CO-CREATING VALUE - THE DYADIC CDO-CIO RELATIONSHIP DURING THE DIGITAL TRANSFORMATION

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CO-CREATING VALUE - THE DYADIC CDO-CIO RELATIONSHIP DURING THE DIGITAL TRANSFORMATION

Research in Progress

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Abstract

Previous studies have shown that if both positions exist in a company - CDOs and CIOs tend to share their tasks and responsibilities and, accordingly, closely interact during the digital transformation of their firms. How exactly this interaction looks like, however, has not yet been investigated in more detail. Our study aims at filling this gap by providing a better understanding of how CDOs and CIOs coordinate their tasks and responsibilities. We investigate how aspects such as a shared understanding regarding the digital transformation of their firms and the existence of a transactive memory system (TMS) influence the CDO-CIO dyad. In order to generate in-depth insights into how CDOs and CIOs collaborate, we adopt a multiple case study approach across companies and industries and are currently in the process of data collection and analysis. Our emergent findings provide first insights into how a fruitful collaboration can look like. We believe that the final results of this study will offer firms guidance on specific actions they can take in order to positively influence the collaboration between CDOs and CIOs during the digital transformation.

Keywords: Digital transformation, Chief Digital Officer, Chief Information Officer, Shared Understanding, Transactive Memory System.

1 Introduction

The notion that IT has the potential to transform businesses is not a new one (see e.g. Venkatraman, 1994). If firms engage in IT-enabled business transformations, they make strategic efforts to increase their ability to compete more effectively with IT (Gregory et al., 2015). The associated managerial aspects mainly concern IT portfolio decisions, IT platform design, IT architecture change, or IT program governance and delivery (Gregory et al., 2015). Hence, the focus of IT-enabled business transformation is on the different aspects of IT application. In recent years, digital technologies have begun to fundamentally transform business strategies, business processes, firm capabilities, products and services (Bharadwaj et al., 2013). These digital technologies are combinations of information, computing, communication, and connectivity technologies and have taken center stage in firms’ transformational activities (Bharadwaj et al., 2013). Accordingly, firms that go through a digital transformation conduct initiatives to explore and exploit new digital technologies. This digital transformation goes beyond merely digitizing resources and involves the transformation of key business operations, products, and processes, culminating in revised or entirely new business models and a firm’s value and revenues being created from digital assets (McDonald and Rowsell-Jones, 2012; Matt et al., 2015). Thus, the digital transformation fuses IT innovation, which focuses primarily on process innovation (Swanson, 1994), and digital innovation, which focuses primarily on product innovation (Yoo et al., 2010). A digital transformation typically involves a digital business strategy, which goes beyond systems, technologies and efficiency as well as the functional thinking of the IT strategy, and revolves around the leveraging of digital resources to create differential value (Bharadwaj et al., 2013). Consequently, the digital transformation encompasses a wide range of tasks and activities that are complex, cross-functional and interdependent, which makes it increasingly difficult for one person, e.g. the
Chief Information Officer (CIO), to assume all of them on their own (Horlacher and Hess, 2016). On top of that, the recent wave of digital technologies, which made the digital transformation possible in the first place, demands completely new mind and skill sets than previous waves of transformative technology (Fitzgerald et al., 2013). Consequently, companies need to assign and spread managerial responsibilities adequately across managers to ensure a successful digital transformation. Some firms do so by complementing their CIOs with newly appointed Chief Digital Officers (CDOs). Horlacher and Hess (2016) studied the managerial roles of CDOs and also gave first insights into the collaboration between CDOs and CIOs during the digital transformation. They found that CDOs and CIOs closely collaborate and that their relationships are symbiotic and interdependent. Yet, responsibilities are clearly divided, with CIOs mainly providing their IT expertise and CDOs adding their business-related know-how.

