

Managing Digital Resources

A Qualitative Investigation of Digital Management in the Norwegian Private Sector

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Abstract

Digital technologies are introduced, removed, recombined, and utilized in businesses, industries, and sectors every day, and fundamentally transform processes and organizations (Brynjolfsson and McAfee, 2016; Westerman et al., 2015). Even so, there is little consensus on how to best manage these technologies and resources. Through an exploratory, qualitative, interview-based study with 16 top managers from 15 Norwegian companies, we aim to uncover how these top managers conceptualize and conduct digital management. We address their planning, organizing, leading, and following-up activities in relation to these resources, and confirm and extend Bygstad et al.'s (2021) framework in the context of the private sector. Furthermore, top managers' conduction of digital management builds two key capabilities: to continuously develop strategies, offerings, and the organization, and to facilitate individual empowerment.

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List of Abbreviations

API: Application Programming Interface. Programming interfaces often used to integrate services or applications with one another.

AS: Aksjeselskap, Norwegian joint stock company

ASA: Allmennaksjeselskap, Norwegian public limited company

CDO: Chief Digital Officer

CDTO: Chief Data and Technology Officer

CEO: Chief Executive Officer

CIO: Chief Information Officer

CTO: Chief Technology Officer

HR: Human Resources

IT: Information Technology

KPI: Key Performance Indicator, a measurable value which demonstrates how well a company, team or individual is performing.

OKR: Objectives and Key Results, a goal-setting methodology that sets measurable goals, and helps companies track progress.

PaaS: Platform as a Service, a business model selling access to platforms as a service.

SaaS: Software as a Service, a business model describing software sold as a service, i.e. hosted by the reseller.

SDK: Software Development Kit

SMAC(IT): Social, Mobile, Analytics, Cloud, (Internet of Things) is an abbreviation referring to some influential modern, digital technologies.

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1 Introduction

Digital technologies are introduced, removed, recombined, and utilized in businesses, industries, and sectors every day, and fundamentally transform processes and organizations (Brynjolfsson and McAfee, 2016; Westerman et al., 2015). These technologies materialize in various shapes, but commonly, they all need management in some shape to create value and provide benefits (Terlizzi et al., 2017). Multiple authors have defined digital management in various different ways (Bygstad et al., 2021; El Sawy et al., 2016; Larjovuori et al., 2016; Zeike et al., 2019), and businesses often develop their own frameworks, processes, and methods for managing these technologies, resources, and the people that develop and maintain them.

As of yet, there is little consensus about the methods or means that most efficiently manage these resources. For this thesis, we utilize Bygstad et al.’s (2021) definition of digital management: “The competent management of digital resources for business purposes, including the planning, organizing, leading and following-up”. In this thesis, we want to address this lack of consensus by applying Bygstad et al.’s (2021) framework in a qualitative study of Norwegian businesses. We aim to uncover how top managers in the private sector conceptualize and conduct digital management. Our research questions are the following:

- (i) How do top managers in the Norwegian private sector conceptualize digital management, and (ii) how do top managers in the Norwegian private sector conduct digital management?

First, we will provide a summary of relevant literature on this topic and related topics, followed by a description of a framework for digital management from Bygstad et al. (2021). Then, we will provide a description of the methodology applied in this research project. To answer these questions, we conducted 16 interviews with top managers from 15 Norwegian companies from various industries within the private sector. We gathered data from a varied base of informants, and were able to synthesize 24 findings, of which we will describe seven in detail in this thesis. Next, we will discuss our findings against existing literature, and provide answers to our research questions. Lastly, we will conclude this thesis.

2 Literature

2.1 Digitalization, Digital Resources, and the Digital Organization

Closely related to the management of digital resources is digitalization. The perceptions of digitalization are many, while some still don't distinguish digitalization and digitization, others argue that digitalization is considering "digital" a resource. Ross et al. (2019) suggest that digital technologies provide businesses with unique capabilities: ubiquitous data, unlimited connectivity, and massive processing power. These capabilities allow businesses to develop new, digital offerings, converting "digital" to a resource for the business.

As mentioned, in practice, digitalization has often been confused with digitization, and they are often used interchangeably. It is important to understand the difference between the two to fully grasp the concepts of digital transformation and digital management. "Digitization is the encoding of analog information to a digital format [...] making physical products programmable, addressable, sensible, communicable, memorable, traceable, and associable" (Yoo et al., 2010), while digitalization refers to the art of exploiting opportunities that lie within the digital format, which in turn transforms work processes and organizations. For instance, we would describe the adoption of video-meeting tools as an alternative to physical meetings as a digitization effort. However, when organizations leverage the potential of video-meeting tools, such as new organization-wide remote-work policies and improved collaboration, we describe it as digitalization. The key differences being that digitalization efforts transform the way a business practice is performed, by using digital technologies.

Snow et al. (2017) claims that "Digital technology can enable individuals, firms, cities, and governments to become smarter - to expand their capabilities and to adapt to new and changing conditions". They further exemplify digital technologies as computer hardware, software, transmission networks, protocols, programming languages, very large scale integrated circuits, algorithms, and all the components and practices that belong to these various technologies. However, since digital technologies in this perception only give an overview of what digital resources might be or where they could be found, we subscribe to Bygstad et al.'s (2021) suggestions of four unique features or capabilities that define digital resources: they are global, general, generative, and generous. These "four G-s" are not always present in all digital resources.

Global Resources

Digital technologies and infrastructures are now made accessible through cloud technologies, VPNs, and other digital artifacts. They are accessible to employees, customers, and others through web-, platform-, or application interfaces, or APIs. For instance, a company's CRM can be accessed from anywhere in the world to almost instantly look up all data pertaining to a specific customer. Additionally, these types of resources allow for more flexible work arrangements, as employees may access necessary resources from anywhere, and communicate

across borders and time zones (Yoo, 2013).

General Resources

In many cases, data can be considered a general resource, meaning that data originally collected for one purpose can be reused in different ways by utilizing advanced analytics technologies. In much the same way, established digital infrastructures may be reused in different respects as well: the same APIs lay the foundation for heterogeneous offerings in digital platforms. For instance, Apple’s iOS SDKs and APIs allow developers to develop significantly different apps for the same interfaces (Parker et al., 2016b). One may also discover that structured data gathered for one analytics purpose can be reused for another through the application of analytic techniques (Davenport, 2018). Modularity is another characteristic of modern digital technologies, allowing these technologies and resources to be used and reused in different contexts by reducing complexity and increasing flexibility (Yoo et al., 2010).

Generative Resources

Recombination leads to more innovation. Open, digital technologies allow for recombination at an unprecedented rate: open-source projects like Linux are embedded in global infrastructures, and companies publish their own internally-developed tools as open-source projects. Furthermore, we have seen that social, mobile, analytics, and cloud (SMAC) technologies have both allowed and increasingly encouraged more rapid recombination. Additionally, the boundaries between the digital and physical world are gradually fading, which offers the possibility to recombine digital and physical resources and reveal a significant potential for innovation. The digital resources expand our collective potential for innovation by reducing costs, as well as markedly diversifying our access to technologies that may be recombined (Brynjolfsson and McAfee, 2016). In this way, digital resources can, in many cases, be considered generative. As mentioned above, some of these resources are modular in nature, and offer generativity due to loose couplings between layers in a layered modular architecture (Yoo et al., 2010).

Generous Resources

Digital resources can also be considered generous, meaning that they can be reused at no significant cost. Data stored physically on hard-drives utilize standard interfacing, and a non-significant amount of energy to recover terabytes of text, audio or otherwise structured or unstructured data. Viewing data or software as resources will, due to the low marginal cost of reuse, challenge some aspects of traditional economic thinking: the scarcity of goods, and economies of scale (Svahn et al., 2017).

Generally, digital resources are materialized in organizations in the forms of data, algorithms or larger digital infrastructures (Bygstad et al., 2021). These resources are interrelated and affect each other: data is accessed, generated, and stored through infrastructures, and analyzed and generated by using algorithms.

Platform Ecosystems

Platform ecosystems are networked markets where several separate IT systems are combined to become an integrated network of systems, facilitating seamless information flow, and internal and external interactions (Parker et al., 2016a, 2016b). New technologies are increasingly converging the physical and digital, which enables the internet to connect, control and coordinate real-world objects. Platform ecosystems transform organizations and reconceptualize industries, which opens a new way of gathering, managing and following up digital resources.

Digital platform ecosystems are uniquely positioned to exploit network effects that arise as more customers or suppliers are active on the platforms. We mainly separate network effects into two categories: positive network effects, where the value of participating in the network increases as more actors participate, and negative network effects where the value decreases. In addition, some platform ecosystems have multi-sided network effects. Positive, multi-sided network effects occur when the value of participating increases as more actors join on the different sides of the network.

The Digital Organization

Snow et al. proposed in their 2017 article a new organizational architecture, the actor-oriented organizational architecture. This method emphasizes each individuals' empowerment to adapt to their environment, and to organize their work autonomously. The architecture relies on three components: actors; commons; and protocols, processes, and infrastructures. Additionally, the architecture relies on the actors' development of new skills: sense-making, social intelligence, cross-cultural competency, computational thinking, media literacy, trans-disciplinarity, design mindset, cognitive load management, and virtual collaboration skills. They call this the digital organization (Snow et al., 2017).

At the core of the actor-oriented organizational architecture lies the notion that empowering actors at the edges of an organization is a way to manage uncertainty. This notion is different from traditional, hierarchical organizational structures, in that they bypass the hierarchies in favor of self-organizing mechanisms (Snow et al., 2017). The actors “[...] engage in self-management rather than wait to respond to directions received from the hierarchy” (Snow et al., 2017), and emphasize collaboration to carry out their value creation. Actors in the actor-oriented architecture can be individuals or teams within organizations or a company in a collaborative community.

Facilitating the actors' autonomous and collaborative functions are knowledge repositories, databases, datasets, and a shared awareness of the situation the team acts in. Making data and knowledge accessible across the organization assists actors in making the right decisions at the right time. Organizations implement these capabilities through both standardized and customized software in infrastructures. Snow et al. (2017) gives particular attention to two types of commons: knowledge and situation awareness. The first because it contains both declarative (i.e. data repositories) and procedural (i.e. know-how or pro-

cess documentation) information that can be leveraged by the organization in various ways. The second because they argue that to be effective, actors need shared awareness of the activities and concerns in their environment.

The actor-oriented architecture relies on actors' reliable access to commons through digital infrastructures. While these infrastructures vary between contexts, they have in common that they allow the actors' self-organization. Protocols like division of labor and mobilization are then used to guide the actors' collaborative actions. Standardized processes help actors by minimizing labor not directly related to them achieving the organizations' common goals.

The architecture describes digital technologies' potential to increase an organization's autonomy in its edges through explicit distributed authority, along with high information flow and digital technologies that support it.

