Johnson 2005), successful utilization of IT capabilities (Armstrong and Sambamurthy 1999), or IT utilization (Wagner et al. 2014). Albeit providing empirical evidence of these positive effects on business value of IT has fundamentally contributed to social alignment research, previous research has thus far overlooked the more direct and proximal consequences of ‘mutual understanding’ on the CEO-CIO partnership itself, such as collaboration quality.

In summary, we can conclude that ‘mutual understanding’ in social alignment research is still under-theorized. Although congruence of views between business and IT executives is widely considered the key aspect of social alignment, previous research is far from providing a nuanced and fine-grained picture of the full concept of intra- and interpersonal congruence of perceptions and of the differentiated directionality effects of understanding as suggested in extant literature (Kenny 1996; White 1985).

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<sup>4</sup> We regard also synonymously used terms in the IS literature whenever we refer to ‘mutual understanding’.

## 2.2.2 Hypotheses Development

In this study, we draw on two widely established models from social and personal relationship research to examine interpersonal relations between CEOs and CIOs: White's perceptual congruence model (PCM: White 1985) and Kenny's actor-partner interdependence model (APIM: Kenny 1996). To develop our hypotheses, we will first draw on the PCM to offer a comprehensive conceptualization of perceptual congruence and second identify the effects of a key aspect of this congruence, CEO-CIO mutual understanding (or bidirectional understanding), on their collaboration quality. The measures of the two directions of understanding form the link between the two models, whereby the PCM feeds these constructs into the APIM that relates them to their consequents. As such, both models work together by providing more comprehensive insights into the bilateral nature and effects of CEO-CIO mutual understanding, which would not be possible by using either model in isolation.

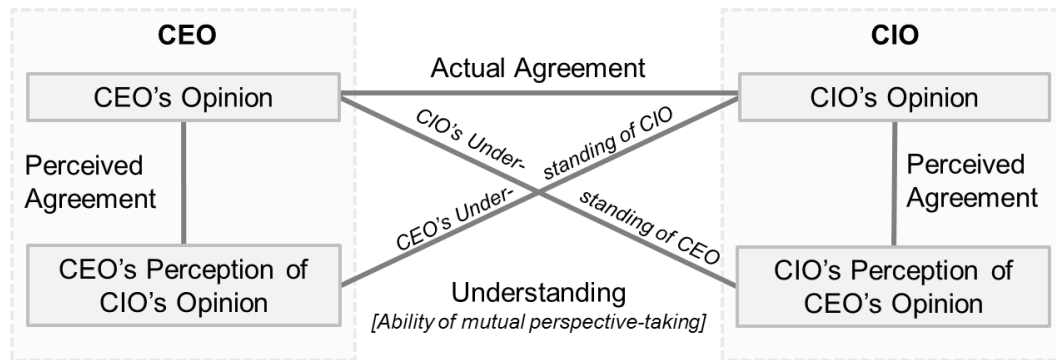
### 2.2.2.1 Perceptual Congruence in the CEO-CIO Partnership

White's model of perceptual congruence is based on a dyadic setting where self- and other-perception of both dyad members are compared interpersonally as well as intrapersonally. This approach of measuring reciprocal perceptions has been widely used in social psychology (e.g., Acitelli et al. 1993; White 1985; Larson 1974; Laing et al. 1966) to assess, for example, the relationship between husbands and wives or parents and their children and has inspired business-related studies to examine, for example, the congruence of co-workers' perceptions (Bakker and Leiter 2010; Morgan 1993). Though not always applied in its full form, IS research has drawn on this model to assess perceptual congruence between, for example, IS user and IS staff (Jiang et al. 2000), system developers and system users (Jiang et al. 1998), business planners and IS executives (Teo and King 1997), developers and customers (Finlay and Mitchell 1994), and IS personnel and end-user personnel (Nelson 1991).

Applied to the social alignment context, we examine the individual opinions of both members of a dyadic CEO-CIO pair and their perceived opinions of the other person, respectively (see Figure 1). Comparing these four variables allows measuring the actual similarity of their opinions (*actual agreement*), the level of perceived similarity of their opinions (*perceived agreement*), and their ability to accurately predict the other person's opinion and thus to take the other person's perspective (*understanding*) (see Table 2 for the PCM terminology as consistently used in this study). The PCM's differentiation between actual agreement, perceived agreement, and understanding makes it attractive to apply this model to CEO-CIO



partnerships, where prior alignment literature has mostly looked at only one of those three dimensions at a time. The PCM thus helps us better understand the nature of mutual understanding from these various angles. Later, we will narrow the focus on the effects of the two directions of understanding, when we employ the APIM.



**Figure 1.** CEO-CIO Perceptual Congruence Model

**Table 2.** Perceptual Congruence Terminology as Used in This Study

Term	Definition / Explanation (based on White 1985)
Perceptual congruence (also: congruence of perceptions)	General similarity of a dyad's self- and other-perceptions, referring collectively to the three facets of perceptual congruence (i.e., actual agreement, perceived agreement, and understanding)
Actual agreement (also: agreement)	Similarity of two individuals' actual opinions
Perceived agreement	Similarity of one individual's actual opinion and his or her perceived opinion of the other individual
Understanding (also: ability of mutual perspective-taking or ability to accurately perceive/predict the other person's opinion)	Similarity of one individual's actual opinion and the other individual's perceived opinion of the first individual. Understanding is bidirectional by nature and can be divided into an active (i.e., understanding) and passive (i.e., being understood) form of understanding. It can also be expressed on an aggregate, dyadic level (i.e., mutual understanding)

Many personal relations researchers (Byrne and Blaylock 1963; Sillars 1985) have found that individuals tend to perceive other people's perspectives significantly more similar to their own perspectives than they actually are. Multiple studies on husbands and wives have found empirical evidence of this phenomenon (e.g., Acitelli et al. 1993; Levinger and Breedlove 1966) which Ross et al. (1977) call the "*false consensus effect*". This effect is described as an inclination to overestimate the degree to which one's own behaviors, attitudes, and beliefs are

shared by other individuals because of an inner need to believe one fits in with the people around oneself, which boosts his or her self-esteem. The CEO-CIO partnership, just like any other closer social relationship, is expected to be subject to the same illusion. Both executives are part of a top management team and regular interactions are the basis of their professional relationship (Collins and Clark 2003; Karahanna and Preston 2013). Despite obvious limitations, professional relationships with mutual dependencies can be viewed as similar to marriages in a way that they both require alignment between the involved parties. Husbands and wives need to align on their financial planning, family planning or career planning much like CEOs and CIOs need to align on strategic directions, objectives or business planning. They often have to legitimize common decisions in front of internal and external stakeholders and are expected to speak with one voice in their daily business. Based upon this reasoning, we hypothesize that

**Hypothesis H1:** *In the CEO-CIO partnership, perceived agreement is greater than actual agreement.*

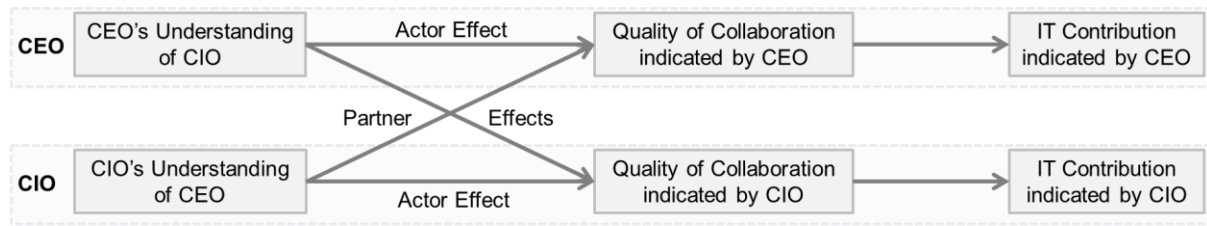
White (1985) validates in his study of married couples that wives' understanding of their husbands is greater than the husbands' understanding of their wives. He explains this finding with power differentials in their relationships. Albeit this view is certainly outdated in most Western countries today, the wives' more accurate perception of their husbands' opinions in White's study is argued to stem from the fact that "*it has always been more important for those of lesser power to understand those with greater power and control*" (White 1985, p. 56). Other social relations researchers have found similar differences in understanding where one dyadic partner is thought to possess more power than the other (e.g., Acitelli 1993; Allen and Thompson 1984). We argue that, by the very nature of the organizational hierarchy, the same holds true for CIOs and their more powerful CEOs. The CIO's understanding of his or her CEO is an important medium to be effective in supporting the business with adequate IT solutions. In this regard, CIOs have to be good listeners, as the CEO's strategic business decisions usually have a great impact on IT budgets and plans (Tallon 2014). Ignoring or misinterpreting the priorities and opinions of the CEO may otherwise have severe and long-lasting detrimental effects for the entire company. As such, we expect that this imbalance of role power also reflects in how CEOs and CIOs will understand each other and accordingly propose that

**Hypothesis H2:** *The CIO's understanding of the CEO is greater than the CEO's understanding of the CIO.*

### **2.2.2.2 Bidirectional Effects of CEO-CIO Mutual Understanding on Collaboration Quality**

Building upon the PCM's concept of bidirectional understanding, we investigate the effects of the same by linking them in our second model. The modeling of interpersonal bidirectional effects in dyadic research is described by what is known in social science as the actor-partner interdependence model (APIM; Kenny 1996). The intrapersonal effect of one person's causal variable on one's own dependent attribute is referred to as "actor effect", while the interpersonal effect of one person's causal variable on the other individual's dependent attribute is referred to as "partner effect". Understanding one another is the PCM's two-directional interpersonal construct and therefore ideally suited to show both actor and partner effects when employed as an independent variable in the APIM. The APIM is a well-established and widely used model in the interpersonal relations literature (Garcia et al. 2015) that uniquely differentiates between the bidirectional effects of the active and passive form of understanding (i.e., understanding and being understood), which is particularly pertinent for our study context. The use of this model in IS research has thus far been limited, though Kearns and Lederer (2000) employ an APIM-like model when distinguishing between the effects of the "alignment of IS plan with business plan" and the "alignment of business plan with IS plan" on the creation of competitive advantage through IS.

We specifically relate the executives' degree of understanding one another to both individuals' perceived quality of collaboration (as depicted in Figure 2). Collaboration quality is often discussed as a crucial factor in social alignment (Kearns and Lederer 2003; Preston and Karahanna 2009b) but largely omitted as construct in empirical alignment studies, which tend to link 'mutual understanding' directly to performance measures such as IT business value (see Table 5). Unlike CEO-CIO agreement, the impact of understanding one another (i.e., being able to accurately predict one another's standpoint) on proximal, relational outcomes such as collaboration quality is hardly researched thus far and a distinction between the effects of the CEO's understanding of the CIO and the CIO's understanding of the CEO is not made in prior research.



**Figure 2.** APIM-based Research Model on the Effects of CEO-CIO Mutual Understanding

Support for why understanding of one another's opinions matters comes from social relations research. In the context of marriages, Lewis and Spanier (1979) posit that spouses who have a better understanding for one another and a stronger ability to empathize are happier, more satisfied, and enjoy higher marital quality. In a professional setting, it has been shown that the same holds true for co-workers and managers who work closely together (e.g., Bakker and Xanthopoulou 2009; Yakovleva et al. 2010). For example, executives who developed the ability to put themselves in each other's position and accurately view situations from the other perspective collaborate better (Johnson and Lederer 2010), resulting from both understanding the other individual's view and being understood by the other person. Similarly, Feeny et al. (1992) note that a “*common attribute of [...] CIOs with excellent relationships [is] their remarkable perception of [...] their CEO's views*” (p. 443).

Earlier, we referred to Acitelli et al. (1993) who argue that in dyadic social relations where there is thought to be a power differential between partners, “*the person with low power needs to be able to understand and predict the actions of the more powerful partner in order to salvage some modicum of control*” (Acitelli et al. 1993, p. 8). Allen and Thompson (1984) furthermore find a direct linkage between this ability and a couple's perceived overall satisfaction with their relationship. If we apply these findings from personal relations research to the CEO-CIO partnership where the CEO is not only considered more powerful but also has fewer attentional resources available than the CIO, being understood by the CIO should contribute more to the CEO's satisfaction than understanding the CIO. Although no previous study could find empirical evidence that the inverse is true for the less powerful partner, we hypothesize that CIOs perceive better collaboration with their CEO when they understand the CEO as compared with being understood by their CEO. Taken together, we argue that

**Hypothesis H3a:** *The partner effect on the CEO's perceived quality of collaboration is stronger than the actor effect from CEO-CIO understanding.*

**Hypothesis H3b:** *The actor effect on the CIO's perceived quality of collaboration is stronger than the partner effect from CEO-CIO understanding.*

If hypotheses H3a and H3b are looked at conjunctly, one can conclude that on an aggregated level, the CIO's understanding of the CEO is the crucial direction when using mutual understanding as a predictor for their quality of collaboration. CIOs need to understand the needs and perspectives of their CEO; in contrast, being understood by their CEO plays a subordinate role for CIOs (hypothesis H3b). CEOs, who are in the more powerful role, appreciate CIOs who understand their views; understanding their CIO contributes less to their level of perceived collaboration quality (hypothesis H3a). Therefore, the overall quality of collaboration between CEO and CIO should be better predicted by the CIO's understanding of the CEO than the CEO's understanding of the CIO. In a similar context, Armstrong and Sambamurthy (1999) likewise find there to be indication that it is more important for CIOs than for CEOs to possess cross-domain business/IT knowledge. Allen and Thomson (1984) and Acitelli et al. (1993) argue in a similar manner, but their respective datasets only partially support this hypothesis on the aggregated level. They merely find empirical evidence for a significant impact of the less powerful partner's understanding of the more powerful partner on the relationship quality perceived by the latter (comparable to our hypothesis H3a). Yet, we suggest that

**Hypothesis H3c:** *Overall, the CIO's understanding of the CEO contributes more to their aggregated quality of collaboration than does the CEO's understanding of the CIO.*

Finally, we hypothesize that the quality level of the CEO-CIO collaboration will positively influence the business value that IT is believed to contribute. Connecting this subsequent output factor to our APIM-based model is important because it underscores the positive effects on the value-add of IT claimed by social alignment. The underlying logic is that the alignment of business and IT strategies can be assumed to profit from good CEO-CIO collaboration which has also been supported in previous studies (Johnson and Lederer 2010). If the two executives collaborate well and their collective decision making yields a high-quality set of business and IT plans, it is ensured that the IT organization's resources are dedicated to high-impact projects which allow a high extent of IT contribution to the organization's overall performance. Consistent with Tallon and Kraemer (2003), collaboration quality directly impacts the

executives' awareness of the other's respective future business and IT needs. In line with this reasoning, we hypothesize that

**Hypothesis H4a:** *The CIO's perceived quality of CEO-CIO collaboration positively impacts the value IT is presumed to contribute to the business.*

**Hypothesis H4b:** *The CEO's perceived quality of CEO-CIO collaboration positively affects the value IT is presumed to contribute to the business.*

## 2.3 Research Methodology

### 2.3.1 Survey Sample and Procedures

In order to test our hypotheses, we designed a survey that contained a variety of items to measure the components of both of our theoretical models. Prior to launching the survey, we tested the survey with a small sample of business and IT leaders. A total of eight individuals (four senior business leaders and four senior IT leaders) participated in the pretests of the survey. The pretest interviews were conducted in person and took place in Germany and the U.S. All four IT leaders spearheaded their respective IT organizations and all four business leaders had some form of relationship with the IT organization in their companies. The individuals represented small, medium, and large size firms in various industries. The pretest interviews were conducted primarily to find out if the questions in the perception part of the survey were commensurate, consistently understood, and comprehensively covering relevant topics. As an outcome of the pretest phase, some survey questions were added, others were dismissed, and in some instances the wording of statements was improved.

The survey was then implemented as an online questionnaire. A total of 1,000 CEO-CIO pairs from randomly selected companies in Germany were asked via email for their participation in the study. Their contact information was obtained from the Hoppenstedt firm database, one of the largest commercial business databases in Germany. We queried the database for companies with more than two million Euros in annual revenue before drawing the sample because smaller companies typically do not have their own separate IT organization and hence no individual in the CIO role. CEOs and CIOs received separate emails with instructions and unique match codes. In addition to the initial contact, two reminder notes were sent out via email during this period. Special attention was given to incoming responses with no matching response from the other member of the CEO-CIO dyad. Towards the end of the survey period, phone calls were

placed in addition to two personalized reminder emails to those individuals whose response was missing to complete a dyad pair. To foster participation and reduce self-reporting bias, all participants were given the opportunity to receive an anonymized management report on the study results.

