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# DIGITAL TRANSFORMATION AND ITS IMPACT ON IT STRUCTURE AND LEADERSHIP

*Research paper*

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## Abstract

*With digital transformation attracting increasing attention, our study is motivated by a need to understand the impact of digitalisation on the transformation of the Information Technology (IT) function in pre-digital organisations. In particular, in this paper, we present a qualitative study that aims to examine how digital transformation influences the organisational structure and leadership of the IT function in pre-digital organisations. The empirical study is based on a series of semi-structured interviews with digital leaders across a range of organisations and sectors in the UK and Scandinavia. We find four different setups both in terms of structure and leadership for the IT function following digital transformation initiatives. The study has both theoretical and practical implications on the management of digital transformation and IT function.*

*Keywords: Digital Transformation, IT Function, Digitalisation, Chief Digital Officer, Chief Information Officer, Leadership*

# 1    Introduction

With the emergence of digital technologies, digital transformation, or digitalisation, has been receiving an overwhelming attention by both academics and practitioners alike (Hess et al, 2016). Studies have placed digital transformation (DT) high up on the business agenda with a recent report positing that the Global Digital Transformation Market would exceed more than US$ 462 billion by 2024 (MRE Report, July 2019). Advancements in smart and interconnected systems including data analytics as well as the popularity of artificial intelligence, Internet of Things (IoTs), digital platforms and social media (e.g. Chanias et al, 2018; McAfee and Brynjolfsson, 2017), have been contributing to an increasing understanding of the possibilities for digitalisation especially for the so-called pre-digital organisations.  Whereas organisations such as digital start-ups (also known as born-digital) are born with and because of digital technologies which means that  being digital and adopting digital technologies is at the heart of what they do, traditional, pre-digital (i.e. those that existed prior to the internet revolution), organisations have to find ways to embrace digitalisation into their operations and strategies while overcoming structural and cultural constraints (Ross et al, 2019). It has been posited that pre-digital assumptions may constrain developments in digital initiatives, and therefore these need to be revisited and adjusted in order to effectively embrace DT (Westerman and Bonnet, 2015).

As a way for managing the transition of pre-digital organisations towards digitalisation, a shared mindset that links information systems (IS) and business leaders has been deemed vital (Hansen et al, 2011). For this, new leadership roles have emerged in the business scene with the aim to guide digitalisation; we call individuals in these roles 'digital leaders'. For example, the role of the Chief Digital Officer (CDO) in DT has been acknowledged and it is seen as a fast-growing role in the executive management team of many organisations (Grossman and Rich, 2012). Other similar roles include Heads of digital, Directors of DT and Heads of digital strategy. Such roles represent the new digital leaders of organisations and therefore the leaders with responsibility to inform the business strategy of the organisation and implement digital technologies and digitization programmes that could potentially radically transform business operations and business model of the organisation.

Vial (2019) shows, in an extensive review of DT research, how structure and leadership are part of the building blocks of DT, and as enablers. However, DT is in itself a radical institutional change affecting organisation structure (Hinings et al. 2018), and this relationship has been scantly researched (Haffke et al. 2017a). Also, DT has also been argued to affect leadership, and more research is also needed also in this area (Haffke et al. 2016; Tumbas et al. 2018). In our study, we answer to these research gaps. Accordingly, the driving research question of our study is: *How does digital transformation influence the organisational structure and leadership of the IT function in traditional, pre-digital organisations?*

In what follows, we review literature on DT exploring the opportunities and challenges it provides to pre-digital organisations. We then discuss the role of the IT function in pre-digital organisations and Chief Information Officers (CIOs) who have traditionally been expected to lead IT-enabled change in organisations and introduce the emerging role of digital leaders such as CDOs. Following these, we introduce the research design of the study, findings and contributions.