Born Digital Companies

Born digital companies are “a generation of organizations founded after 1995, whose operating models and capabilities are based on exploiting internet-era information and digital technologies as a core competency” (Panetta, 2016). New companies have several advantages when trying to establish an actor-oriented architecture, as they possess little architectural (Verdecchia et al., 2021) and technical debt (Cunningham, 1992; Tom et al., 2013). Older companies, however, must be redesigned to adopt these same principles (Snow et al., 2017).

2.2 Managing Knowledge

In the knowledge economy, knowledge can be considered one of an organizations' most important assets (Bollinger and Smith, 2001; Davenport, 2005). Knowledge infrastructures aim to retain knowledge within or between organizations. It consists of a network of “people, artifacts, and institutions” (Edwards et al., 2013), including “individuals, organizations, routines, shared norms, and practices”. In modern times, it is hard to know what it means to “know”: increased access to and volume of data and information, conflicting viewpoints, interdisciplinarity, and increasingly translucent borders makes routines for generating, analyzing, sharing, and maintaining knowledge especially important.

Edwards et al. (2013) point out that modularity, multi-layered, and a rough-cut character are important when describing a knowledge infrastructure; they are not systems. The knowledge infrastructure is continuously evolving, adapting to new requirements, systems, socket layers, social practices and norms, and changing components. Notably, retaining knowledge in an organization after an employee comes to the end of their tenure is a key challenge for organizations.

When discussing knowledge, we often consider two types: tacit and explicit. The former is the “unspoken”, “ill-defined” type of knowledge, and the latter is the opposite. While tacit knowledge is hard to manage, work increasingly occurs on platforms that do not share the “common ground” necessary for tacit knowledge exchange; Microsoft Teams, Zoom, Mira, and others. Tacit knowledge and common ground is often considered a major stumbling block for these kinds

of long distance collaboration (Olson et al., 2009). Davenport (2005) writes that tacit knowledge is best transferred through long-term mentorship arrangements. However, Edwards et al. (2013) argue that knowledge infrastructure can handle some challenges related to managing tacit knowledge by positioning the infrastructure for continuous change and development.

Knowledge Workers

Davenport (2005) describes knowledge workers the following way: “*Knowledge workers have high degrees of expertise, education, or experience, and the primary purpose of their jobs involves the creation, distribution, or application of knowledge*”, pointing out that a knowledge worker is someone who thinks for a living. Workers that are closely aligned with an organization’s growth prospects also fall under the knowledge worker category. Davenport (2005) claims that “without knowledge workers there would be no new products and services, and no growth”. The knowledge workers are essentially those who possesses the knowledge and are able to apply the knowledge into products, services, and growth activities. Based on Davenport’s reflections we can consider knowledge and knowledge workers as integral components of companies’ strategies.

The knowledge economy has drastically transformed management practices. Managers have transitioned from designing and overlooking processes, to facilitating complex, knowledge-intensive work and collaboration. Workers are no longer viewed as replaceable cogs in machinery, but as assets integral to the business’ strategic potential. This transformation necessitates the emergence of new skills. Thomas Davenport has produced extensive literature on knowledge management and knowledge workers, and summarized his research in his 2005 book: “Thinking for a living: how to get better performance and results from knowledge workers”. The book covers key questions to knowledge work and workers, and Davenport provides eight shifts for managers to consider:

- From overseeing work to doing it too
- From organizing hierarchies to organizing communities
- From hiring and firing workers to recruiting and retaining them
- From building manual skills to building knowledge skills
- From evaluating visible job performance to assessing invisible knowledge achievements
- From ignoring culture to building a knowledge-friendly culture
- From supporting the bureaucracy to fending it off
- From relying on internal personnel to considering a variety of sources

These shifts describe not only transformation in management practices, but also business and management priorities and principles. Davenport’s suggestions

all exemplify the importance of managers' designing a good work environment. He claims that employing traditional management practices are counterproductive in this respect; the bureaucracy must be fended off instead of supported. While these shifts are painted in broad strokes, they provide managers with a springboard for designing their own managerial practices.

However, while this book covers both the organizational and managerial transformation, it does not consider modern digital technologies. Digital platform ecosystems, modern knowledge infrastructures, and global, instant collaborations are not considered in his body of work. New organizational structures, practices, technologies, companies, and ecosystems that have appeared the last 20 years has forced managers and organizations to adhere to a completely different dynamic between internal and external relations. Therefore, it is important that these shifts be considered as principles. Still, knowledge work is very much relevant for modern businesses, and some of the principles Davenport presents is visible in modern managerial literature, i.e. Snow et al. (2017).

As the knowledge workers are important for companies' value creation, top managers need to create a workplace where the workers are able to thrive. Among 13 lessons, El Sawy et al. (2016) deemed it important for managers to create an attractive workplace for digitally savvy people. This suggestion revolves around the notion of hiring newer and younger generation employees, which have different demands and values.

Transformational Leadership

Transformational leadership relies on a leaders' capacity to influence others, to motivate followers to commit to a shared vision or goals, and emphasizes individual development via "coaching, mentoring, and provision of both challenge and support" (Bass and Riggio, 2006). Transformational leadership is centered around each individual, and hinges on four components: idealized influence, leaders behaving as role models and having influence on their followers; inspirational motivation, or leaders behaving in ways that motivate others; intellectual stimulation, or proactively stimulating creativity and innovative thinking through questioning assumptions or reframing; and individualized consideration, which is when leaders take each individual's needs into consideration in interactions (Bass and Riggio, 2006). Furthermore, transformational leadership practices have implications for strategic planning, organizational structure, job design and -assignment, personnel development, organizational development, and decision making, and more (Bass and Riggio, 2006) - and should change how managers approach each of these.

The leadership style, however, is not a panacea (Bass and Riggio, 2006). In some cases, it may therefore be necessary to apply aspects of other leadership styles; often transactional leadership, or management-by-exception. In unstable environments, however, these management styles may be particularly risky: outdated technology, processes, or rules are reinforced through transactional or management-by-exception styles, but does a company no favors when abilities for rapid change and flexibility is the most pressing need.

When applied in an organization, transformational leadership hopes to de-

velop motivated, capable, independent employees that are aligned with the company's vision and goals (Bass and Riggio, 2006). It should also, when applied correctly, have a net positive effect on group performance. The transformational leadership style is particularly well-suited to managing uncertain environments, as it distributes decision authority throughout the organization (Bass and Riggio, 2006).

2.3 Strategizing and the Activity-Based View

While strategy is traditionally considered as something a business *has*, as the result of intervallic processes in the boardroom, Whittington (2006) treats strategy as something people (within an organization) *do*. Whittington suggests that strategy emerges as a result of the activities conducted in a business. This conceptualization is similar to Snow et al.'s (2017) actor-oriented organizational architecture, in the sense that they both consider teams' and individuals' activities as important strategic components in organizations.

Whittington (2006) describes three strategic concepts that describe different aspects of strategic practice: practitioners, praxis, and practices. Practitioners are those that take part in shaping, developing, and executing strategies. Praxis is a collective term for activities related to "deliberate formulation and implementation of strategy" (Whittington, 2006), and strategy practices describe different activities that practitioners employ in their praxis. The strategy can be organization- or team-specific, extra-organizational, or even societal (Whittington, 2006), and materializes according to the business' needs.

When viewing strategy as the result of the activities performed in an organization, the effects the individual has on an organization becomes immediately apparent. Central to Whittington's (2006) framework is that anyone within an organization can be a strategic practitioner, and thus affect the organization's set of strategic practices. If anyone can affect businesses in this way, it would be in the companies' interests to design its architecture in a way that minimizes strategic switching costs, duplicate work, or other hidden costs.

Johnson et al. (2003) argue for a shift in strategy, from a macro-perspective towards a micro perspective on strategy and strategizing. This view takes a closer look at "the detailed processes and practices that constitute the day-to-day activities of organizational life and which relate to strategic outcomes" (Johnson et al., 2003). They suggest that in an activity-based view, one can view strategizing at a micro-level, i.e. for teams or individuals within an organization. Johnson et al. (2003) argues that rather than explaining the outcomes of what goes on in organizations like traditional strategy research, the activity-based view focuses on the activities which constitute the strategy (Johnson et al., 2003). This way of looking at strategy encourages managers to involve the organization in performing the strategy, as the day-to-day work is performed by individuals. In more recent times we have seen the introduction of the digital organization (Snow et al., 2017), where individuals self-organize in teams, while managers' responsibilities shift more towards alignment of the teams.

While we here have described the activity-based view of strategy, the resource-based view is also worth mentioning, as this is a strategic view many possess naturally. This view was conceptualized by Jay Barney in 1991, and posits that four indicators point to a firm’s resource-based competitive advantage: value, how valuable the resource is; rareness, how rare the resource is; imitability, how easy the resource is to imitate; and substitutability, how easy the resource is to substitute with something else. In this thesis, the activity-based view is primarily applied, but as many consider knowledge an important strategic resource (Bollinger and Smith, 2001), it is important to include this view as knowledge is an important component of digital management.

2.4 Previous Research on Digital Management

Previous research has been conducted on similar topics, but is often dubbed “digital leadership”. In this section, we will address some theorizations of digital leadership.

Before describing the different theorizations on digital management and leadership, we would like to provide distinctions between these terms. Digital Leadership often refers to the leadership capabilities necessary for a company to successfully undertake a digital transformation (El Sawy et al., 2016; Larjovuori et al., 2018; Zeike et al., 2019). This often encompasses change management skills and “soft-skills”, such as skills in interpersonal relations. Digital management, on the other hand, is a more recently emerged term and refers to the “harder” skills associated with these transformations, and those associated with the successful management of digital businesses, and often those associated with managing digital resources (Bygstad et al., 2021). Lastly, digital strategy or digital business strategy is when digital resources are leveraged to create value (Bharadwaj et al., 2013).

The emergence of digital resources affects businesses and industries immensely. They allow for new business models; new product- and service innovation; and new processes, protocols, and infrastructures delivered through personal computers and global infrastructures, making the digital resources accessible from almost anywhere (Yoo, 2013). The active leading of these resources, as well as the people that develop, manage, and support them, have however not been studied extensively. Below, we will highlight some key findings from research related to digital management.