The welcome page of the online questionnaire outlined the purpose of the survey. It also stated that confidentiality and anonymity of the responses were ensured. Participating CEOs and CIOs were instructed to complete their surveys independently of each other. The incoming response data (including the order) for each dyadic pair were stored as one data entry in the dataset. Keeping the data paired was important for statistical testing, as tests concerning dyadic models like ours need to be based on the response pairs, not on the individual responses, due to non-independence of dyadic data (Yakovleva et al. 2010).

We received responses from 176 of the 1,000 contacted CEO CIO pairs. Despite individualized reminder efforts, 36 CIO responses came back without a matching CEO response and 14 CEO responses remained without a matching CIO response. Additionally, 24 response pairs had to be dropped from the dataset because of insufficient data quality. The final set of 102 response pairs served as an input to our statistical analysis. The net response rate of 10.2% is comparable to that of similar studies employing matched pair CEO CIO surveys (e.g., Preston and Karahanna 2009b; Tallon and Kraemer 2003). Table 6, Figure 6, and Figure 7 in the Appendix describe the demographic and socio-economic characteristics and the frequency of communication (i.e., general interactions and strategic discussions) between CEOs and CIOs of companies in our survey sample.

### **2.3.2 Measurement of Variables and Controls**

The CEO version and the CIO version of the survey contained the exact same items to measure the three facets of perceptual congruence, quality of collaboration, and the extent of IT contribution (see Table 3). The last section of the survey that asked for demographic and socio-economic information was slightly different depending on the role of the respondent.

**Table 3.** Survey Items Employed for Measurement of Latent Variables

Construct	Survey Items	Source
Quality of Collaboration	<p>Please indicate your level of agreement with the below statements on a 7-point Likert scale, ranging from “strongly disagree” to “strongly agree”.</p> <ul style="list-style-type: none"> <li>• I am highly satisfied with the collaboration between our CEO/CIO* and me</li> <li>• Overall, I maintain an excellent professional relationship with our CEO/CIO*</li> <li>• The collaboration between our CEO/CIO* and me yields best results</li> <li>• Our CEO/CIO* and I speak the same language</li> </ul>	Jones 1995; Preston and Karahanna 2009b
IT Contribution	<p>Please indicate the extent IT has contributed to each of the following for your organization on a 7-point Likert scale, ranging from “not at all” to “very great extent”.</p> <ul style="list-style-type: none"> <li>• Profitability</li> <li>• Sales revenues</li> <li>• Market share</li> <li>• Operating efficiency</li> <li>• Customer satisfaction</li> </ul>	Johnson and Lederer 2010
<b>Perceptual Congruence Facets</b>		
Actual Agreement	Inter- ( <i>actual agreement</i> ), intra- ( <i>perceived agreement</i> ) and cross- ( <i>understanding</i> ) dyad rating differences of statements about ...	Byrd et al. 2006; Gatignon and Xuereb 1997; Gemino et al. 2008; Ness 2005; Peppard and Ward 1999; Rouse 2008; Venkatraman 1989; Weill and Ross 2004
Perceived Agreement	<p><u>Business Topics**:</u></p> <ul style="list-style-type: none"> <li>• Strategic orientation</li> <li>• Market aggressiveness</li> <li>• Business operations</li> <li>• Business decision making</li> </ul> <p><u>IT Topics**:</u></p> <ul style="list-style-type: none"> <li>• IT outsourcing</li> <li>• IT governance</li> <li>• IT-related projects</li> <li>• IT flexibility</li> <li>• The IT organization</li> </ul>	
Understanding		

\* Depending on their role, respondents had to rate the quality of collaboration with their respective counterpart.

\*\* The statements on business and IT topics are included in Tables A3 and A4 of the Appendix.

Quality of collaboration and IT contribution were reflectively measured by four and five survey items, respectively. The respondents were given a seven-point Likert scale (anchored at (1) = strongly disagree and (7) = strongly agree) to express their level of agreement with the statements that served as indicators for these two latent variables. Perceptual congruence of CEO and CIO opinions was measured by asking both dyad members to rate their own level of agreement with statements about different business and IT topics as well as the perceived opinion of the other person to those same topics. All statements were to be rated on a



seven-point Likert scale. The perception part followed in its fundamentals the techniques developed by Laing et al.'s (1966) interpersonal perception method. We covered a broad range of business and IT topics in order to tap into a variety of areas of potential agreement or disagreement between a company's chief executive and the head of IT. Exemplary statements were »*In the future, compared to now, we need to gain market share, even if this means sacrificing short-term profitability*« (Business topic area) and »*The implementations of our IT governance principles are effective*« (IT topic area).

The four responses per dyad were then compared interpersonally and intrapersonally to derive the three perceptual congruence facets (see Figure 1). Rather than using the absolute difference of two response scores, we followed the approach suggested by Acitelli et al. (1993). The applied numerical congruence scoring technique (see Table 9 in the Appendix) translated two seven-point Likert scale ratings to a congruence score between one and ten, assigning relatively lower congruence scores when two responses are in opposite sides of the answer spectrum and relatively higher congruence scores when both responses fall in the same side of the spectrum. According to this principle, answer scores of five (mildly agree) and seven (strongly agree), for example, are less incongruent than answer scores of three (mildly disagree) and five (mildly agree), although both pairs of scores are exactly two points apart. Consistent with previous CEO-CIO studies (Byrd 2006), the perceptual congruence scores of each topic block (e.g., strategic orientation, IT outsourcing) were first reflectively aggregated to the area they belonged to (i.e., business and IT topics), which were then rolled up to composite scores (covering both business and IT topics).

Non-response bias was assessed by verifying that early and late respondents were not significantly different in their characteristics (Armstrong and Overton 1977). We compared both the CEO and the CIO sample based on their socio-demographic attributes and responses to the principal constructs in the study. T-tests for differences in the means of early (first 50) and late (last 50) respondents showed no significant differences ( $p > 0.05$ ). Following extant guidelines in the literature (Sivo et al. 2006), we also drew on the Hoppenstedt firm database to compare the distributions of demographic and socio-economic characteristics (i.e., company size, annual revenue, and industry) of non-respondents with the distributions we found in our sample. The results showed the demographic and socio-economic variables of the firms had a similar distribution in the sample of non-respondents as those in our research sample ( $p > 0.05$  for distributions on company size, annual revenue, and industry, respectively). Overall, these findings indicate that a result bias due to non-responses is unlikely in this study. We also

checked the response order in the dyads (i.e., whether we received the CEO's or CIO's response first), but we did not find any significant impact of response order on the results in our study.

Furthermore, we included several control variables (e.g., company size and industry affiliation) but the patterns of results remained qualitatively unchanged. Such being the case, we will neglect the controls when reporting our statistical results in subsequent sections.

### 2.3.3 Measurement Model Tests and Common Method Bias

We assessed construct reliability and validity for the constructs linked in the APIM-based research model. Table 4 exhibits reliability and validity statistics as well as interconstruct correlations.

We assessed the psychometric properties of the measurement model results by examining internal consistency, convergent validity, and discriminant validity. The loadings of the measurement items on their respective latent variables were above the threshold value of 0.7 and all were significant ( $p < 0.05$ ). Furthermore, measurement items did not have cross loadings above 0.4 on the unintended constructs and the square roots of AVE were consistently larger than relevant interconstruct correlation coefficients, suggesting discriminant validity (Hair et al. 2009).<sup>5</sup> Internal consistency ( $\rho_c$ ) of all reflective constructs clearly exceeded the threshold of 0.70, implying acceptable reliability (Fornell and Larcker 1981). Convergent validity is considered adequate when the average variance extracted (AVE) is 0.50 or more; this condition was satisfied in all cases.

**Table 4.** Reliability Statistics, Validity Statistics, and Interconstruct Correlations (APIM Constructs)

Construct	$\rho_c$	AVE	Range of Loadings	(1)	(2)	(3)	(4)	(5)	(6)
(1) CEO's understanding of CIO	0.769	0.625	0.69 – 0.90	<b>0.79</b>					
(2) CIO's understanding of CEO	0.795	0.660	0.72 – 0.91	0.66	<b>0.81</b>				
(3) Quality of Collaboration indicated by CEO	0.954	0.840	0.90 – 0.93	0.14	0.20	<b>0.92</b>			
(4) Quality of Collaboration indicated by CIO	0.964	0.870	0.92 – 0.94	0.13	0.20	0.84	<b>0.93</b>		
(5) IT Contribution indicated by CEO	0.963	0.839	0.90 – 0.93	0.14	0.26	0.88	0.77	<b>0.92</b>	
(6) IT Contribution indicated by CIO	0.966	0.851	0.91 – 0.93	0.17	0.19	0.77	0.89	0.77	<b>0.92</b>

Notes: Diagonal elements are the square root of AVE. All factor loadings are significant at least at the  $p < 0.05$  level.

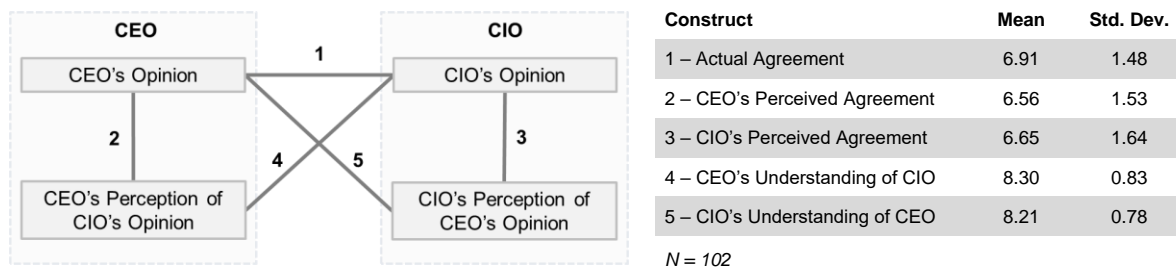
<sup>5</sup> The results of an exploratory, principal components factor analysis are omitted here for brevity. They can be obtained from the authors upon request.

Given that all of our items were measured with the same method, we tested for common method variance using Harman's one factor test (Podsakoff et al. 2003). We performed an exploratory factor analysis on all the variables, but no single factor was observed and no single factor accounted for a majority of the covariance in the variables. Further, a correlational marker technique was used, in which the highest variable from the factor analysis was entered as an additional independent variable (Richardson et al. 2009). This variable did not create a significant change in the variance explained in the dependent variables. Both tests suggest that common-method bias is unlikely to have significantly affected our results.

## 2.4 Results

### 2.4.1 Hypothesis Tests Related to the Perceptual Congruence Model

Hypotheses H1 and H2 were examined by pairwise comparisons between means. Paired one-tailed t-tests allowed the evaluation of differences in the means between perceptual congruence constructs and typically yield acceptable results for the purpose of comparing constructs in a perceptual congruence model (e.g., Acitelli 1993; White 1985). Figure 3 shows sample means and standard deviations of all five dyadic perceptual congruence constructs.

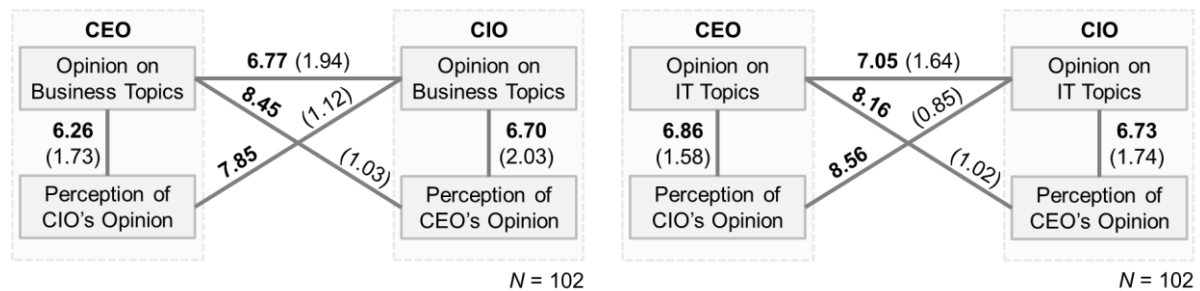


**Figure 3.** Perceptual Congruence Scores (Means and Standard Deviations)

The t-test results for hypothesis H1 presented the first unexpected finding in our study. Not only did the data not support our hypothesis of perceived agreement transcending actual agreement ( $p > 0.05$ ); there was even evidence of the inverse of hypothesis H1. Between CEO and CIO responses, actual agreement was significantly greater than perceived agreement in our sample. This was the case for the CEO's perceived agreement compared to actual agreement (means of 6.56 and 6.91;  $p < 0.001$ ) as well as for the CIO's perceived agreement compared to actual agreement (means of 6.65 and 6.91;  $p < 0.01$ ). Unlike in marital relationships, there was no evidence whatsoever for the "*false consensus effect*" (Ross et al. 1977). Quite the contrary:

the opinions of CEOs and CIOs in our sample were more similar than both perceived them to be.

To test hypothesis H2, we compared the level of understanding of one another that CEO and CIO each possess. The results showed an insignificant difference between the means of the CEO's understanding of the CIO and the CIO's understanding of the CEO on the composite level (means of 8.30 and 8.21;  $p > 0.05$ ). Therefore, hypothesis H2 was not supported.

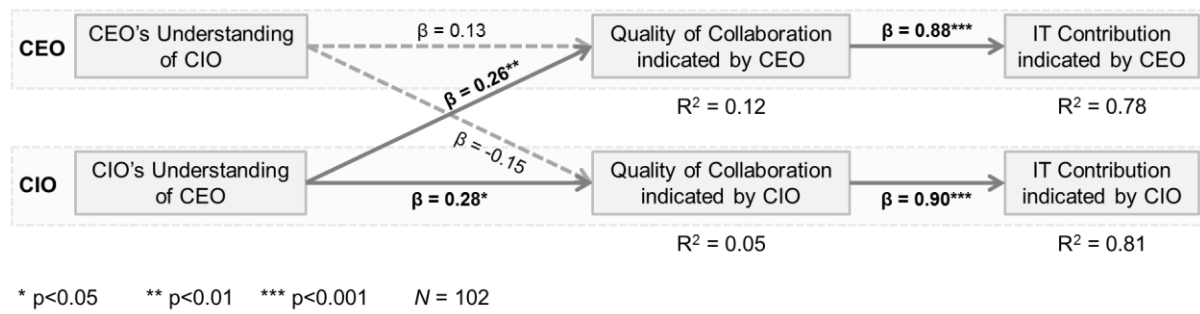


**Figure 4.** Scores of CEO-CIO Perceptual Congruence for Business and IT Topics

However, separate t-tests for the two topic areas' understanding scores showed statistically significant differences (see Figure 4). In our sample, the CIOs were better able to predict their CEO's responses to statements on business topics than the CEOs were able to predict their CIO's responses to the same (means of 8.45 and 7.85;  $p < 0.001$ ). For IT topics, the inverse case was significant: CEOs understood their CIO better than CIOs understood their CEO (means of 8.56 and 8.16;  $p < 0.001$ ). Accordingly, CEOs had a greater level of understanding of their CIO on IT topics than on business topics (means of 8.56 and 7.85;  $p < 0.001$ ) and CIOs had a greater level of understanding of their CEO on business topics compared to IT topics (means of 8.45 and 8.16;  $p < 0.001$ ). These post hoc findings are picked up later in the discussion part of this paper.

## 2.4.2 Hypothesis Tests Related to the APIM-based Model

In our APIM-based model, we hypothesized differences in the strengths of actor effects and partner effects that connect mutual understanding of CEO and CIO with their individually perceived quality of collaboration. We used SmartPLS 2.0 (Ringle et al. 2005), a structural equation modeling (SEM) tool, to test the APIM-based model, which is strongly recommended when dyads are distinguishable (Kenny et al. 2006).



