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Is IT enough? Reflection on the Role of IT in the Digital Era

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Abstract. The fast-paced digitalization of products and services across all industries creates volatile and rapidly changing market environments. In such a climate, many organizations are struggling due to a lack of dynamic digital capabilities: the abilities to both create and react to new digital business models in a timely fashion.
To develop dynamic digital capabilities, organizations need to rethink the role of the IT-organization and its position in the digital value chain. Based on the insights from three Danish companies that successfully compete in the digital economy, we identify organizational templates that can guide managers in the process of reshaping IT organizations for digital success.

Keywords: Digital Transformation, Digital Leadership, Information Technology Governance, Dynamic Capabilities, Organization Design.

1 Companies Need to Rethink IT in The Digital Era

The ongoing digitalization of products and services across all industries is causing shifts in consumers' apprehension of value. Digital innovations are often more radical and faster than traditional, incremental innovations. They cause shifts in the consumer's apprehension of value and blur the line between physical and digital. Digitalization has had disruptive effects on major industries, such as music, newspaper, and book industries, and no sector seems to be immune to the ongoing digital transformation. To compete in such an environment, organizations need to develop the capabilities to efficiently and effectively manage digitalization.

Research has resulted in a considerable amount of knowledge on digitalization [1] [2]. However, there still exists widespread uncertainty about the proper management of digitalization in practice.

In many industries, digital disruptions are caused by innovative organizations, which create new business designs at the intersection between the digital and the physical world [3] [1]. For organizations to be able to digitize their products and services, dynamic digital capabilities are required. However, just as "Digital Strategy Does Not Equal IT Strategy" [4], digital capabilities are only vaguely related to traditional IT

capabilities, and much of what we know about IT capabilities can therefore not simply be transferred to digital capabilities [5][6]

Both IS academics and practitioners need to rethink the role of IT within the organization and investigate how to develop capabilities that support the shift from operational IT system thinking to the development of innovative digital products and services. The dual systems view allows for a better understanding of the new role that IT takes in the age of digital [7]. While traditional IT systems have over the last decades penetrated every aspect of the value chain, IT was rarely a part of a firm's actual products and services (with the natural exception of the IT industry). In the dual systems view, these systems are referred to as back-end systems. In the digital economy, however, the role of IT gradually expands to become either part of products and services (e.g., mobile banking applications) or fully replace physical products (e.g., the music or movie industry) and services (e.g., travel agencies). These systems are front-end systems. From the perspective of IT architecture, this means that the focus of organizational IT moves from back-end systems towards front-end systems and thereby supports the increased importance of IT with regard to the creation and delivery of new digital products and services to customers. Back-end and front-end systems have inherently different characteristics (see Table 1).

Table 1. Back-end and front-end systems in the dual systems view.

System type	Description	Focus
Back-end	The back-end of the IT architecture evolves at a slow pace due to the criticality of the systems and the need for stability. Back-end systems are often transaction-focused systems, such as (legacy) operating systems, ERP, or SCM systems.	Quality/Stability Efficiency Legal compliance Evolutionary development
Front-end	The front-end of the IT architecture evolves at a fast pace due to the customer-centric approach that requires organizations to meet customer needs in a timely manner. Front-end systems are either fully or partially digitalized products or services offered by the organization.	Speed/Time-to-market Innovativeness User-involvement Revolutionary development

2 The Changing Role of the IT-Organization

To account for the extended role of IT for a firm's success, organizations must reconsider the role of the IT organization in the digital value chain. In the era of digitalization where technology is changing rapidly, digital technologies are penetrating the core of the products and services the organization offers [8]. The ends of technology are no longer limited to value chain optimization or integration, and IT organizations thus must play a part in a firm's face to customers.

Regarding the management of IT, the new reality of this dual set of systems is that the CIO is not only responsible for operational and largely internal systems but also takes charge of customer-facing innovation. This represents a risky paradigm shift for

many organizations and thus requires careful examination and guidance. The purpose of our research is therefore to explore how firms can manage the changing role of IT organizations in the digital economy.

