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# WE'VE GOT THE POWER – THE RELEVANCE OF IT LEADERSHIP AND ORGANIZATIONAL IT CAPABILITIES IN THE FULLY DIGITIZED BUSINESS ERA

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# WE'VE GOT THE POWER – THE RELEVANCE OF IT LEADERSHIP AND ORGANIZATIONAL IT CAPABILITIES IN THE FULLY DIGITIZED BUSINESS ERA

*Research paper*

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## Abstract

*Modern information technologies allow for an ever increasing digitization of business processes in various industries around the globe. This requires an organization-wide digital mind-set and IT capabilities to react agile in turbulent business environments. Which enabling role CIOs have to develop IT capabilities as necessary predecessor to develop organization-wide strategic IT alignment is still unclear. How strategic IT alignment as means to react to rapid market changes can be achieved as consequence of organization-wide capabilities has not been answered yet. In this research, we capture individual and organizational factors characterizing the CIO position and combine them with two preliminary stages of IT competencies, IT infrastructure and IT capabilities, in a single nomological net to identify their influence on strategic IT alignment. Evaluating the results by means of a broad sample collected within a survey among 141 IT-decision makers in the U.S., our partial least squares analysis supports most of our hypotheses, notably verifying the influence of CIOs on organizational structures and strategic IT alignment, therefore fully mediated by IT capabilities. Building on Mintzberg, we propose strengthening the CIO leadership position furthermore throughout the entire organization to cope with the challenges arising from the ongoing digitization of business processes.*

*Keywords: IT alignment, CIO, leadership, IT capability, IT competence, IT skills, strategy*

## 1 Introduction

In research and practice, the last 25 years have been characterized by the gradual integration of information technology (IT) into businesses, as for coordinating the IT with the business strategy in the concept of IT alignment (Henderson and Venkatraman, 1993), the interplay between IT and business leaders (Preston and Karahanna, 2009), or establishing IT as organizational capabilities (Bharadwaj, 2000; Lu and Ramamurthy, 2011). With technological progress, information sharing and the management of large data volumes increased significantly and is challenging established business processes and business models (Bharadwaj et al., 2013; Coltman et al., 2015). For example, emerging technologies such as the Internet of things, virtual reality, artificial intelligence, or social media analytics have led to totally new functions and possibilities to create agile and flexible business processes (Yoo, 2010; Lasi et al., 2014). Complemented by innovative methods and tools for data analytics and data utilization (e.g. big data, data mining, machine learning (Chen et al., 2012; Yoo et al., 2010; Turban et al., 2014)), organizations are forced to think more intensely about how to further digitize business processes. In order to keep up with the aforementioned challenges, the importance for organizations to develop a digital mind-set increases, consolidated and formulated in “digital business strategies” (Bharadwaj et al., 2013). We propose that IT capabilities distributed evenly across the entire organization are key to deal with the challenges of more advanced business process digitization. Likewise, this re-

search investigates how characteristics of the IT leader, often referred to as the CIO, have the means to influence organization-wide IT capabilities, and how these influence strategic IT alignment.

In this research, we focus on organization-wide IT capabilities, thereby overcoming the limiting perspective of viewing IT capabilities as something that only should reside within the IT department and the IT staff of an organization. Thus, we do not distinguish between IT capabilities of the IT employees and business employees, overcoming the definition of IT skills and competencies as the key capabilities and routines of the IT department for service provisioning services to the organization (Ravi-chandran and Lertwongsatten, 2005; Peppard and Ward, 2004; Duncan, 1995). In this context, we base our understanding of IT capabilities as characterized by a combination of functional facilities and intangible IT resources of an organization, supporting organizational agility, and resulting in enhanced firm performance (Chakravarty et al., 2013). Due to the technical and economic upheavals of digitization and globalization, organizational agility is meant to increase in importance (Coltman et al., 2015). Prior research has shown that IT enables organizations to become more agile in turbulent environments (Pavlou and El Sawy, 2006; Wolf et al., 2012). Building on recent research, an organization's organizational agility can be improved significantly by investments in IT capabilities (Lu and Ramamurthy, 2011; Chakravarty et al., 2013).

How digitization of business processes will change the role of IT strategy and IT alignment need to be assessed (Coltman et al., 2015). Together with the changing role of strategy, organizational structures will also be influenced (King, 2011). New IT infrastructure stimulates a rethinking of traditional structures, control, and change concepts and procedures of IT (Tilson et al., 2010; Henfridsson et al., 2014). In line with King (2011), we call for more research on how technologies and economic changes might influence organizational IT structures and CIO decision making. Based on recent research on important characteristics of a CIO to fulfil leadership functions (Preston et al., 2008; Chen et al., 2010b), this research analyses how the internal standing and organizational support empowers the CIO to influence IT capabilities of IT and non-IT employees. Our findings suggest that the IT leader's managerial role needs to be extended (Mintzberg, 1989; Grover et al., 1993), as the CIO is essential to provide faster organizational responses as well as agility to meet rapidly changing market requests.

In a second step, we analysed how these organization-wide IT capabilities influence IT alignment, the central element for competitive advantage (Kearns and Lederer, 2000). The importance of IT capabilities for IT alignment has been already shown (Fink and Neumann, 2009), but it is still unclear how this might be relevant for organization-wide IT capabilities. The alignment concept in digitized businesses is crucial as IT agility is creating IT alignment, which in turn leads to organizational agility (Tallon and Pinsonneault, 2011; Tiwana and Konsynski, 2010).