**Figure 5.** PLS Results on APIM-based Research Model

The SEM-based estimation of the effects exhibited results that supported our hypotheses. The effects we hypothesized as stronger were significant, while the effects hypothesized as weaker were not significant (see Figure 5). Thus, hypotheses H3a and H3b were supported. Chi-squared tests to compare the size of two parameters within the APIM (Cook and Kenny 2005), confirmed the significance of the differences between the magnitudes of actor and partner effects as hypothesized ( $\chi^2_{\text{CEO}} (N = 102, df = 1) = 4.93, p < 0.05$ ;  $\chi^2_{\text{CIO}} (N = 102, df = 1) = 5.34, p < 0.05$ ).

The CEO's perceived quality of collaboration was significantly affected only by how well he or she was understood by the CIO (partner effect,  $\beta = 0.26, p < 0.01$ ) and the CIO's perceived quality of collaboration was significantly affected only by how well he or she understood the CEO (actor effect,  $\beta = 0.28, p < 0.05$ ). In other words, the satisfaction of the CEOs in our sample was dependent upon them being understood (passive form of understanding), while the CIOs were more satisfied with the cooperation when they better understand (active form of understanding) the views of the CEO. Our empirical study thus showed that the CIO's understanding of the CEO is the pivotal factor in improving and strengthening collaboration quality between CEOs and CIOs (as perceived by both parties).

Hypothesis H3c was supported by the survey data as well. Partial least squares analysis of a slightly modified version of the APIM-based model (where quality of collaboration was aggregated to one composite construct) confirmed the significance of the CIO's understanding of the CEO ( $\beta = 0.28, p < 0.01$ ) and the insignificance of the CEO's understanding of the CIO ( $\beta = -0.15, p > 0.05$ ) in predicting a dyad's aggregated quality of collaboration.

Finally, the PLS results for the structural model also provided support for hypotheses H4a and H4b (see Figure 5). CEOs and CIOs who were more satisfied with the collaboration stated significantly higher levels of IT contribution to the business in their organizations ( $\beta_{\text{CEO}} = 0.88$ ,

$\beta_{CIO} = 0.90$ , both  $p < 0.001$ ). This was an integral assumption to make the case for the relevance of the social dimension of business-IT alignment.

## 2.5 Discussion

### 2.5.1 Synopsis of Key Findings

The findings from our empirical investigation raise several key points. First, our empirical study examined perceptual congruence between business and IT leaders, which constitutes a crucial socio-psychological aspect of strategic business-IT alignment. Contrary to our hypothesis, the sampled CEOs' and CIOs' opinions were actually more similar than both perceived them to be. This observation is not in line with marital relationship research where partners typically tend to succumb to the "*false consensus effect*" (Ross et al. 1977). We see this as an indicator of a high level of professionalism in the CEO-CIO partnership. Both executives do not shy away from conceptually confronting conflicts of opinions, so much so that more disagreement is perceived than actually existent. This extreme, on the other hand, is not describing a healthy relationship either. Individuals who perceive significantly more disagreement than existent are most likely biased by negative prejudices and experience a lack of effective communication of each other's viewpoints.

Second, we focused on how well CEOs and CIOs in our sample were able to accurately predict (i.e., understand) one another's opinions on relevant business and IT topics and we related their level of understanding to the quality of the two executives' professional collaboration in an APIM-based model. We found that the CIO's understanding of the CEO plays a more important role in the CEO-CIO partnership than the CEO's understanding of the CIO. CEOs want to be understood while CIOs need to understand their counterpart. We explain these desires with a power differential in their roles by virtue of the organizational hierarchy. It is more important for the less powerful to understand the more powerful partner in order to maximize the satisfaction of both and bring about fruitful collaboration. As expected, quality of collaboration had a strongly significant impact on the extent of IT contribution to the business indicated by both executives.

Third, despite the disparity in importance, we found both executive groups in our sample were able to accurately predict their counterpart's viewpoint on the composite level. When split by topic groups, however, we discovered significant differences post hoc. On IT topics, the CEOs

were better able to correctly perceive their CIO's opinions, whereas on business topics, the CIOs were better able to predict their CEO's responses. We explain this finding with mutual recognition of subject matter expertise, supporting Chan (2002), and a slight negligence of the other individual's opinion on topics of one's own respective domain. Hence, business leaders tend to listen to their CIO's judgment of IT-related problems more than to the CIO's opinion on business strategy (if he or she is asked at all to state an opinion). CIOs, on the other hand, pay closer attention to their CEO's business direction than to the CEO's opinion on IT-related questions. This is certainly a quite pragmatic speculation for the observed divergence of attention that needs to be verified in future research studies.

## **2.5.2 Contributions to Theory, Research, and Practice**

This study makes several contributions related to social business-IT alignment and interpersonal relations research. First, although previous social alignment research has advanced our knowledge of 'mutual understanding' between business and IT executives (e.g., Johnson and Lederer 2010; Reich and Benbasat 2000), prior work has largely focused on unitary concepts (e.g., "shared understanding" or "shared knowledge") – which have been primarily measured based on the actual similarity of executives' own perceptions – or just on one single direction of understanding such as "IT's understanding of business" (Wagner et al. 2014; Feeny et al. 1992). Responding to strategic alignment scholars' recognition of the importance of a more nuanced investigation of social alignment in general and 'mutual understanding' in particular (Coltman et al. 2015; Preston and Karahanna 2009b), our study departs from and goes beyond an aggregated and undifferentiated view on CEO-CIO mutual understanding. Specifically, drawing on White's (1985) perceptual congruence model, we propose a multifaceted perspective on the congruence of CEO-CIO perceptions by theoretically and empirically distinguishing between actual similarity of perceptions (i.e., actual agreement), intrapersonal perception of agreement (i.e., perceived agreement), and the interpersonal ability to accurately predict one another's perceptions (i.e., understanding). In particular, the executives' ability of taking their counterpart's perspective is a crucial dimension in grasping the directionality and agency of understanding (i.e., "who understands whom"), yet has so far been largely overlooked as a vital factor in social alignment research. Thus, the PCM introduces a novel perspective on CEO-CIO perceptual congruence in its different facets, which particularly helps us examine the nature of CEO-CIO mutual understanding at a deeper level.

Second, our finding that the importance of the CIO's understanding of the CEO outweighs the importance of the CEO's understanding of the CIO in affecting collaboration quality – and thus that the effects of understanding are unilateral rather than bilateral – is a valuable and useful insight that confirms previous business-IT alignment research (e.g., Armstrong and Sambamurthy 1999; Feeny et al. 1992; Wagner et al. 2014). By revealing the disaggregated effects and thus the disparate importance of the two directions of CEO-CIO understanding, our study not only highlights the relevance of a more fine-grained view on the bidirectionality of understanding and the usefulness of the decompositional nature of Kenny's (1996) actor-partner interdependence model. Our findings also suggest that studies framing social alignment's antecedents solely as "mutual" or "shared understanding" between CEOs and CIOs without considering the two directions of interpersonal understanding will likely leave the salient role of the CIO's understanding of the CEO unconsidered. Yet, although we found empirical evidence for the salient role of the CIO's understanding of the CEO in this study, our post-hoc finding on differences in understanding by topic group shows that we cannot ignore the other direction either. Had we only considered the CIO's understanding of the CEO, the disparate importance of an active and passive role of understanding and the finding that bilateral understanding varies by subject would have been overlooked. In the same vein, we cannot rule out that the CEO's understanding of the CIO has significant effects on constructs other than CEO-CIO collaboration quality. As such, we conclude that mutuality indeed matters and both directions of CEO-CIO understanding should be considered in future research studies.

Third, and more broadly, we make a theoretical contribution to interpersonal relations research by linking dual theories of intra-/interpersonal perceptual congruence and interdependence (i.e., the PCM and the APIM) as a way to garner a more comprehensive understanding of the bilateral nature of CEO-CIO understanding and its effects on partnership quality. Although the PCM and the APIM have been applied in isolation from one another in previous social and personal relationship research, including organizational contexts (e.g., Bakker and Xanthopoulou 2009; Yakovleva et al. 2010), our study shows that linking both models can yield even deeper insights into the nature of perceptual congruence and the effects of bilateral understanding on collaboration quality. While the PCM allows examining perceptual congruence from various angles (e.g., by comparing perceived and actual agreement or the prediction accuracies of one another's perceptions) and thus serves as useful source to *capture both directions of understanding* (being a crucial input to APIM), we deploy the APIM to focus



on comparing the bidirectional effects of understanding and hence provide an important rationale for the *raison d'être* of the distinctions made in the PCM.

There are also several practical implications for the partnership between business and IT leaders that can be inferred from the results of our study. First, we want to elaborate more on the unusual difference between perceived agreement and actual agreement we found in our sample. If, as found, CEOs and CIOs perceive each other's opinions significantly less similar than they actually are, this is an indication for the existence of negative prejudices and room for improvement when it comes to communication. We know from our pretest interviews and ongoing dialogues with practitioners that tensions between the business side and the IT side of an organization exist more often than not and perceptions of the players involved are a matter of importance. The mitigation or even removal of incorrectly perceived disagreement can act as an effective tool to improve poor business-IT relationships and ultimately lead to better alignment. Both business and IT executives should make sure their take on controversial topics are effectively communicated, especially when their relationship is troubled. Perceptions can only be accurate when topics are openly discussed and both agreement and disagreement are candidly communicated. Mid to long term, CIOs might be able to reduce or fully remove negative prejudices by demonstrating their high level of business understanding and proactively guiding business strategy, particularly by bringing in their perspective on emerging technology trends, IT-driven innovation, and digital transformation (Hess et al. 2016). Peppard et al. (2011) offer further recommendations on how to reduce prejudices (e.g., through more objective performance assessments or clear expectation management), especially as they stem from ambiguity of the CIO role due to differing perceptions among executives.

Second, other studies frequently call for efforts to extend the CIO's level of business knowledge (e.g., Chan et al. 2006; Hussin et al. 2002). Our results clearly indicate that the CIOs' understanding of their Chief Executive Officer plays an important role for the productiveness of their partnership. Thus, the CIO's ability to communicate in business terms and comprehend the firm's business models is indeed imperative. At the same time, our data do not provide evidence of a prevalent lack of the CIOs' ability to accurately perceive their CEO's views on business topics.

Finally, authors often call for CIO-orchestrated educational efforts that are meant to increase business executives' knowledge about IT (e.g., Preston and Karahanna 2009b). Our findings do not necessarily lead to this conclusion. We found a comparably high level of understanding

that CEOs have of their CIO's perspective on IT topics and we could show that the CEOs' understanding of their CIO plays a non-significant role for the fruitfulness of their partnership. Our advice to practitioners is that educating IT leaders on business yields more success in terms of strategic business-IT alignment than teaching CEOs about IT. CEOs expect their CIOs to understand them (and their business) and guide them in making IT-related decisions. CIOs can successfully accomplish becoming a CEO's trusted advisor on IT questions by building this trust through a foundation of competence and credibility, which does not come from educating CEOs on IT but from demonstrating a thorough understanding of ongoing business and industry developments. CEOs, on the other hand, should not underestimate their CIO's know-how in business. We were able to show that CEOs and CIOs in our sample actually stated significantly more similar views on the course of the business than perceived by CEOs.

### **2.5.3 Limitations, Future Research, and Conclusion**

Our study is not without limitations, which also provide directions for future research. We obtained our data from an online CEO-CIO survey that allowed participants to skip questions. In order to work with the data, we had to eliminate a substantial segment of our sample because of incomplete dyadic data or low data quality. Although this procedure is common practice, it is possible, on the one hand, that our sample is subject to a bias from filtering out the data of incomplete dyads and response pairs of insufficient data quality; on the other hand, a smaller sample size tends to impact the results' statistical significance negatively. Altogether, the resulting sample size of 102 dyads is typical for research involving CEOs and CIOs (e.g., Kearns and Lederer 2000; Tan and Gallupe 2006) or CIOs and top management teams (e.g., Preston and Karahanna 2009b). With respect to our results, we suggest that future research should continue to empirically test the propositions developed in this paper. It would be particularly interesting to find out if future studies can replicate the phenomena that appeared in our study, such as actual agreement transcending perceived agreement and the CIO's understanding of the CEO dominating over the CEO's understanding of the CIO in explaining the quality of CEO-CIO collaboration. Likewise, future research should try to locate specific areas where disagreement is likely to occur (e.g., investment decisions, budget allocation, IT governance, or the role and responsibilities of IT) and investigate potential perception biases due to stereotypes.

The survey-based data collection for our study happened at a single point in time from executives in a distinct geographic area (Germany). Different conclusions might have resulted

from a longitudinal perspective, had we collected data at multiple points in time. As such, future research may benefit from statistical analysis of longitudinal data to analyze the change in perceptual congruence and interdependence between CEOs and CIOs (Cook and Kenny 2005). Furthermore, a potential geographic bias caused, for example, by economic conditions or regional attitudes could have been alleviated, had we included companies in other geographic areas. As for future research, launching a CEO-CIO survey that measures interpersonal and intrapersonal perceptions in countries other than Germany would certainly be of value in order to improve the generalizability of our findings.

Resulting in a third limitation, the fear of negative consequences from rating the CEO-CIO partnership quality poorly while being easily identifiable in the survey sample might have led to positively biased CIO responses to the quality of collaboration items in the survey. This concern was indicated by one of the CIO pretest participants. Nevertheless, we compared CEO and CIO responses to the collaboration quality items and found no evidence for different rating behaviors of CIOs as compared to CEOs ( $p > 0.05$ ). Both groups used the full spectrum of the seven-point scale. However, the representativeness of our sample in terms of collaboration quality remains an assumption. A potential bias due to non-responses from CEO-CIO dyads with poor partnership quality cannot be ruled out completely. Although we have no immediate concern, future research could mitigate this potential bias by obtaining collaboration quality measures from a neutral third party's perspective (e.g., a third executive or human resource manager).

In general, future research should explore the concept of perceptual congruence (i.e., of understanding in particular) between business and IT executives more fully. We revealed disparate importance of the two directions of understanding for CEO-CIO collaboration quality. Still, we did not pursue the identification of any mediating factors or factors antecedent to understanding. It remains to be studied what generally enables and inhibits the executives' ability to take the counterpart's viewpoint and what underlying mediating mechanisms might be of importance. Furthermore, it remains to be examined what causes the uncommon divergence between actual and perceived agreement in the CEO-CIO partnership. Our theoretical explanation of this unexpected finding might seem plausible but is empirically unverified. Continued research in this area becomes increasingly important as the CIO's responsibilities are expected to grow in an increasingly digital economy (Weill and Woerner 2013b) and closer (personal) partnerships between CEOs and CIOs are consequential.

In conclusion, we hope that our results provide impetus for further analysis of the social dimension of strategic business-IT alignment and give food for thought to communities in practice. Notwithstanding the CEOs' biased interest in consultation on information technology, CIOs can grow their role as strategic IT advisors and become trusted partners of their business counterparts while developing a relationship that allows businesses to gain an IT-enabled competitive edge through strategic alignment.