Westerman et al., (2015) & Zeike et al., (2019)

In their 2015 book, Westerman et al. (2015) provides tools for assessing managers’ digital leadership capabilities. They also define the concept of “digital mastery”, describing companies and leaders that are able to utilize digital technologies and its by-products vastly more efficiently than their peers. The authors claim that this is due to their digital capabilities, and their leadership capabilities. Notably, they also claim that investing in digital technologies is not that important, but the utilization of these technologies for organizational

Author(s)	Year	Definition
Westerman et al., Zeike et al.	2015, 2019	Digitally successful companies have built strong leadership capabilities to envision and drive transformation. In this context, leadership capabilities are the ways in which managers are driving change
El Sawy et al.	2016	Doing the right things for the strategic success of digitalization for the enterprise and its business ecosystem
Snow et al.	2017	Technologically aware and adept leaders who can set the digital agenda and create the context for the digitization of every relevant aspect of their organizations
Larjovuori et al.	2018	The leaders' ability to create a clear and meaningful vision for the digitalization process and the capability to execute strategies to actualize it
Bygstad et al.	2021	The competent management of digital resources for business purposes, including the planning, organizing, leading and following-up

Table 1: Overview of selected theorizations of digital management

transformation is crucial in determining the success of digital transformation efforts.

The digital capabilities refer to the capabilities that see digital technology as a mean to transform business and change ways of customer engagement, operations, and business models Westerman et al., 2015. The leadership capabilities, on the other hand, refer to the managers' capabilities for leading and managing the changes associated with the introduction of these technologies. The authors claim that strong leadership in the form of setting vision and direction, and correcting diverging activities is imperative for digital transformation success. They claim that these leadership capabilities materialize in strong top-down leadership forms through governance and coordination.

Establishing governance should result in increased coordination and sharing of resources, and is according to Westerman et al. (2015) established through three governance mechanisms: (i) The shared digital units are independent, shared departments that work with developing digital services in use across the company. (ii) Governance committees that makes decisions and ensures alignment across the organization through investing, resource allocation, and

establishing policies and standards. (iii) Digital leadership roles help anchor digitalization in the top management group, and manage change, ensure alignment with the digital vision, and enforce policies.

Zeike et al. (2019) assessed 368 upper-level managers' psychological well-being in relation to their digital leadership capabilities, and found that managers with more capabilities in digital leadership, in general, have better psychological well-being. Zeike et al. (2019) formulated their definition of digital leadership based on Westerman et al.'s (2015) descriptions of digital leadership. They assessed the digital leadership capabilities on two axes: using digital tools, and assessing digital leadership skills. For the latter part, they focused on the leader's abilities to drive forward digital transformation, making others enthusiastic about digital transformation, and having a clear idea of the necessary structures and processes for the digital transformation. Theirs is a fairly limited description of the capabilities related to digital leadership, and does not consider the management of digital resources to any significant degree.

El Sawy et al., (2016)

El Sawy et al. (2016) conducted a case-study on the LEGO group's decade-long digitalization journey to give insight and build a foundation for enhancing enterprise capabilities for digital leadership. Their definition emphasizes managers' capabilities to do "the right thing", working towards digitalization success. They suggest that there is a critical need for digital leadership when corporate IT switches from a legacy-perspective to a digital perspective. They also mention that the success of the business ecosystem is important to consider, and by this, they argue that it is impossible to achieve business success without considering a business' ecosystem.

They argue that there are six building blocks for enhancing enterprise capabilities for digital leadership:

- A different kind of business strategy, i.e. the concept of business strategy should embed digitalization
- Different kinds of business models, i.e. new digital business models for creating business value through different value propositions and revenue-sharing modes
- Different kinds of enterprise platform integration, i.e. integration between the outside and inside of the enterprise
- Different kind of people mindset and skill set, i.e. top management and all employees will need to be more adaptive and willing to experiment and innovate, and needs to appropriate adaptive skill sets
- A different kind of IT function, i.e. organizational changes required for digital leadership and digital business strategy requires rework of the corporate IT function and CIO

- A different kind of workplace, i.e. adapting the workplace to younger employees that are “born digital” and enter the workforce with different values and expectations.

El Sawy et al. (2016) also formulate 13 lessons for digital leadership, but we assume that some could not be implemented everywhere. This article is a result of research conducted at one, large-scale production company, and some lessons might therefore not be applicable for everyone. However, we think that this article formulates interesting and insightful concepts for the digital manager.

Snow et al., (2017)

While Snow et al. (2017) primarily focus on describing the “digital organization”, they provide an interesting consideration for management in digital organizations: leaders should set the digital agenda. According to these authors, this is crucial for digitalization success. We previously described which operational elements their suggestions contain: the actors; commons; and protocols, processes, and infrastructures. They explain that these digital organizations have the opportunity to be “collaborative, agile, and minimally hierarchical” (Snow et al., 2017). Managers, then, implement and facilitate this organization through empowering their actors; investing in, developing, and maintaining “commons”; and establishing protocols, processes, and infrastructures.

Larjovuori et al., (2016) & Larjovuori et al., (2018)

Larjovuori et al. (2016) focus on leaders’ ability to create, communicate, and execute on a vision. They find that two leadership factors significantly affect an organization’s digital maturity: the leaders’ strategic leadership of digitalization, and whether they apply “servant leadership”, i.e. leadership that serves others. They claim that increasing employees’ well-being increases an organization’s chances to succeed in digitalization.

In another paper, Larjovuori et al. (2018) explains further that digital leadership has four main foci: strategic vision and action, leading cultural change, enabling, and leading networks. They suggest that management should formulate clear and strong strategic visions, accompanied by advancing digital development through “investments in experimentation, innovation, and expertise (Larjovuori et al., 2018). Furthermore, they promote developing a risk-friendly culture to promote exploration, by continuously searching for processes, methods, and frameworks to implement these. Top managers should enable their employees by providing coaching opportunities, and promoting participation in co-creation workshops, as this might reduce anxiety related to change. Lastly, they suggest proactively managing the company’s networks, by involving the customer, and facilitating collaborations and partnerships.

In summary, these definitions or considerations of digital management do not to any significant degree assess the careful management of digital resources.

They do, however, determine that a clear, communicable strategic vision is crucial for digitalization success. Additionally, El Sawy et al. (2016) and Larjovuori et al. (2016) both suggest that leaders should develop their capabilities to carry out or execute the formulated strategy. Furthermore, El Sawy et al. (2016) and Snow et al. (2017) emphasize the managers' role in facilitating collaboration, and orchestrating their ecosystem of partners and customers. Lastly, El Sawy et al. (2016), Larjovuori et al. (2016), and Zeike et al. (2019) emphasize managers' development of a "humanized" workplace, and their application of "human" management methods.

2.5 Summary

Our literature selections center around digital resources and various management theories and theories of strategy. We have tried to illuminate digitalization, and digital resources, as these are important aspects of digital leadership. Furthermore, we discussed Snow et al.'s (2017) digital organization, an actor-oriented architecture focused on providing individuals the resources they need to make high-quality decisions. We also found managing knowledge and knowledge workers an interesting aspect related to digital leadership, along with strategizing, and considering the activity-based strategic view. Lastly, we summarized and discussed some definitions of digital leadership. In the next section, we will describe the framework for digital management we apply in this thesis.

3 Framework for Digital Management

The field of Management is as old as organizations themselves. To be able to discuss management practices across organizations, industries, and sectors, a conceptual framework is necessary. Bateman and Snell (1996) provide a framework for describing managerial functions in their 1996 book “Management: building competitive advantage”: planning, organizing, leading, and controlling. This framework is usually applied in relation to the two main resources of a business; the people that work there, and their financing means.

In their paper “Digital Management - A Framework”, Bygstad et al. (2021) (which extends Bygstad et al., 2018), aim to conceptualize digital management, as well as uncover how top managers in the Norwegian public sector conduct digital management. Central to their conceptualization is defining digital resources as something that should be viewed as equally important to people and money when managing an organization. Therefore, they applied Bateman and Snell’s (1996) management framework on these digital resources. This theory was then confirmed in in-depth interviews with 14 top managers in the public sector. Through these interviews, Bygstad et al. (2021) identified six main managerial shifts:

- From strategy to continuous development
- From optimization to reconceptualization
- From relationship to partnership
- From IT silos to platform ecosystems
- From PowerPoint to dashboards
- From benefits realization to position in ecosystem

(from Bygstad et al., 2021)

They found that digital management differs from the traditional management of IT departments (IT management), where digital management is the responsibility to manage digital resources for business purposes. Importantly, “These practices are characterized by continuous development and a systematic orchestration of digital resources” (Bygstad et al., 2021). As they compare managing digital resources to managing people and money, they apply the same four managerial activities: planning, organizing, leading, and following-up. In the table below, we present their implications for managing digital resources.

For each managerial activity we will first describe their general implications and what the activity means for top-managers. After that, we will purely focus on describing the managerial implications for digital resources specifically.

Resource	Management Activity			
	Plan	Organize	Lead	Follow-up
People	Setting goals	Plan Activities and Projects	Motivate	Check results
Money	Budget	Delegate	Show responsibility	Accounting and auditing
Digital	Oversee technological progress, position and orchestrate	Establish governance, build digital architecture and ecosystems	Manage change, stimulate use, visualize	Monitor, exploit network effects

Table 2: Framework for digital management of digital resources (from Bygstad et al., 2021)

Planning

Planning consists of the managerial activities connected to assessing strategic opportunities, defining strategies, deciding which activities the organization should engage in, and what resources are necessary to carry out the plans. The plans are usually developed for the entire organization, and vary greatly from vague and general to highly specific (Bateman and Snell, 1996).

Planning digital resources refer to the strategic aspects of these resources. According to Bygstad et al. (2021), managers should oversee technological progress, and position and orchestrate these resources. By overseeing technological progress, managers should be able to identify new opportunities. Orchestrating refers to the continuous processes of managing the interplay between companies.

Organizing

The organizing function is the activities related to coordinating the organization’s resources to achieve the goals specified in the planning function. Managers hire, organize, create protocols and processes, and allocate resources (Bateman and Snell, 1996).

Organizing digital resources concerns establishing governance and building digital architectures. We find that their description of the types of activities regarding establishing governance is lacking, and it is unclear precisely what kinds of activities they refer to, and accordingly, it is hard to determine how they conceptualize parts of the organizing function regarding digital resources. They describe “building digital architecture and ecosystems” as having both an internal and an external aspect: internally, building a functional digital architecture is important. Externally, managers can choose to participate in larger platform ecosystems, and have to organize their digital resources accordingly.

Leading

The leading function is associated with motivating, directing, and communicating with employees. Managers have day-to-day interactions with people and try to align them towards common individual-, team-, and organizational goals (Bateman and Snell, 1996). This function takes place at all levels of the organization and not necessarily only in a top-down fashion.

When leading digital resources, benefits management, i.e. making sure that the expected benefits from an IT investment is realized (Terlizzi et al., 2017), is important. For Bygstad et al. (2021), this includes transforming the organization, and ensuring that personnel develop new skills. Furthermore, as this value is realized through utilization of the digital resources, stimulating use is important. Lastly, Bygstad et al. (2021) points out that visualization of information is necessary to develop data-driven capabilities.

Following-up

The controlling function (dubbed following-up) consists of activities related to controlling the progress of plans. Adjustments to the plan or its related strategies are made as needed. Managers conduct these functions by collecting performance data of individuals, teams; departments; and business units, and by taking actions to correct any discovered problems (Bateman and Snell, 1996).