This research is one of the first to shed light on the importance of the empowerment of the CIO and related organizational structures on IT capabilities (means to IT agility) to create organization-wide IT capabilities on IT alignment. In so doing, we capture individual and organizational factors characterizing the CIO position (Chen et al., 2010b) and combine them with the two preliminary stages of IT competencies, IT infrastructure and IT capabilities, in a single nomological net to identify their influence on strategic IT alignment. Consequently, in this analysis we mindfully keep the view on the diversity of different organizational levels – going along with the potential to gain insights how to implement the organizational capabilities and what their microfoundations in organizations actually are. We furthermore are interested in how these new economic and technical conditions may influence IT capabilities, IT alignment, and CIO-related power structures. More precisely, we are focusing on the following two research questions:

*Which agency role does the CIO play in influencing organization-wide IT capabilities and how do these comprehensive IT capabilities impact on strategic IT alignment?*

The remainder of the article is organized as follows: first, the theoretical underpinnings and the derived hypotheses of our research model are introduced. In detail, organizational constructs such as IT

capabilities and IT alignment as well as the agency role of the CIO will be discussed here. Further, we examine the results of an online survey among 141 CIOs in the U.S. within a scope of a structural equation model analysis and discuss the derived results with regards to theoretical contributions.

## 2 Literature Background

The role and function of a CIO has gained a lot of interest in research as important driver of IT capabilities for supporting business processes (Banker et al., 2011). The central function of a CIO is to deliver value from IT investments, likewise effectively deploying the IT infrastructure (Peppard et al., 2000). An important part of this is IT management for the development of IT capabilities (Duncan, 1995), whereas IT management covers not solely the management of technological assets such as IT infrastructure (Bhatt and Grover, 2005; Duncan, 1995), but which is also related to operational assets such as IT skills and competencies. IT capabilities are important to realize the full potentials of IT (Mata et al., 1995) to generate IT business value from IT (Chen, 2010). Not surprisingly, the role of IS executives has gained more strategic importance over the years, from head of the tactical IT middle management (King and Teo, 1997; Kearns and Lederer, 2003) to C-level-management and membership in the top management team (Banker et al., 2011).

With the growing emphasis of IT, advanced technical and non-technical competencies turn out to be important to fulfill properly the CIO's function. The different roles and functions of a CIO comprise managerial roles (e.g. leader, figurehead, liaison role), informational functions (spokesman, disseminator), and decision making functions (e.g. resource allocator, entrepreneur) (Mintzberg, 1989; Grover et al., 1993). Especially the leadership component is crucial to the formulation of IT business strategies (Porter, 1996), which in turn leads to substantial contributions of IT to efficiency and strategic growth of the company (Chen et al., 2010b). Becoming part of the board, additional competencies in communication gained importance as well, as the CIO developed into an IT representative (spokesperson) and mediator (liaison function) (Grover et al., 1993). Likewise, for the concept of strategic alignment, the CIO is responsible to explain and promote the IT strategy within the top management team to achieve a common understanding about the importance of IT (Chen et al., 2010a). Similar to the CIO roles as defined by Mintzberg (Mintzberg, 1989; Grover et al., 1993), "strategist", "relationship architect", and "integrator" could be confirmed as relevant CIO roles in another study (Smaltz et al., 2006). The CIO's authority in decision making has a significant impact on the ability of IT to contribute to strategic IT alignment and ultimately, to company performance (Preston et al., 2008). In fulfilling those managerial functions, a CIO cannot only exploit but also explore IT capabilities for future competitiveness through a strong organizational standing (Chen et al., 2010b). Partially based on the conceptualizations of the latter investigation, the research at hand targets advancing the knowledge on a CIO's ability in influencing IT capabilities throughout the whole organization.

The concept of IT capabilities has been extended over time (table 1): Initially based on the activities of the IT function (Duncan, 1995), the scope has slightly been broadened via integrating the view on business-IT relationship (Bhatt and Grover, 2005; Ravichandran and Lertwongsatten, 2005), to, recently, an organization-wide phenomenon (Lu and Ramamurthy, 2011; Chakravarty et al., 2013). The composition of IT capabilities can be differentiated into technical skills and business skills of IT staff complemented by IT skills of end users (Aral and Weill, 2007), likewise this research builds on a similar understanding and conceptualization from a study investigating how IT capabilities enhance organizational agility (Chakravarty et al., 2013). In line with this categorization between IT unit and business employees, agility through IT can be caused either separately by capabilities of the IT staff within the IT department (Fink and Neumann, 2007) or the result of broad IT capabilities of the organization (Lu and Ramamurthy, 2011; Chakravarty et al., 2013). Although IT capabilities can be defined as "a mutually reinforcing system of practices and competencies" (Aral and Weill, 2007), table 1 underlines that the antecedents of IT capabilities are still not well understood. Approximately, we found IT capabilities as second order or multidimensional construct (Lu and Ramamurthy, 2011; Chakravarty et al.,

2013; Bhatt and Grover, 2005), but how the organizational interplay between organizational leaders enhances IT capabilities is still an open question.

Related Study	Scope of IT Capabilities			Predecessors	Consequences
	IT function	Business-IT relationship	Organization wide		
Duncan, 1995	✓	-	-	-	IT service capabilities
Mata et al., 1995 (conceptual)	✓	✓	-	-	Competitive advantage, sustainability
Bharadwaj, 2000 (conceptual)	✓	✓	✓	-	Firm performance
Ravichandran and Lertwongsattien, 2005	✓	✓	-	IT infrastructure flexibility, IS human capital, IS partnership	IT support for core competencies, firm performance
Bhatt and Grover, 2005	✓	✓	-	Organizational learning	Competitive advantage
Aral and Weill, 2007	✓	✓	✓	(IT investments)	Firm performance
Lu and Ramamurthy, 2011	✓	✓	✓	-	Market and operational agility
Chakravarty et al., 2013	✓	✓	✓	-	Organizational agility, firm performance