# 2    Conceptual Foundations

## 2.1    Digital Transformation: Concept, Opportunities and Challenges

Researchers have linked digital transformation to the use and application of digital technologies. For example, Gruman (2016) described DT as 'the application of digital technologies to fundamentally impact all aspects of business'; whilst Westerman et al (2014) refer to DT as the use of technology to radically improve performance or reach of enterprises. A more explicit definition was given by Warner and Wäger (2019) who defined DT as the use of new digital technologies (e.g. mobile, artificial in-

telligence, cloud, blockchain, IoTs) to enable major business improvements to augment customer experience, streamline operations, or create new business models. Similarly, Hinings et al (2018) define DT as the 'combined effects of several digital innovations bringing about novel actors (and actor constellations), structures, practices, values, and beliefs that change, threaten, replace or complement existing rules of the game within organizations and fields'. In this paper, we adopt Vial's (2019) definition who following a review of DT studies, presented DT as 'a process where digital technologies create disruptions triggering strategic responses from organizations that seek to alter their value creation paths while managing the structural changes and organizational barriers that affect the positive and negative outcomes of this process' (p.118).

Despite the different definitions provided, there is a general agreement in the literature on the opportunities that digitisation provides for enriching customer experience, making substantial operational improvements and transforming business models (Fitzgerald et al, 2014). According to Cascio and Montealegre (2016), the implications include: "…transforming the very foundations of global business and the organizations that drive it […] not just helping people to do things better and faster, but they are enabling profound changes in the ways that work is done in organizations" (p. 350). Further, Bharadwaj et al (2013) refer to the DT potential for increasing the scope and scale of business operations, speed in decision making and enhanced value creation opportunities. Collectively, digitalization is seen to transform business models, operational processes and user experience (Henriette et al, 2016).

With this increasing understanding of the DT potentials in revamping organisations, there is a strategic need for DT initiatives to gain wider stakeholders' approval and become institutionalised (Hinings et al, 2018). As such, DT should be guided by the business digital strategy as well as an organisational culture that encourages innovation and collaboration (Kane et al, 2015). The need for a cultural fit has been emphasised by Tabrizi et al (2019) when positing that DT is not just about introducing new digital technologies. Leadership has also been found to be a key factor for successfully transforming an organisation to be a digital organisation (Kontić and Vidicki, 2018), whilst structural organisational changes also need to take place (Matt et al, 2015).

It follows from the aforementioned review that there is an increasing acknowledgement in the literature on the opportunities and challenges of DT for businesses. Digital technologies that are often managed by IT departments, are a core component of the DT programmes. What is less known is how the increasing organisational emphasis on DT affects IT functions (Gerster, 2017; Haffke al, 2017a). More specific, the way in which DT has implications for governance structures, management methodologies, organizational setup, working methods, processes and culture of the IT function, is scantly researched (Haffke et al, 2017a). In the next section, we review the structure of the IT function and the potential changes it faces as a result of digitalisation.

## 2.2   The IT Function and Structure

Digital transformation puts pressure on the IT function, handling conflicting goals of IT for innovation and agility on the one hand, and the need for reliability and stability on the other hand (Haffke et al, 2017b). Initially developed by practitioners, Gartner´s concept of bimodal IT and McKinsey´s approach of two-speed IT, suggested a way of resolving these conflicting goals and managing a balance between the traditional IT-delivery and a more agile and business-oriented mode (Gartner, 2014; Bossert et al, 2014). As Bossert and colleagues (2014) point out, pre-digital companies have to deal with their legacy systems in their effort to become digital enterprises, and together with customer-centric front-end solutions, a two-speed architecture need to be managed. A part of this is to build and develop a new organisation and governance model. Gartner (2014) on the other hand focuses on the way in which bimodal IT should be structurally implemented, first in projects and then further in the enterprise. The concept of bimodal IT is summarised by looking at the contrasting characteristics of the two modes (see Table 1), where mode 1 is about traditional IT aiming for stability, security and reliability through waterfall approaches and mode 2 is about agile or digital IT aiming for agility, speed and innovation through iterative development and fast delivery (Horlach et al, 2016).

| Traditional IT (mode 1, industrial/core IT) | | Digital IT (mode 2, agile IT) |
|---|---|---|
| Stability | **Goal** | Agility & speed |
| IT-centric | **Culture** | Business-centric |
| Remote from customer | **Customer proximity** | Close to customer |
| Performance and security improvement | **Trigger** | Short term market trends |
| Performance of services | **Value** | Business moments, customer branding |
| Security & reliability | **Focus of services** | Innovation |
| Waterfall development | **Approach** | Iterative, agile development |
| System of records | **Applications** | System of engagement |
| Slow | **Speed of service delivery** | Fast |