When following up digital resources, ensuring that development, maintenance, or other goals are met is naturally important. This helps ensure that the company develops their digital resources in line with their strategic goals, and that their assumptions about their resources are correct. Companies work on monitoring short-term goals by analyzing “production data”, i.e. usage data, number of complaints, revenue, and more; and they analyze long-term goals using internal and external data from the market and ecosystem, often by applying big data analysis (Bygstad et al., 2021). According to Bygstad et al. (2021), managers should also try to identify and exploit network effects in developed ecosystems.

Considerations

While this framework is holistic and encompasses general managerial activities, it is important to state that this framework can be considered “instrumental” by some. As we have established, employees, i.e. people, are important for the value or benefits realization (Terlizzi et al., 2017) of digital resources. The reader should therefore keep this in mind as we discuss against this framework. This will be addressed in further detail in the discussion chapter.

4 Methodology

When researching Digital Management it is possible to draw inspiration from many theories and perspectives that influence the field. However, Bygstad et al.'s (2021) framework allows us to look beyond the complexities that digital management touches upon. Having outlined the content and baseline of current digital management research, we now turn to the execution of this study.

4.1 Research Design

This study looks towards the four key activities found in managers' activities; planning, organizing, leading, and following-up (Bateman and Snell, 1996; Bygstad et al., 2021) on people, financial resources, and digital resources to conceptualize a framework for digital management. King et al. (2019) suggest that the qualitative interview research method is suited in cases where a researcher aims to uncover complex relationships between multiple observed phenomena, and people's lived experiences. Furthermore, they suggest a semi-structured approach when conducting phenomenological research, which we followed. We therefore apply a qualitative approach, using semi-structured interviews in this study.

This research project is an exploratory study (Wilson, 2014) into the field of digital management; at the time of writing, little research has been conducted on digital management, and even less on digital management in the Norwegian private sector. We apply inductive reasoning to draw general conclusions based on the specific practices, processes or patterns emerging from the interview data.

Constraints of Research Design

This research design does, however, propose some limitations: we were only presented with one perspective on the company's practices, and had no visibility into the operational level's viewpoints. Additionally, one hour proved to be limiting in some cases - to cover all topics within the given time, we had to move quicker through topics than preferred. These time restrictions highlighted the importance of truthful and accurate interpreting to ensure a correct representation of results. For instance, we noticed that some concepts, while present at multiple companies, were described using different terms.

We tried to mitigate these challenges during both the interview process, and analysis. During the interviews, when unsure, we asked clarifying questions to ensure we understood correctly. Additionally, we iteratively re-analyzed each interview, both in isolation, and comparatively with other companies and the findings. This process is described in further detail in the Data Analysis section. We also cross-referenced our findings with publicly available information: news articles, documentation, financial reports, job advertisements, and more, where available.

4.2 Selection of Informants

The sample consists of a diverse set of organizations picked with a focus on getting a variety of industries, time since establishment, and size in total employees. To narrow our scope to a more manageable size for this research, we chose to focus on the Norwegian private sector. In addition, we wanted to examine both traditional organizations that are currently or have previously gone through a digital transformation, as well as born digital companies. On these terms we reached out to 33 companies through both convenience sampling (i.e., selecting from the individual network we had access to) and targeted sampling (i.e., identifying companies based on company profile and position). In total, 18 representatives agreed to be interviewed, but due to unforeseen circumstances, we were only able to interview 16 of these.

Furthermore, this study is focused on top managements' perspectives on digital management. Thus, it was imperative that we only included leaders in high-ranked positions, i.e. at the executive or director level in the study. This selection was necessary for two reasons; (i) to ensure that we were provided data that encompassed the entire organization, and not solely a business unit or department; and (ii) to be able to address the same challenges that leaders meet, independent of industry and/or ownership models. Below, we have provided a censored overview of our informants.

Number	Organization	Role of representative	Industry
1	Advokatfirmaet Bahr	Digital Program Manager	Legal Services
2	Gjensidige	Director	Insurance
3	Grieg Seafood	CDO	Fish Farming
4	Handelshøyskolen BI	CDO	Higher Education
5	Kahoot!	CTO	SaaS, Education and Learning
6	Kongsberg Digital	President (1), CTO (2)	SaaS, Shipping and Heavy Asset Industries
7	Nordic Choice	CEO	Hotel and Hospitality
8	NRC Group Norway	CEO	Building and Infrastructure
9	OBOS	Executive Vice President	Housing and Development
10	Posten	Director of Digital Innovation	Freight and Logistics
11	Schibsted	CDTO	Media
12	Sopra Steria	HR- and Strategy Director	Digital Professional Services
13	Advokatfirmaet Thommessen	CDO	Legal Services
14	Tietoevry	Head of HR	Digital Professional Services
15	Vipps	CTO	Financial Services

Table 3: Overview of informants

4.3 Data Collection

We performed 16 interviews with the leaders from the companies, with a semi-structured approach. The interview guide was based on the conceptual framework (as presented in the previous section) and mainly consisted of four open questions, one for each managerial activity. To support these questions we pre-

pared a catalog of additional questions to aid the interviewer during each of the topics. As the interviews were conducted we had feedback mechanisms to retroactively update the catalog of questions based on new information, new insights, new findings and learning experiences that were gathered. This was done to ensure that the flow in the interviews and the quality of data were improved, because we learned a lot from the interviews in the early stages. Such as, what topics were good to begin with, what the informants found easy or difficult to talk about, how to deal with informants that were either verbose or laconic, and others.

We prepared each interview in advance by researching the companies and informants. We mainly searched through available information online about the company's services, financial and organizational goals, and digital profile and initiatives. These preparations were critical, as we found that having a rudimentary understanding about the industry and company was important to conduct efficient interviews. Most of the managers operate in different industries under different ownership models, and we wanted to ensure that we uncovered the same topics independent of these.

We both took part in conducting the interviews, but had different roles: one led the interview, and one primarily took notes. To begin with, we wanted to make it easy for the interviewer and informants to maintain a relationship with each other. Another reason was to make sure that we had dedicated responsibility on the notes and video-recordings. Finally, this would avoid misunderstanding and back-and-forth conversations. Following each section, or focus, on managerial activity in the interview, the note-taker was prompted whether they had any follow-up questions. This way the note-taker could prepare questions based on the course of the interview. We closed all the interviews by asking open questions and asked the informant to relate it to the interview and topics, to allow the informants to add insights based on what he or she felt was missing. We also took feedback on what the informants thought about the interview.

The interviews lasted approximately one hour each, and all of them were performed through a video-conference format in Zoom or Microsoft Teams. As mentioned, as we progressed with the interviews, the interview catalog was adjusted and improved, and new perspectives was brought to light. Therefore, we asked for consent to send additional questions by mail, to fill in information where we were either unsure, or lacked data to confirm our findings. Additional questions were sent to a large portion of the informants, but we also had one situation where the CEO at a company was very concise in their responses, prompting us to schedule an additional interview with the CTO of the company.



Figure 1: Snippet of an interview in video-conferencing format

All interview subjects consented to a form describing the research purposes and data management activities in advance, in addition to video and/or audio recordings of their respective interview. All informants are anonymized, apart from the company name and their title at the time the interviews were conducted.

4.4 Data Analysis

Following each interview, we discussed immediate observations, utilizing an inductive approach (Wilson, 2014). We entered findings in a retroactively/continuously updated database, and in the event of new entries, we compared previous interviews with the new ones. These discussions, along with analyzing interview notes and listening back recordings constituted our open coding process (Wilson, 2014). At the end of the interview process, this database provided an overview of our findings. In total, we found 24 unique patterns, practices or processes. These are described in table 7 in the appendices. Each of these were related to one, two, or three managerial activities: planning, organizing, leading, or following-up.

24 complex findings are, however, too many to explain in necessary detail in a thesis. All findings are found in the interview data, but some have previously been described by other authors. We therefore deemed it reasonable to do a selection from these 24 that might be of more interest to the reader, and novel to the research field. In some cases, however, we expand on previously

described observations, where our findings suggest more insight into managers' practices. We selected seven findings to describe in detail in the next chapter. The findings were selected based on: number of observations, or how many companies reported on the finding; apparent relation to each company's digitalization success, or how much the informant emphasized the importance of implementing the pattern, practice or process; "x-factor", or how interesting, unique, or significant we found the observation; scope, to provide an enjoyable and informative read; and discussions with our supervisor. Some findings addressed similar topics, but were related to different managerial activities. These findings are described as "one" finding in the results section to preserve clarity.

To process the findings we started to write up a preliminary description for each of them to start discussion and ensure common understanding before we proceeded with further in-depth analysis of each company and finding. Digging deeper into each finding, we listened back to the recordings to ensure we interpreted the data correctly. We also searched for quotes and examples to illuminate each finding.

5 Results

Through interviews with 15 Norwegian businesses, we developed in total 24 separate observations relevant to digital management. In this section we will describe seven of these findings in detail, utilizing examples from the interviewed companies, highlighting how and why the companies are changing their management practices.

Below, you will find two tables. Table 4 shows our selected findings, along with a brief description, and table 5 show where we observed those seven findings in our informants. The number of informants correlate with table 3.

Number	Management activity	Finding	Description
1	Planning	From separated to integrated digitalization strategies	That top management understands why digitalization is performed, including the process, their role, and contributions.
2	Planning, Following-up	From strategy to continuous development	A shift from approaching strategy as a continuous rather than cyclical process.
3	Planning	From optimization to reconceptualization	Describing a shift from utilizing digital technology to effective tasks, processes, and methods to fully transform a value offering.
4	Organizing	From IT Silos to platforms and ecosystems	Tightly integrating previously separated systems, facilitating sharing of information and seamless internal or external interaction.
5	Organizing, Leading	From information silos to knowledge infrastructures	From having separate archives for storing knowledge to building larger systems to capture and curate knowledge.
6	Leading	From hierarchies to individual empowerment	A shift from having strict hierarchies to delegating responsibility and authority to the middle-manager and operational level.
7	Following-up	From manual analytics to developing data-driven capabilities	Actively utilizing data and insights to reshape strategic and operational processes to improve product and service quality.

Table 4: Overview of selected findings

Finding number	Informants														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1		X	X	X	X	X	X		X		X	X	X	X	X
2		X	X		X	X		X	X		X	X		X	X
3		x	X	X	X	X	x		X	X	X		x		X
4		x	x		X	X			X	X	X	x	X	X	X
5	X	X	X	X	X	X					X	X	X		x
6	X	X	X	X	X	X	X					X	X		X
7		X	X	x	X	X			x	X	X	X	X	x	X

Table 5: Overview of observations per informant organization
Lower case “x” means finding was partly implemented. Capital “X” means that the finding was wholly implemented.