2.1 Digital agility and dynamic digital capabilities

To investigate the role of the IT organization for digital business transformation, we developed an analytical framework that combines the dual systems' view with the concept of dynamic capabilities. Dynamic capabilities are commonly conceptualized as "the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments" [9]. A firm's dynamic capabilities rely on three main foundations: sensing new opportunities, seizing new opportunities, and transforming the resource base to allow for continuous reconfiguration and management of threats [10]. These are entrepreneurial and innovative activities, which form a firm's ability to innovate products and processes and thereby react to changing markets.

In combination with the dual systems perspective, a firm's dynamic digital capabilities comprise both back-end and front-end systems and thus emphasize the technological aspect of market change that dominates the digital economy. Dynamic digital capabilities then include the abilities to (i) sense challenges from and opportunities for new digital business models, (ii) seize these opportunities by means of timely technological and organizational implementation, and (iii) transform the firm's technological and organizational resource base to allow for continuous and rapid sensing and seizing of new opportunities.

For example, the process of sensing digital opportunities and challenges in the newspaper and media industry led to the development of digital offerings, such as online newspapers or complementary online content. Early innovators were able to sense and seize these opportunities faster than their competitors, thereby creating a competitive advantage. Moving from a physical to a digital format is not a trivial change but requires rethinking the whole production process of established media organizations. Some firms, therefore, reacted by creating separate online brands, while others developed their traditional brand to include a digital edge. Organizations can pursue different strategies when seizing digital opportunities, all of which may be successful. However, successful seizing always depends on the existing resource configuration of a firm, including both back-end and front-end systems. Thus, organizations continuously need to transform their digital capabilities to support timely sensing and seizing of future digital opportunities.

3 Research Method

We conducted informal interviews with top-level management and experts from a range of companies/industries before narrowing down our data collection to the three case companies that form the base of our analysis. For each of the companies, we conducted semi-structured interviews with top and senior-level management involved in IT

decision-making. A total of 15 interviews were conducted. The interview guidelines contained a set of questions regarding the organization's strategy for the digital economy, the role of the IT organization, and an example of the adoption of a digital trend by the organization. During the interviews, we led the questioning while maintaining flexibility to embrace issues that emerged during the data collection. In some instances, follow-up interviews or conversations via email or telephone were used to collect additional information.

In all cases, with various additional data sources used to triangulate our data collection and increase the reliability of our findings (including external and internal documents, trade-magazins and general newspapers, organization charts, company presentations, consultancy reports).

3.1 The case companies

The three case companies were pruposefully selected due to their individual characteristics and their distinctive way of achieving success in the digital era. Common for the case companies is that they are all Danish private sector companies. The three companies can be described based on the characteristics summarized in Table 2:

Each of the case companies is a leading market player within their respective industry, and successfully competes with partially or fully digitized products or services. While HomePartner can be considered a digital native firm, that is, the company was founded with a digital business model; in contrast, FinancePartner and GreenEnergy can be described as digital immigrants, which were challenged to adapt their traditional business models to the new digital realities[11].

Table 2: Overview of case companies

	GreenEnergy	**FinancePartner**	**HomePlatform**
Industry	*Energy*	*Banking*	*Real-estate*
Type	Digital immigrant	Digital immigrant	Digital native
Founded	1945	2000 (merger of 4 established banks)	1999
# of employees (approx.)	*15.000*	15.000	100
Market	*B2B*	B2B/B2C	B2B/B2C
Type of output	*Physical and digital products*	*Physical and digital services*	*Digital services*
Market	*Global*	*Nordic region*	*Denmark*

FinancePartner, a recently founded organization that is the result of a merger of four established financial institutions, has decided to adapt to the digital economy with evolutionary, incremental changes, while GreenEnergy went through a radical and revolutionary restructuring process. The selection of diverse cases reflects our aim to understand the various forms the IT organization can take for successful digital business transformation. Prior research has shown that industry, size, and value focus are

impactful dimensions when investigating digital transformation [5]. Moreover, all of the industries represented by our case companies have recently undergone or are currently undergoing major changes due to the digital revolution: the real-estate industry (HomePlatform) has remarkably changed from a physical to a virtual industry, the banking industry (FinancePartner) is currently facing potentially revolutionary changes by means of new technological developments; the energy industry (GreenEnergy) is yet to be facing disruptive changes, with some new technologies (e.g., smart-meters) already pointing towards potential future developments. The differences between our companies allow us to gain a broad perspective of how different organizations and industries can follow different models to compete successfully in the digital era.