*Table 1 Characteristics of Traditional and Digital IT (from Horlach et al, 2016, p. 1421).*

Horlach et al (2016) found that there were many publications for practitioners about bimodal IT or two-speed IT, but only one academic paper about how IT departments deal with heavyweight and lightweight IT (i.e. Bygstad, 2015). While explaining and contrasting these two kinds of IT, Bygstad looks into the potential of their relationship. As he suggests, the governance of lightweight IT for IT department is an unsolved problem, and that when dealing with this problem, the relationship to heavyweight IT also needs to be included.

In another review of the current state of research on DT and IT, Gerster (2017) points to the paper by Haffke and colleagues (Haffke et al, 2017a) that extends Bygstad´s work focusing on organizational structures. Also, Haffke et al (2017a) study different archetypes of IT design to implement bimodal IT. Horlach and colleagues (2016) discuss organisation of bimodal IT either project-based, with a separate digital unit outside the IT-department, or with IT as a service broker partnering with external vendors and third-party providers. Further, Haffke et al. (2017b) find three archetypes of bimodal IT design, project-by-project, or a split between the two modes either within or outside the IT function.

Since then, more research has been carried out on bimodal IT. Jönhk et al (2017) took a focus on developing design options for agile IT when implementing bimodal IT , while Badr (2018) studied practices that improve organizational ambidexterity and enable bimodal IT. These practices include leading both internally and externally, where examples of internal practices are IT participation in business decisions and strategic discussions, and elevate the value of IT (Badr, 2018). Lastly, Horlach and colleagues (Horlach et al, 2017) studied how bimodal IT may be implemented to increase agility of IT delivery paying particular attention to the role of outsourcing.

The agility of the IT-function consists of the ability to sense and respond to opportunities in emerging business needs, changes in the markets and emerging digital opportunities (Leonhardt et al, 2017). In the organisational structure where different design options are implemented to enable bimodal IT, more and more often the role of the CIO is supplemented with other digital leaders, such as Chief Digital officers (CDOs). We explore the differences between these roles in the section that follows.

## 2.3   CIOs and Digital Leaders

Several studies have examined the evolving role of CIOs and shown that the strategic responsibilities have become more important (e.g. Chun and Money, 2009). Extant literature argued that as IS matures, CIOs would gain more managerial including strategic responsibilities (Grover et al, 1993; Peppard, 2010). Recent research has indicated that CIOs still struggle with challenges when performing

their strategic leadership role, and that this also is linked to IT leader stereotype that undermine their authority (Gonzales et al, 2019).

Research on CDOs show a digital leadership role that is emerging and evolving. Singh and Hess (2017) find three different roles of which CDOs undertake; entrepreneur, digital evangelist and coordinator. Furthermore, they argue that a CDO is recommended when both internal and external complexity and pressure for digital transformation are high. Another study shows how the CIO and CDO roles both complement and influence each other, and in particular how the CIO role will change in terms of reduced strategic responsibility (Haffke et al, 2016). Here, with the CDO sharing responsibility for DT initiatives with the business, it is stressed that close CIO-CDO alignment in terms of governance is important in order to ensure business and IT alignment. Following from these, extant literature has posited that more research is needed into how DT as an evolving phenomenon is affecting digital leadership (Haffke et al, 2016; Tumbas et al, 2018).

Similarly, research on the relationship between digital leaders such as CDOs and organisational structure is still limited. Horlacher and Hess (2016) showed how governance structures are affected by employment of CDOs, and that CDO need to be positioned and have sufficient influence in these structures in order to pursue efforts of DT. They call for more research in companies with progress and experience both with DT and digital leaders. Such calls are reinforced by Singh et al (2019) in their study on digital leaders and their links to organisational structure and strategy. In this study, we aim to cover some of this gap.