## 2.6 Appendix

**Table 5.** Empirical Literature on the Social Dimension of Business-IT Alignment Related to This Study\*

Reference	Study design and context	Key social alignment construct(s)	Operationalization of construct(s)	Key antecedent(s) of construct(s)	Key consequent(s) of construct(s)	Principal findings / Major contributions
Turban and Jones 1988	Survey of N = 155 subordinates and their 25 supervisors at a rehabilitation center in the southwestern U.S.	Perceptual congruence (i.e., similarity of perceptions) between supervisors and subordinates	(Reversed) sum of squared differences between supervisor and subordinate responses to the same set of questions about behaviors important in receiving a high merit pay increase	N/A	Subordinate's job satisfaction; performance rating of subordinate; pay rating of subordinate	Identification of three types of supervisor-subordinate similarity: perceived similarity, perceptual congruence, and actual similarity; all three similarity types found to affect supervisor's evaluations of subordinates
Lind and Zmud 1991	Survey of IS and business personnel at N = 48 departments of two U.S. divisions of a large multinational firm over five time periods	Convergence (i.e., mutual understanding) between technology providers and business personnel about the firm's business activities and the importance of the technology in supporting those activities	(Reversed) aggregated differences between the mean responses of IS providers and those of business users to the same sets of questions about 14 business activities and their utilization of IT	Communication frequency; communication channel richness	IT innovativeness	Determination of convergence as a predictor of IT innovativeness; communication frequency and communication channel richness found to predict convergence

Feeny et al. 1992	Semi-structured interviews with N = 14 CEO-CIO pairs of U.K.-based organizations across industries	Shared understanding; particularly the CIO's understanding of the CEO with respect to IT topics	Congruence of executives' responses or level of agreement on the same questions; CIO's ability to correctly perceive CEO's view on IT	Executives' personal profiles (career background, experiences, attitude, position, team role, etc.)	N/A	Identification of favorable CEO and CIO attributes as well as contributing organizational attributes that yield successful business-IS partnerships
Boynton et al. 1994	Survey of N = 132 senior IT executives at firms across industries	Managerial IT knowledge	Multiplication of senior IT executive's assessment of both IT management's knowledge of the business unit and line management's knowledge of the value and potential of IT	IT management climate	IT use	Application of absorptive capacity theory to the domain of IT use; managerial IT knowledge found to be a dominant factor in explaining high levels of IT use

Lederer and Prasad 1995	Survey of IS development project estimators and project implementers at N = 112 organizations across industries	Perceptual congruence about cost estimating between estimators and implementers	Mean differences between estimators' and implementers' ratings of the same set of statements related to cost estimating	N/A	N/A	Contrasting of estimators' and implementers' perceptions on the estimating process and its success; perceptions found to coincide on how estimating is done; perceptions on the importance of the estimate, the satisfaction with the estimating process, the estimating accuracy, and the causes of inaccurate estimates found to differ
Nelson and Coopridge 1996	Survey of N = 86 IS departments and their line customers in seven firms of different industries	Shared knowledge (i.e., shared understanding and appreciation among IS and line managers for the technologies and processes that affect their mutual performance)	Mean of IS department's response and line organization's response on the same questions about the level of shared understanding and appreciation	Mutual trust; mutual influence	IS performance	Deeper investigation of the nature and importance of shared knowledge as an organizational performance factor; the relationship between IS performance and mutual trust and influence found to be mediated by shared knowledge

Reich and Benbasat 1996	N = 57 semi-structured interviews with 45 business and IS executives from 10 business units within three large Canadian life insurance companies; assessment of written plans	Mutual understanding of business and IT missions, objectives, and plans (predictive of “short-term linkage”); shared vision for IT (predictive of “long-term linkage”)	Average of IS executive’s understanding of business objectives/plans and business executive’s understanding of IT objectives/plans (scored by authors as an assessment of congruence between interviewee’s view and counterpart’s view as well as written plans)	N/A	Linkage (i.e., level of alignment)	Distinction between the social and the intellectual dimension of alignment; validation of “understanding of current objectives” and “congruence of IT visions” to be predictive of business-IT alignment; distinction between short-term and long-term aspects of alignment
Armstrong and Sambamurthy 1999	Survey of N = 235 pairs of CIOs and top management team members of medium to large U.S. firms from eight industries	Senior leadership knowledge (CIO IT knowledge, CIO business knowledge, TMT IT knowledge)	CIO’s assessment of TMT member’s IT knowledge and TMT member’s assessment of CIO’s business and IT knowledge	Systems of knowing; strategic IT vision	IT assimilation (i.e., successful utilization of IT capabilities)	Examination of the influence of the antecedents of IT assimilation; CIOs’ business and IT knowledge found to significantly influence their firms’ IT assimilation whereas senior business executives’ IT knowledge was not found to have a significant influence on IT assimilation



Luftman et al. 1999	Survey of N = 1,051 business and IT executives representing over 500 U.S. Fortune 1,000 organizations over a timespan of five years	“IT understands business” as one of 14 alignment enablers; “IT does not understand business” as one of 14 alignment inhibitors	Business and IT executives’ (separate) identification of the three key enablers and inhibitors to achieving alignment; responses gathered via an open-ended questionnaire	N/A	Level of alignment	Identification of enablers and inhibitors of business-IT alignment from the perspective of business executives versus IT executives
Reich and Benbasat 2000	N = 57 semi-structured interviews with 45 business and IS executives from 10 business units within three large Canadian life insurance companies; assessment of written plans	Mutual understanding of business and IT missions, objectives, and plans (short-term alignment); shared vision for IT (long-term alignment)	Average of IS executive’s understanding of business objectives/plans and business executive’s understanding of IT objectives/plans (scored by authors as an assessment of congruence between interviewee’s view and counterpart’s view as well as written plans)	Shared domain knowledge; communication between business and IT executives	N/A	Deeper investigation of the social dimension of short-term and long-term linkage; shared domain knowledge and increased communication between business and IT executives found to lead to short-term strategic alignment; only shared domain knowledge found to lead to long-term alignment

Johnson and Lederer 2005	Survey of N = 202 CEO-CIO pairs of firms across industries in two adjacent states of the U.S.	CEO-CIO convergence (i.e., the degree of mutual understanding) about the current and future role of IT (split into: differentiation future role, enhancement future role, managerial support future role)	Latent variable of the absolute differences between CEO and CIO responses for each item of the same set of questions	Communication frequency; communication channel richness	Financial contribution of IS	Application of communication theory to the CEO-CIO relationship; more frequent communication found to predict convergence about the current role, differentiation future role, and enhancement future role; use of richer channels found to predict convergence about the differentiation future role; convergence about the current role found to predict IS financial contribution
Huisman and Iivari 2006	Survey of N <sub>1</sub> = 223 system developers and N <sub>2</sub> = 73 IS managers of firms across industries in South Africa	Perceptual congruence between IS managers and IS developers	(Reversed) difference between the responses of IS developers and those of IS manager to the same sets of questions about the deployment of systems development methodologies	N/A	N/A	Evidence of existence of differences in perceptions between IS managers and developers; managers found to perceive methodology impact on productivity and quality as more important than do developers, whereas system developers perceive support for verification and validation as more important than do managers

Li et al. 2006	Survey of N = 49 organizations across industries in China	Common understanding (as part of the alignment construct)	First order construct of the informant's rating of top management's IT/IS knowledge and the informant's rating of IT-IS professionals' knowledge of business	N/A	Degree of IS strategic planning success	Investigation of the effect of organization information management environment maturity and alignment on IS strategic planning success; both factors found to positively impact IS strategic planning success
Tan and Gallupe 2006	Interviews with N = 80 business and IS executives of six companies in the financial services and health services industry in New Zealand	Shared cognition (i.e., commonalities (similarities) and individualities (differences) in the executives' cognitive maps)	Average "Weirdness index" of business and IS executive's rating and sorting of 15 factors influencing alignment (modified "Repertory Grid Technique")	N/A	Level of alignment	Examination of the cognitive basis of shared understanding; cognitive commonalities between business and IS executives found to be positively related to a higher level of alignment

Stoel 2006	Survey of N = 75 matched pairs of manufacturing informants and IS managers in large manufacturing companies	Shared Knowledge (split into: operational knowledge and strategic knowledge)	Second order construct of manufacturing's knowledge/understanding of IS (as perceived by manufacturing informant) and IS' knowledge/understanding of manufacturing (as perceived by IS manager)	Mutual trust; information dependence; clear corporate strategy; executive support for IS; organizational learning culture; formal IS-business interface; overlapping knowledge; joint IS management	Business process performance; IS process performance	Conceptualization of shared knowledge at the operational and the strategic level; factors that foster the development of shared knowledge found to differ across the two levels
Preston and Karahanna 2009b	Survey of N = 243 matched pairs of CIOs and top management team members of firms across industries	Shared understanding about the role of IS	Average of CIO's and top management team member's response to questions on the degree to which CIO and TMT members have a shared view and understanding about the role of IS within the organization	Shared language; shared domain knowledge; systems of knowing; relational similarities	IS strategic alignment	Development of a nomological network of various explanatory factors that predict shared understanding about the role of IT, which represents the social dimension of IS strategic alignment; social systems of knowing and experiential similarity found to not have a significant effect on shared understanding

Preston and Karahanna 2009a	Survey of N = 243 matched pairs of CIOs and top management team members of firms across industries	Shared IT vision between the CIO and the top management team	Not stated explicitly; most likely measured as the average of CIO's and top management team member's response to questions on the degree to which CIO and TMT members have a shared IT vision	Six distinct visioning mechanisms (Shared business language, visioning network hierarchy, CIO educational leadership, CIO-TMT commonalities, CIO strategic knowledge, CIO relational capital)	IS strategic alignment	Identification of five distinct configurations of visioning mechanisms that enable or inhibit shared vision between CIOs and top management team members, which predicts IS strategic alignment
Johnson and Lederer 2010	Survey of N = 202 CEO-CIO pairs of firms across industries in two adjacent states of the U.S.	Mutual understanding about the role of IT	Latent variable of the absolute differences between CEO and CIO responses for each item of the same set of questions	N/A	Eight alignment dimensions (aggressiveness, analysis, internal defensiveness, external defensiveness, futurity, proactiveness, riskiness, innovativeness)	Mutual understanding between CEOs and CIOs about the role of IT found to impact seven out of eight alignment dimensions, whereof six out of eight dimensions predict IS contribution to the organization

Johnson and Lederer 2013	Survey of N = 202 CEO-CIO pairs of firms across industries in two adjacent states of the U.S.	Agreement on the contribution of IS to the organization	Comparison of means between the CEO's and the CIO's responses to the same set of questions on IS contribution	Eight distinct IS strategies (Aggressiveness, analysis, internal defensiveness, external defensiveness, futurity, proactiveness, riskiness, Innovativeness)	N/A	CEOs and CIOs found to agree on the contribution of IS but disagree on how IS strategy produces that contribution; CEOs found to view analysis and proactiveness strategies as the two top keys, whereas CIOs view innovativeness and aggressiveness strategies at the top
Karahanna and Preston 2013	Survey of N = 81 pairs of CIOs and top management team members of U.S. hospitals	CIO-TMT cognitive social capital (consisting of shared cognition and shared language)	Average of CIO's and top management team member's response to questions on the degree to which CIO and TMT members share a common language and have a shared understanding about the role of IS within the organization	CIO-TMT structural social capital	CIO-TMT relational social capital; IS strategic alignment; firm's financial performance	Identification of three dimensions of social capital (structural, cognitive, and relational) as antecedents of IS alignment; cognitive and relational social capital found to directly influence IS strategic alignment but structural social capital found to exert its influence through its effects on cognitive social capital

Tallon 2014	Survey of N = 133 top-level business executives in 13 U.S.-based Fortune 500 firms across eight industries	Consensus among different business executives on the scale and locus of IT impacts	“Interrater reliability score” of executives’ perceptions of IT impacts on firm profit and value chain	CIO leadership; IT promotion; IS engagement; IS-business communications	N/A	Application of distributed sensemaking theory; consensus among different business executives as to the business value of IT found to be a function of the CIO’s sensegiving activities that create an awareness or knowledge of IT
Wagner et al. 2014	Survey of N = 136 mid-level managers of credit departments at German banks	Business understanding of IT (i.e., business domain knowledge of IT employees)	Business informant’s assessment of IT employees’ business domain knowledge	Social capital (along the three dimensions: cognitive linkage, structural linkage, relational linkage)	IT utilization; IT flexibility	Application of social capital theory on the level of operational alignment; clarification that social capital is an enabler of business understanding of IT, with the cognitive dimension exerting the strongest influence

\* Construct names in this table as per the references; not necessarily in line with the terminology used in this article (see Table 2).

**Table 6.** Descriptive Survey Sample Characteristics

Personal Characteristics	CEOs	CIOs	Company Characteristics	
Gender	86% Male	96% Male	Annual Revenue in Million Euros	
Age (SD)	50.8 (4.1)	46.9 (4.8)	<10	1%
Highest Level of Education			10-49	28%
Less than 4-year Degree	2%	1%	50-99	20%
4-year Degree	4%	7%	100-499	38%
Graduate or Prof. Degree	50%	70%	500-999	10%
Doctorate Degree	41%	17%	≥1000	3%
Experience			Total Assets in Million Euros	
Years in Industry (SD)	27.5 (4.8)	23.0 (5.1)	<10	10%
Years in Firm (SD)	18.9 (5.2)	16.2 (4.9)	10-49	30%
Years in Position (SD)	5.7 (3.7)	4.1 (3.1)	50-99	23%
Years in IT (SD)	1.8 (4.5)	14.0 (3.4)	100-499	30%
CIO Reporting Level			500-999	4%
Direct Report	n/a	45%	≥1000	3%
Two Levels below CEO	n/a	45%	Number of Employees	
Three Levels below CEO	n/a	11%	<100	2%
CIO Title			100-499	36%
CIO	n/a	58%	500-999	27%
VP of IT	n/a	26%	1,000-4,999	31%
IT Director	n/a	14%	5,000-9,999	3%
Executive IT Officer	n/a	2%	≥10,000	1%



**Table 7.** Survey Items on Business Topics Assessed by CEOs and CIOs

Constructs and items (Sources)	CEO		CIO	
	Own response	CEO's perception of CIO	Own response	CIO's perception of CEO
Strategic orientation (Gatignon 1997; Venkatraman 1989)	In the future, compared to now, we need to ...			
... adopt innovations earlier	5.55 (0.97)*	3.59 (1.21)	3.81 (1.48)	5.58 (1.14)
... be more on the lookout for businesses to acquire	5.71 (1.13)	3.60 (1.39)	3.76 (1.42)	5.64 (1.18)
... focus more on divesting selected operations	5.54 (1.05)	3.60 (1.31)	3.75 (1.39)	5.70 (1.09)
... develop better understanding of our industry and competitors	5.65 (0.98)	3.47 (1.32)	3.85 (1.51)	5.63 (1.17)
Market Aggressiveness (Venkatraman 1989; Byrd et al. 2006)	In the future, compared to now, we need to ...			
... become better at securing our present market position	5.68 (1.00)	3.47 (1.38)	3.90 (1.50)	5.73 (1.13)
... become faster at introducing new products and services	5.54 (1.01)	3.53 (1.37)	3.72 (1.60)	5.55 (1.10)
... gain market share, even if sacrificing short-term profitability	5.59 (1.06)	3.57 (1.3")	3.87 (1.50)	5.67 (1.14)
... become faster at increasing our capacity	5.68 (1.06)	3.45 (1.49)	3.95 (1.55)	5.77 (1.12)
Business operations (Byrd et al. 2006)	In the future, compared to now, we need to ...			
... we need to reduce the riskiness of our business model	4.26 (1.41)	3.70 (1.29)	3.58 (1.16)	4.55 (1.37)
... we need to devote more attention to improving the efficiency of our business operations	5.44 (1.06)	3.72 (1.29)	3.94 (1.48)	5.39 (1.10)
... we need to improve coordination among functions	5.51 (1.06)	3.75 (1.26)	4.05 (1.49)	5.38 (1.12)
... we need to start/intensify leveraging Business Process Outsourcing (BPO) companies to allow us to focus on our core business	5.45 (1.03)	3.77 (1.39)	4.11 (1.53)	5.53 (1.22)
Business Decision Making (Byrd et al. 2006)				
We have sufficient data to support our day-to-day decision making	5.51 (1.04)	3.95 (1.34)	3.92 (1.46)	5.62 (1.13)
We adopt a rather conservative view when making major decisions	2.74 (1.40)	3.85 (1.31)	3.79 (1.53)	3.05 (1.60)
We tend to be future-oriented (i.e., more focused on the long term than on the short term) when making major decisions	5.52 (0.97)	3.91 (1.40)	4.07 (1.48)	5.57 (1.10)
We need to develop a more comprehensive analysis of the business situations faced, when confronted with major decisions	5.64 (1.18)	3.88 (1.43)	4.06 (1.50)	5.67 (1.07)

\* Mean (Standard Deviation).