3.2 Dynamic Digital Capabilities at Homeplatform

As one of Denmark's largest online marketplaces, HomePlatform can be seen as a "digital native" - where technology has always been the backbone of the organization. HomePortal has by far the largest market share in the online real estate market in Denmark, and is continuously aiming to improve and diversify its position in the market. The managers of HomePortal attribute their success not only to being a first-mover in the Danish market, but also to their ongoing efforts to improve user experience and customer offerings.

The core business of HomePlatform revolves around a digital marketplace for connecting tenants and landlords of rented accommodation, cooperative and owner-occupied real-estate. HomePlatform's vision is "to be involved in every and any housing change in Denmark", either directly or indirectly by connecting tenants or landlords with other externally provided services as e.g. removers, credit capabilities etc. One of the most valuable resources of HomePlatform is its data. HomePlatform has never separated their digital strategy from their business strategy. Structuring and aggregating data are strategically critical activities for HomePlatform, as this enables the connection of various internally or externally provided services to tenants and landlords. A second strategic objective is the ability to create second-to-none user interfaces. A third objective of strategic importance is HomePlatform's ability to quickly develop and release new or improved digital services and products through an agile organization. Due to the digital nature of HomePlatform, the IT organization consists of developer resources that work tightly integrated with the business organization on developing and providing digital products and services.

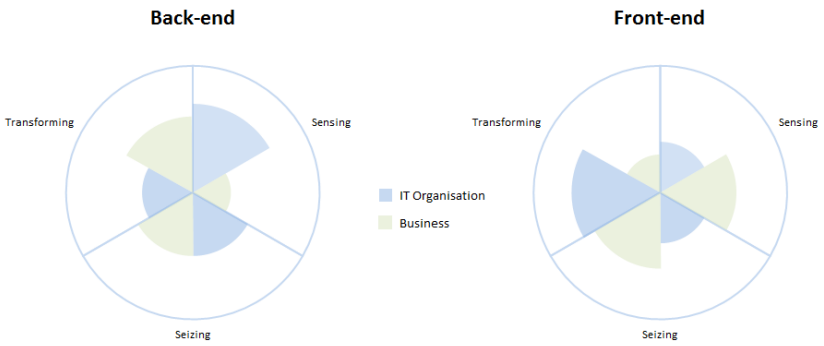

Fig.1: Sensing, seizing, and transforming for back-end and front-end systems in HomePlatform

Sensing

Our findings show that in HomePlatform many opportunities are sensed internally with a focus on how to better exploit their resource base. HomePlatform uses the communication platform Slack for sensing, with a dedicated communication-channel for 'business inspiration'. This channel and the associated processes of idea-generation and discussion are the materialized internal (local) sensing process in HomePlatform.

Anybody at HomePlatform can join this virtual idea generation channel and pitch or discuss ideas, regardless of workplace, department or role - ideas can spring from anywhere within the company. This way, HomePlatform encourages a broad and inclusive approach to sensing. The channel is quite popular among the employees and gives the management the chance of a direct overview of new and innovative ideas from within the firm, while at the same time minimizing the distance between employees and management. As Figure 2 shows, both back-end and front-end opportunities are locally sensed in a shared manner between business and IT employees. In addition, input to the front-end sensing activity also includes a broad range of other sources external to HomePlatform, such as business partners, suppliers, and information gained through observation of competitors.

Transforming

In the transformation process of front-end systems the IT organization takes the lead, while the business organization plays a smaller role. In early 2015, optimizing user experience (UX) and interfaces (UI) was decided to be a central element for HomePlatform's strategy. At this time, HomePlatform realized that the user-experience (UX) and user-interface (UI) of their digital products were not on a competitive level. By assessing their resource-base they found that it would be unfeasible to seize this opportunity due to a lack of UX and UI competencies. Therefore HomePlatform has initiated a transformation phase during the last 12-14 months in order to renew the resource base in accordance with these strategic objectives. The transformation of the resource-base towards more UX and UI competencies supports the efficient seizing of future front-end opportunities.