With this study, we wish to analyze the dyadic CDO-CIO relationship more closely for two reasons. First, we observe an urgent need for collaboration and expertise coordination as the digital transformation is a complex and cross-functional endeavor and both CDOs and CIOs possess distinct expertise, which is equally relevant and needed during the digital transformation. Firms need to know which actions they can take in order to ensure that CDOs and CIOs leverage and combine their collective skills and knowledge adequately. Second, resulting from their often distinct functional and educational backgrounds, CDOs and CIOs may be prone to conflicting views regarding the digital transformation of their firms, which might inhibit a smooth collaboration. Scholars from team research have shown that team members who possess knowledge in different domains, such as CDOs and CIOs do, tend to have dissimilar views and languages (Dougherty, 1992; Dunaway and Subherwal, 2012). If team members have very unique perspectives and are additionally resistant to new ideas, their ability to effectively interact with each other is hampered (Anand et al., 2003; Dunaway and Subherwal, 2012). This may lead to such undesirable behaviors as purposeful non-cooperation, unproductive communication, mistrust, limited information sharing and, finally, poor performance (Leenders et al., 2003; Browning and Kanaga, 2007; Dunaway and Subherwal, 2012). Therefore, we are interested in how far CDOs and CIOs agree on aspects of the digital transformation of their firms. Finally, we wish to identify factors, which can positively influence the CDO-CIO collaboration. In order to gain insights into these factors, we are currently conducting interviews with CDO-CIO dyads across firms and industries, complementing the interview data with quantitative measurements and secondary documents.

Our paper is organized as follows: First, we give an overview of the two theories of transactive memory systems and shared understanding, which will help us analyze the dyadic CDO-CIO relationship. This is followed by a description of our case study design and our data collection and analysis processes. Subsequently, we present our emergent findings and anticipated contribution of our research in progress paper.

2 Theoretical Background

To analyze coordination and agreement in the CDO-CIO collaboration, two theories lend themselves to application particularly well. The first one, the theory of transactive memory systems (TMS), plays a particularly important role in team performance (Faraj and Sproull, 2000; Kanawattanachai and Yoo, 2007; Lewis, 2003, 2004) and will help gaining insights into the CDO-CIO collaboration by disclosing specialization, coordination and integration of their diverse expertise. TMS theory has been frequently adopted in IS research, for instance in the context of knowledge transfer in global IS teams (e.g. Oshri et al., 2008), team learning in IS development (Spohrer et al., 2012), IS-based organizational memory (e.g. Nevo and Wand, 2005), or the coordination of expertise in software development teams (Faraj and Sproull, 2000). The second one, the theory of shared understanding, will help us gaining insights into how similar the viewpoints of CDOs and CIOs are with regards to the digital transformation and, consequently, how prone they are to having conflicts. In the IS context, shared understanding between the CEO and CIO has been found to facilitate the alignment of an organization’s IS with its business strategy (Johnson and Lederer, 2010).
2.1 Transactive memory systems (TMS) theory

TMS theory is a theory of group-level cognition and refers to the specialized division of cognitive labor among members of a team (Choi, 2010). The TMS construct was first applied in the field of psychology to describe the ways in which dyads in close relationships share knowledge and allocate responsibilities for knowing (Wegner, 1987; Wegner et al., 1991). Later, scholars extended the use of transactive memory to work groups. They found that TMS develops naturally when people work and solve problems together and that it leads to higher levels of group performance (Littlepage et al., 2008). Scholars have shown that the presence of relevant expertise alone is not yet conducive to success, but that the value of any kind of teamwork to organizations can only be realized if team members integrate the differentiated expertise of other team members (Faray and Sproull, 2000; Nonaka and Takeuchi, 1995; Lewis, 2003). According to TMS theory, people in organizations learn who knows what, and may use that knowledge to decide who will do what, resulting in more efficient and effective individual and collective performance (Majchrzak et al., 2007). For instance, Faray and Sproull (2000) have shown that expertise coordination positively and strongly impacts team performance in software development teams because group members divide the cognitive labor for their tasks, with members specializing in different domains. Mutual reliance then frees individual members to develop deeper expertise in each specialty area and ensures access to other team members’ task-relevant expertise (Lewis, 2003).