Table 1. *IT Capabilities: Scope, Predecessors, Consequences*

From an organizational point of view, the discussion about IT alignment revolved around the necessity to expand the IT function discussion from an inside-out to an outside-in view (Henderson and Venkatraman, 1993) which requires IT and business units to mutually shoulder responsibilities for IT alignment (Reich and Benbasat, 2000). IT alignment became one of the top three literature streams in IS strategy research (Chen et al., 2010a), with different categorizations, definitions, research streams, and measurement constructs (Gerow et al., 2014; Coltman et al., 2015). Based on Henderson and Venkatraman's (1993) strategic alignment model (SAM), business-IT-alignment is categorized at three levels: 1) intellectual alignment of business and IT strategy (strategic level), 2) operational alignment of organizational and IS infrastructure and processes (operational level), and 3) combinations of the aforementioned (cross-domain). Intellectual alignment is commonly regarded as strategic alignment, comprising business strategy and IS strategy as predecessors of strategic alignment (Sabherwal and Chan, 2001). Regarding consequences of IT alignment, however, similar to the "value of IT" discussion (e.g. Sabherwal and Jeyaraj, 2015), investments in IT do not always result in the anticipated positive effects such as business process improvements (Bharadwaj, 2000; Aral and Weill, 2007), which can be traced back to the fact that not all companies are capable of deploying IT effectively. Beyond conceptual research, empirical evidence has found that strategic alignment has a significant positive impact on business performance (Chan et al., 2006; Chan and Reich, 2007; Wu et al., 2015). Refining Henderson and Venkatraman's (1993) strategic alignment model, the supposed effect of IT alignment on firm performance was dissolved in support of positive IT influence (Gerow et al., 2014). How a "digital business strategy" (Bharadwaj et al., 2013) influences IT alignment in overcoming the orientation of the IT planning at the business strategy is yet unclear (Coltman et al., 2015). We correspond to the idea of further merging business and IT processes in reflecting unite capabilities of the business and IT side through featuring organization-wide IT capabilities.

Taking antecedents of IT alignment into account, extending the IT alignment conceptualization by a preliminary stage, mental alignment between the top management executives on cognitive (e.g., educational mechanisms, shared understanding, structural systems of knowing) and social level (e.g., relational similarity, shared language, social systems of knowledge) is regarded as prerequisite for intellectual alignment (Preston and Karahanna, 2009). In-line with these alignment concepts, recent research concentrates on complex networks and how socio-organizational structures enforce IT alignment (Karahanna and Preston, 2013; Preston and Karahanna, 2009; Preston et al., 2008). The meas-

urement of strategic alignment initially was characterized by two-dimensional concepts (Kearns and Lederer, 2000; Sabherwal and Chan, 2001) in favour of unidimensional scales in recent research (Preston and Karahanna, 2009; Valorinta, 2011; Yayla and Hu, 2011). Characteristic to all these analyses turns out the investigation on strategic and decisional level, so that either business or IT managers were interviewed (Reich and Benbasat, 2000). Likewise, the perspective concentrates on the IT department by means of integrating technical aspects such as IT infrastructure in IT alignment research (Fink and Neumann, 2009). Lately, research has further focused on the analysis of antecedents of operational alignment, examining employee level instead of C-level activities (Schlosser et al., 2015). Recent research found first evidences how firms with defender strategies react on environmental uncertainty via IT alignment (Chan et al., 2006). On the enterprise level, organizational agility can be driven by IT alignment, which itself is enforced by IT agility (Tallon and Pinsonneault, 2011; Tiwana and Konsynski, 2010).

### 3 Research Model and Hypotheses

On functional level, prior research has already identified the impact of peripheral knowledge alignment between IT and business employees on strategic agility (Tiwana and Kim, 2015). In this research, we widen the view on organization-wide IT capabilities, assess the role of the CIO and related organizational structures as enabler for IT capabilities and consequently for strategic IT alignment. The proposed research model (figure 1) builds on hypotheses delineating how CIO characteristics contribute to enhance IT infrastructure, IT capabilities, and subsequent IT competencies. Hereafter, we investigate the influence of these CIO controlled capabilities on the degree of strategic alignment. Globally, we set out to outline the interrelation between organizational roles and structures on resulting capabilities as well as on the organizational success factor of strategic alignment for the future of digitized businesses.

#### 3.1 The cascading effects of CIO characteristics

In the following, we will briefly discuss the individual human capability factors of the CIO as relevant determinates for an organization-wide IT capability. Human capital comprises individual skills, experiences, and knowledge of the CIO relevant to generate value for the organization (Snell and Dean, 1992). The concept of human capital originates from education research and has been used to assess potential new employees in human resource management processes. Applied to CIOs and their human capital, it can be conceptualized as IT experience, organizational tenure, and level of education (Chen et al., 2010b). Having a long track record as IT manager might have positive influence on organizational effects and perceptions towards the CIO (Mata et al., 1995). We propose the level of education as a likely predictor of a CIO's influence, as more knowledgeable CIOs are proven to participate in top management decision making (Armstrong and Sambamurthy, 1999). Furthermore, the business knowledge of a CIO positively influences a shared language between the other board members and the CIO (Preston and Karahanna, 2009). As the CIO's structural power expresses the closeness of the IT executive to the board, we propose:

*H1: CIO human capital has a positive impact on the CIO structural power.*

The CIO reporting structure to other top management leaders is a further illustration of the allocation of power and control conferred to the IT executive in an organization (Banker et al., 2011). The higher the structural power of the CIO, the higher the perceived strategic decision-making authority of the IT leader in the organization (Preston et al., 2008). The higher the formal and informal interplay between the CIO and other top managers, the higher a CIO's ability to transfer value-creating information and relevant insights to top management colleagues (Armstrong and Sambamurthy, 1999). A high communication frequency among members of the board leads to mutual understanding about the role of IT and its necessity for adequate IT funding (Johnson and Lederer, 2005). Organizational support for IT expresses the degree and intensity in loyalty to the IT department and an organization's willingness to

contribute to IT initiatives (Preston et al., 2008) and plainly measures the amount of the IT budget and the ability of the CIO to stay within the dedicated (Feeny et al., 1992). It can be assumed that a functioning CIO reporting structure very likely depends on the fit between the CIO and other C-level-managers, influencing the support of relevant IT initiatives (Banker et al., 2011). Therefore, we suggest:

*H2: CIO structural power has a positive impact on organizational support.*

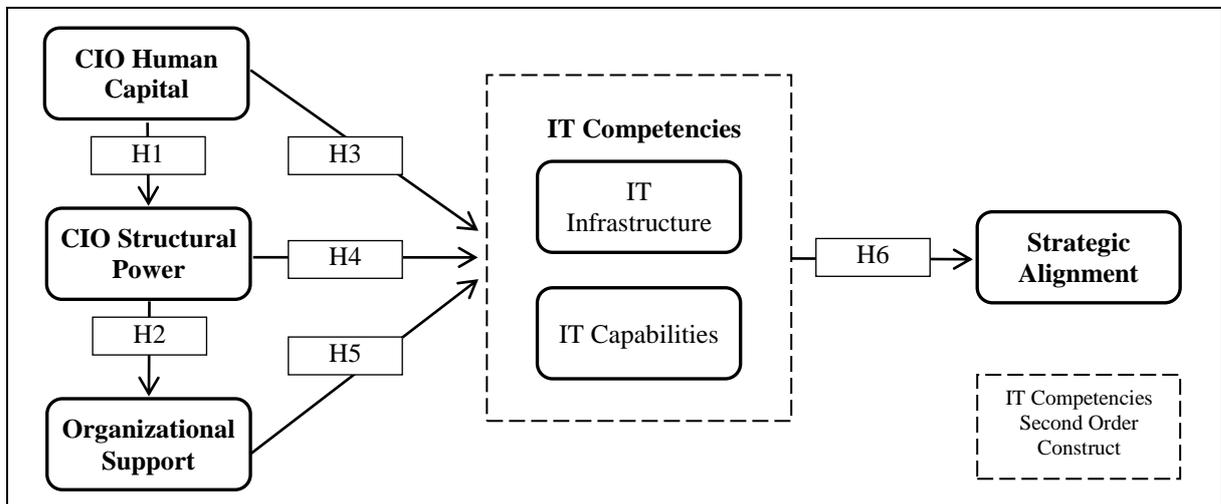


Figure 1. Research Model

### 3.2 The role of the CIO to organizational IT capabilities

Information systems comprise the technological infrastructure, the human management of the IT assets, as well as its organizational implementation alike (Chen et al., 2010a). Sound IT capabilities allow the full exploitation of the IT infrastructure. An organization's operational agility was shown to increase along with investments in IT capabilities (Lu and Ramamurthy, 2011; Chakravarty et al., 2013). Whereas IT resources constitute to support business processes, IT competencies open up potentials for developing new business strategies (Henderson and Venkatraman, 1993). Based on IT infrastructure and IT capabilities jointly conceptualized as IT competencies, we now focus on the ability and function of the CIO in influencing them (Peppard and Ward, 2004). Information systems became the backbone of value generation for enterprises, accompanied by key responsibilities of CIO to be in charge of the routine to keep the infrastructure updated and apply regularly investments to maintain state-of-the-art IS (Feeny et al., 1992). Based on the presented human capital concept, in our research we focus on IT capabilities that capture technical IT skills as the IT-related expertise of human capital (Ravichandran and Lertwongsatten, 2005; Peppard and Ward, 2004; Peppard et al., 2000) and adequate knowledge about IT compared to competitors (Peppard and Ward, 2004; Lu and Ramamurthy, 2011). Additionally, we focus on the CIO's human capital and his or her impact on organizational IT capabilities within an organization, since CIOs are supposed to possess both IT and business knowledge (Armstrong and Sambamurthy, 1999). Thus, we propose:

*H3: CIO human capital has a positive impact on IT competencies.*

A strong IT leadership position is meant to establish adequate IT capabilities noted as a precondition for effectively deploying the precise IT resources (Chatterjeem et al., 2001). A CIO's structural power strengthens the management freedom and flexibility of a CIO in decision making (Preston et al., 2008). Exceeding the traditional perspective of IT management as the accountability for operating IT infrastructure, IT services provision to the organization, and hiring and organizing suitable IT staff to perform the necessary tasks (Feeny et al., 1992), the CIO shall be organizational empowered to overcome the boundaries of the IT function and influence organizational IT capabilities. To this end, we

would like to verify the effect of strong organizational IT leadership on organization-wide IT competence:

*H4: CIO structural power has a positive impact on IT competencies.*

Providing a resilient strategy for IT and effectively planning therefore are parts of valuably integrating business demands in IT leadership (Lu and Ramamurthy, 2011). Strategic planning capabilities and effectively pursuing an IT vision demonstrates strategic effectiveness of a CIO (Preston et al., 2008). Investments in IT infrastructure are essential to implement IT services to the organization to keep up the business (Peppard and Ward, 2004). The CIO acts as “resource allocator” (Grover et al., 1993), which means that more organizational support and resources dedicated to the CIO create opportunities to maintain a competent team to implement the CIO’s vision and put innovation to work (Armstrong and Sambamurthy, 1999). Thus, we explore the organizational willingness to enforce such visionary actions by the hypothesis:

*H5: Organizational support has a positive impact on IT competencies.*

### **3.3 Organizational IT capabilities as antecedents of strategic alignment**

IT capabilities are proven to positively impact on firm performance (Bharadwaj, 2000), strategic alignment supplementary mediates the influence to organizational performance (Wu et al., 2015). At the common view, IT skills are the relevant techniques IT staff must maintain to gain IT competencies throughout processes and organizational structures (Peppard and Ward, 2004). Indeed, organizational IT capabilities must cover the IT skills of end user additionally to technical and business skills of the IT staff (Aral and Weill, 2007). Organizational IT capabilities also characterize a synergy of IT resources and corresponding organizational resources, comprising the potentials for gaining not instantly imitable competitive improvements (Bharadwaj, 2000). Likewise, the management capability of planning as well as maintaining state-of-the-art IT infrastructure and still maintain a relevant facet of IT capabilities (Aral and Weill, 2007). Whereas the influence of both IT capabilities and IT alignment on organization success seems to be stated, we would like to analyse in detail the effect of firm-wide IT capabilities on IT alignment and therefore propose:

*H6: IT competencies have a positive impact on strategic alignment.*

## **4 Research Methodology and Data Collection**

### **4.1 Survey data, sample, and data preparation**

A quantitative survey was conducted among senior IT decision makers in the U.S., resulting in N=141 complete questionnaires, to validate our research model (figure 1) and the proposed hypotheses. During August and September 2015, participants of a CIO panel operated by a large international market research institute were asked to participate in the online survey. Applying measurement constructs already validated within extent studies, we were able to achieve high reliable results by means of conducting a survey for data collection (Straub, 1989). The survey was conducted on our behalf and was based on our own online survey tool. We controlled for firm size and only considered companies of at least 100 employees or more, having IT departments with more than two employees, to assure for staff responsibilities of the CIO. To guarantee for IT decision makers only, at the beginning of the questionnaire we filtered again for the degree of participation in IT decision making, collecting for the two highest out of five values. To ensure appropriate data quality, we implemented plausibility checks for several items and three track questions to check for consistent answers. As a result of these procedures, we eliminated 21 respondents from the gathered data. Presenting the sample characteristics in table 2, the surveyed values of job positions measured at the end of the questionnaire verify this procedure: 80% of our sample are CIOs and IT directors on strategic and tactical level, measured by the scale presented by Sharma and Rai (2015). As already mentioned, we apply the designation “CIO” in

the following as aggregation for all IT leader respondents in our sample. The average organizational tenure of the respondents of 12 years signals a mature IT decision maker sample, corresponding to a high professional IT experience. The affiliation in the current organization is higher than in a comparable study (Aral and Weill, 2007), but there you find 50% IT decision makers only. The CIO tenure of 12.18 years appears consistent to prior findings of Lu and Ramamurthy (2011) stating an average affiliation of ten years with the current company.

Age			Organizational Tenure Ø 12.18 years			IT Experience Ø 16.2 years				
20-25	4	2.84%	1-4	19	13.48%	1-4	9	6.38%		
26-35	25	17.73%	5-9	42	29.79%	5-9	15	10.64%		
36-45	49	34.75%	10-14	35	24.82%	10-14	33	23.40%		
46-55	41	29.08%	15-19	20	14.18%	15-19	29	20.57%		
56-65	18	12.77%	20-24	9	6.38%	20-24	30	21.28%		
66-75	4	2.84%	25-29	8	5.67%	25-29	12	8.51%		
<b>Total</b>	<b>N=141</b>	<b>100%</b>	30-40	8	5.67%	30-40	13	9.22%		
Gender						Reporting Level (distance CIO – CEO)				
male	87	61.70%				0 (direct)			69	48.94%
female	54	38.30%				1			43	30.50%
Job Position										
CIO / vice president of IT, chief technology officer, chief security officer				55	39.01%	2	23	16.31%		
director of systems development, director of IT/IS operations, internet technology strategist				59	41.84%	3	4	2.84%		
other IT decision makers				27	19.15%	4	2	1.42%		

Table 2. CIO Characteristics

Industry Sector (n>5)			Country		
Banking / Financial Services	13	9.22%	United States	141	100%
Retail Industries	13	9.22%	States (N>6)		
Education / Training	11	7.80%	California	26	18.44%
Computer Services	10	7.09%	Illinois	11	8.51%
Healthcare / Medical	9	6.38%	Texas	12	8.51%
Industrial Manufacturing	8	5.67%	New Jersey	10	7.09%
Consulting	7	4.96%	New York	9	6.38%
Transport / Transportation Services / Logistics	7	4.96%	Massachusetts	8	5.67%
			Pennsylvania	8	5.67%
Others	63	44.68%	Others	57	40.43%
<b>Total</b>	<b>N=141</b>	<b>100%</b>	<b>Total States reported</b>	<b>44 of 50 88.00%</b>	

Table 3. Firm Characteristics

An analysis of firm characteristics indicates a good range in the numbers of employees, the firm’s age, as well as the size of the IT department. The average firm in our sample was founded in 1970, had 15.775 employees and an IT department supported by 366 (standard deviation of 1,305). Firm size approximately shows a normal distribution, peaking at 1,800 employees. With selected sample characteristics using the Pearson Correlation significant at 0.01 level, firm size correlates with the size of the IT Department at 0.492 suggesting a positive relationship as well as a broad data foundation for general results. Regarding the largest industry sectors featured in our sample, strongly IT-based sectors are represented more than five times more often. Including 44 of the 50 states of the U.S. (table 3) and summing up, the sample provides an adequate view on CIOs in different industries in the U.S.

## 4.2 Operationalization of constructs

All measures were informed by prior academic findings that have been published in one of the AIS senior scholar basket journals. In the operationalization of our constructs, we consciously stayed as close as possible to the original ones to keep our results comparable to former studies, as well as to contribute to constant scale deployment in IS research. Partially, we refined scales to develop them towards a more ordinal or ratio scaling to improve results against nominal measurement (table 4).