Seizing
The transformation process described above was crucial to the speed with which new digital products and services can be seized and released to the customer. In addition, a high level of autonomy with regard to decision-making processes allows for increased speed and short time-to-market.

Back-end opportunities are collaboratively seized by IT and business employees. For example, the use of Slack was initiated by the IT developers, and is now adopted throughout the organization. It is a deliberate choice at HomePlatform, to let the best tools emerge among the employees. Therefore, seizing of smaller back-end opportunities can be rather swiftly conducted. However, decision-making on larger and potentially costly back-end systems remains a management competency. In such cases, there is a clear decision-making process at HomePlatform where new opportunities, such as a new enterprise system, have to be approved by the management.

3.3 Dynamic Digital Capabilities at Financepartner

Founded in 2000, FinancePartner is the result of a merger of four established financial institutions. Therefore, unlike HomePortal, the new organization therefore does not have a "clean slate", but rather has to manage the consolidation of partially redundant existing infrastructures and processes from the four constituents, while at the same time react to the changes in the industry caused by digital innovations.

Many of the services offered by FinancePartner are delivered in what the CIO refers to as a "digital wrapper". A digital wrapper is the digital solution for delivering a financial service - not the financial service itself. FinancePartner's success in the digital economy is characterized by the early development and deployment of innovative solutions to gradually replace traditional customer interaction, such as the possibility for mobile banking across different devices (including smartphones and smartwatches), that often include additional value-adding services (e.g., expense analytics).

As the CIO argues, financial companies will differentiate themselves more and more through the digital wrapper and not the financial services themselves. The business strategy at FinancePartner is emphasizing the role of the digital economy, as the CIO argues: "everything today is digital". FinancePartner has both a digital strategy as well as an IT strategy, which describes how technology should enable business development.

FinancePartner's IT organization developed from having a centralized IT organization, dealing primarily with back-end systems to the integration of front-end system capabilities. Today, the purpose of the IT organization is to fulfill two tasks: (i) ensure a stable foundation for IT operations and at the same time (ii) support the business developers with the development of digital products and services.

Sensing
FinancePartner aims to scan for new back- and front-end opportunities both in and out of the banking industry. To do so, FinancePartner observes direct competitors but also disruptive developments in other areas, such as the music or newspaper industry.

FinancePartner senses broadly to be up-to-date with new technological opportunities such as blockchain technology, which has the potential to become a major factor for future trading and finance services.

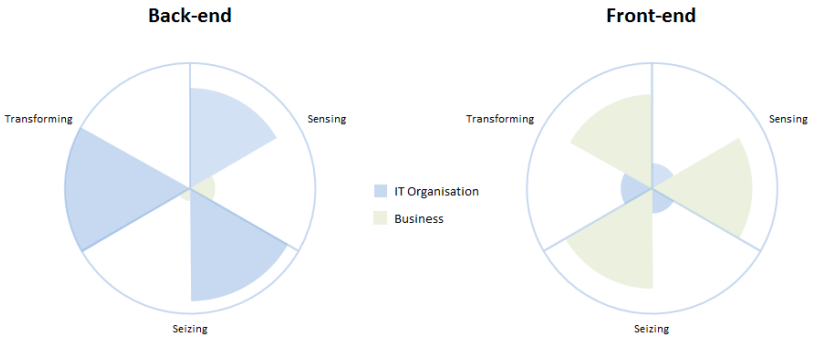

Fig.2: Sensing, seizing, and transforming for back-end and front-end systems in FinancePartner

FinancePartner engages in what they call "pseudo core research", as they acknowledge the importance of technological research. FinancePartner also senses back-end opportunities, with a focus on process innovation. For example, FinancePartner is currently investigating how the application of robotics can help automate currently manual banking processes. FinancePartner's IT organization has decentralized the sensing activity to different business-oriented verticals of the IT organization. As the CIO argues, sensing is often based on a personal interest for a topic. Top management does not engage directly in sensing activities in each vertical. Management is currently considering creating the role of a Chief Innovation Officer, who should facilitate the sensing effort and support communication of sensing activities to management.