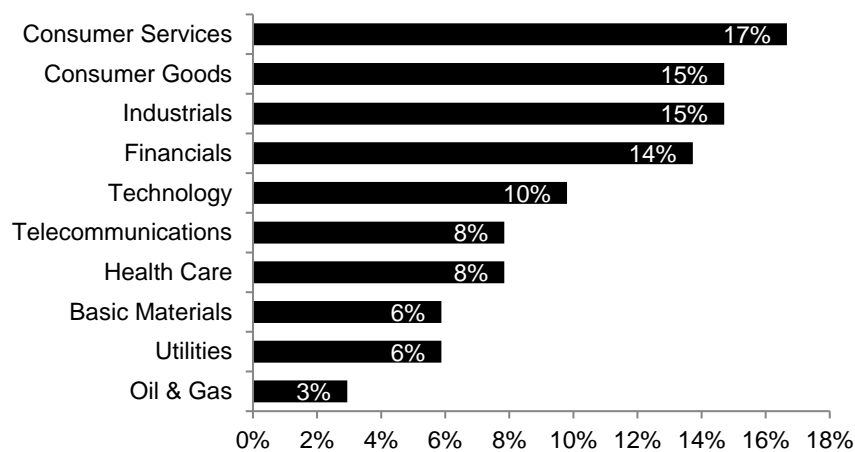
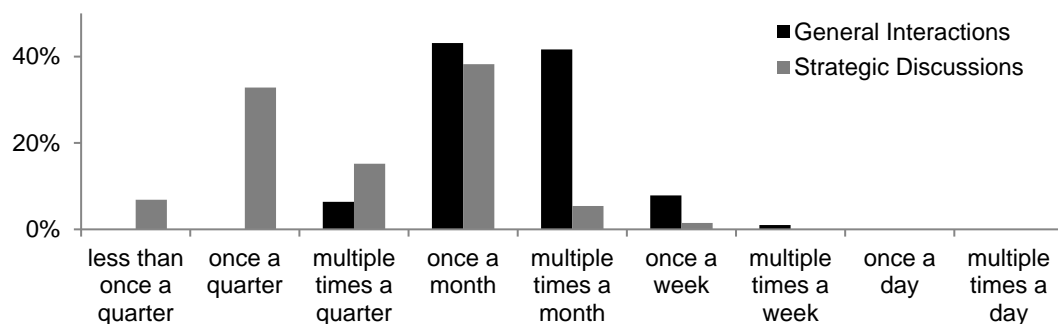
**Table 8.** Survey Items on IT Topics Assessed by CEOs and CIOs

Constructs and items (Sources)	CEO		CIO	
	Own response	CEO's perception of CIO	Own response	CIO's perception of CEO
IT Outsourcing (Rouse 2008)				
Overall, we are satisfied with the benefits from IT outsourcing	3.93 (1.22)*	5.53 (1.08)	5.50 (1.02)	3.60 (1.46)
We are satisfied with the value for money of our IT outsourcing arrangements	3.82 (1.26)	5.43 (1.05)	5.42 (1.16)	3.79 (1.42)
The extent of IT outsourcing in our IT organization is too large (R)	3.87 (1.26)	5.71 (1.10)	5.52 (1.12)	3.71 (1.48)
We outsource too many strategically important functions of our IT organization (R)	4.13 (1.22)	5.42 (1.20)	5.60 (1.18)	3.73 (1.48)
IT Governance (Weill and Ross 2004; Weill and Woodham 2002)				
The implementations of our IT governance principles are effective	3.89 (1.36)	5.58 (1.25)	5.36 (1.13)	3.55 (1.60)
Our level of IT governance is mature	3.80 (1.28)	5.49 (1.18)	5.31 (1.06)	3.61 (1.49)
Our IT governance needs stronger business ownership (R)	3.84 (1.33)	5.57 (1.24)	5.32 (1.09)	3.65 (1.49)
Our IT organization is struggling with the various IT governance compliance requirements (R)	3.91 (1.43)	5.48 (1.22)	5.33 (1.21)	3.67 (1.51)
IT Projects (Gemino et al. 2008)				
	Our IT-related projects ...			
... have appropriate business ownership	4.48 (0.98)	5.79 (0.90)	5.41 (0.87)	4.29 (1.34)
... meet time and budget constraints	3.38 (1.11)	4.94 (1.05)	4.24 (0.94)	3.18 (1.31)
... are worth it (i.e., pay off)	4.20 (1.01)	5.50 (1.00)	5.11 (0.88)	4.00 (1.18)
... meet business requirements	4.27 (1.08)	5.53 (0.94)	5.27 (0.90)	4.06 (1.41)
... deliver the expected benefits	4.31 (1.10)	5.60 (0.90)	5.30 (0.95)	4.13 (1.38)
IT Flexibility (Ness 2005)				
Our IT structure can be upgraded to handle needs at a much higher scale	4.45 (1.09)	5.83 (0.97)	5.61 (0.92)	4.30 (1.23)
Functionality can be quickly added to critical IT applications based on end-user requests	4.35 (1.04)	5.79 (0.95)	5.60 (0.98)	4.33 (1.28)
Our IT flexibility is impaired by legacy systems (R)	3.75 (1.04)	2.42 (1.13)	2.25 (1.08)	3.75 (1.37)
Our IT flexibility is impaired by our change management procedures (R)	3.70 (1.00)	2.22 (1.17)	2.25 (1.23)	3.67 (1.40)
IT Organization (Peppard and Ward 1999; Rockart et al. 1996)				
Our IT budget is large enough to accomplish the IT organization's goals	5.40 (0.69)	4.55 (1.00)	4.50 (0.95)	5.25 (0.95)
Our IT budget is optimally utilized to accomplish the IT organization's goals	4.33 (0.87)	5.63 (1.43)	5.52 (1.34)	4.09 (1.04)
Our IT organization is staffed sufficiently to accomplish its goals	5.32 (0.85)	4.65 (1.03)	4.45 (1.09)	5.16 (0.97)
Our IT organization is structured optimally to accomplish its goals	4.35 (0.83)	5.70 (1.37)	5.58 (1.21)	4.19 (1.11)

\* Mean (Standard Deviation); (R) = Reverse coded.

**Table 9.** Perceptual Congruence Scoring Table

		Response Person A							
		Strongly Disagree		Neutral			Strongly Agree		
		1	2	3	4	5	6	7	
Response Person B	Strongly Disagree	1	10	9	7	5	3	2	1
		2	9	10	9	6	4	3	2
		3	7	9	10	8	5	4	3
	Neutral	4	5	6	8	10	8	6	5
		5	3	4	5	8	10	9	7
	Strongly Agree	6	2	3	4	6	9	10	9
		7	1	2	3	5	7	9	10

**Figure 6.** Industries Represented in Survey Sample (N = 102)**Figure 7.** Frequency of Communication between CEOs and CIOs (N = 102)

### 3 Article 2: The Role of the CDO and Its Interdependencies with the CIO Role

**Title:** The role of the CIO and the CDO in an organization's digital transformation

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**Published in:** Proceedings of the 37<sup>th</sup> International Conference on Information Systems, Dublin, Ireland

**Available at:** <http://aisel.aisnet.org/icis2016/ISSstrategy/Presentations/3/>

**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

### 3.1 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<sup>6</sup> (CIO) has gained importance for the same reason (Matt et al. 2015; Weill and Woerner 2013a).

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.

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<sup>6</sup> 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.

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 2013c).

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.

## 3.2 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.

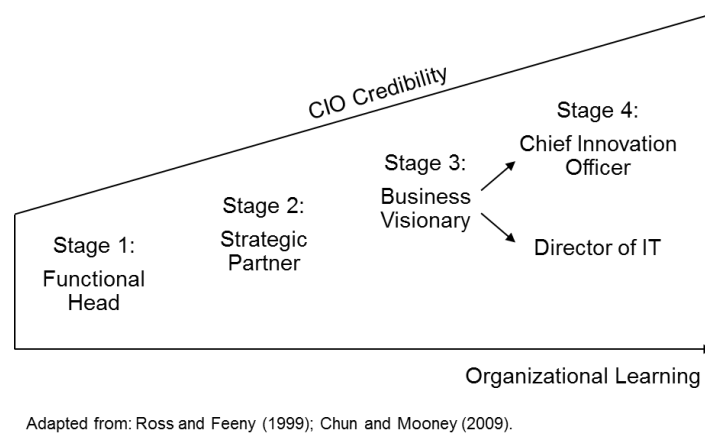
### 3.2.1 The Evolution of the CIO Role

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 8 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.



**Figure 8.** 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<sup>7</sup> (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

<sup>7</sup> 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).

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 8). 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 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).

### **3.2.2 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.

### **3.2.3 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.

### **3.3 Research Methodology**

#### **3.3.1 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<sup>8</sup> who were subsequently interviewed

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<sup>8</sup> In three firms, the CIO delegated the interview to a direct report due to the CIO's unavailability.

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 10 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.<sup>9</sup>

### **3.3.2 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).<sup>10</sup>

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<sup>9</sup> 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.

<sup>10</sup> 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 10.** Overview of Investigated Firms

Firm ID	Firm Size <sup>A</sup>	Industry	CDO	Interviewee's Reporting Level to CEO <sup>B</sup>	
				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 <sup>C</sup>	+ 1 (CIO)	+ 1 (Operations)
Firm 8	Very large	Travel/Transport	Yes	+ 2 (CIO)	+ 1 (CDO)
Firm 9	Large	Banking	No <sup>D</sup>	+ 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)

<sup>A</sup> Firm size: Large = employees > 250 and annual revenue > EUR 50 mil. ;

Very large = employees > 1,000 and annual revenue > EUR 500 mil.

<sup>B</sup> 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.

<sup>C</sup> CDO role existed but the position was recently terminated.

<sup>D</sup> 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). 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.

### 3.4 Results

Seven of the 19 companies of which we interviewed executives had a CDO at the time of the interview (see Table 10). 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.

#### 3.4.1 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 9 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.



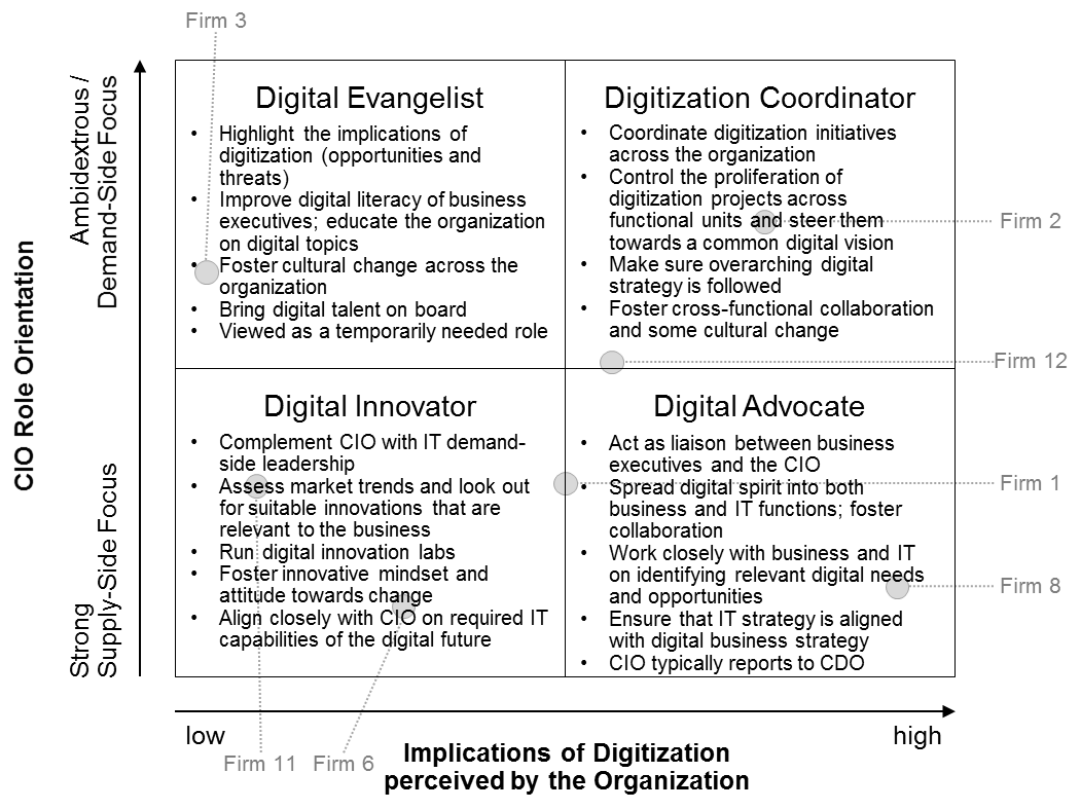


Figure 9. CDO Role-Types

### 3.4.1.1 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.

### 3.4.1.2 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.

### 3.4.1.3 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.

#### **3.4.1.4 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.

### 3.4.2 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.

#### 3.4.2.1 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.

#### 3.4.2.2 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).

### 3.4.2.3 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.

#### **3.4.2.4 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.

#### **3.4.3 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.

#### **3.4.3.1 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.

#### **3.4.3.2 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 responsibility of the CDO.

#### **3.4.3.3 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.

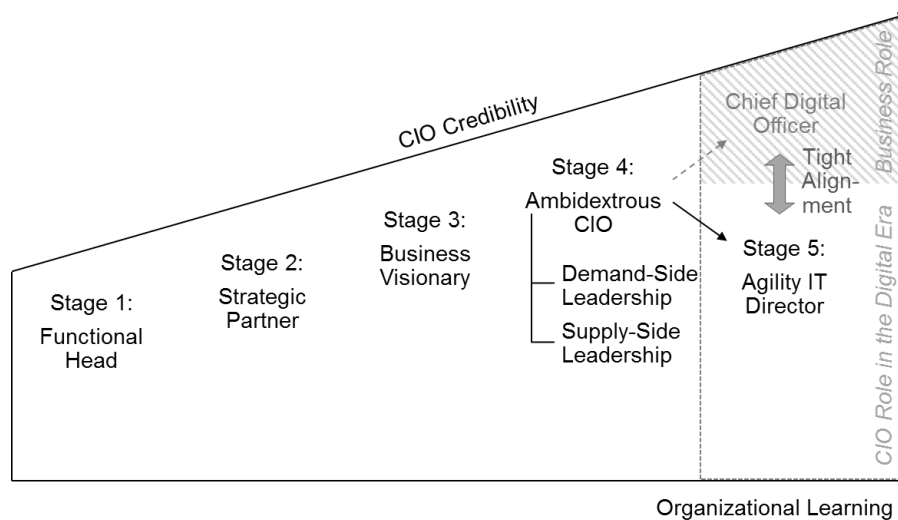
### 3.5 Discussion

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.



### 3.5.1 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 10 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.



Based on: Ross and Feeny (1999); Chun and Mooney (2009).

**Figure 10.** 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 10) – 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 10). 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.

### **3.5.2 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.

### **3.5.3 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 9) 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.

### **3.5.4 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.

### 3.6 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.

### 3.7 Appendix

#### 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

## 4 Article 3: The Role of Bimodal IT in Transforming the IT Function

**Title:** The transformative role of bimodal IT in an era of digital business

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**Published in:** Proceedings of the 50<sup>th</sup> Hawaii International Conference on System Sciences, Honolulu, Hawaii

**Available at:** <http://scholarspace.manoa.hawaii.edu/handle/10125/41822>

**Abstract:** Digital transformation is challenging the traditional expectations of the IT function, as organizations demand a more agile IT function, capable of exploring innovative uses of IT in a digital business context. Using qualitative executive interview data, this paper explores the bimodal approach organizations can use to create an IT function that effectively supports and drives the organization's digital agenda. The study finds that for many organizations, a bimodal IT design, of which we found three distinct archetypes to exist, serves as a transitional stage in the pursuit of embedding a higher level of agility and a stronger exploration focus in the IT function, which ultimately operates unimodal. This study's investigation into bimodal IT has significant implications for how the IT function transforms in the digital business era and is of relevance to practitioners as digital transformation affects organizational structure, culture, and methods of working.

**Keywords:** Bimodal IT, digital transformation, IT agility, IT ambidexterity, IT function transformation

## **4.1 Introduction**

Academics and practitioners alike have observed the rise in the strategic value of information technology (IT). However, they have also challenged the ability of a firm's IT function to support the organization in achieving its strategic objectives (Campbell 2016). With the increased focus by organizations on digital transformation, a trend that is often driven by changing customer behaviors and new market entrants with digital business models, the emphasis on the IT function to support the organization in developing digital capabilities has intensified.

Established firms often face challenges exploiting opportunities that arise from digitization. Organizations often need to work within the constraints of existing legacy information systems (IS) and with an IT function, which is frequently focused on “keeping the lights on”, rather than on conducting exploratory activities. New firms have entered the market with digitally supported offerings, which have in some cases secured significant market share, and are posing threats to established firms and their traditional business models. These threats, actual or perceived, as well as the lucrative digital opportunities available, if successfully exploited, have caused established firms to focus on IT agility and IT exploration to enable digital transformation. A frequently adopted mechanism, for example, is the implementation of “digital labs”, where employees are located in an environment focused on entrepreneurship and innovation. This supports the creation of digital innovations which often take the form of externally facing services that facilitate increased customer engagement (e.g., through mobile applications) as well as automation (e.g., business-to-business platforms).