Lewis (2003) developed a perceptual measure of transactive memory (see Appendix, table 3), which serves as an indicator of the level of development of TMS in a team and consists of three dimensions. (1) Specialization: team members are specialized in different areas of expertise, know about each other’s specialization and accordingly specialize in different aspects of a given task. (2) Credibility: team members trust in each other’s expertise and belief that it is correct, valuable and reliable. (3) Coordination: team members are able to efficiently match team task requirements with specialized expertise and accordingly coordinate their work efficiently.

The greater the presence of each indicator in a team, the more developed is the TMS and the better team members efficiently coordinate their actions (Majchrzak et al., 2007). We assume the existence of TMS in the CDO-CIO dyad to be beneficial for three reasons. First, a group with an effective TMS uses the knowledge and expertise of its members better (Moreland et al., 1998; Stasser et al., 1995; Jackson and Klobas, 2006). The TMS specifically targets how team members leverage their expertise by utilizing and integrating distributed specialized expertise (Lewis 2003). Second, a group with an effective TMS coordinates activities more effectively to accomplish organizational goals because team members better anticipate the capabilities of others and appropriately allocate roles and tasks (Wittenbaum et al., 1998; Majchrzak et al., 2007; Choi, 2010; Jackson and Klobas, 2006). Third, a group with an effective TMS reduces the cognitive overload of each individual team member and allows for specialization (Hollingshead and Brandon, 2003; Wegner, 1987; Jackson and Klobas, 2006). Individuals who are part of a TMS assume responsibility for different knowledge domains, and rely on one another to access each other’s expertise across domains (Majchrzak et al., 2007). To sum up, a group with an effective TMS makes better decisions, as the expertise of team members is recognized and taken account of (Stasser et al., 1995; Jackson and Klobas, 2006). In order to measure the existence of a TMS between CDOs and CIOs, we use the scale items by Lewis (2003), which we adapted to the CDO-CIO context (see Appendix, table 4).

2.2 Theory of shared understanding

On the one side, it is assumed that team members who already possess complementary expertise, such as CDOs and CIOs do, may develop TMS more quickly. In practice, cross-functional teams are even purposefully constructed to leverage the specialized expertise of individual team members (Lewis, 2003). On the other side, scholars suggest that cross-functional teams tend to have more problems in integrating their different knowledge stores due to poor mutual understanding and misperceptions (e.g. Gruenfeld et al., 1996; Dunaway and Subherwal, 2012). Therefore, we will draw on the theory of mu-
tual understanding (similarly referred to as shared understanding) to analyze the similarity of viewpoints of CDOs and CIOs regarding the digital transformation.

Shared understanding refers to the actual agreement of individuals on a topic (Preston and Karahanna, 2009; Reich and Benbasat, 2000). In the IS context, shared understanding favorably influences the development of a shared vision of the role of IS and thus the contribution of IT to the organization (Johnson and Lederer, 2010). Shared understanding leads to better decision-making, and therefore it is assumed that managers with stronger agreement about IT management issues would develop a high-quality set of interrelated business and IS plans (Johnson and Lederer, 2010). Uncertainty reduction theory predicts that little or no shared understanding between parties leads to greater uncertainty about organizational issues, actions, and attitudes. The presence of shared understanding implies less uncertainty, and therefore less information seeking - which can be time consuming, costly, and inefficient - and greater cohesiveness and effectiveness (Johnson and Lederer, 2010).

In the context of this study, we define shared understanding as the degree of shared cognition between the CDO and the CIO on the digital transformation of their firm and on the role digital technologies play in their firm. We assume that a shared understanding helps the CDO-CIO dyad collaborate well and frees both of costly information seeking. If they do not share an understanding, however, information seeking may delay the progress of the digital transformation.

3 Research Methodology

Research on the collaboration between CDOs and CIOs during the digital transformation is in its embryonic phase and our goal is to generate very first insights. To do this, we employ a case study design to develop a holistic understanding of the real-life interactions between CDOs and CIOs (Eisenhardt, 1989; Yin, 2014). We specifically employ a multiple case study design to create more robust theory and ground our propositions in varied empirical evidence (Eisenhardt and Graebner, 2007). Comparing cases helps clarify whether an emergent finding is consistent throughout multiple cases (Eisenhardt 1991). To meet concerns regarding the scientific rigor of case study research, we closely adhere to the methodological recommendations by Yin (2014) and Patton (1990).