## 3   Research Approach and Methods

Our study is based on the qualitative interpretive approach that aims to understand phenomena through the meanings assigned to them (Klein and Myers, 1999). The approach adopted follows our recognition that the DT phenomenon is understood and implemented in different ways contributing to different implications and meanings. Based on this, we invited digital leaders based in different pre-digital organisations to participate in the study. Where appropriate, we invited CIOs from the same organisations to take part. Data collection took place between May and September 2019 and was based on 14 semi-structured interviews that took place in different organisations, in UK and Scandinavia, ranging from sectors such as education, utilities, consultancy, finance and fitness (see Table 2). For confidentiality reasons, the names of the companies and participants interviewed are kept confidential. Across all organisations, the participants were key informants on the topic of DT; they were people with direct responsibility for digitalisation in their respective organisations and had roles such as Chief Digital Officers, Heads of digital, Chief information officers and Chief Technology Officers. The majority of the interviewees were males, reinforcing a characteristic of the IT profession as a male – dominated one (Gillard et al. 2008).

| Interviewee | Gender | Industry | Size |
|---|---|---|---|
| CIO | F | Food and beverage | National, Large |
| CDO | M | Food and beverage (same company as above) | National, Large |
| CIO | M | Health and fitness | Global, Large |
| CDO | M | Health and fitness (same company as above) | Global, Large |
| CDO | M | Energy Group | National, Large |
| CIO | M | Energy Group (same company as above) | National, Large |
| CIO | M | Energy SBU | National, Medium |
| Operation manager | M | Production | National, Medium |
| CEO | M | Recruitment | National, Micro |

| CDIO | F | Education | National, Large |
|------|---|-----------|-----------------|
| Digital Manager | M | Research consultancy | Global, Small |
| Head of Digital | F | Financial | National, Large |
| Head of Digital | F | Utility | National, Large |
| CIO | M | Heritage | National, Medium |
| CTO | M | Energy | Global, Large |

*Table 2. List of interviewees*

The interviews were semi-structured and were guided by a list of pre-designed topics to enable us to develop consistency in the dataset. Examples of pre-designed topics which appeared in the interview protocol include: Participants' main responsibilities, current projects/activities and DT in the organisation, organisational structure of IT function, situation in terms of personnel and other managerial roles in the IT function, relationship with senior management, and strategic influence. Also, where the case presented both a CIO and CDO (or a different digital leader), we sought to explore the relationship between the two and the influence that they exert or are expected to exert on each other with further questioning. The interviews lasted between 35 and 70 minutes and were subsequently transcribed.

Data analysis was guided by the driving question of the study that aimed to examine the impact of DT on the organisational structure as well as leadership of the IT function. As such, in the analysis particular attention was paid to the following themes: DT in the organisations, the leadership responsibilities of the different roles, the organisational structure of the IT function, and how leadership and structure was influenced by DT in the respective organisation. As a result, we were seeking in the different cases evidence of how the IT function changed, if at all, as a result of DT programmes in their organisations. During our reading and re-reading of the transcriptions, we were also open to new themes that could emerge from the data. An emerging theme for example was the nebulous nature of the DT process and the subsequent impact that this was having on internal organisational relationships. We present the findings of our analysis in the section that follows.

## 4   Findings

### 4.1   Digital Transformation: A process in the making

An early finding from our analysis has been that DT is an evolving process and not a one-off project that can be completed within a specific pre-set timespan:

*«We don't see it as a project anymore but a team; specific projects and components have a certain lifespan. We talk about digital transformation horizons, but digital community is on a continuum and is evolving».* (Head of Digital, Financial)

*"...so, as I always say it's [DT] not a destination. But it is a focus if you like, it will not be done in just 3 years. It's just that we know that we have some big things that we must address…"* (CDIO, Education)

*"...Not a program, but continuous effort. We do little work in establishing business cases before.. rather smaller incremental parts, proof-of-concepts, test it, see if gets attention, and then escalate. It is an agile approach. We test, learn, get feedback.."* (CDO, Health and Fitness).

Another participant explained this evolving process with reference to continuous technological advancements: *"It never stops transforming. We talk about snapchats, Augmented Reality. It is still a buzzword."* (Head of Digital, Utility)

DT was also described as a creative (Digital Manager, Consultancy) and as an experimental (CDO, Health & Fitness) process. For this it is expected that organisations will go through additional internal changes: *«The CDO may be the next CIO; I genuinely do not know what will happen to the CDO. For*

*those of us in Digital, whatever the job title, the world will need our skills»* (Head of Digital, Financial).