5.1 From Separated to Integrated Digitalization Strategies

This finding is a synthesis of three findings “digitalization is anchored in top management”, “digital resources are crucial for the organization’s value creation”, and “the digital strategy and business strategy are one and the same”. These were combined due to their similar contents: the top managers’ understanding and utilization of digitalization and digital resources in strategic respects.

We observe that nearly all of the companies have established executive roles such as Chief Technology-, Information-, Digitalization-, or Data Officers, indicating that digitalization and technology are such an integral part of their business that they need dedicated responsibility to administer the domain. Establishing these roles helps ensure support, common understanding, and engagement within top management, and across departments. Many respondents emphasize the challenge and importance of communicating when discussing strategy and how the strategy is carried out at the operational level. Our informant from Thommessen comments:

“The most important function of the innovation department is [facilitating] collaboration. [...] Every department wants new tools, new functionality, new ways of working. We want to ensure that we invest in new solutions that work across the firm and promote collaboration, and avoid spending time on solutions which make us more silo oriented.”

(Translated by the authors)

Thommessen’s innovation department reports directly to a member of the top management group: the CDO. The quote highlights their emphasis on using the innovation department as a facilitator for cross-department collaboration. Furthermore, the informant comments that this would be impossible without support from the CEO.

Schibsted has established a central forum for the group that focuses on making high-stakes decisions with regards to the group’s data strategy. This forum largely consists of the Chief Executives focused on technology or products from every area of Schibsted. They gather once every month to evaluate the current strategy, make the necessary adjustments, and collectively decide on which areas to focus development resources. In this forum, Schibsted also defines data interfaces between brands. To ensure alignment with the group strategy, Schibsted considers their efforts at two levels:

“We’re running quite a tight program structure. [...] That means that we set up projects, where a program is a project containing several projects. [...] Which projects we run within a program changes over time.”

(Translated by the authors)

To ensure long-term strategic focus, Schibsted defines “programs”, but the contents of these programs - the “projects” - organically evolve over time as they learn and gain experience. Our informants note that if the project does not yield expected results, it is cut so development resources can be spent elsewhere. Through the creation of a centralized Chief Data and Technology Officer role, and a central forum for making strategic decisions regarding data, Schibsted is rigged for agility and speed, while retaining alignment with the group’s strategy.

Besides the creation of top-management roles concerned with digitalization and technology, we observe that more than two thirds of our informants has a digitalization strategy that is either unified or directly linked with the business strategy, which is a practical example that digitalization is anchored in top management. The CDO of Grieg Seafood comments:

“We establish a digitalization strategy that is directly linked to our business strategy. It points to which focus areas and characteristics that my teams shall establish to support the whole value chain.”
 (Translated by the authors)

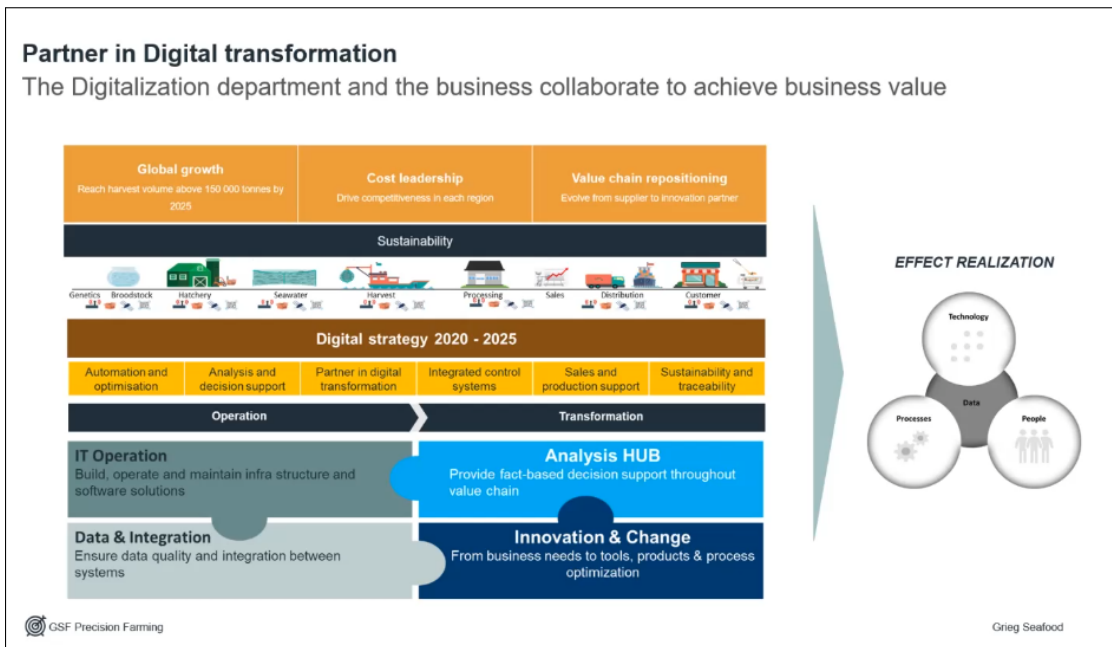


Figure 2: Illustration of Grieg Seafood’s digitalization strategy. Illustration provided by the informant

On the figure illustrating Grieg Seafood’s digital strategy, we see that the digital strategy is supporting the three overarching goals in their business strategy. Furthermore, they have established a relation between the digital investments

and their value chain. They use data as the component - their "fourth pillar" - that connects technology, processes, and people.

Another informant, the CTO at Kahoot! comments:

"In Kahoot, I think I would say that it is presupposed that it is in the DNA that we think of digital ways to work and do things. We don't really have a digitalization strategy [...] it is baked into the other plans for how we do employee engagement, planning, information sharing and so on, how you operationally perform work. It is already presupposed that [we are] as digital as possible [...]"

(Translated by the authors)

These findings indicate that the digitally mature managers actively incorporate digital aspects into the strategic planning of activities in the organization.

5.2 From Strategy to Continuous Development

Traditional strategic planning is often conducted in the boardroom with a multiple year time-horizon. Today, digital managers view strategy differently; the strategy is a tool to ensure alignment within the organization and to ensure that the conducted activities work towards similar goals. Additionally, top managers continuously monitor progress, market transformations, new technologies, and often change their sets of strategic practices (Whittington, 2006) to optimize their efforts. Approaching strategizing as a continuous rather than cyclical process changes the organization's planning activities. The CDO at Thommessen comments:

"We don't know exactly where we are headed, or which changes we will face in the coming years [...] our CEO illustrates this as a tidal wave, something new will come, how can we be best prepared when it comes?"

(Translated by the authors)

Thommessen aims to prepare their organization for an uncertain future by building up capabilities for developing and deploying digital technologies quickly within the organization and with their customers. They are aware that at some point in the future, the competitive landscape will change significantly, but they are as of yet uncertain of what, exactly, these changes entail. Part of their efforts is establishing their aforementioned innovation department, which monitors market and technology developments, and continuously experiments with new offerings to gain experience, and to expand their portfolio of digital offerings.

Most of the top managers in our sample have a proactive approach to emerging digital technologies, they engage in planning from the beginning with the intent to drive change, or to absorb new strategic potential. They also look to emerging technologies to learn and gain knowledge, so that when the changes

occur, they are better prepared to meet new customer demands. We find it important to include this finding as it describes companies' capabilities for absorbing new knowledge and technologies, improving or enhancing existing processes utilizing advanced technology, and developing or defining new business areas. The CTO at Schibsted supplements:

“We don't know if Apple or Microsoft will release AR-glasses next year or in three years, but when they do, we predict that it will impact us in some way. At that point we need people that know something about it. [...] We have established an AI-program where we have three or four employees that will train our product owners on applying AI technology. [...] Another example, crypto, we don't know what to do with it, so we invested in a crypto exchange - Firi. [...] to tap into the domain and build competency in the area.”
 (Translated by the authors)

The CTO at Schibsted explains that their brands are free to use whichever development methodologies they like, and exemplifies with Finn.no. They use a development framework that was developed in-house. They facilitate for agile development methods to receive user-input and feedback for each iteration, so that teams ensure progress. An illustration is presented below:

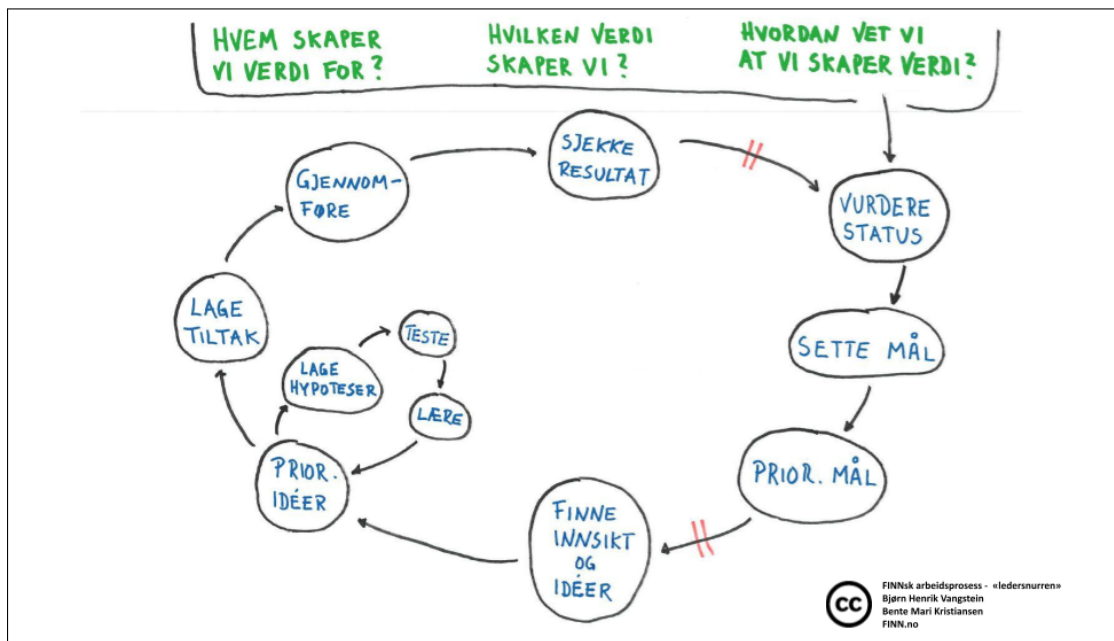


Figure 3: Illustration of Finn.no's "Spin" ("Snurren")
 Illustration provided by an employee at Finn.no

The rapidly changing environments have implications for how an organization plan their strategy. Our informants focus on balancing exploration and exploitation efforts through establishing departments that focus on experimentation. Furthermore, they look to building up continuous development capabilities to quickly learn, adjust to changes, or invest in opportunities.