<b>CIO Human Capital</b> (Chen et al., 2010)	
CIO Human Capital 1	IT Experience: How many years of work experience do you have as an IT professional? (measured in years)
CIO Human Capital 2	Organizational Tenure: How long have you been with your current organization? (measured in years)
CIO Human Capital 3	What is your level of education? (dropped) (High school / associate's degree / bachelor's degree / master's degree)
<b>CIO Structural Power</b> (Chen et al., 2010; Preston and Karahanna, 2009; Preston et al., 2008)	
CIO Structural Power 1	I interact with TMT members on a formal basis (e.g., official meetings, work-related phone calls, etc.)
CIO Structural Power 2	Which of the following best describes your involvement with the top management team of your company (TMT)? (formal member / weekly / monthly / half a year / yearly or less often)
CIO Structural Power 3	How many reporting levels are between you and the CEO? (direct report / two levels / three levels / four levels / five or more levels)
<b>Organizational Support</b> (Chen et al., 2010; Preston et al., 2008)	
Organizational Support 1	The IT department in our organization is poorly funded. (reverse coded)
Organizational Support 2	Our organization provides the necessary resources for strategic IT initiatives.
Organizational Support 3	The organization ensures that IT initiatives receive the proper support to be successful.
<b>IT Infrastructure</b> (Chakravarty et al., 2013)	
IT Infrastructure 1	We have strong IT planning capabilities.
IT Infrastructure 2	We have extensively invested in building our IT infrastructure.
IT Infrastructure 3	We have state-of-the-art IT infrastructure.
IT Infrastructure 4	We regularly update our IT assets.
<b>IT Capabilities</b> (Chakravarty et al., 2013)	
IT Capabilities 1	We have strong technical IT skills.
IT Capabilities 2	We have adequate knowledge about IT.
IT Capabilities 3	Our IT skills are comparable with the best in the industry.
IT Capabilities 4	We invest heavily in our IT human resources.
IT Capabilities 5	We have a good understanding of the possible benefits of IT applications.
<b>Strategic Alignment</b> (Preston and Karahanna, 2009)	
Strategic Alignment 1	The IT strategy is congruent with the corporate business strategy in your organization.
Strategic Alignment 2	Decisions in IT planning are tightly linked to the organization's strategic plan.
Strategic Alignment 3	Our business strategy and IT strategy are closely aligned.
Unless specified, constructs measured by 5-point Likert scale, 1=completely applicable, 5=not applicable at all	

Table 4. Measurement Items

The measurement scales for the CIO characteristics were mainly taken from a study focused on CIO executives (Chen et al., 2010b). Hence, we capture CIO human capital as the IT leader's professional IT experience, membership in the company as IS professional, and the level of education. For CIO structural power (Chen et al., 2010b; Preston et al., 2008; Bradley et al., 2012), we decided to add the third item consistent with Preston and Karahanna (2009) to measure the extent of formal communica-

tion and between the CIO and the CEO as well, e.g. official meetings, work-related phone calls, etc.. The degree of organizational support for CIO initiatives was obtained from (Chen et al., 2010b; Preston et al., 2008). IT competencies are operationalized from a study among top managers involved in strategic decision making (Chakravarty et al., 2013), as they are accelerating internal business processes first before they subsequently change the respective industry. As our sample consists of IT decision makers, we explicitly advised respondents to rate the overall IT capabilities of the organization, to assure differentiation from IT function capabilities. This item set serves as a suitable basis for measuring firm wide IT competencies due to its two dimensional structure: we adopt the second-order construct subdivided into an IT infrastructure and IT capabilities dimension. Therefore, we conceptualized IT infrastructure by the adequacy of IT assets as means to gain competitive advantage (Kearns and Lederer, 2000), complemented by the degree of IT planning activities and investments in IT infrastructure. IT capabilities are measured using five items, that capture technical IT skills, IT knowledge, and IT experience of the entire organization (Mata et al., 1995). Further, the capabilities are represented by the overall investments into human resources (Croteau and Bergeron, 2001). IT alignment was surveyed as unidimensional strategic alignment and conceptualized based on two well acknowledged IT alignment studies (Preston and Karahanna, 2009; Karahanna and Preston, 2013). Here, two items express the congruence of business and IT strategy consistent with the traditional definition (Sabherwal and Chan, 2001), while we cover the dynamic quality of alignment as one that for time-to-time adjustment (Chen et al., 2010a). To capture the complexity and interweaving of business and IT strategy, we furthermore include an item expressing the way of how decision making in IT is interrelated to the overall business strategy.

### 4.3 Measurement model validation

Overall, the measurement model consists of four reflective constructs and one reflective-formative second-order construct. Before analysing the path relations and their importance, we test the reflective measurement constructs for construct reliability, convergent validity, and discriminant validity. For construct reliability, we evaluated the average variance extracted (AVE) and the composite reliability (CR) (table 4). All calculated values surmount the proposed threshold of 0.5 for AVE (Chin, 1998) and 0.7 for CR. Additionally, we scored Cronbach's alpha and all coefficients except for CIO human capital and IT alignment above the desirable lower threshold of 0.6 (Nunnally et al., 1967). Finding the CR value for these two constructs above the recommended value of 0.7 and cross-loadings on other constructs low, we accept it as a minor issue. Especially the marginal value of IT alignment may be caused by the high degree of explanation contributed by the second-order construct (Hair et al., 2013). We conceptualized this as close as possible to the original source as reflective-formative second-order construct (Chakravarty et al., 2013; Edwards, 2001) and considered the balance of the indicators of the lower constructs to avoid biases (Ringle et al., 2012). Although the evaluation criteria for the lower constructs apply, we added the values for the second-order construct for cross-checking in table 4 (Hair et al., 2013). In a second step, discriminant validity was assessed by computing the inter-correlations between the latent variables according to the Fornell and Larcker criterion (Fornell and Larcker, 1981; Gefen et al., 2000).

Based on a data set of 141 respondents, we conducted the data analysis as structural equation model (SEM) based on a partial least square approach using the SmartPLS software tool (version v.3.2.6, Ringle et al., 2016), with results presented in figure 2, employing a 500 sample bootstrapping technique for model assessment (Chin, 1998). For evaluating the explanatory power of the dependent variable of strategic alignment, we controlled for firm size, firm age, kind of industry, number of employees of the IT department, and state no significant findings. The  $R^2$  values of the dependent constructs IT infrastructure (0.842), IT capabilities (0.891) and 0.454 for strategic alignment indicate constantly strong amounts of variance explained by the model (Chin, 1998). To assure an appropriate significance level for the path coefficients in the latter analysis, we removed the item CIO human capital 3 (Jarvis et al., 2003). Reviewing the relevant p-values for derivation of statistically definite conclu-

sions, five of the proposed six hypotheses were finally supported (figure 2). Precisely, three hypotheses were confirmed highly significant at 0.001 level, and two significantly close to the medium threshold ( $p=0.015$ ,  $p=0.019$ ). One hypothesis was rejected as found insignificant ( $p>0.05$ ). Finally, the mediation analysis according to the prescribed procedures based on distribution independent bootstrapping results (Hair, 2014; Preacher and Hayes, 2008) identified the reported effects in the measurement model as fully mediating. Thus, the succeeding analysis consequently fully concentrates on the theorized hypotheses since no significant influences of the independent variables on the dependent target variable strategic alignment have been found ( $p>0.10$ ,  $p>0.20$ ,  $p>0.30$ ). To exclude common method bias, we applied the Harman single factor test to verify that no more than 50% of the total variance of all items may be explained by one single component (Podsakoff et al., 2003).