*"I have a pretty senior role, but it is not a role that is part of the senior executive team. I believe that this is going to change soon. We have the second largest budget. It is inconceivable that we are not at the executive board. This is not an ego thing, but it is that every decision that the university makes probably means some aspect of digital delivery. It is a reflection where we are in terms of DT"* (CDIO, Education).

Further, participants also pointed that DT is a collaborative process not just between IT and digital but between other stakeholders in the organisation: *"I feel like I'm pushing an open door. Though there is great collaboration from the senior leadership of the university, they do not always get me. I think they find me quite challenging because I use a different language"* (CDIO, Education).

## 4.2   Digital Transformation and impact on IT structure and leadership

Following our research question, we have identified different ways in which the structure and leadership of the IT function is influenced by DT. Linked to this, the findings show that the organisational structure for IT and digital services are implemented in four different ways. Within these categories we present findings related to leadership responsibilities (these are summarised in Table 3). Below, we present more detailed findings within each of the categories of the different setups of organisational structure and leadership.

| Organisational structure of IT and Digital Function | Responsibilities (leader) | |
|---|---|---|
| | IT leader | Digital leader |
| IT function (Digital as projects) (e.g. Energy company- SBU) | CIO:<br>• IT operations<br>• IT Security<br>• Vendor management<br>• System architecture<br>• Project management | - |
| Separated IT and Digital functions and separated leaders (e.g. Small Consultancy firm) | CIO:<br>• IT operations<br>• IT security<br>• Vendor management<br>• Platform for future innovation | CDO:<br>• Strategy<br>• Innovation (together with business)<br>• System architecture<br>• Portfolio management<br>• Customer services |
| Integrated IT and Digital function with separated leaders (e.g. Health and fitness company) | CIO/Head of operations and security:<br>• IT operations<br>• IT security<br>• Vendor management<br>• Project management<br>• System architecture | CDO:<br>• Strategy<br>• Digitalisation in the company<br>• Innovation (together with business)<br>• Digital development<br>• IT and digital operations<br>• IT and digital security<br>• Vendor management<br>• System architecture<br>• Project management |

| | | |
|---|---|---|
| | | •   Benefit management |
| Integrated IT and Digital function with single leader (e.g. Utility company) | Chief Digital and Information Officer<br>•   IT/digital operations<br>•   IT/digital security<br>•   Digital development<br>•   Digital strategy | |

*Table 3. Setups of organisational structure and leadership*

### 4.2.1   IT function with Digital as projects

The first setup involves an IT function with sole responsibility for managing digital projects. In the organisations with no separate structure for digital neither in terms of function nor leadership, the management of digital projects was handled by the IT function. In these cases, the IT function focuses mostly on IT-operations and security, in addition to vendor management, system architecture and project management. One IT leader indicated that his role is that of reducing the system landscape complexity, where cloud-based solutions was an important part.

*"Technical skills here are very good, but the portfolio shows that you have just added and added new solutions, and never retired any [...]. So, the portfolio is so large that if we just start making small changes in one end, we are going to spend 10 years. So, we need a game changer, and for us this is cloud" (CIO, energy SBU).*

The same individual was part of discussions with senior management about digitalization opportunities, and in doing so became part of strategy development. Still, because of limitations of time and scope of the resources of the IT-function, they kept the focus on handling technical issues of DT initiatives.

### 4.2.2   Separated IT and Digital functions

The second setup involves one where IT is separated from Digital, both in terms of structure and leadership. Hence, there are two distinct functions with two leaders. According to the digital manager of a small consultancy organization the advantage of this approach is that there is a clear difference between the functions and roles: *"There is someone providing internal IT support. My role is more outwards facing. I am not putting strain on internal IT»* (Digital manager, consultancy). These separate managers then report to the senior management of the organisation.