Transforming

Today, FinancePartner is conducting a large consolidation project targeting the core banking systems in order to accommodate for the efficient seizing of future opportunities. By transforming the core banking systems, FinancePartner is also preparing to fend off international competitors, rather than just the current national and regional competitors. The CIO argues that "it has become obvious that if we do not have IT guys that can turn around and work with this, then we won't have a business to run". The transformation of the resource base is not limited to technical renewal and consolidation, but will have a major impact on the required skillset of the employees. The ambitious plan of the CIO is exemplified best by the CIO's comparison of FinancePartner to "a team [that] used to play third division football planning to play in the premier league". To gain a better understanding of how digital trends can impact the traditional business area of FinancePartner, the IT organization set up a governance structure based on different business verticals. This allows the organization to be responsive within the different business domains. The vertical-structure also ensures an efficient coordination

with the business organization, as the verticals also possess the decision-making authority. The verticals have greater autonomy to develop the business in terms of front-end applications, while back-end systems are tightly coupled by management.

Seizing
Due to the recent merger, FinancePartner has yet to achieve a consolidated IT architecture. Thus, although the IT department of FinancePartner is set-up as one organization, the four constituents are still largely operating as isolated entities. Development and maintenance of digital artifacts - including the actual financial products - has to be done redundantly for each of the four underlying institutions. In this light, the process of seizing opportunities (e.g., mobile technologies) is often a complicated and lengthy endeavor.

By developing the digital competences of the IT organization, the seizing of new front-end systems can be done in a shared manner between IT and business departments. Moreover, the business organization is also involved in the process of seizing back-end systems, and they hold the final decision right for changes to the architecture. The reason for the participation of the business organization in back-end system decisions is that the financial sector is heavily regulated, and new developments have to be in line with industry and legal standards. Therefore, the business organization develops different risk profiles to evaluate proposed solutions, and then decides on a potential development or implementation.

3.4 Dynamic Digital Capabilities at Greenenergy

GreenEnergy has historically been a manufacturer for heavy industrial machinery. To compete in a more and more digital market, GreenEnergy has developed a second value chain based on digital products that are embedded within their physical products. Despite the industry-wide unmatched success of the introduction of this digital edge, GreenEnergy's self-image is still that of a physical product provider, or as the CIO clearly states: "we are a manufacturing company". GreenEnergy does not have a standalone IT strategy, as the IT organization follows the strategic initiative of the business. Based on GreenEnergy's strategy, the IT department has created three different strategic focus points: (i) reduce the complexity of the IT landscape, while increasing the efficiency of IT procurement, (ii) increase awareness regarding security, and (iii) transform the firm into a digital enterprise. According to the CIO, GreenEnergy feels heavily pressured into changing direction, because the fast changing digital economy pushes them to act more like a software company in order to better utilize their digital value chain.

Sensing
The IT and business organization at GreenEnergy have clearly separated responsibilities. For back-end systems at GreenEnergy, the allocation and responsibility of resources regarding the three clusters of dynamic capabilities are quite uniform. The IT organization has the responsibility for back-end systems while the IT organization has

little influence regarding front-end systems. This is due to the IT department being designed as an internal service provider to the business departments.

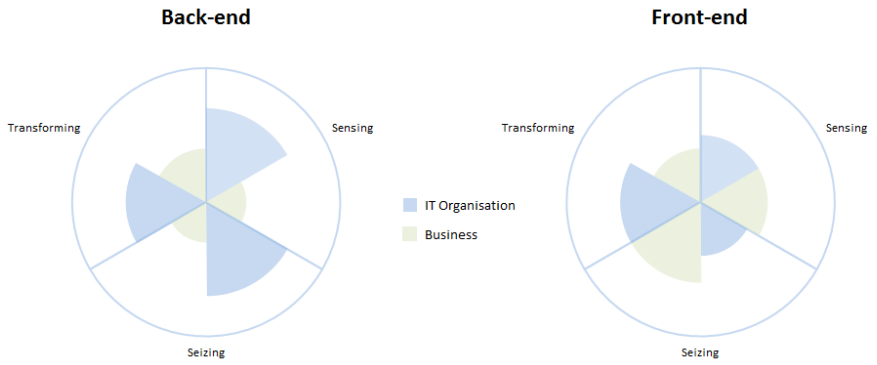

Fig. 3: Sensing, seizing, and transforming for back-end and front-end systems in GreenEnergy

The IT organization has historically been seen as a support function, without the responsibility to influence or challenge the existing value chain. The IT organization is therefore naturally limited to providing operational support with a focus on back-end systems.