The observations suggest that the mature digital managers are proactively searching the market for new technology and investing in the learning opportunities to be prepared for future changes in best practices and standards. To keep up with changes in demand, and development of new technology, Kahoot! conducts strategic praxis iteratively in short periods:

“Strategy is difficult to define in the long-term [...] we have a vision of where we want to be in the future, and we have thoughts about what our brand must stand for. [...] These pillars have been there for several years. Thereafter, we work with more short-term objectives that we want to achieve, and these are divided into activities for each product area.”

(Translated by the authors)

Kahoot! points out that they need strategic focus for a given period to ensure that they are able to evaluate their progress. They form and carry out strategies within product teams to ensure tight processes and ownership to each product’s progress and development:

[...] There is an underlying principle that we try to run a product-led organization, where the strategies are defined for each product and this is also where the strategy is carried out [...] both defining, performing and monitoring of goals.”

(Translated by the authors)

This distributed mode of organizing the strategic planning processes is common across all of the software companies we interviewed. Increasingly, other companies are adopting modes of distributed iterative strategic work as well, through product teams that work closely with customers. They are assessing spoken and unspoken needs and try to develop products and services accordingly, while continuously monitoring their performance. OBOS formulates a group strategy, but allows each subsidiary company freedom to design their strategic activities, planning, and monitoring processes. Sopra Steria has designed their organization to facilitate multilateral feedback loops regarding their strategic choices, involving top management, employees, customers, and partners.

For Vipps, new offerings and innovation naturally emerge as the platform is developed. They generate new services that lead to creation of even more services and offerings, as they can be easily recombined through usage of APIs. Vipps have developed their own agile methodology for product and service development, “Sløyfa”, or “the bow-tie” in English. Our informant states that not all teams adopt this methodology, but all product teams have some sort of agile approach to development. In (Figure 4), we present their methodology.

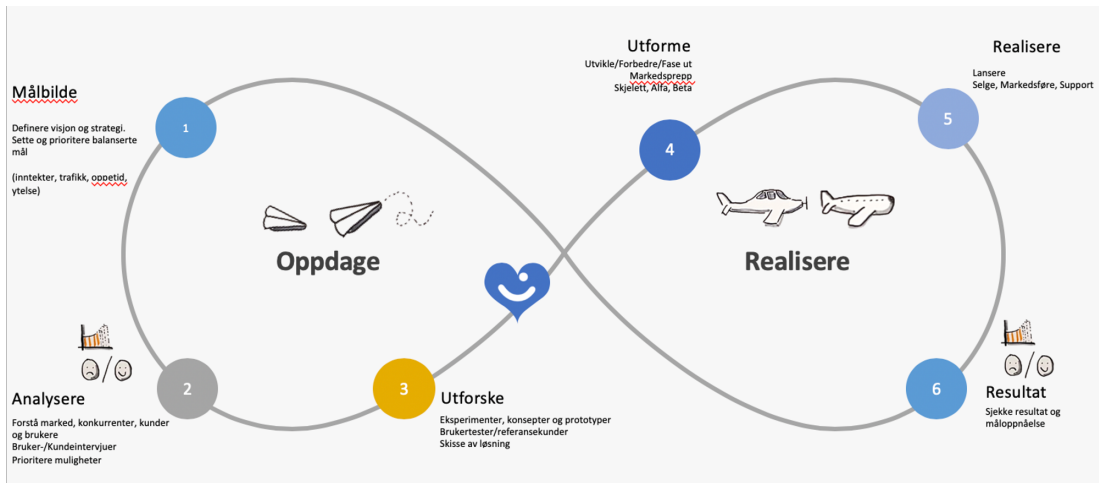


Figure 4: Illustration of the Vipps' bow-tie ("Sløyfa")
 Illustration provided by an employee at Vipps

For the companies in professional service, and building and infrastructure we interviewed, Tietoevry, Sopra Steria and NRC Group, we see that the strategy is shaped by the tenders they choose to bid on, as well as the customers they interact with, and the partners they collaborate with. Sopra Steria states that they want to become a leading digitalization partner, and that every decision needs to support that ambition. They want to collaborate with big and small customers alike, and often use projects with smaller customers to collaboratively experiment with new approaches and technologies.

Our informants reported the need to quickly respond to changes in their environments, and have designed their strategic planning processes accordingly. In the software industry, feedback loops are naturally designed using usage data, customer feedback, and other metrics, as they are readily available. These companies can establish these costs, using or reusing data or infrastructures, exemplifying the generosity of digital resources. The digitally mature managers from other industries apply these principles at their own businesses and distribute the strategic responsibility for key areas throughout the organization. They increasingly apply data-driven, agile methodologies in their product and service development.

5.3 From Optimization to Reconceptualization

With the emergence of new digital technology organizations often looked at technology as a tool to optimize and make work processes more efficient. However, as digitizing and digitalizing efforts are performed, the content changes, and digital resources transform processes, domains, business models and ecosystems. Most of the informants described a shift from optimization to reconceptualization.

What was changed varied from company to company, but the degree of impact was generally high. Grieg Seafood exemplifies the reconceptualization of a role, more specifically the operator's role in fish breeding. He comments:

“The technology gradually takes over parts of an operator's role, but the operator receives a wider task because he now has digital decision support. He or she can absorb and utilize more information which enables better decisions all the time.”

(Translated by the authors)

The operator's role has changed fundamentally as the company introduced data-driven capabilities regarding the fish's growth, welfare, and quality. The on-site operator's role has changed to maintaining equipment rather than deciding when the fish is fed, at what time, and how much. These decisions have since been moved to a central unit - “operation central”.

Our informant at OBOS explains that they are actively exploring new forms of living arrangements through an experiment; OBOS Living Lab. This is a housing lab with 34 apartments designed to be a dynamic test-arena in collaboration with its tenants. Data is actively gathered to evaluate the living arrangement, provide necessary adjustments, and continuously try to develop housing situations that “work”. They are, as mentioned above, largely dependent on inhabitants' voluntary collaboration, but some data is also gathered autonomously. Through this initiative, OBOS aims to discover new habitation models through the use of customer insights, and aims to reconceptualize how people live in their homes and how housing developers shall build homes.

Vipps is another example of reconceptualization. They completely transformed peer-to-peer payments from happening delayed to occurring instantly, in an app-interface. Their offering was adopted by most of the Norwegian population in a very short time. On this success, Vipps were able to expand their portfolio of offerings, leveraging network effects, and providing payments services to businesses as well. This illustrates two reconceptualizations: in peer-to-peer payments, and in their business model, delivering services to both consumers and businesses through an ecosystem of services.

We also observed reconceptualizations at the logistics company Posten. Traditionally, they used technology to optimize communication, route-planning, and to innovate new logistics models. The last couple years they have launched a new investment, Shelfless. Shelfless is a concept that allows businesses to rent storage in their warehouses, which enables Posten to deliver a service that supplements the e-commerce businesses by handling everything logistics-related from when the consumer buys a product, until it is delivered. This fundamentally transforms how businesses act, allowing them to focus entirely on their products and customers, minimizing their need for a physical infrastructure for logistics.

In addition, half of our informants report that they already have, or are currently implementing internal digital platforms. These in-house platforms have many functions, among them continuous data-flow between the different business functions for decision-making capabilities, having a single source-of-truth,

and more. Those who have internal platforms today report that they have reconceptualized how service and product development is conducted, through significantly lowering cost and “innovation overhead” or by allowing for unforeseen discoveries through continuous and rapid interaction on the platform.

These examples show that digital managers see how digital resources can be utilized to not only improve existing offerings, but completely reshape how an activity is performed. The digital managers are able to make changes in their own organization to achieve both operational excellence and competitive advantages.

5.4 From IT Silos to Platforms and Ecosystems

Historically, systems are developed specifically to automate or enhance business functions and are combined with other systems developed to carry out a pipeline of activities that are needed to create value. For some organizations we observe that many individual systems have led to IT-silos, which needs to be integrated. In companies that partake in industries that are information-heavy and fragmented, platform ecosystems have emerged to address the challenge of fragmentation. Even still, some industries are still resistant to adopting these technologies, which might be due to high regulatory control, technical debt, or resource-intensiveness, or other organizational constraints. Our informant at NRC group comments:

“Many of our contracts have models for how we can invoice based on progression [...] Sometimes we meet customers that have specific demands for [software], on one side you have governments as a stakeholder, and then you have customers, and us. It can be frustrating that something that is used in one project, can’t be used in the next because the customer wants it differently.”

(Translated by the authors)

The lack of standardized software in the building and infrastructure industries is a problem. It does not allow for major investments in digital platforms, and that is one of the reasons the industry is lagging behind. These dynamics can be observed in other industries as well. The Director of Digital Innovation at Posten supplements:

“Integration is often the biggest job, making systems play together, so that is essential every time we bring in another system or change systems. [...] We have approximately 400 IT-systems. We always try to reduce the complexity, but [experience] shows that it is more difficult in practice when they are operational.”

(Translated by the authors)

The informants with legacy systems note that integrating systems is a massive undertaking. OBOS is developing an internal service platform that exposes data through APIs for reuse internally. Our informant states:

“We started three or four years ago developing that, which in this house, is called a digital service platform. The platform should function as a hub for all of our systems. [...] From being in a situation where we had single integrations from systems X to Y, [...] we developed this platform. It is still not finished, and it has been incredibly expensive.”

(Translated by the authors)

In the process of integrating isolated services, OBOS discovered unknown complexities that made this project vastly more expensive than expected. Gjensidige, on the other hand, buys a core insurance system from a supplier. They also expect a multi-year implementation process. Tietoevry is in the process of renewing one of their key services, a banking-as-a-service software suite. This new version is built on platform principles, and aims to facilitate rapid service development through extensible APIs. We observed two general approaches when introducing a new system, either by adapting the system to the organizational processes through customization, or adapting the organization to the system.

Another aspect of new applications, systems, or platforms is the act of stimulating the people to use them. Our informant at OBOS states that the implementation of new systems is really complicated, and it demands the convincing and preparation of end-users. He reflects on that the complication associated with introducing new systems lies with the people and not necessary in the systems and exemplifies that a business intelligence platform that they adopted has been live for four years, but they have yet to reach the level they expected to be after two. Another informant at Gjensidige reflects that they use their own employees to facilitate training, and that they spend much time on communicating the reasoning behind the implementation.

Approximately half of the companies we interviewed have or are developing internal digital platforms that make enterprise data available, and enable active use of data and insight across the organization. Kongsberg Digital and Vipps are exposing their services to third parties through APIs, allowing others to modify, customize, or create new services to further develop the ecosystem. Kongsberg Digital’s platform, Kognifai, has a marketplace of add-ons developed by third parties. Vipps also collaborate with their partners:

“An important principle around development of Vipps products, especially those products that are exposed through APIs and platform elements, is that we have a good partnership with partners that can develop on top of our basic products.”