Another advantage of this separation is linked to the digital branding of the organisation:

*«The company now has a Chief digital officer who was previously a director of mobile digital channels. At the time there was a big debate on whether or not to have a CDO. Some liked the idea, some didn't. Some said: CDO is given a golden ticket to do things differently. CDO is part of the formal leadership structure of the organisation. If you ask me, it is a positive thing, but other people found it was threatening their power. It was positive because 'we needed someone to focus on digital'.* (Head of Digital, Financial Sector)

In a large company (food and beverage) both leaders report to COO who represent IT and digital in the executive management team. This was implemented 1 year ago, where previously there was no CDO, and CIO was reporting to CFO. Here, CIO is responsible for IT operations and security, and for vendor management including ensuring IT governance. In one company, the CIO focus on enabling more of this to be carried out by application owners in the business. All applications are cloud-based, and the IT function small in terms of resources compared to different business divisions and units. Hence, the CIO perceives her role to provide training, structure and policies, and expert resources when needed (e.g. system architecture) for applications owners in the business to carry out IT governance. Furthermore, she sees her responsibility as providing the platform for future flexibility towards new technology and projects in the future:

*"Because, I do not think anyone can sit here now and say how the market will look like in 5 or 10 years. We do not know what will happen, but if something happens, we have to be fast turning around, and then we need platforms making this possible, and this is why we work on moving to cloud. This is why we work on having APIs and integration platforms so that we easily can plug in and out services. So, I have to think differently in terms of making this ground structure, but what will come on top of it I believe is very difficult to say" (CIO, Food and beverage).*

In the same case, the digital function is led by a CDO but even though his title is CDO, internally he uses the title "head of architecture and digitalisation". This means helping to see innovative possibilities, sometimes based on knowledge about technology, and also based on understanding the business. Further, he plays the role of an advisor for the executive management team and through this influence when strategic decisions are made:

*"The executive management team has to make some decisions, and more and more of those decisions involve technology. [...] So, I can say 'We can do it this way, or we can do it that way. But my recommendation is that we choose this direction because of these reasons'. So, my opinions about what is a good idea or not will influence this" (CDO, Food and beverage).*

This separation between IT and digital appears to have been a popular structure that was mentioned by the interviewees as per the example below: *"In my previous organisation (telecom industry) the digital team broke away from IT ... we had way too much reliance on IT. Their focus was not customer experience led. They were not good at integrating with all stakeholders. We therefore had a split [between IT and digital]».* (Head of Digital, Utility).

### 4.2.3  Integrated IT and Digital function with Separated Leaders

In this third setup, IT and digital is integrated and gathered in one function. Within this function, it varies to what degree they are merged or if they are separate groups. Most often, the CDO is the leader, but where an IT leader exists either as a CIO or a head of IT operations and security reporting to the CDO.

In one company (health and exercise), both IT and digital have their own team/group, with CIO and CDO as being their respective leaders. Here, the CDO is the leader of both and CIO reports to CDO. CDO reports to CEO, and is also part of the executive team. In another company (energy-group) the CDO was also the leader of this function, but the separation between IT and digital not that evident in terms of being dedicated groups. But, as he says, he has one on his team responsible for operation and security.

In one company (health and exercise) CIO is responsible for IT operations for network, communication, servers, clients and applications (including ERP-system). Within his responsibility, we also find security, vendor management, project management and system architecture. In his team, he has dedicated resources for all these areas. In addition, they have a business developer resource. The CIO started his position 1.5 year earlier and perceive his role to be most importantly about reducing system landscape complexity and implementing IT governance structure. All applications are cloud-based. He also works closely with the CDO when it comes to development to the digital as to maintain alignment between the digital and IT.

*"And there is great focus on delivering new functionality digitally, or to the customer. And then there is a fight on resolving technical debt [...] because Digital race forwards with new functionality and if we do not resolve this technical debt everything will be more difficult to govern and also more expensive" (CIO, Health and fitness).*

The CDO has worked in this position for 3 years and is responsible for both IT and digital operation and security. He is responsible for developing the digital (e.g. mobile apps, websites), and also project management, sometimes being close to the actual implementation of these projects. In addition, he works with innovation together with business (e.g. use of IoT, social media to enhance or create new value for customers), and strategy development with the executive management team. He perceives his role to the main driver of digital development where this also drives strategy development. Digital-

isation and digital transformation is for them "running business", and he believes his role to be persistent. They focus on trying to separate IT and digital by developing a service platform where integration between the two are made.

In another company (energy – group) the CDO sees his role as closing the gap between IT and business.