Digital transformation does not just affect products, services, and business models of organizations, but also affects the internal organizational landscape, including leadership roles and responsibilities (Bharadwaj et al. 2013a; Hess et al. 2015; Matt et al. 2015). Many firms are aware of the need to transform themselves, including their processes and culture, to achieve their digital objectives. This has frequently resulted in the restructuring of organizations and the creation of new executive roles, such as the Chief Digital Officer (CDO) (Rickards et al. 2015). The implications of digital transformation for the IT function lie in the revised business expectations of IT. Many business executives previously perceived IT primarily as a cost center. However, they now require the IT function to increase its agility and become a driver of digital innovation.



Bimodal IT is a concept developed by practitioners (Bossert et al. 2014a), which argues that the traditional design of the IT function is often not suited to effectively balancing both exploratory and exploitative tasks. Instead, to have the agility to support the business with exploratory digital innovation, while at the same time maintaining superior traditional IT operational performance, the IT function should operate in two parallel modes (Bossert et al. 2014a; Colella et al. 2014]. The two modes differ structurally and typically follow different management principles, as they are set up to achieve different objectives. Mode 1 represents a traditional approach to IT governance, with an emphasis on safety and accuracy, while Mode 2 emphasizes agility and speed by operating non-sequentially in multiple iterations. Throughout this paper, we are referencing these two modes by referring to them as Mode 1 and Mode 2. Both modes typically have their own methodologies, structures, governance principles, and culture as well as varying attitudes toward risk acceptance. With performance being of highest value, Mode 1 typically utilizes waterfall-driven (sequential) approaches to managing IT projects and facilitates a risk averse culture. In Mode 2, customer experience and business outcomes are in the foreground, with teams often applying agile (iterative) project management methodologies (e.g., “scrum” techniques (Behar et al. 2015)), targeting short release cycles, and working on endeavors with less certain outcomes. Bimodal IT, also sometimes referred to as “two-speed IT”, encompasses the provision of platforms optimized for stability and resilience alongside platforms to develop and run customer-facing applications. In a bimodal design, this is realized by an architecture of segregated platform domains, with one domain managed for fast-paced iterative delivery (Mode 2) and the other managed for back-end transactional integrity (Mode 1) (Bossert et al. 2014a).

Practitioners have extensively discussed whether bimodal IT is a desirable form of design for the IT function. While there are mixed opinions in praxis, our study investigates the drivers, manifestations, and future path of this concept and aims to guide practitioners by laying out the implications.

## **4.2 Conceptual Background**

Although research on bimodal IT is still in its infancy, initial studies that contrast the characteristics of “traditional IT” and “digital IT” in a bimodal setup exist (Horlach et al. 2016). However, there is little guidance from IS research on the approach that an organization should take to leverage this trend. At the same time, this has not inhibited practitioners from developing their own concepts around bimodal IT (Behar et al. 2015; Bossert et al. 2014a; Colella et al.

2014), leading to a situation where practice leads research. In practice, organizations have explored a range of structural and managerial options to reliably maintain existing IT infrastructure and applications while at the same time pursuing mechanisms to harness digital innovations (Bossert et al. 2014b).

In this section, we briefly provide some background on digital transformation and its implications for the IT function as well as introduce the concepts of IT ambidexterity and IT agility, as they are relevant for explaining the findings of our study.

### **4.2.1 Digital Transformation and Its Implications for the IT Function**

Technological change and innovation as well as the rapid adoption of digital products and services by consumers in recent years have significantly affected our modern society. Describing the implications for businesses, the term “digital transformation”, often used synonymously with “digitization”, has become a popular phrase among practitioners in this context. We view digital transformation as encompassing the digitization of sales and communication channels and the digitization of a firm’s offerings (products and services), which replace or augment physical offerings. Furthermore, digital transformation entails tactical and strategic business moves that are triggered by data-driven insights and the launch of digital business models that allow new ways of capturing value (Bharadwaj et al. 2013a; Pagani 2013; Setia et al. 2013).

This has resulted in a paradigm shift in the perception of the IT function and has extended the IT function’s role beyond its traditional service provider role (Hess et al. 2015; Sia et al. 2016). Today, the business demands an IT function that is at the forefront of exploring digital options that create competitive advantage for the firm (Setia et al. 2013). Previously, the approach to IT strategy creation has focused on aligning functional IT strategy with business strategy (Horlach et al. 2016). However, digital transformation now influences the firm’s strategy formation, resulting in increasing reliance on digital business components to drive value. As a result, the distinction between business and IT is becoming increasingly indistinct (Bharadwaj et al. 2013a).

In order to truly harness the power of digital transformation, organizations need to manage significant changes, including changes to the design of the IT function (Fitzgerald et al. 2014), especially with regard to IT agility and IT exploration capabilities. A firm’s Chief Information Officer (CIO), the most senior IT executive, is often challenged with finding the optimal

balance of explorative and exploitative IT endeavors as well as provisioning agility besides high reliability, all of which regularly relate to the choice of structural design, management style, and working methods in the IT division. IS research and practice have long debated the question of how to organize the IT function best in order to effectively contribute to the firm's performance (Bossert et al. 2014a; Colella et al. 2014] and this discussion has only intensified in the context of digital transformation.

In the past, IS research has focused on describing the types of operating models rather than the actual underlying arrangement of activities that enable the IT function to support the organization in its pursuit of digital business opportunities. Meanwhile, practitioners have created novel approaches to organize firms' internal IT functions, with bimodal IT designs receiving a great amount of attention from CIOs and IT leaders who wish to maintain and enhance traditional IT while being able to respond to business demands for exploring digital innovation options (Behar et al. 2015; Bossert et al. 2014a). Simultaneously, practitioners have identified that traditional governance structure and rules are "putting the brakes on" the necessary experiments and innovations required for the business to thrive in the digital economy (Colella et al. 2014).

While the implications of digital transformation for firms across industries have received significant attention in practice and academia (Bossert et al. 2014a; Setia et al. 2013), the implications of digital transformation for the IT function in terms of optimal governance structures, management methodologies, organizational setup, working methods, processes, and culture are thus far scantily researched.

#### **4.2.2 IT Ambidexterity**

The concept of ambidexterity describes the ability to balance competing and conflicting priorities, which in an organizational context are typically explorative and exploitative actions (March 1991). Accordingly, IS research views IT ambidexterity as the IT function's ability to simultaneously explore new IT opportunities and innovations (IT exploration) as well as exploit existing IT resources and practices (IT exploitation) (Lee et al. 2015). Supported by early research in this field, firms initially attempted to achieve ambidexterity through multiple structurally separated divisions with different exploratory and exploitative mandates (Duncan 1976). However, the mechanisms that allowed this structural separation to occur were cumbersome and expensive to implement. Thus, the concept of ambidexterity was expanded to enable individual divisions to become "contextually ambidextrous" by requiring each division

to pursue exploratory and exploitative activities in balance (Sethi and Sethi 2009). However, in the context of digital transformation, there appears to be a reversion to structural ambidexterity on the business side, with business units undertaking explorative digitization initiatives by forming separate innovation teams that exist outside traditional organizational structures.

### **4.2.3 IT Agility**

IT agility encapsulates the ability of the IT function to sense opportunities to innovate and to respond rapidly (Goldman 1995). This enables the IT function to seize opportunities that arise with “speed and surprise” as well as quickly adapt to external developments in areas such as technology and regulation (Chi et al. 2010; Sambamurthy et al. 2003). An agile IT function is capable of being proactive and driving the changes that the firm’s competitors will need to respond to. Moreover, it is able to comprehend changes in the firm’s environment and respond rapidly. Conceived as an antecedent to organization agility, IT agility allows firms to rapidly respond to competitive actions from a greater repertoire of responses (Sambamurthy et al. 2003) and, in the context of alignment, enables swift correction of misalignment between business and IT (Tiwana and Konsynski 2010). The concept of IT agility has been extended in the context of digital transformation. Firstly, with digital disruption increasingly affecting traditional business models, IT must not only support the organization in increasing its agility, but the IT function itself must also gain agility (Tiwana and Konsynski 2010). Secondly, IT agility needs to be complemented by an organizational culture that fosters agility. The effectiveness of an agile IT function is limited if the organization’s culture does not facilitate entrepreneurship, as the responsiveness of the IT function will be underutilized due to a lack of impetus by the overall organization to innovate (Tallon and Pinsonneault 2011).

In summary, digital transformation encompasses significant changes for firms across industries, implicating increased desirability of high levels of IT ambidexterity and IT agility. While there has been extensive research on each of these disciplines, IS research has paid scant attention to bimodal IT and its propensity to enable IT agility and IT ambidexterity. To address this research gap, our study poses the following three research questions:

- (1) When and under what conditions do companies consider a bimodal IT design?
- (2) What implementation options are predominant?
- (3) How does bimodal IT promote the IT function’s evolution?

## **4.3 Research Methodology**

### **4.3.1 Research Design**

We used a field study approach to investigate bimodal IT, utilizing data from 19 European companies. This approach has previously helped to explore various managerial research topics, particularly in areas where little prior research exists (Gregor 2006). Utilizing field data across a variety of contexts rather than analyzing individual cases allows us to increase the generalizability of the results (Klein and Myers 1999).

We examined companies with similar organizational characteristics (i.e., large and very large European firms) in various industries. Companies participating in our study had to have a minimum of 250 employees, annual revenues of at least 50 million Euros, and an internal IT function with a history of at least 15 years. We initially approached CIOs of 60 companies and received confirmations for interview appointments from 19 CIOs who were subsequently interviewed either by phone or in person. In three cases, the CIO delegated the interview to a direct report due to the CIO's unavailability. Following the interview, the CIO was requested to refer us to an executive on the business side who is particularly concerned with digital business topics (namely the CDO in cases where such a role existed). Table 11 provides an overview of the 19 cases and lists information on firm size, industry affiliation, as well as the reporting level and functional role of the interviewed business and IT executives.

### **4.3.2 Data Collection and Analysis**

To ensure comparability and reliability of the results, we employed an interview guide for conducting semi-structure interviews with the executives. The interviews were completed in the timeframe from February to May 2016 and were scheduled for a duration of 60 minutes, with actual interview durations ranging from 45 to 100 minutes. Although the interview topics were the same for both business and IT executives, the specific interview questions depended on the role of the interviewed executive. For example, CIOs were asked to assess past developments and share future plans around the design of the IT function, while business executives were asked to discuss their perceptions of changes in the IT function's design as well as expectations regarding an IT design that would provide optimal digitization support for the organization.

We also gathered complementary quantitative data from business executives and CIOs using a follow-up questionnaire in order to increase reliability and validity of our findings. The

questionnaire items covered aspects such as the organizational support for IT (as perceived by the CIO) and IT vision and contribution (as perceived by the business executive).

All interviews were recorded and transcribed. In cases where the interview language was not English, the interview transcript was translated into English before coding the data. The coding process involved two coders and codes were only accepted where both agreed on the codes; however, no substantial disagreement occurred. We supplemented interview and questionnaire data with secondary data, including press releases and publicly available reports on the companies as well as internal documents that were made available to us.

**Table 11.** Overview of Investigated Cases

Case ID	Firm Size <sup>A</sup>	Industry	Interviewee's Reporting Level to CEO <sup>B</sup>	
			IT Executive	Business Executive
Case 1	Very large	Insurance	+ 1 (CIO)	+ 1 (Operations)
Case 2	Very large	Media	+ 2 (CIO)	+ 2 (Strategy)
Case 3	Very large	Travel/Transport	+ 2 (CIO)	+ 1 (Digital Business)
Case 4	Large	Professional Services	+ 1 (CIO)	+ 1 (Sales)
Case 5	Large	Banking	+ 1 (CIO)	+ 1 (Strategy)
Case 6	Large	Travel/Transport	+ 1 (CIO)	+ 1 (Operations)
Case 7	Very large	Wholesale/Trade	+ 2 (Group CIO)	+ 1 (Digital Business)
Case 8	Very large	Banking	+ 3 (CIO + 1)	+ 2 (Digital Business)
Case 9	Very large	Retail	+ 2 (CIO)	+ 1 (Digital Business)
Case 10	Very large	Media	+ 2 (CIO)	+ 2 (Digital Business)
Case 11	Very large	Retail	+ 1 (CIO)	+ 1 (Digital Business)
Case 12	Very large	Utilities	+ 2 (CIO)	+ 1 (Marketing)
Case 13	Large	Banking	+ 2 (CIO)	+ 1 (Operations)
Case 14	Large	Media	+ 2 (CIO)	+ 2 (Digital Business)
Case 15	Very large	Manufacturing	+ 3 (CIO + 1)	+ 3 (Operations)
Case 16	Very large	Automotive	+ 2 (Group CIO)	+ 2 (Digital Business)
Case 17	Large	Health Care	+ 2 (CIO)	+ 3 (Innovation)
Case 18	Very large	Health Care	+ 3 (CIO + 1)	+ 2 (Digital Business)
Case 19	Large	Professional Services	+ 1 (CIO)	+ 1 (Digital Business)

<sup>A</sup> Firm size: Large = employees > 250 and annual revenue > EUR 50 mil.;

Very large = employees > 1,000 and annual revenue > EUR 500 mil.

<sup>B</sup> Reporting level to CEO: +1 = direct report; +2 = 2 levels below CEO; +3 = 3 levels below CEO; (CIO + 1) = 1 level below CIO.

We then prepared the coded interview data, questionnaire data, and supplemental data using data reduction methodology (Miles and Huberman 1994). We deduced the different states and archetypes of bimodal IT by using a coding tree that is grounded in key characteristics of each

case, such as the structure, working methods, and governance of the IT function (as perceived by the IT executive and the business executive). We furthermore compared the cases to identify similarities in relationships and facts, using cross-case analysis techniques (Miles and Huberman 1994). Our early conclusions were confirmed by relating various manifestations of bimodal IT with IT ambidexterity and agility. Eventually, we aggregated our findings into a framework for bimodal IT that is grounded in the collected data.

## 4.4 Results

Our data analysis reveals three key findings. Firstly, we find agility and ambidexterity are the two primary reasons why companies decide to implement a bimodal IT design. Secondly, the data identifies three different archetypes of bimodal IT manifestations. Thirdly, we find that bimodal IT is an interim transition step in the overarching transformation of the IT function, as digital transformation places different demands on IT, rather than being an end state for the IT function.

### 4.4.1 Finding 1: Why Companies Decide for a Bimodal IT Design

In general, our data shows that the transition to a bimodal IT design correlates with business demand for more effective digitization support as companies realize the implications of digital transformation. Strong and rapidly increasing internal and external pressure to develop digital business solutions such as ancillary end-customer facing digital services, digital customer communication channels, and the digitization of the firm's offerings itself demands a level of IT agility and IT exploration that traditional IT governance has not historically been designed for.

#### 4.4.1.1 The Need for IT Ambidexterity

Many companies have developed a strong focus on IT exploitation in the past. Digital transformation, however, is about exploring innovative uses of IT rather than optimizing costs and affecting incremental IT improvements. Several interviewed executives identified that this is important, including the CIO in case 9, as *"it takes a mindset change, the courage to experiment, a culture that accepts failure, and different working methodologies, which takes time to implement"*. In response to strong demand for support of digital business innovation, Mode 2 can serve as a means to cultivate an environment of IT exploration. *"Our [Mode 2] digital unit has the mandate to identify and experiment with relevant new technologies. We set new standards with regards to creative working, decision making, and collaboration,"* stated

one of the CDOs (case 11), explaining why the company established the CDO's group outside of the traditional IT division that operated in Mode 1.