3.1 Sample

We employ purposeful sampling to select information-rich cases, which are cases from which scholars can learn most about central issues of their research questions (Patton, 1990), and to select cases based on theoretical replication, which aims at identifying contrasting cases (Eisenhardt, 1989; Eisenhardt and Graebner 2007; Yin, 2014).

We selected our sample in two steps: We searched for (1) companies that engaged in digital transformation activities and (2) employed both a CDO and a CIO. Among those we applied the theoretical replication logic and selected companies that differed in their sizes, the industries they belonged to and these industries’ stages in their adoption of digital technologies (Faeste et al. 2015). Table 1 gives an overview of our sample.

<table>
<thead>
<tr>
<th></th>
<th>Industry</th>
<th>Revenues [in €]</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 1</td>
<td>Retail</td>
<td>&gt;20bn.</td>
<td>&gt;50,000</td>
</tr>
<tr>
<td>Case 2</td>
<td>Telecommunication</td>
<td>1bn-10bn</td>
<td>2,500-5,000</td>
</tr>
<tr>
<td>Case 3</td>
<td>Market research and consulting</td>
<td>100mn-1bn</td>
<td>1,000-2,500</td>
</tr>
<tr>
<td>Case 4</td>
<td>Finance</td>
<td>100-200mn</td>
<td>500-1,000</td>
</tr>
</tbody>
</table>

Table 1. Sample overview
3.2 Data collection and analysis

In order to ensure the generation of in-depth insights into the CDO-CIO collaboration, our primary source of data consists of the interviews, which we independently conduct with both CDO and CIO per case. The interviews consist of a qualitative part and a smaller quantitative part with several quantitative assessments, where we ask each interviewee to grade the quality of their collaboration and the role of digital technologies in their firms, both using a five-point Likert scale, and to fill in the adapted TMS scale (see Appendix, table 4). In order to further triangulate our findings, we review any available secondary documents, including interviews, press releases and management reports or comments by industry experts. The use of both qualitative and quantitative methods allows for an in-depth investigation of the collaboration and interactions between CDOs and CIOs and is intended to provide even richer insights than one approach alone would do. Applying this technique furthermore strengthens the robustness of our analysis and the validity of our findings by enhancing their explanatory power.

The interviews are currently conducted in a face-to-face manner – with the exception of one interview, which was conducted by telephone due to the interviewee’s tight schedule – and will take about 60 minutes each. So far, we have conducted interviews with CDO and CIO of case 1. The remaining interviews will be conducted shortly. We use a semi-structured interview format and mainly pose open-ended questions to facilitate exploration and to allow the interviewees to freely express their views. The guideline we use prompts CDOs and CIOs to talk about their company’s digital transformation, the specific tasks they assume, the cooperation with their colleague and any challenges they encounter during their collaboration. We also explore a variety of factors that might affect the collaboration between CDOs and CIOs. For instance, we ask both about their educational and career backgrounds, their personal experience with change and IT, their organizational positions, the overall organizational design of their companies, the level of change they implement and they desire, their views of digital technologies as business critical success factors, and their general view of the digital transformation of their firms. The latter questions simultaneously enable us to analyze shared understanding.

For reasons of transparency and traceability, we record each interview on audio tape and transcribe it verbatim afterwards (Miles and Huberman, 1994). With the help of the ATLAS.ti software, we gather, code and analyze all our primary and secondary data. Given the small sample size, it is inappropriate to formally test the results of the Likert scales. Our study is intended to build insights using the depth rather than breadth of the data. This will lead to stronger propositions that can be tested by subsequent work. Accordingly, the Likert scales solely help assess TMS, shared understanding and the quality of collaboration within each CDO-CIO dyad. We also use standard within-case and cross-case analysis techniques (Eisenhardt 1989). Hence, we compile detailed descriptions of each case and analyze any factors that might have an influence on the results of the Likert scales. To extend external validity and enhance generalizability, we then conduct a cross-case analysis. We revisit the data multiple times and look for patterns regarding the influencing factors across cases. The use of tables thereby facilitates comparisons between cases (Miles and Huberman, 1994; Yin 2014).