### 4.2.4   Integrated IT and Digital function with Single Leader

Related to the previous structure is an integrated function with single leader. In some cases, we have come across cases where organisations had an integrated IT and Digital Function with a single Leader looking for both. This was particularly observed in those cases where the IT function was renamed and rebranded to signal the organisation's focus on digitalization. The quote below shows evidence of this rebranding of the IT function and integration with digital:

*«We used to have a traditional IT department. Mike was the Chief Technology Officer. His vision was to digitize many of our assets and really basic digitization across the region. Very much the non-customer facing side. The executive board decided to rename him to Chief Digital Officer. He also brought it an external consultant as a part of this process. It disrupted the way people think of digital. The IT department was renamed as [company name] Digital with significant changes, a whole new structure, governance and finance»* (Head of Digital, Financial).

A similar case of rebranding was in the case of an education organisation: *«I have taken the university's IT function with the responsibility to build more digital capability. I am responsible for building the digital profession. This is quite an IT role in many ways but with much digital focus, if that makes sense. Where do I start? It involves the transformation of our infrastructure, putting in place data governance, the use of data for business intelligence, AI, data architecture, it involves defining our digital capability framework and service design standards for creating new digital products; so we are building new technology blueprint informed by digital thinking. They all come under one umbrella programme, the DT programme of the university».* (CDIO, Education)

We are not commercial enough to drive digital. There are few more years of maturity yet, maybe another 5 years.

A successful implementation was mentioned by the CIO of a heritage organisation: *«You cannot take technology out of digital…. In order to build successful digital capability, you need a senior team with a very strong engineering, data and technology capability; these need to be an enduring thing – not just a one-off... it was a collaborative process».* Despite the effectiveness of this approach, this was not without challenges: *«At [heritage organisation] there were a few conservative people and quite a lot of fashionistas, but couldn't get together. My role was to bring the two groups together and make them understand that they can't have everything».*

To sum up, the study has shown that in order to succeed, DT requires the right mix of IT and digital capabilities. For this, DT triggers changes in internal organisational structures and leadership for both IT and digital services. Nevertheless, it also became evident that different organisations have gone about utilizing IT and digital capabilities differently.

## 5   Discussion

As an increasing number of organisations are developing an interest in DT, in this paper we examined the impact of DT on the structure and leadership of the IT function of pre-digital organisations. Earlier literature has posited the need for the IT function to become more agile and customer orientated (e.g. Horlach et al. 2016) in order to cope with the changing nature of organisations and the need to be more digital. Our findings have shown that the IT function itself is going through transformation following DT initiatives in their respective organisation. We have shown different ways in which DT impacts the

IT function and in doing so identified both structural and leadership changes albeit of different degrees and nature, within the IT function. Below we discuss the contributions of the study to the literature.

Our study contributes to the discourse on the impacts of DT and how specifically this shapes organisations. Much of the attention in the extant literature has been on the impact of DT on changing business models (e.g. Henriette et al. 2016). We add to this by showing how DT contributes to changing the internal structures and leadership of organisations. In particular, we identified four different structures and leadership for the IT function in organisations that undergo DT: IT function with digital projects; separated IT function from digital function; integrated IT and digital function with separated leaders and integrated IT and digital function with a single leader. Though different, these structures imply an organisational need to change the IT function in order to accommodate the need for digital capability and enabling bimodal IT. Our findings are also in line with research on bimodal IT where the early stages of DT are associated with digital projects or separate digital functions, and where reintegration between IT and digital functions is adopted when competence and experience with DT increase (Haffke et al. 2017b). For example, in the energy SBU case the main issue concerning IT was to pay off the technical debt and consolidate the application portfolio. At this early stage of DT, there was no pressure or need to add strategic responsibilities to the CIO nor initiate any separate digital structure besides standalone projects. However, the CIO was invited into discussions with the senior management about digitalisation opportunities, and in this way showing signs of moving forward in terms of DT. From the findings, we see that when the business becomes more reliant on IT, the pressure for the IT function to be agile and the digital leader to take on strategic responsibilities, increases. Here, in the second category of setups, this pressure is handled through establishing a separate digital function with a dedicated digital leader, usually a CDO. In the third category, DT is according to one of the respondents "running business", and the IT and digital is integrated with separate leadership, but most often with a CDO as the leader for both. Lastly, we have seen examples of which IT and digital are integrated and falling within the responsibility of one single leader, usually following a strong focus towards digitalisation in the business.