Construct	AVE	CR	Alpha	R <sup>2</sup>	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CIO Human Capital (1)	0.659	0.791	0.517	-	<b>0.812</b>						
CIO Structural Power (2)	0.575	0.801	0.648	0.001	0.035	<b>0.759</b>					
Organizational Support (3)	0.619	0.830	0.697	0.292	-0.043	0.540	<b>0.787</b>				
IT Infrastructure (4)	0.591	0.852	0.767	0.842	0.123	0.387	0.627	<b>0.769</b>			
IT Capabilities (5)	0.590	0.877	0.825	0.891	0.174	0.510	0.561	0.735	<b>0.768</b>		
IT Competencies (6)	0.512	0.904	0.880	0.465	0.160	0.489	0.636	0.917	0.944	<b>0.715</b>	
Strategic Alignment (7)	0.594	0.734	0.593	0.454	-0.039	0.424	0.546	0.666	0.591	0.634	<b>0.673</b>

AVE = Average Variance Extracted; CR = Composite Reliability; Alpha = Cronbach's alpha;  
R<sup>2</sup> = coefficient of determination; square root of AVE shown on diagonal

Table 4. Reliabilities and Correlations

## 5 Discussion of the Research Results

Our results underline the important influence of a strong CIO position on strategic alignment, whereby fully mediated by key responsibilities of the CIO's responsibilities, namely building organizational IT competencies. We underline the strong relationships between CIO structural power, organizational support and IT competencies (H2 + H5). Starting at the CIO structural power as central part of our research model, we find highly significant impact of the organizational standing of the CIO on received organizational support for IT initiatives (H2). As highlighted already by extant results (Preston and Karahanna, 2009; Chen et al., 2010b; Preston et al., 2008), we support common findings on the CIO's interaction with the senior business executives to work as essential predecessor for a productive organizational atmosphere around IT concerns. Furthermore, organizational support for IT highly influences firm-wide IT competencies (H5). We therefore confirm the assumption that allocated and apparent power of the CIO strengthens the backing for IT issues in an organization (Banker et al., 2011) as organizational support expresses the consciousness of an organization about the importance of IT – represented by IT funding.

Due to the strong effects of H2 and H5, the direct impact of a CIO's structural power on IT competencies is heavily mediated, but keeps significant at 5%-level. Looking deeper at the CIO structural power construct, it mainly describes the interaction of the CIO with the top management team (TMT). Whereas the shared understanding (Reich and Benbasat, 2000; Preston and Karahanna, 2009; Chen et al., 2010b) between business and IT leader seems to have bear fruit in resulting organizational support on managerial level (H2), this managerial level-oriented construct has significant, but yet gradable impact on firm-wide IT capabilities (H4). The differences between these two paths suggest the CIO as readily accepted as highest legitimized IT representative on the strategic level, but less throughout the entire company, e.g., for business users. We propose this underrepresented connection as essential potential to the future challenges of digitized business models, constituting the direct influence of the CIO on firm-wide IT capabilities. The strong mediation of H2 and H5 on H4 suggest the established operations of board approved support for IT initiatives. We conclude that the CIO's position as IT

leader to the entire organization is not as developed as his competence as resource allocator or entrepreneur, corresponding, e.g., to organizational support, which is in line with Mintzberg’s findings regarding managerial roles (Mintzberg, 1989; Grover et al., 1993). Thus, we support the necessity to force the leadership component in addition or in exchange to the C-level designation, thereby underlining the arguments made by King (2011). Further, we propose to strengthen the direct influence on organizational IT capabilities by intensifying Mintzberg’s supplementary interpersonal parts of the CIO position within digitized businesses: the liaison role to foster the interconnectivity to business workers and especially an accepted perception as figurehead for IT throughout the whole organization.

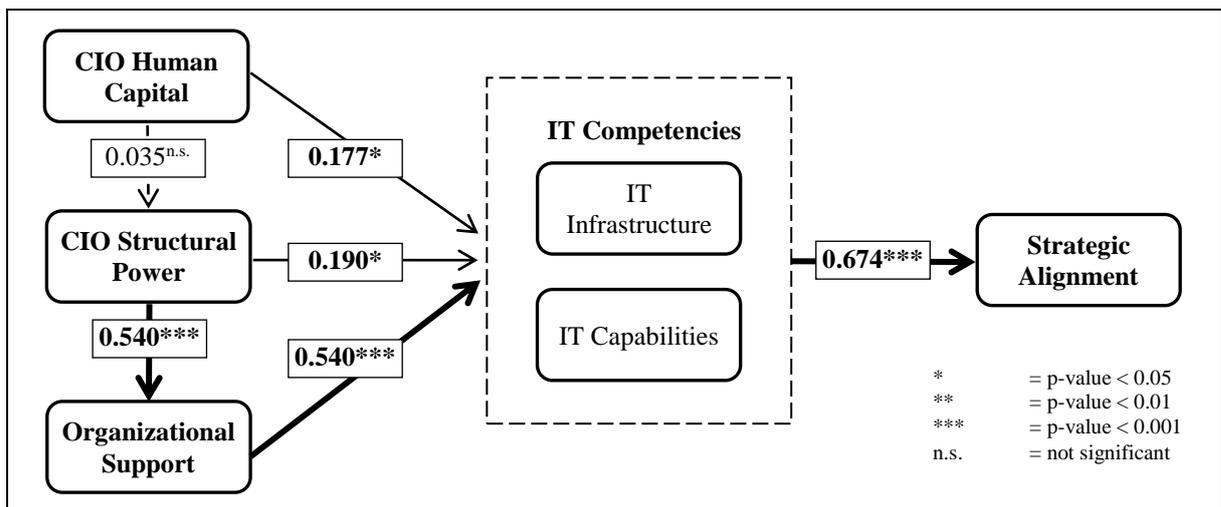


Figure 2. Resulting Research Model

Additionally, a minor effect of CIO human capital on IT competencies has been found (H3), assuming that the experience and organizational knowledge of the CIO, namely organizational tenure and IT experience, indicate a weak but present influence of the CIO’s human resource factors on IT capabilities. A direct effect of the CIO’s human capital on structural power could not be detected (H1). This rejected connection between the CIO’s personal factors and the engagement with the TMT may arrive with regards to reliability problems of the CIO human capital construct.