4 Emergent Findings

In the following, we outline the results of the within-case analysis of case 1, which is an example of a “very positive” CDO-CIO collaboration as rated by our interviewees.

The digital transformation of case 1 rests on three pillars. (1) Customer experience enhancement involves the creation of a seamless customer experience across all touch points, for instance by introducing cross-device online shopping carts, equipping sales employees in the retail stores with tablet PCs to better cater to customer needs, or introducing new smartphone applications with integrated state-of-the-art technology, such as location based services and augmented reality. (2) Business operations focus on “efficiency through automation” (CDO) in order to gain more time for customer experience enhancement. (3) New business opportunities involve the monitoring of new fields of business which are created through digitalization and which can pose both opportunity and threat for the company.
The analysis of the TMS scales discloses that CDO and CIO of case 1 do specialize, trust each other, and coordinate their tasks to a high extent. During the interviews, we gained insights into how exactly specialization and coordination look like in case 1 and which factors might play a role in mutual credibility.

With regards to specialization, a clear division of responsibilities characterizes the CDO-CIO collaboration. The CDO mainly decides on the specific initiatives and innovations to pursue and communicates these across the firm, whereas the CIO realizes the CDO’s selection IT-wise. The prerequisites for a smooth collaboration were cited to be the “clear definition of responsibilities without overlaps” (CIO) and the “mutual acceptance of their respective roles” (CDO). According to the CIO, it is furthermore important that the CEO keeps an eye on the appropriate task division and task assignment in the long term, since an initially clear division might become automatically blurred over time. Consequently, the CEO needs to have a sufficient understanding of the issue of responsibility division in order to prevent conflict between CDO and CIO. Yet, not only need their responsibilities to be defined clear-cut, but also their roles. Both CDO and CIO are members of the extended board; yet, the CDO assumes a special role in case 1, acting as an “innovator, visionary and consultant for the top management team”, as the CIO stated. The CDO is the only role solely dedicated to the digital transformation of firm 1. He has his own budget dedicated to digital innovations but no profit responsibility, which might hamper innovativeness during the digital transformation. On top, he enjoys a high level of freedom by the top management team regarding his actions. The CIO - as any other manager in case 1 - however, contributes to the digital transformation in addition to his day-to-day business and his common responsibilities as a CIO.

The CDO stated that it is absolutely necessary for CDOs and CIOs to mutually accept their respective roles during their collaboration. Moreover, mutual openness with regards to issues and preferences in the progress of the transformation was mentioned to be a key factor in their collaboration. Both elements may explain the high levels of credibility in the TMS scale.

With regards to coordination, an intermediary fosters CDO-CIO task integration. Formally, this intermediary is a manager reporting to the CIO, yet he is simultaneously a member of the formal CDO team and takes part in their team meetings. These meetings serve as a platform to discuss the progress of the digital transformation and current initiatives. Consequently, this manager helps to tightly integrate the CDO and CIO teams and indirectly fosters the mutual exchange of information between CDO and CIO. As a result, initiatives selected by the CDO can move even quicker into the phase of implementation, which is the remit of the CIO. Coordination and information exchange is further strengthened by the regularity of the CDO team meetings, which take place each one to two weeks. CDO and CIO also directly interact, mainly informally, but also during the biweekly extended board meetings, were the CDO presents his progress during the digital transformation and discusses it with the members of the extended board. Researchers have already assumed that frequent face-to-face communication and intensive and task-related communication may facilitate the formation of TMS (Hollingshead, 1998; Lewis, 2004; Kanawattanachai and Yoo, 2007). Frequent interaction and communication also seem to foster TMS of CDO and CIO in case 1.