(Translated by the authors)

Furthermore, Vipps has made a lot of documentation of their services and products, design-materials, and more, available to all their customers to ensure the correct use of their brand. Furthermore, they also share the data that the customers should have access to, so that they can monitor the services that they subscribe to.

Schibsted, on the other hand, exposes their data and services through APIs in a similar fashion to Kongsberg Digital and Vipps, but only to their internal brands. These interfaces are leveraged to create network effects between Schibsted’s brands. Another example of an established ecosystem is that Grieg Seafood collaborates with research institutions on increasing yield from their fish farms, based on Grieg Seafood’s data.

This finding indicates that the digital managers understand the market and industry they operate in, and how digital resources create opportunities in it. They are involved in facilitating changes in the organization’s digital platform and have a profound understanding of how these changes are adopted by their users. Furthermore, they are able to clarify their role as either the owner of an ecosystem and the responsibilities that follow, or take part of a larger ecosystem.

5.5 From Information Silos to Knowledge Infrastructures

This result is a combination of two findings, “From archives to shared knowledge infrastructures” and “From information silos limiting sharing to focus on developing sharing cultures”. The two findings point to different parts of an organization but together they cover both the infrastructure and the cultural aspect that make up sharing in an organization.

In contexts characterized by individual empowerment, development and learning are crucial to “get right”. Companies develop routines for sharing experiences to ensure the continual development of their employees, and to avoid repetition of common mistakes. Empowered by social contracts and knowledge infrastructures, employees share their experiences with one another. 10 of our informants highlight the necessity of an established sharing culture and trust to allow for truthful, vulnerable, and functional communication, while 8 are actively working on establishing knowledge infrastructures to create, retain, and share knowledge within the organization.

Archives have traditionally been used to store experiences, routines, and data. The drawback in archives is that the information is stored and accessible, but opaque or “siloe”. With knowledge infrastructures, organizations are going from repeating project research to developing systems and standards for collecting, curating, and reusing knowledge across the organization.

The CTO at Kahoot! claims that “Higher overall information flow leads to increased total learning, which in turn provides organizational learning” and tries to increase information flow through several techniques; (1) communicating strategies and news through company-wide “town-hall meetings”; (2) only using one digital tool for internal communication to reduce communication overhead; (3) facilitating for knowledge-sharing sessions for both profession- and product areas; (4) presenting and advertising product launches and status for learning purposes every two weeks to keep the organization “in the loop”. Through these mechanisms they maintain a sharing culture that allows the whole organization to provide feedback and learn from others’ experiences. However, Kahoot!, a relatively young company, might still benefit from their “start-up-like” culture in this respect.

Sopra Steria notes an organization-wide culture shift taking place over many years. This shift is influenced both by organizational policy - namely how the organization rewards knowledge sharing, and as an organic development between employees. The informant describes how these shifts have transformed the organization from rewarding having expertise, to developing a culture that incentivizes the sharing of expertise. The company also facilitates sharing through processes and frameworks for sharing knowledge and experience: a yearly, internal conference; regular knowledge sharing sessions; high-quality documentation; shared knowledge databases; and more.

The CTO at Kongsberg Digital emphasized their need to enroll new employees as quickly as possible, as a result of industry-wide, rapid changes in employment. Encouraging creating high-quality documentation is necessary in the modern software industry, but Kongsberg works hard to reduce the time spent from onboarding to a productive member of a team. They are continuously developing two knowledge sources: an internal wiki with information on initialization of the development environment, owned by each product area; and KDI Academy - its own, internal learning platform focused on transferring industry and customer knowledge, along with third-party learning platforms. Their internal platforms are continuously kept up-to-date. The importance of onboarding for Kongsberg Digital is highlighted by their establishing KPIs on time-to-productivity, and further emphasized by their initiatives to reuse knowledge:

”The knowledge that is developed in a project can be reused in other projects. [...] It scales our programming activities.”
(Translated by the authors)

Bahr, a legal-services company, tries to share experiences through a centralized database, “ERFA”, the purpose of which is to share experiences about clients, subject areas, projects, deals, standards and contracts which all can be used at later points. For the database to be useful, they use enterprise indexing and search software to make the information more accessible and available across the organization. The information is used for training, inspiration, and individual development, and is made accessible to the entire organization.

Most of the managers that highlighted the importance of robust knowledge infrastructures pointed out that users are involved in generating and maintaining knowledge, but also the design of the infrastructures. In some cases, such as with Kahoot!, the knowledge infrastructure has organically emerged over multiple years. The top managers create incentive structures to encourage active maintenance of and additions to the knowledge infrastructures. They also approve of budgeting associated with developing and maintaining the infrastructure, along with other activities affecting the knowledge infrastructure. Furthermore, they reportedly lead intra-organizational communication, and try to balance demands between departments and business units to ensure that all parts are included.

This finding illustrates that digital managers are able to create systems that capture and curate knowledge. The digital managers understand their role as

facilitators of digital infrastructures to support organizational and individual development.

5.6 From Hierarchies to Individual Empowerment

In our interviews, we found that most of the companies move from the typical hierarchical organizational structures towards flatter ones. In hierarchical architectures, the highest level of authority and responsibility is found at the top; the further down you exist in the hierarchy, the less responsibility and authority one possesses. The flatter structure functions in much the opposite way, and promotes delegation of authority and responsibility, and thus leads to more individual empowerment.

In increasingly complex and fast-changing environments, the top managers argue that the distribution of responsibilities is necessary to effectively manage strategic, organizational, and market changes. Through knowledge infrastructures and frameworks that balance autonomy and alignment, managers empower individuals to make decisions that directly affect business. This approach presupposes trust between manager and employee across the entire organization, and alignment with the business visions or strategy. Therefore, companies need to ensure that each individual is aligned with the general direction the company is headed, while maintaining their opportunities to make decisions.

Two thirds of our informants are focused on communicating clearly, and strive to create common practices in sharing knowledge, news, and other important information. For most of these, the practical way they communicate is to establish strategies and visions as commonly known, and communicate the specific activities and ambitions through a variety of methods. For instance, Vipps aims to align their employees with the company’s long-term strategy by creating several visions that teams can choose from, and focus on for a given period. Additionally, crucial OKRs and goals are communicated to the organization:

“All the objectives and key results from the company goals shall be passed down to the different [teams]. Each team individually has the responsibility to reach those goals, and each individual in these teams has - [...] it is something we are still trying to achieve - a clear mapping between their daily tasks and the overarching company goals.”

(Translated by the authors)

Through these methods, Vipps aims to ensure that employees are “pulling in the same direction” while still allowing for autonomy regarding their work activities. Additionally, they highlight the importance of choice of development technologies, and prioritizing tasks. As much of Vipps’ value creation happens in agile teams, the individual’s autonomy hinges on democratic decisions made within each team. Empowering individuals changes which management capabilities are needed, and highlights the importance of leading through motivating, training, and development of new individual and organizational capabilities.

Vipps highlighted the importance of allowing the individuals freedom to carry out company missions, (1) because of the collective increase in a team’s motivation and willingness to take responsibility when trusted, and (2) because the individuals are the experts in their respective fields, meaning they are most suited to find optimal solutions. While we observed similar mechanisms at other companies, only Vipps had explicit, regular processes for teams to choose their strategic foci for specific periods. They claim this is possible due to their highly competent staff, their matrix organizational structure, and their trust in their teams to make good decisions. At the other informant companies, these processes were more ad hoc, but they described the strategy as more guiding than controlling.

Trust is necessary when designing an organization for individual empowerment. The HR and Strategy Director at Sopra Steria comments:

“When making decisions, one makes both good and bad decisions. Evenly over it should be that the decisions are good, or at least that the sum of decisions are positive. [...] As long as it does, there is no one that takes over the authority. [...] Our management model is structured in a way that decisions are essentially made as situations occur.”

(Translated by the authors)

They highlight that individual empowerment from the organization’s standpoint bears some inherent risk. Sopra Steria tries to manage this risk by establishing trust and transparency between manager and employee to ensure that potential problems are discovered, and handled properly. Sopra Steria views poor decisions as a learning opportunity, and guides their employees through rectifying the problem, rather than intervening. This illustrates an important aspect of individual empowerment: genuinely trusting your employees, and viewing work as an opportunity for individual development.

Our informant at Kahoot! further strengthens this view and explains that it is important to trust and have faith in the employee, they must be allowed to fail, but aims to reduce the probability by providing support. The support in this context is threefold: first, a combination of routines and processes that are not too detailed (so as to provide freedom to experiment); second, of frequent interactions with leaders and good colleagues; and third, feedback loops established in the company’s digital resources, such as data dashboards. This facilitates learning environments for the employee and freedom to structure their own workday.

Top managers at Vipps spend a lot of time trying to figure out what motivates their technologists. In more detail, he explains that participation in decisions, influence, being heard, valued, and inclusiveness are factors they have looked into when motivating individuals, in addition to preparing career paths within the organization. They aim to make sure each individual knows how they may progress in the organization and potentially into management roles, and in many respects align with the principles of transformational leadership.

Nordic Choice motivates their employees to use digital resources by relating change to the customer journey. Other companies find it important to provide their employees with proper training and support, as they find their employees' motivation to decline if they do not experience any sense of achievement.

This finding indicates that digital managers are able to facilitate the right systems and structures to motivate their teams and individuals to take responsibility for organizational performance.

5.7 From Manual Analytics to Developing Data-Driven Capabilities

This result consists of two findings, namely “from intuition and market surveys to actively using customer data in product and service development” and “focus on developing data-driven capabilities”. Both of them are related to the use of data to drive new opportunities, and by combining them we address capabilities that are both internal and external.

With the evolution of web-based technology, more than half of our informants respond that gathering data is easy, but utilizing them is more challenging. Large amounts of unstructured data are generated through user interaction with digital technologies and infrastructures such as social media, games, apps, entertainment, and more sensitive and context-relevant data like location and behavioral data is accessible due to the wide-spread usage of mobile technology. The gathered data is utilized in both tactical and strategic contexts (Parker et al., 2016b).

At most of the interviewed companies, we observed the tactical use of data in various ways, mostly by analyzing user data. By continuously monitoring interaction data, they can comparatively select the better of two or more solutions, discover pain points in user interaction, uncover bugs, and more. These ways of using data are more short-term, and used to quickly create value while reducing risks for inaccurate decision-making. To exemplify, we observed that the software companies, in addition to Tietoevry, utilize statistics on customer usage of their applications and the gathering of customer satisfaction indicators. Furthermore, Nordic choice used their booking rates to actively decide whether or not to trigger marketing initiatives. Grieg Seafood also views data in an operational manner:

“We have the opportunity to gather real-time data through sensors in the sea that are presented in our operational center. We have cameras both under and over the water, so that we can monitor a fish's movement. We then introduce machine-learning techniques to indicate when the fish are full, based on its behavior. This way the operators can turn up or down the feed rate based on such decision support.”