Finally, we highlight the stable connection between organizational IT competencies and strategic alignment (H6). Our results exceed prior findings in similar contexts (Croteau and Bergeron, 2001; Croteau and Raymond, 2004; Fink and Neumann, 2009). This strong impact of IT capabilities on alignment confirms the potential to gain competitive advantage of IT resources (Kearns and Lederer, 2000) - whereas in digitized businesses dominant market positions may fade quickly due to fast imitations of internal digital structures such as alignment (Porter, 1996; Bharadwaj et al., 2013; Coltman et al., 2015). We thus will discuss the implications of our findings on strategy, leadership, and capabilities management in the conclusions.

## 6 Conclusion, Limitations, and Further Research

The analysed research model focuses on the function and organizational framing of the CIO, the consequences in resulting IT competencies (in the form of IT infrastructure and IT capabilities) which in turn influence the extent of strategic IT alignment. Thus, this study contributes to the literature stream about antecedents and consequences of IT capabilities, organizational leadership theory on management, and alignment theory in the following way. Digitization and globalization generate new options to exploit data and to communicate directly or automatically, business processes and entire business models rely on IT, which we call digitized businesses. As an answer to these new challenges for organizations, we apply IT capabilities as answer to enforce data management, data analyses, and conse-

quent decision support (Chakravarty et al., 2013). To have digital options on hand, agile business (re)actions are crucial especially in turbulent environments (Pavlou and El Sawy, 2006; Wolf et al., 2012), based on IT capabilities as foundation to digitized businesses (Bharadwaj et al., 2013). Consequently, we provide a deeper look at IT capabilities in this research – especially on organization-wide IT capabilities – and its CIO related predecessors and consequences to strategic IT alignment. Consequently, we have expanded the view of IT capabilities from the IT function to the whole organization, in consequence integrating business IT competencies as well. We found first evidence for the existence of a digital mind-set in shape of organization-wide IT capabilities.

Generally, we find a strong organizational influence of the CIO depending on his or her structural power. This can be interpreted as an increased awareness of organizations about the relevance of IT. Our research also discloses the lack of direct influence of the CIO position on organizational IT capabilities. Having achieved acceptance within the TMT, strong organizational support is still essential for the CIO to influence organization-wide IT capabilities. This weak direct impact bears potential to reinforce the CIO as leader to IT concerns influencing the entire organization. We propose to reinforce the CIO's position as IT leader, but magnify his or her organizational charisma as leader according to the managerial role as defined by Mintzberg (Mintzberg, 1989; Grover et al., 1993). To install and reinforce necessary IT capabilities within organizations, complementary liaison functions probably enhance the CIO's influence on organization-wide IT capabilities even further. Especially standing the challenges in turbulent environments, we state it as necessary for the CIO to serve as such "advocate" for IT concerns - towards business employees as well as gaining advanced autonomy and decision-making authority. King (2011) consequently proposes more social leader qualities to promote IT interests in the future than "role-holders" (King, 2011, p.135). Future concepts for the CIO position should therefore implement flexible management techniques, which connects to the research in the field of IT governance (Weill and Ross, 2004). Moderately, the human resource factors of the CIO, namely IT experience and organizational tenure, influence organizational IT capabilities less than the organizational factors of structural power and support for IT initiatives. To our knowledge, we are the first to show the influence of organizational predecessors for organization-wide IT capabilities.

Our results about the effect of organizational IT competencies on IT alignment support recent findings (Tiwana and Kim, 2015), but extend existing discoveries (Fink and Neumann, 2009) with the evidence of linking organization-wide IT capabilities with strategic IT alignment. We therefore develop the research about capabilities alignment from a managerial level (e.g. Croteau and Raymond, 2004) to the entire organization. The strong relation from IT capabilities on IT alignment may underline the relevance of both constructs to organizational agility (Tallon and Pinsonneault, 2011; Chakravarty et al., 2013). Thus, organizations seem to be taking advantage of these resources to act on digital markets. Thus, we are able to trace back the CIO's influence to the IT leader's organizational characteristics.

As to all research, there are several limitations to consider that concurrently represent venues for further research: For this analysis, we used an established IT alignment measurement (Preston and Karahanna, 2009; Karahanna and Preston, 2013). To correspond to the concept of a unite digital business strategy (Bharadwaj et al., 2013) and supporting the ongoing fusion of the business process and the IT process, a renewed conceptualization of the IT alignment construct might be appropriate to further explore the investigated circumstances (Coltman et al., 2015). Especially the digital business strategy (Bharadwaj et al., 2013) and its influence on the strategy based business-IT alignment construct needs further investigation. Second, the reported number of employees and size of IT departments leads to more general results - characteristics and specialties of different industry types or firm sizes could be investigated in this context possibly more deeply, for instance via subgroups of the sample or further qualitative research such as case studies. As to the method of data collection, as mentioned the sample was gained within a professional online panel, whereby a certain bias of common characteristics among the respondents may influence the generalizability of the results at hand in contrast to a fully random sample. Further, we asked CIOs for their self-assessment of the firm's IT capabilities which is probably biasing the evaluation of the IT capabilities construct in favour of surveying IT experts.

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