Based on this constraints, the IT organization only senses opportunities that support value creation or optimization of internal processes. For example, the IT organization sensed the back-end opportunity of supporting the value chain by introducing an e-commerce solution for spare parts and service management, which could increase the turnover for the service unit. GreenEnergy senses for back-end systems both locally and globally. Local sensing is conducted through the roles of Engagement Officers, Subject Matter Experts and the Solutions Architects. These roles are designed to supply the corresponding business partners with solutions and sense demand. GreenEnergy's global sensing is a rather narrow process of sensing among vendors and contractors, mostly relying on proactive suggestions from external partners. All inputs are channeled and evaluated by the Enterprise Architecture (EA) department, which decides on which technological opportunities to pursue. GreenEnergy is primarily sensing opportunities for process innovation.

At GreenEnergy, a separate business-unit termed Research & Development (R&D is responsible for sensing front-end opportunities and for applying big data, open source and SCADA systems in order to develop front-end systems.

Transforming

The IT organization undertook a large transformation to renew their resource base for future digital demands. During this phase, the CIO argued that the IT organization will not be able to both manage the support services while at the same time develop new business opportunities. Therefore, the transformation infused a tighter governance

structure, leading to a centralization of back-end system responsibility within the IT organization. In addition, a service integrator approach would change the IT organization from generating to integrating services. GreenEnergy has centralized back-end decision-making authority in the Enterprise Architecture (EA) department which manages the system portfolio, while all front-end systems are managed by the R&D department.

Seizing
The transformation efforts enable the IT organization to seize back-end opportunities by focusing resources on developing the business instead of generating new services. Seizing these opportunities often has an indirect link to increased financial performance. For example, seizing the opportunity of an e-commerce solution for spare-parts and service management has become an important parameter in the placing of several new orders. In line with the transformation efforts of the IT organization, seizing of back-end opportunities takes place solely in the IT organization, relying on their specialized expertise for operational IT, whereas the R&D department independently seizes front-end opportunities.

4 Managing IT in the Digital Economy

We have introduced three Danish companies that implemented different models of utilizing IT for digital success. Our case companies are active in different industries and differ in many key characteristics, such as size, age, or value focus. Based on our insights and the analytical framework of dynamic digital capabilities, we were able to derive three distinct models that can guide organizations in their struggle for digital agility. In the following, we outline the key characteristics of each model and discuss its underlying drivers, risks and barriers. In practice, managers can use these models in a twofold manner. First, they can be used as templates to evaluate an organization's digital capability (“where do we see ourselves?”) and better understand the drawbacks and benefits associated with a specific organizational design. Second, the models are useful to critically assess potential future directions (“which model might fit best for us?” for the role of IT within an organization.

4.1 The collaborative model: IT is digital

Start-ups and many small and medium enterprises (SMEs) benefit from a crucial advantage when it comes to dynamic digital capabilities: the ability to collaborate. A small number of employees allows these organizations to collaborate instead of cooperate; that is, employees from different functional backgrounds, including IT, are working together on achieving the organization's goals. In contrast, cooperation refers to sharing a common goal , but relying on independent or separate work processes to achieve that goal [12]. Cooperation is a byproduct of increased organizational structure in organizations, usually intended to manage the increasing complexity that comes with the growth of a firm [13]. Dynamic digital capabilities however rely on the mix of technical skills

with business knowledge that gets lost when the different functions of an organization are separated into silos. From this perspective, growth is a natural enemy to agility - if not managed properly. As shown in the case of HomePlatform, both Business and IT employees are partaking in sensing, seizing, and transforming of the organization with regard to both back-end and front-end systems. Short, largely informal, and democratic decision processes support the fast-paced evaluation and realization of new ideas. The small size of an organization, paired with an entrepreneurial spirit and low knowledge and communication barriers are the key aspects to this model.