Analyzing their views of digital technologies and their digital transformation shows that a high level of shared understanding characterizes the CDO-CIO collaboration. For instance, both view digital technologies as business critical success factors and the digital transformation as a cross-functional endeavor. Both advocate a high level of change, with IT playing a crucial role in the digital transformation. What might foster their shared understanding is the fact that both parties share a combination of IT, change and business experience resulting from their education and previous positions. The CDO studied information systems and gained a lot of experience with IT during his career, which encompassed functions as entrepreneur and CEO. The CIO in turn has a university degree in business administration but worked in several IT functions before his current position as a CIO.
With this study, we wish to identify factors, which can positively influence the CDO-CIO collaboration. While analyzing case 1, we were already able to gain first insights into such factors, which we summarize in table 2.

| TMS: Specialization       | • A clear-cut definition of roles and division of responsibilities  
|                          | • A CEO with sufficient understanding of this issue                  |
| TMS: Credibility          | • Mutual acceptance of their respective roles                        
|                          | • Open communication regarding issues and preferences                |
| TMS: Coordination         | • An intermediary integrating the CDO and CIO teams and indirectly fostering the mutual exchange of information between CDO and CIO  
|                          | • Regular formal and informal direct communication between CDO and CIO |
| Shared understanding      | • A CDO and a CIO having experience with IT, business and change      |

Table 2. Factors that positively influence the CDO-CIO collaboration in case 1

5 Anticipated Contributions

This study sets out to explore a wide range of ideas associated with the CDO-CIO relationship and to gain some tentative insights into how those ideas might fit together. For instance, we know from previous research that shared understanding and the existence of TMS both independently reinforce successful relationships and collaboration. We anticipate that our research will yield contribution to both theory and practice. From a theoretical perspective, we will increase our understanding of shared understanding and TMS in the context of the digital transformation. We will demonstrate how TMS and shared understanding can be used to explain relationships between CDOs and CIOs. From a practitioner perspective, this study advances our understanding of the CDO-CIO collaboration. We believe that the findings from this study will offer firms guidance on specific actions in order to positively influence the CDO-CIO collaboration. Acknowledging the importance of shared understanding and TMS can help firms diagnose and design interactions between CDOs and CIOs in order to increase the quality of their collaboration and ultimately the success of the firm’s digital transformation.
References


Co-creating Value

### Appendix

#### Specialization
1. Each team member has specialized knowledge of some aspect of our project.
2. I have knowledge about an aspect of the project that no other team member has.
3. Different team members are responsible for expertise in different areas.
4. The specialized knowledge of several different team members was needed to complete the project deliverables.
5. I know which team members have expertise in specific areas.

#### Credibility
1. I was comfortable accepting procedural suggestions from other team members.
2. I trusted that other members’ knowledge about the project was credible.
3. I was confident relying on the information that other team members brought to the discussion.
4. When other team members gave information, I wanted to double-check it for myself. (reversed)
5. I did not have much faith in other members’ expertise.

#### Coordination
1. Our team worked together in a well-coordinated fashion.
2. Our team had very few misunderstandings about what we do.
3. Our team needed to backtrack and start over a lot. (reversed)
4. We accomplished the tasks smoothly and efficiently.
5. There was much confusion about how we would accomplish the task. (reversed)

**Table 3.** Transactive memory system scale items (Lewis 2003)

#### Specialization
1. Each of us has specialized knowledge of some aspect of the digital transformation.
2. I have knowledge about an aspect of the digital transformation that the other team member has not.
3. We are responsible for expertise in different areas of the digital transformation.
4. Our specialized knowledge is needed to complete project deliverables of the digital transformation.
5. I know which kind of expertise my colleague has which relevant to the digital transformation.

#### Credibility
1. I am comfortable accepting procedural suggestions from my colleague during the digital transformation.
2. I trust that my colleague’s knowledge about the digital transformation is credible.
3. I am confident relying on the information that my colleague brings to the discussion on the digital transformation.
4. When my colleague gives information relevant to the digital transformation, I want to double-check it for myself. (reversed)
5. I have much faith in my colleague’s expertise when it comes to the digital transformation.

#### Coordination
1. We work together in a well-coordinated fashion on the digital transformation.
2. We have very few misunderstandings about what we do during the digital transformation.
3. Our team needs to backtrack and start over a lot during the digital transformation. (reversed)
4. We accomplish our tasks in the digital transformation smoothly and efficiently.
5. There is much confusion about how we accomplish a task of the digital transformation. (reversed)

**Table 4.** Transactive memory system scale items adapted to CDO-CIO dyads