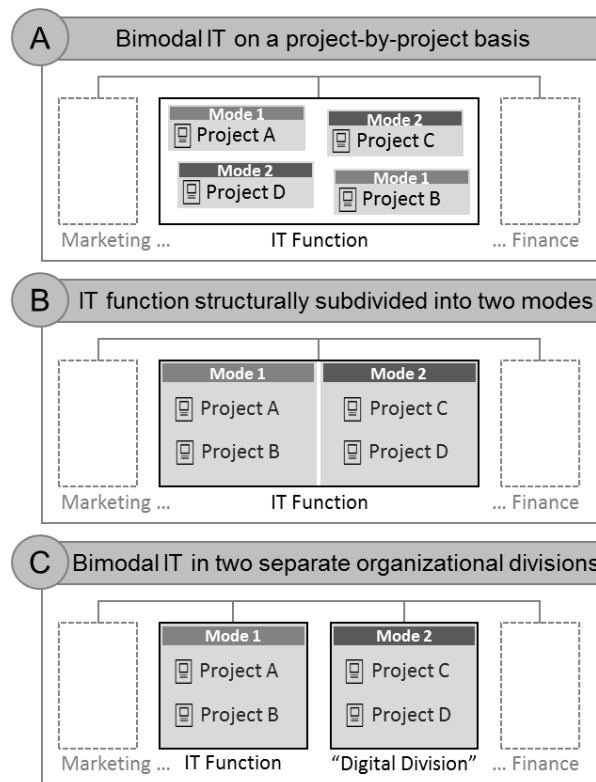
#### 4.4.1.2 The Need for IT Agility

Dissatisfaction with the responsiveness of the traditional operating mode of IT, rigid system landscapes that allow little flexibility, and waterfall-driven approaches to IT project management are major reasons for IT functions to introduce Mode 2 as an alternative in a bimodal design. “[Mode 2] allows us to quickly take on new topics and build solutions incrementally in short cycle times,” stated the CIO in case 10, while other interviewed executives made similar remarks. The introduction of a separate mode is often a desirable choice because of dichotomous expectations of IT in many firms as “*top management is constantly questioning the high cost of IT, but at the same time demands agility*” (Business executive, case 18). A bimodal IT design can assist in balancing both.

### 4.4.2 Finding 2: Three Archetypes of Manifestations of Bimodal IT

Of the 19 companies in our study, 14 companies exhibited an IT design that operates in two distinct modes. While those firms employed varying forms of bimodal IT, our data analysis identified three distinct archetypes (A), (B), and (C) with different intensities of structural split between the two modes. In the least strict split between Mode 1 and Mode 2, the mode is chosen on a project-by project basis (archetype A). Choosing a more intense approach, some companies introduce a distinct split between operating in Mode 1 and Mode 2 within the IT function (archetype B), while others further articulate the split by implementing Mode 2 as a separate divisional entity outside of the IT division (archetype C). Figure 11 depicts the three archetypes of bimodal IT. The state of bimodal IT and the archetype chosen in each of the cases is contained in Figure 12.





**Figure 11.** Three Archetypes of Bimodal IT Design

#### 4.4.2.1 (A) Bimodal IT on a Project-by-Project Basis

A frequently chosen approach to the operationalization of bimodal IT is to implement a second mode that is adopted for selected projects. Starting a new project requires prior selection of one of the two modes.

The CIO of a large European airport (case 6) described how the introduction of an “*agile project mode*” in the IT division allows project teams to follow “*more startup-like processes*” to support digitization projects. Previously, the IT function had been perceived by the business as non-innovative and too slow to respond. “*However, our biggest challenge is getting our IT staff to adopt the new working mode. Working under the agile mode means purposefully allowing failure, trying ten things, throwing away seven, and continuing with three,*” explained the CIO as he described the challenges relating to the more explorative style of Mode 2 that his employees are not used to yet. “*We have now successfully managed two projects under the agile mode and are going to manage more projects like this, once we have more people trained on the new processes and they embrace the new working style.*”

Establishing a Mode 2 for IT projects can be challenging, especially in highly regulated industries with strict processes and tight governance around IT implementations. Case 5, for example, describes a large European bank that has been historically very conservative, but has

recently begun to experience “a growing appetite for risk when realizing the potential of digital innovation in the financial technology space” (CIO). The IT function has developed a “fast path approach” that follows a “light touch governance model” and allows projects to “skip certain process steps in order to gain speed and agility,” explained the CIO. Yet, “this approach cannot be followed by all projects due to regulatory requirements and service level stipulations”. Project teams operating under the “fast path approach”, however, have the freedom to experiment with digital innovations and launch new services quickly. “We have successfully developed a web chat application for online banking and released it into production. However, by declaring it a pilot, the project team can get around certain IT service elements and the stipulation to have complete process descriptions, which slow other projects,” explained the CIO, highlighting the more agile and explorative approach these projects are taking. The business is aware of the “implications of having unsupported prototypes in production” but accepts the risks in exchange for speed, agility, and explorative learnings.

#### **4.4.2.2 (B) IT Function Structurally Subdivided into Two Modes**

Companies that structurally subdivide their IT function into two distinct groups that operate under the two modes have an increased level of bimodality.

The automotive manufacturer in case 16, for example, introduced such a split in response to implementing its digital business strategy. “Our traditional core IT has large commodity components to it,” stated the interviewed Group CIO, explaining how this type of IT requires a separate operations mode than “the agile IT division, which is highly connected to the digital strategy and implementing the digital vision we have for the company”. “Our IT division has to work in two modes now because we cannot just switch off or stop supporting the old systems and applications, while another group within the IT function has the mandate to innovate and lay the foundation for flexible information systems that combine, aggregate, and analyze data utilizing today’s digital possibilities,” added the interviewed business executive.

The CIO of a media company (case 2) compared his bimodal IT divisions with “tankers” and “speedboats”. “On one hand, you have a big tanker where system stability and reliability are of highest value. On the other hand, you need speedboats to experiment with new technologies and bring digital innovation to the market quickly. You have to be careful not to slow down the speedboats too much by linking them too tightly to the tanker. We have experienced in the past that these speedboats need to be organizationally separated from the tanker to guarantee speed and flexibility.”

A professional services company CIO (case 4) subdivided his IT division into two groups with one group “working on customer-facing IT solutions where we see a strong demand for agility and innovation” and the other group “delivering traditional IT services”. “[The former] requires a different skill set than what we find in our traditional IT unit and a more business-minded, almost consultant-like, way of thinking,” explains the CIO as he provides reasons for splitting the department into Mode 1 and Mode 2 units. The business recognizes the value of the bimodal model, with the interviewed Head of Sales stating, “On one hand, we want to spend less on traditional IT; on the other hand, we demand our IT function to evolve into a more agile digitization support unit that has a deep understanding of our business and customers, so [the bimodal design] fits well into our digital transformation strategy.”

#### **4.4.2.3 (C) Bimodal IT in Separate Organizational Divisions**

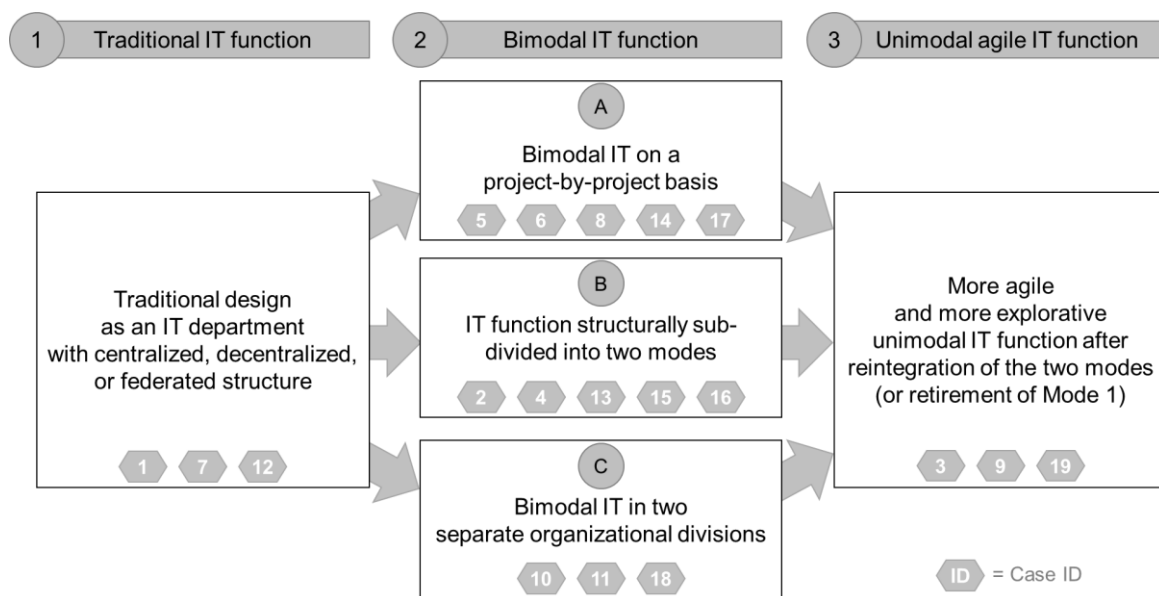
A less common but even more intense approach to bimodal IT is to implement Mode 2 completely outside the traditional IT function. In such cases, the division operating in Mode 2 is frequently under the leadership of a Chief Digital Officer and often referred to as “digital division”.

Case 11, for example, describes a multi-divisional retail firm that is challenged by stagnating revenue streams from its traditional business models. The senior leadership team of the company decided to diversify into ancillary digital services through digital channels and introducing digital customer touchpoints at the firm’s thousands of small retail outlets. A digital laboratories unit outside of the IT function was formed and a CDO was hired to head the new division, which operates in Mode 2. “*We intentionally wanted to cause [internal] disruption by forming a new unit,*” stated the CDO, referring to his mission to “*ultimately foster a more innovative mindset and culture across the organization*”. “*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 the IT division has been unable to explore and experiment with innovative digital end-customer services. “*My IT department was not the right place for the digital labs,*” stated the CIO.

Another way in which companies achieve a bimodal IT design with separate organizational divisions is through strategic acquisitions. The multinational pharmaceutical company in case 18, for instance, acquired a digital leader in its industry in order to accelerate its own digital transformation. “*We kept the highly innovative IT division of [the acquired company] deliberately separate from our classical IT in order to protect the culture, the resources, and the innovative spirit we have there*” stated the interviewed business executive, adding that “*the*

value of the [acquisition] deal would be destroyed if we were to integrate it with our traditional IT division.” Hence, the acquired firm became the digital division of the company. The interviewed IT executive explained how “we needed to protect an alternative environment to work on digital solutions in the horizon of days and weeks rather than months and years,” which are common cycle times in the traditional IT space. “We realized that digital is not the same as IT; digital exploration requires a completely separate process framework that is different from the robust processes we have in place in large parts of our IT department.”

Each archetype comes with its specific advantages and disadvantages. Depending on the circumstances, a company might prefer one to another, but we did not identify a general hierarchy of archetypes. It is also worth noting that alternating between archetypes is possible. We noted that IT functions of several firms had previously changed their bimodal IT design. Although shifting from archetype A to B or from B to C is more common than other transitions, our data does not support the concept that the development of bimodal IT in firms begins with archetype A and then sequentially moves to B and C.



**Figure 12.** Concept of Bimodal IT as a Transition Stage Toward a More Agile and Explorative IT Function

#### 4.4.3 Finding 3: Bimodal IT as a Temporary Transition Stage

Considering the research question of how bimodal IT fits into the evolutionary development of the IT function, our data analysis provides a clear answer: Bimodal IT is an interim short-term stage in a larger transformational process that the IT function undergoes as the business demands more effective digitization support from IT. Figure 12 depicts this evolution.

Only three companies in our study solely operated with a traditional design. However, the interviewed executives in all three cases indicated that switching to a bimodal design in the future was a possibility. *“As an energy utility [compared to other industries], we arrived fairly late to the digital age. We just started our very first digitization project, but our IT division still operates in a traditional design,”* stated the Chief Marketing Officer in case 12. His CIO counterpart strictly opposed the idea of operating under an archetype B or C design because *“it contradicts the culture we have in our IT organization”*. However, the CIO could envision *“working with an adaptive speed on a project-by-project basis,”* stating, *“agile methods of working might be more suitable to support emerging fast-pace digital initiatives in our company.”* The CIO of a wholesale and trade company (case 7) explained how the need for a bimodal design is currently surfacing: *“We are still working with traditional release cycles and long lead times from requirements gathering to design, development, and testing. However, we see growing business demand for taking a step-by-step approach to jointly working on innovative digital solutions at much faster speeds. Yet, we do not have the people who are capable of working in this mode. Our newly appointed CDO is now going to build such a division from the ground up.”*

Yet, we found that companies seldom plan to keep the bimodal IT design in the long term. In nearly all cases, IT executives had the ambition to transition their IT function to a unimodal agile IT function that largely embraces agility and IT exploration. Bimodal IT is predominantly viewed as a temporary means of transformation. *“Senior management has plans to roll [Mode 2] out across the entire IT organization [...]; we have already started giving training to various groups in the corporate IT organization in order to spread the culture and the way of working,”* stated one of the interviewed IT executives (case 18). Another CIO (case 13) elaborated, *“Outsourcing is a core aspect of our IT strategy and might bring us to a point where our [Mode 1] IT division can be fully dissolved.”* The Head of Strategy of a large bank (case 5) explained his vision of how, *“in an ideal world, we don’t have two modes of IT, but we have a highly agile single-mode IT, where IT operations are fully integrated into the digital business innovation processes. In fact, at some point, I see IT not existing as a division anymore, but as a competency fully embedded within the business.”*

Three companies in our study had already taken the next step and transitioned from a bimodal design to a unimodal design. The large retail firm described in case 9, for example, had a bimodal IT design with two separate organizational divisions (archetype C) for several years in order to develop an e-commerce presence. *“We decided to spin off our digital endeavors as an*

*autonomous entity in fear of being slowed down by the rest of the organization, not just with respect to IT but also our traditional approach to marketing, procurement, etc.,”* stated the former head of the division who now fills the CDO role of the company. *“Now that our online sales platform has become a mature pillar of our business, we decided to reintegrate the divisions of the e-commerce entity into our company and build a multi-channel organization,”* added the CIO. By reintegrating the Mode 2 e-commerce IT team with the Mode 1 corporate IT function, the company managed to *“transfer technological knowledge, competencies, cultural aspects, and working methodologies”* (CIO), thereby enhancing agility and ambidexterity of IT. Case 3, which describes a passenger transport company, provides another such example. The company had successfully developed a strong online and mobile presence for ticket sales and on-trip digital customer engagement in an archetype B structurally separated IT division. *“We chose to merge the two divisions back together although this meant a huge culture clash,”* explained the CIO, remembering how *“[the] classical [Mode 1] IT division used to have two software releases per year and conflicts about the prioritization of requests commonly led to escalations.”* *“Now [after merging Mode 1 and Mode 2] we are designing a common platform for both online and offline sales systems with an architecture that allows for a high degree of flexibility and fast-speed development, which will shift the mode of our entire IT organization to weekly release cycles,”* stated the CDO who had formerly been responsible for the Mode 2 IT division and is now a top management board member.

## 4.5 Discussion

### 4.5.1 The Bimodal IT Phenomenon

This paper introduces the concept of bimodal IT to the academic discourse as being the division of the IT function into two modes. Mode 1 is focused on stability and enabling the IT function to provide continuous IT services to the business and Mode 2 is focused on assisting the organization in rapidly responding to external market forces and driving digital innovation. Through the accumulation of these two modes, the IT function as a whole can assist the organization engage in explorative and exploitative endeavors. This definition is consistent with the experience described by practitioners (Colella et al. 2014).

Moreover, we extend the concept of bimodal IT in two major ways from that discussed in practitioner literature, which presents a direct contribution to both academic and practitioner knowledge. Firstly, we found three archetypes of bimodal IT to exist in practice: project-by-project mode selection, a structural division of the IT function into two modes, and

implementing Mode 2 entirely outside of the existing IT division. Organizations implementing these approaches are able to adopt one archetype and later adjust to another archetype as a result of changing requirements and the experience with the previous archetype. Secondly, we discovered that bimodal IT is not the end destination for the IT function. Instead, bimodal IT is used in practice to achieve the next evolutionary state where the different exploratory and exploitative modes are combined again in a unimodal IT function, which is more agile than at the beginning of the IT function's transformational journey.