The study also contributes to the literature on digital leadership extending research in this area. It shows evidence of emergent leaders in the digital era, such as CDOs (e.g. Hess et al, 2016) and the important role they play in the DT process. Though some literature exists that questions the sustainability of these new roles, what our study has found is that these roles play a crucial part in their respective organisations especially at an early stage of the DT process, and in setting up the way for the DT process. As one of the respondents phrased it: "CDO is given a golden ticket to do things differently" (Head of Digital, Financial Sector). In relation to this, our study adds to the existing body of knowledge by showing how digital leaders relate to the IT function and CIOs. What we know is that this relationship varies across different organisations. We reveal new arrangements that manage the inter-dependencies between the IT and digital, adding understanding to the relationship between lightweight and heavyweight IT as suggested by Bygstad (2015), and the need for alignment between CIO and CDO (Haffke et al. 2016). In the second category of setups with separated IT and digital functions the alignment is ensured through the CDO who appears to take responsibility for system architecture and portfolio management. In the third category of setups, where IT and digital is integrated but with CDO as the main leader, this alignment is made tighter supported by a hierarchical relationship between digital and IT. Prior research has pointed to unimodal structures with digital and IT as the way forward handling the need for two-speed IT (Haffke et al. 2017b). In terms of leadership, our results show that digital leaders for these new structures need to take responsibility for both these two modes, and in this way could find themselves in a similar situation that CIOs previously found themselves before the DT journey started with challenges in terms of scope and priority (Chun and Money, 2009). An obvious example of this is the leader role titled CDIO. However, these organisations have digital capabilities which they might have not had had before, and in this way could be in a better position to deal with these challenges.

Finally, despite the increasing reference to academic and practitioners' literature on investments in digitalisation programmes, our study shows that such initiatives are not always strategic orientated nor are they clearly defined. This has an implication on the role that digital leaders perform in organisa-

tions where in some cases these are seen to perform an operational rather than a strategic role. In relation to this, DT initiatives are not always driven by business strategy; instead these are found to trigger digital strategy formulation by generating senior management attention in a reactive and incremental manner. In relation this this, findings also point to 'digital' as being a nebulous word and show that organizations are still in the process of learning, exploring and unpacking the opportunities of digital transformation for themselves. In doing so, they rethink their strategies, structures, digital leadership, role of the IT function, skills and digital capabilities. Our findings on this latter issue are only tentative, however, and more research needs to be carried out to shed more light on the strategic orientation of DT programmes.

# 6 Conclusions and Implications

The study has aimed to provide empirical insight into the role of digital transformation in changing the IT function and specifically its structure and leadership. Despite an increasing number of studies on digital transformation, this has been the first study to our knowledge that has explicitly examined the relationship between digital transformation and IT function. Further, the study has taken a focus on pre-digital organisations that tend to face more challenges in adopting and implementing digital initiatives than the so called born-digital organisations.

Our study has implications for the management and leadership of DT programmes as well as for IT functions. Our study showed that different setups of organisational structure and leadership may develop to support DT and that there is no single one that is better than the other. This depends on the type of the organisation, its culture and size. Regardless of the setup, there is a need for clarity across different managerial levels on the organisation's approach toward digital leadership. Furthermore, regardless of the setup adopted, as digital and IT capabilities are interdependent, there is a need for the relevant leaders to work together and develop effective collaborations that would contribute to the success of DT programmes.

The study is not without limitations. Our findings are based on a limited number of interviews. Also, though we sought to get the views of both CIOs and digital leaders from the same organisation, this was not always possible. As such, we contribute to the agenda for future DT research. In particular, there is a need for in-depth case study research in this area where researchers are able to explore the extent of digital transformation that takes place in specific organisations whilst identifying the challenges that organisations face during this process. Future research should also examine the relationships between IT and digital leaders over a period of time in order to unpack the influences that they exert on each other. Further, our study has not explained why some organisations may choose to integrate the IT and Digital functions and whilst others choose to differentiate them. Research therefore is required to provide further insight into the reasons for structuring the IT function in what ways.

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