Drivers
The main drivers for the collaborative model are size and entrepreneurship spirit. The size of an organization directly influences its flexibility in organizational structure and decision processes. By not restricting functions and task areas, a continuous exchange of information among employees from different backgrounds, including IT, is encouraged. Low communication barriers and innovative information exchange tools (e.g., Slack) can support local and global sensing activities. Entrepreneurship spirit, i.e., striving for innovative solutions and a general attitude to explore new digital opportunities rather than exploit traditional strengths, is supportive for the ability to timely react to new developments. Organizations that follow this model do not risk falling into the trap of organizational inertia or being dragged behind by path-dependency, as they constantly seek out new challenges and thereby actively participate in market change.

Risks and barriers
Traditional managerial knowledge holds that as organizations grow, they require more structure, and thus lose the ability to effectively collaborate across different domains. Recent developments however show that alternative approaches to the introduction of rigid structure exist. The process-centered perspective aims to replace functional hierarchies by organizing firms along their core and support processes [14]. In this view, employees are not part of a functional department, such as Marketing or IT, but rather in charge of end-to-end processes, which span across functions and create a clear value for the customer. Today, enterprise systems can easily manage the increased need for information sharing and knowledge management that comes with a process-centered management approach. Therefore, companies embracing the collaborative model can implement new organizational designs to counter the need for more structure during times of growth.

4.2 The bi/multi-modal model: separate IT and digital

Building on the dual systems view, various IT consultancy companies have recently triggered the creation and widespread discussion of multi-modal (building on earlier bi-modal or two-speed) IT architectures . In essence, these models aim to create a fruitful environment for digital innovation (front-end systems) while at the same time acknowledging the need for stable, operations-oriented IT (back-end systems). This is achieved by reorganizing a company and dividing the domains into different modes and

organizational structures. GreenEnergy has implemented this model by separating their IT organization from the R&D department, which is a part of the business organization. In this model, the IT organization keeps the focus on their traditional expertise of back-end systems, while the R&D department is in charge of sensing, seizing, and transforming for front-end opportunities and challenges. A number of companies have recently undertaken steps to adopt this model – with more or less success [15] .

Drivers

Like in the case of GreenEnergy, mounting financial pressure and industry competitiveness can force managers to think of radical ways to halt and eventually reverse a company's decline. GreenEnergy realized that they needed a fast and game-changing solution to regain their competitiveness. The CIO quickly concluded that the bloated IT department would not be able to address the need for the fast development of innovative digital business models. This approach does not to include asking the IT department to think outside the box – but it removes the box entirely by creating an independent group in charge of customer-facing digital innovation. The separation of speed and stability, or innovation and operation, is at the core of this model. By establishing a new entity, management can successfully work around the otherwise challenging tasks of breaking up organizational inertia and institutionalized processes of the IT organization, and thus leave the often strong work identity of IT employees untouched. Following this transformation approach allows GreenEnergy to sense and seize digital opportunities independently and creatively.

Risks and barriers

The creation of a customer-facing front-end department comes with a requirement for considerable investment in human resources and technology. The multi-modal setup brings along the risk of redundant resources, as in many cases similar skills are required for back-end and front-end systems. Moreover, since the development goals of the R&D are inherently unclear, HR is tasked with the problem to form a team with a wide range of different knowledge backgrounds, which is however still required to engage with the core-business model and value proposition of the company. Setting up dedicated digital innovation (or R&D) departments comes with the challenge of how to measure and eventually evaluate the productivity of this initiative.

Companies that have implemented this separated model come to realize that one of the biggest challenges is the transfer of successful digital developments (front-end) into the realm of the overall IT architecture of the firm. As a result, organizations that fail to transform their architecture continuously will face an increasing amount of shadow-IT. Recent developments to address this issue include for example tri-speed architectures, which include a third entity that takes care of this transformation – by integrating customer-facing solutions into the existing architecture.