### **4.5.2 Implications for IT Ambidexterity**

Academics and practitioners alike have been discussing tensions between conflicting and competing tradeoffs in IT. While these tensions have existed for some time, we argue that the bimodal IT design presents a solution to transform the IT function into a more ambidextrous one. As the impact of digital transformation on business increases, the IT function is required to contribute to the organization's exploratory endeavors, which entails the IT function taking on similar exploratory traits. Specifically, we find that an initial separation into two modes helps achieve this and enables the IT function to transform.

Bimodal IT represents to some extent (especially in archetype B and C) a return to structural ambidexterity, where one division focuses on exploratory activities while another division focuses on exploitative activities. Yet, the approach to separate the IT function into two modes is novel compared to existing methods of creating contextually ambidextrous IT functions, which principally rely on individual staff members conducting exploratory and explorative activities in the right amounts under the direction of IT leadership. Rather than striving for contextual ambidexterity from the outset, firms should initially utilize structural ambidexterity through a bimodal IT design to commence the transition.

However, separating the IT function into two modes requires mechanisms, which are often costly to implement, and can inflict a deep cultural division and cause tensions between the different teams. In the long term, firms should resolve this by merging the IT function back into a single operating mode through creating a single division rather than relying on structural mechanisms to implement ambidexterity.

### **4.5.3 IT Function Transformation**

While there are mixed views by practitioners on the ability of the bimodal IT concept to improve the performance of the IT organization and the organization as a whole (Campbell 2016), this

study finds that firms implementing bimodal IT can use it as a pathway to enable the IT function to transform itself. Practitioners can conduct this transition by following these guidelines:

- (1) Assess the current state. Even if it has not been formally introduced, the IT division might already have adopted a bimodal design. Especially, archetype A is often adopted informally.
- (2) Find the appropriate bimodal IT archetype for the firm. Consult business and IT leadership teams to assess the advantages and disadvantages of each of the three archetypes identified in this paper, given the specific organizational circumstances.
- (3) Periodically assess the success and maturity of the organization's bimodal IT setup. Consider changing archetypes as appropriate. Reintegrate the two modes and share learnings across modes once the organization is ready to adopt what Mode 2 has cultivated.

The resulting IT transformation eventually enables the IT function to support the business more effectively in its digital transformation. However, a transformation of only the IT function is not enough to effectively embed digital business capabilities in the organization. For digital transformation to be successful, the organization as a whole must adopt a culture that allows joint business-IT digitization initiatives to flourish.

## **4.6 Conclusion**

This study finds that bimodal IT is a three-pronged approach, which enables the IT function to transform into an entity, which effectively supports the business undergoing digital transformation. The results also indicate that in the longer term, the IT function reverts to a unimodal design after it has adopted the learnings from the governance principles, working methods, and cultural aspects developed in Mode 2 throughout the IT function.

This has implications for practitioners who are tasked with designing the organizational structures to effectively support digitization. This paper provides practitioners with a pathway for IT function transformation, from understanding the purpose of bimodal IT and the different archetypes to clearly identifying that the bimodal IT design is not a destination but an interim stage in a larger transition. The study provides impetus for business and IT leaders to benchmark their firm's IT function and its ability to support digitization initiatives and discuss the study's findings with peers through communities of practice.



This paper sets the foundation on which further research can build. However, there are several limitations due to the methodology used. Specifically, limitations relate to the study's nature being subjective and exploratory, which constrains generalizability. Future research should seek to further investigate and empirically validate the study's findings. Future research can also assist in developing a framework, which provides greater clarity into the conditions that facilitate the success or failure of implementing each of the three archetypes and give recommendations to overcome any challenges identified.

## **5 Dissertation Conclusion and Contributions**

### **5.1 Summary of Key Findings**

Three principal research questions around the implications of digital business transformation for executive leadership roles, business-IT alignment, and the IT function motivated this dissertation (see Chapter 1). Guided by the research questions, the three articles that form the core of this dissertation focus on developing a deeper comprehension of mutual understanding between CEOs and CIOs, understanding the role of the CDO and its interplay with the CIO role, and gaining insights into the characteristics and purpose of bimodal IT as a design type of firms' internal IT operations.

The first article (Chapter 2) examines social alignment between CEOs and CIOs by deconstructing the three facets of perceptual congruence (i.e., actual agreement, perceived agreement, and understanding) between the two executives by using White's (1985) perceptual congruence model. Unlike marital relationships, the study underlying this article does not find the CEO-CIO partnership to succumb to the "false consensus effect" (Ross et al. 1977). In fact, the study finds that CEOs and CIOs perceive each other's opinions of key business and IT topics less similar than they actually are. By applying Kenny's (1996) actor-partner interdependence model, the study further identifies the CIO's understanding of the CEO as the crucial direction of understanding that predicts the quality of the CEO-CIO partnership and ultimately a higher level of IT value contribution to the firm. As is the case with most hierarchical relationships, it is more important for the lower ranked executive (the CIO) to understand the priorities and needs of the higher ranked executive (the CEO) than vice versa in order to maximize both individual's satisfaction. CIOs who have a strong business acumen and can easily take the CEO's perspective are hence more successful than those who do not. Lastly, the study finds that CEOs tend to perceive the CIO's opinion on IT topics significantly better than on business topics while CIOs tend to perceive the CEO's opinion on business topics significantly better than on IT topics, which can be explained quite pragmatically by a mutual recognition of subject matter expertise.

The second article (Chapter 3) is concerned with conceptualizing the CDO role and assessing its development in contrast with the development of the CIO role. Through conducting executive interviews and analyzing the results, the study underlying this second article finds four different CDO role-types (digital evangelist, digitization coordinator, digital innovator,

and digital advocate) to exist in practice, with the role-type adopted in companies depending primarily on the CIO role orientation and the implications of digitization perceived by the organization. These CDO role profiles can overlap to some extent with existing CIO role profiles, especially in firms where CIOs have been ambitious but only moderately successful at developing effective demand-side leadership. However, the study acknowledges that not every firm needs a Chief Digital Officer. The four primary factors that determine this need are the pressure for digitization, the need for orchestration of changes within the firm, the CIO role profile and reputation, and the digitization focus areas of the firm. The study further finds that the creation of a CDO role often implies a split of the formerly ambidextrous CIO role, which ultimately shifts the CIO's focus back on supply-side leadership and diminishes the importance of the role. Nonetheless, according to the study results, CDOs tend to strengthen the position of IT within firms by acting as ambassadors for the IT function, which on the other hand requires tight alignment with their CIO counterparts.

In the third article (Chapter 4), the implications of digital transformation for the IT function as such are discussed. The study underlying this article uncovers the role of bimodal IT as a transitional stage in a larger transformation process that the IT function undergoes as it transforms from its traditional supply-side orientation to a more agile and explorative digitization support unit. The study finds three archetypes of bimodal IT to exist in practice, those being: bimodal IT on a project-by-project basis, a structurally subdivided bimodal IT function, and bimodal IT in two separate organizational divisions (one outside the IT function). The three archetypes differ significantly in their intensity of disruption for the organization upon introduction and are associated with their specific advantages and disadvantages. The study also finds that companies occasionally shift their bimodal IT design from one archetype to another archetype, if requirements change or the previous archetype failed to meet expectations. Another major observation that the study articulates is the succession of the transitional bimodal IT stage by a unimodal agile IT function. Bimodal IT is an effective instrument to introduce new methods of working, test new structures, processes, and governance principles, and foster a more innovative culture at the appropriate level of internal disruption (depending on the archetype). However, ultimately this short-term interim stage of costly separation of two IT modes is followed by a reintegrated unimodal IT function that operates at a higher level of agility and ambidexterity than before.

## **5.2 Theoretical Contributions**

All three articles make valuable contributions to the body of IS research and interpersonal relations research, which lie not only in the insights generated but also in the novelty of the applied research models.

The study published in the first article (Chapter 2) makes particular contributions to the field of social alignment research. Other researchers have thus far largely ignored the bidirectionality of CEO-CIO mutual understanding, as it has mostly been treated as an aggregated and unitary concept. By introducing White's (1985) perceptual congruence model to the IS discipline, the study makes important intra- and interpersonal distinctions of perceptual congruence and allows measuring the two directions of interpersonal understanding independently. A multifaceted view on the congruence of CEO-CIO perceptions, distinguishing between actual agreement, perceived agreement, and the prediction accuracy of one another's perceptions (i.e., understanding), has not existed in IS literature before. Furthermore, the application of Kenny's (1996) actor-partner interdependence model allows assessing the effects from the CEO's understanding of the CIO and the CIO's understanding of the CEO separately – a distinction that social alignment research to date has not made. The difference in relative importance of these two directions of understanding is a finding that advances our understanding of the CEO-CIO partnership and assists the IS research community to gain a more nuanced perspective on social alignment and its underlying mechanisms. In fact, the application of White's (1985) perceptual congruence model in combination with Kenny's (1996) actor-partner interdependence model is a novelty not just in business-IT alignment research but also in interpersonal relations research in general. The study has the potential to provoke a shift in research to assess perceptual congruence between individuals from multiple angles and to separate the specific effects in a differentiated fashion, which responds to calls from other social alignment researchers for a more fine-grained view on mutual understanding (e.g., Coltman et al. 2015; Preston and Karahanna 2009b).

The second article (Chapter 3) makes important contributions to the field of executive role research. While there have been a range of publications explaining the CIO role and its evolution (e.g., Chun and Mooney 2009; Peppard et al. 2011), this article marks the beginning of an era of research on the CDO role, which is still at a very early stage. The CDO role and the reasons to create it have thus far been scantily researched. Most research on digital business transformation still assumes that the CIO – as head of the IT function – is in the lead for digital

topics (e.g., Bharadwaj et al. 2013a; Hess et al. 2016), which does not reflect reality in practice. The article's illustration of the four different CDO role-types enhances our understanding of what the role entails and how it can be focused differently given the circumstances of the firm. Furthermore, the study underlying this article provides an extension and valuable update to previous research on the CIO role (Chun and Mooney 2009; Ross and Feeny 1999) as well as the theory of CIO ambidexterity (Chen et al. 2010; Gibson and Birkinshaw 2004; Vidgen et al. 2011). The study interprets the CDO role as a split-off from the CIO role, mainly taking over the aspects of strategic differentiation through external-facing application of digital technologies (i.e., digital strategy) and IT innovation. The CIO role, on the other hand, gradually returns to an "IT Director" type role with strong technological focus, eventually solely responsible for IT supply-side leadership. This confirms previous research that predicts a split in the CIO role (Chun and Mooney 2009; Peppard et al. 2011) and presumes that CIOs will experience less pressure to achieve both effective supply-side as well as demand-side leadership. The study hence poses CIO ambidexterity as a concept that is no longer relevant once CDO and CIO have assumed well-aligned role configurations that divide IT exploration and IT exploitation among the two. These conclusions enhance our knowledge of the scantily researched CDO role and its interplay with CIO role and provide thought-provoking propositions for the IS community.

The third article (Chapter 4) introduces bimodal IT to the academic discourse. It extends existing research on how the IT function should be organized and governed (e.g., Brown 1997; Sambamurthy and Zmud 2000) and explains the reasons for a necessary transformation of the IT function along with the business undergoing digital transformation. With minimal academic research on bimodal IT existing to date, this article can be considered a seminal paper on the topic. The article is the first to distinguish between different archetypes of bimodal IT and the first to predict the subsequent state of a unimodal agile IT function. Similar to the implications of the second article, which discusses the theoretical construct of CIO ambidexterity, this third article questions the appropriateness of demanding contextual ambidexterity from the IT function (see Gibson and Birkinshaw 2004). The concept of bimodal IT rather suggests that mechanisms of structural ambidexterity, with a division between exploratory and exploitative IT activities, precedes a successful contextually ambidextrous IT function. Prior IS literature has largely overlooked this option, although solutions around spatial separation and parallel structures have been discussed extensively in the context of organizational ambidexterity (see O'Reilly and Tushman 2013 for a review).

Overall, the findings presented in the three articles significantly advance academic research on digital business transformation by shedding light on how the IT function transforms along with the business, how CDOs and CIOs alongside of each other effectively manage digital transformation, and how the different facets of perceptual congruence between CEOs and CIOs affect business-IT alignment.

### **5.3 Practical Contributions**

Besides the theoretical contributions, the findings discussed in this dissertation also provide rich and relevant recommendations for practitioners.

On the topic of social alignment between CEOs and CIOs, the first article (Chapter 2) reveals important insights into perceptual congruence as an alignment factor. Effective alignment mechanisms, both on the social as well as the intellectual dimension, are crucial to improve business-IT relationships, which are often plagued by a history of misalignment. The results from the study underlying this first article guide CEOs, CIOs, and their advisors towards achieving higher levels of business-IT alignment. Specifically, it is important to remove negative prejudices on both sides, communicate effectively on controversial topics, and remove tensions from incorrectly perceived disagreement. CIOs should be aware of the pivotal role of their understanding of the CEO, dismiss extensive educational efforts that try to increase CEOs' IT knowledge, and instead spend time enhancing the business acumen of their IT leadership team in order for the business-IT partnership to thrive.

Moreover, this dissertation makes IT executives in practice aware of their changing role in an increasingly digital business environment (see second article, Chapter 3). One of the practical contributions of this work lies in articulating the changing expectations of CIOs, fostering a discussion of the implications between them and their superiors and peers. This allows CIOs to determine the appropriate role profile for themselves and the IT function in their firm. CDOs and those responsible for creating and recruiting for this position can utilize the CDO role-type matrix (see Figure 9) as guidance. The factors that determine the need for a CDO role, identified in the second article, can serve as valuable guidance for board members and members of top management teams who are uncertain about how to react to digitization trends in their environment. It is furthermore of practical relevance to avoid ambiguity and role overlap between CIOs and CDOs, which is discussed in the second article as well.

Lastly, this dissertation guides practitioners in making use of bimodal IT designs. The third article (Chapter 4) conceptualizes the different types of bimodal IT in a practitioner-friendly way and lays out clear guidelines for executives on how to harness this design concept. It informs practitioners about the characteristics of the three different bimodal IT archetypes identified by the study and positions the phenomenon in the broader context of IT transformation. The discovery that bimodal IT is a transitional state rather than an end state for the IT function is a valuable insight that even practitioner research on the topic has thus far not identified.

## **5.4 Limitations and Future Research**

It is important to consider the valuable findings and contributions to research and practice from this dissertation in the light of some limitations that come along with the underlying research.

First, both the quantitative study and the qualitative study that form the basis for the three articles are non-longitudinal with a geographic focus on Europe (especially German speaking countries). The economic conditions and environmental circumstances at the time when the data was collected might have induced a bias, which limits the generalizability of the findings, as might regional attitudes and peculiarities. A longitudinal and less geographically limited perspective on the research topics would be helpful, which provides opportunities for future research.

Second, the both studies were constrained by their sample size. In particular, the qualitative study based on interviews with 19 matched pairs of business and IT executives needs to be interpreted considering this limitation. Given that only seven of the 19 firms in this sample had a CDO at the time the interviews took place, it is arguable whether the four CDO role-types identified are representative in a larger context. Nonetheless, the explorative qualitative study on the CDO role and bimodal IT provides impetus for further research in the domain of digital transformation and its implications for digital leadership roles and the IT function. IS scholars should continue an empirical assessment of the developments around the CDO role, the CIO role, business-IT alignment, and bimodal IT. Further quantitative research should validate the findings and conclusions posited in this dissertation. This should also occur with respect to the novel employment of White's (1985) perceptual congruence mode in combination with Kenny's (1996) actor-partner interdependence model in the context of mutual understanding between business and IT executives.

Lastly, it is worth acknowledging that digital business transformation has large cultural implications for companies, which is an aspect none of the three articles in this dissertation focused on in depth. Changes concerning technology, strategy, products and services, business processes, and executive roles are frequently viewed as key aspects of digital transformation while organizational culture has largely been ignored. Future studies should investigate the role of organizational culture in a digital transformation setting more closely, potentially leveraging theories in the multidisciplinary field of organizational behavior. Concerning not only this aspect but also more broadly, qualitative case studies that investigate fewer cases in more depth might be appropriate to generate additional valuable insights on the topics discussed in this dissertation.

In general, this dissertation provides thought-provoking content for catalyzing discussions in communities of practice and assists practitioners with overcoming the various challenges that lie in digital transformation. The insightful results from the studies contained within this dissertation encourage further research on social alignment, digital leadership roles and responsibilities, and the transformation of the IT function in the context of digital business transformation.



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