4.3 The digital IT-department model: develop IT into digital

Unlike the multi-modal approach, the digital IT-department model aims to expand and develop the existing IT resource base for digital success. That is, companies actively pursue a change of traditional IT departments by adding the responsibility for front-end systems to their domain. From a resource-based perspective, this model can be considered conservative and organic to existing institutional set-ups. FinancePartner decided to incrementally add new, digital competences to their existing IT organization in order to develop dynamic digital capabilities. The management of FinancePartner successfully used the organizational change processes triggered by the recent merger to push forward the digital transformation of the IT department. In addition to complex institutional structures based on the ongoing integration and consolidation efforts of the four original infrastructures, the organization at the time did not perceive the need for radical and fast-paced organizational change to remain competitive within the financial industry.

Drivers

Developing traditional IT organizations by expanding their responsibility towards customer-facing innovation represents a substantial paradigm shift for many firms. Like FinancePartner, organizations that do not perceive upcoming radical shifts in their industry might find this model attractive, as it represents the most organic approach to exploit the existing resource-base. Industry-specific expert IT knowledge that has often been acquired and developed over many years is likely to prove useful for timely sensing and seizing of new digital opportunities, both within and external to the organization. In firms with traditionally large and influential IT departments, the decision to develop the digital agenda within the existing structure may be based on formal or informal power-relations, that favor a centralized IT and digital department over the dispersion of authority and responsibility across different domains.

Risks and barriers

To pursue this approach, established institutional structures in the form of power relations, company culture, and workplace identity have to undergo a change process. The management of FinancePartner was able to use the organizational change process triggered by the merger of the four constituent institutions to put the transformation of the IT organization with regard to front-end competencies on the agenda. However, the need to break up often rigid structured bears the same risks that many large projects focusing on organizational change face: hard to estimate financial efforts and potential strong resistance of employees. In addition, organizational change is a process that often takes time and cannot be realized quickly, which limits a firm's ability to respond to market changes in a timely and effective manner. GreenEnergy realized that the industry-competitive pressure was too high for slow and incremental growth of dynamic digital capabilities, while FinancePartner felt less time pressure within their industry. For organizations to pursue this model, the work process between business and IT departments have to be efficiently aligned and functional. Decision-makers need to be

aware that for organizations with dysfunctional business-IT relationships, increasing the responsibility of the IT department will likely cause further misalignment, rather than supporting the development of a company's dynamic digital capabilities.

Table 2: Comparison of models

	Collaborative	**Multimodal**	**Digital IT-department**
Drivers	Small size	Breaking out of organizational inertia	Rigid power relations in the organization
	Entrepreneurship spirit	Strong functional identities	Desire to keep expert knowledge concentrated
		Resistance to change	No time pressure perceived
		Misaligned business-IT relationship	
		Perceived time pressure	
Risks	Unmanagable complexity	Difficult to put in place	Endless, unfeasible organizational change process
		Creation of shadow IT	Missing out on opportunities while finding a structure
		Translation between modes is critical but difficult	Misaligned business-IT relationship deteriorates further
Barriers	Growth	Upfront financial investment	Too strong institutionalized roles and identities hinder change process
		Unclear/novel recruitment outside of functional expertise	
Case	HomePortal	GreenEnergy	FinancePartner

5 Concluding Comments

The rise of the digital economy holds great opportunities for new and incumbent organizations across all industries. To reap these chances and at the same time prepare for a new set of digital challenges, organizations need to become digitally agile - that is, they need to develop and manage dynamic digital capabilities. Firms need to actively reconsider and shape the new role of the IT organization to support digital agility. With this research, we aim to support managers in (i) understanding and evaluating their current structural strengths and weaknesses and (ii) formulating a potential future success model based on the characteristics of an organization.

While our research cannot provide definite, universal guidelines for organizations to face the complex reality of the digital economy, we offer insights into potential success models that can help decision makers to systematically develop and evaluate a company specific model. By understanding the specific drivers, risks and barriers of different models that can support the successful creation of dynamic digital capabilities, managers can adopt these generic models to the context of their own organization and thus follow a structured approach to reshaping the role of IT within the digital enterprise.

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