(Translated by the authors)

By continuously monitoring and gathering data about the environments, our informants have implemented measures to structure and automate analytic of

data. This in turn enables the employees to more quickly assess the situation on the right parameters and insights. Thus, the employees can more comfortably make a decision, and the quality of each decision is improved.



Figure 5: Illustration of Grieg Seafood's full-scale integrated operational center in Rogaland
Illustration provided by the informant

For Grieg Seafood (see figure 5), all biological production is monitored and controlled in the operational center. Furthermore, in addition to using data to connect technology, processes, and people, they use data and integration to drive new innovation and change in the organization (see figure 2).

In addition to short-term use of data, we observed the use of data in a more strategic manner, where it was used as a main component to strengthen an organization. This was mainly found in the organizations that acknowledged data as a key driver for the future of the industry, meaning that digital technologies and the information they provide is a central factor in the organization's operations. The CDO of Grieg Seafood comments:

“We go from being an experience-based industry to being an insight-based industry. We have data as the fourth pillar in our organizational structure [...] located centrally to facilitate production growth, organizational effectiveness and application of new technology”.
(Translated by the authors)

Our informant at Gjensidige tells us that digital technologies to support decision-making is so integrated in the organization that it is no longer something they think about. All decisions are made on the information that are visualized in different systems and he explains that their core competency is insights, and that it has become their competitive advantage:

”We are a large company, we have lots of data and have the opportunity to use them”
(Translated by the authors)

Gjensidige also pursues the development of an fully automated insurance claim process for damaged cars. By using machine-learning algorithms they aim to enable the customer to fill in all the details of an accident and have the algorithm verify and calculate the costs related to the damage. However, this service has yet to be deployed, but illustrates the ambitions that the organization have with their data.

At Kahoot! we saw extensive use of data dashboarding technology to elevate status and meetings. Weekly touchdown lasts for approximately 10 minutes to touch base, while monthly sessions are more in-depth. Weekly meetings typically included turnover, amount of sign-ups, and use of products, while in monthly meetings they reviewed roadmap status and planned campaigns and activities related to improvements of the previous period.

The CDTO at Schibsted explains that they have developed a common data platform to gather, analyze, and present data from all of the group's brands to be able to leverage their potential for network effects across their businesses based on user data. Decisions on the data interfaces between Schibsted's brands are made in the forum mentioned in the first finding. This illustrates another example where data is at the core of their operations, and is an effective driver for how they make decisions and effectively drive growth and development. Furthermore, this example shows how they aid their collective group optimization by keeping track of what the brands are creating and controlling to convert value to the other brands on the platform.

These findings indicate that digital managers do not shy away from the capabilities that lie within data, but rather embrace data and technology to reshape strategic and operational processes to improve product and service quality.

5.8 Summary

In this section, we have described seven key results from this research regarding planning, organizing, leading, and following-up managerial activities from 15 Norwegian private sector top managers. We found that most of the informants are changing their approach to all of these processes, in ways that are appropriate for their industries and contexts. We also found that all-but-one possess digital resources, and rely on them for their value creation. While the findings are common across multiple industries, software companies are often further ahead regarding strategic experimentation, and agile methodologies, as well as with distributed strategic responsibility. In the next section, we will compare these findings to existing literature on the subjects.

6 Discussion

In this chapter, we will use the results described in the previous chapter and existing literature on the topic of digital management to illuminate our research questions: (i) How do top managers in the Norwegian private sector conceptualize digital management, and (ii) how do top managers in the Norwegian private sector conduct digital management?

6.1 How do Top Managers in the Private Sector Conceptualize Digital Management?

Digital technology leads to unprecedented rates of change in almost all industries and sectors (Bygstad et al., 2021; Parker et al., 2016b; Snow et al., 2017). They make new modes of organization and work possible, allow new business models, and facilitate complex cross-disciplinary collaboration within and across companies and sectors. Managers, therefore, need to competently manage the new digital resources to fully realize their potential. Bygstad et al. (2021) defined digital management as the “competent management of digital resources for business purposes, including planning, organizing, leading, and following-up”. In this chapter, we would like to compare their framework along with other conceptualizations of digital management and related research, to our findings, and propose some additions by systematically discussing the four managerial activities related to digital resources. In table 6, you will find a summary of our contributions to their framework.

Management Activity	Framework (Bygstad et al. 2021)	Contributions
Planning	Oversee technological progress, position and orchestrate	Integrated digitalization strategy, activity-based strategic view of digital resources
Organizing	Establish governance, build digital architecture and ecosystems	Orchestrate resources, individual empowerment, information security
Leading	Manage change, stimulate use, visualize	Communicating vision, motivating, individual consideration
Following-up	Monitor, exploit network effects	Leveraging ecosystem, organizational and individual learning

Table 6: Overview of contributions to Bygstad et al.’s (2021) Framework

Planning

Overseeing technological progress is, according to Bygstad et al. (2021) an important digital management activity. Staying on top of technological progress is important for top managers in the private sector, as new technologies quickly can prove to provide significant competitive advantage. The top managers of software companies in this sample are optimistic towards adopting new technology. They allow teams to adopt whichever technologies or frameworks they feel will help them achieve their goals, as long as they adhere to security demands, and have complete life cycle responsibility. In other industries, the top managers report that they stay aware of technological progress by being conscious themselves, or getting information from the organization. When the organization realizes the strategic potential of new technology or digital resources, they try to exploit them.

Westerman et al. (2015) suggest that establishing shared digital units is one way to manage digital transformation. The digitally mature top managers in this sample adopt this approach. For instance, Schibsted prepares their group by creating internal teams that experiment with new technology, preparing to expand their portfolio of digital resources. Thommessen's top management emphasizes in their internal communication that significant change is inbound, and that the organization needs to be proactive in their approach to new technology. They have also established an innovation department that work with developing these digital offerings. These are important change management activities, but they also argue it affects the organization's mindset towards new technology.

The other planning activity Bygstad et al. (2021) emphasize regarding digital resources is positioning and orchestrating. The findings illustrate that the organizations that create and maintain platform ecosystems have managers that actively orchestrate their ecosystem. Kongsberg Digital and Vipps have both opened their platforms to third parties that can utilize their APIs to integrate with their services, or build extensions. This is possible because their digital resources are global, accessible from anywhere; general, re-usable in different ways and contexts; generative, reproductive due to loose couplings in a modular architecture; and generous, they are cheap to re-use. In other words, they are almost stereotypical digital resources. In the same way, Schibsted shares data internally across their own brands to exploit potential network effects. These companies orchestrate interactions with their partners and each other through APIs, and effectively position themselves at the center of their respective platform ecosystems.

The other organizations frequently orchestrate collaborations: Grieg Seafood collaborates with research institutions on increasing yield at their fish farms, and to drive research on the biological development of fish roe, and fish genetics; and Sopra Steria, Tietoevry and NRC Group partners with other firms to access the competencies necessary to bid on tenders, and solve complex problems. The informants orchestrate partnerships according to their specific needs and the needs of their customers.

As alluded to in the literature section, digital management and digital leadership are different terms for similar concepts. Digital leadership (Larjovuori et al., 2016; Westerman et al., 2015; Zeike et al., 2019) is, however, leaning more towards the softer leadership necessary for digital transformation, while digital management (Bygstad et al., 2021) focuses on the operational aspects of leadership during and after digital transformation. Amongst these two, a repeating theme is that of leaders defining a vision or direction that the company should head towards as a result of digitalization. Notably, not all companies undertake a digital transformation (e.g. "born digital" companies). The definitions of digital leadership are therefore not as relevant in these cases. Here, the definitions of Bygstad et al. (2021) and El Sawy et al. (2016) are more applicable, as they focus on the operational aspects of the business during and after digital transformation processes.

Bygstad et al. (2021) comment that one particularly important aspect for top managers is being able to understand a "basic theory of digitalization, i.e. how the key concepts are defined and related, and how they inform decision-making and daily practices" (Bygstad et al., 2021). This consideration is similar to Westerman et al.'s (2015) digital capabilities. Managers need to realize the potential that is embedded in digital technologies. However, all-but-two of the informants considered this aspect as self-evident. They demonstrated this by pointing to their unified digitalization and business strategies, their established management of digital resources, or explicitly stating that managers understanding digital technology is a requirement to compete in their modern environments.

This aligns with El Sawy et al. (2016): a strategy that is executed "through enterprise-wide digitalization, rather than through a business strategy that has an extra digital layer [...]", and Larjovuori et al. (2018): "Digitalization was perceived to be increasingly integrated into all strategic foci [...]". While El Sawy et al. (2016) noticed this in one organization, this same approach was observed in 11 of the 15 interviewed organizations. This suggests that companies in the private sector have moved past efforts of understanding digital technology to simply expecting it, and are actively embedding digital resources in their managerial activities.

The top managers in this sample state that they do not have the capability to accurately predict where the market will be in 3-5 years. Long-term strategies are more like "visions", and used as a tool to ensure alignment of the organization's activities. The digitally mature top managers realize that the value in digital resources are not dependent on them solely existing, but on how they are utilized. This supports Whittington's (2006) argument that strategy is not something an organization has, but something it does. Furthermore, it supports that top managers consider strategy at the micro-level, similar to Johnson et al. (2003), meaning that the strategy effectively is the activities teams and individuals conduct with and on the digital resources. The top managers describe

strategies that are strong about which direction the company is headed, but consciously avoid describing in detail their ideas of how to get there. Each team and individual is then made responsible for achieving strategic goals, while the top managers make sure they have the necessary resources, capabilities, and direction.

In software development, agile development methodologies have long been considered viable, as they account for uncertainties that traditional, "waterfall"-like methodologies do not. For instance, "being agile" presupposes regular testing with the customer and client, and allows teams to do necessary adaptations without significant sunk cost. The strategic responsibility for development is then distributed to product teams that have the authority to adapt their products or services such that they create value for their customers in a satisfactory manner. As this distributed responsibility moves decisions closer to the customer, these companies see reduced response times, and in turn increased responsiveness.

Johnson et al. (2003) suggest that day-to-day activities that contribute to strategic outcomes are important for companies' strategy. While these agile methodologies were not as widely distributed in 2003 as they are today, the distance from distributed strategic responsibility to a micro-strategic activity-based strategic view seems short. These agile teams conduct in particular two activities that directly affect the strategic outcome: user or customer testing, and development. Software development has the advantage of relatively low-cost prototyping (i.e. no need for physical, hardware prototypes), but these principles are exchangeable to other development processes as well, some of which can be seen in entrepreneurship circles, i.e. by them adopting "fail fast" (Salimi, 2022) mindsets.

Most of the top managers in the sample possess a contrasting view of strategy than what is considered traditional. Business strategies and digitalization strategies are often the same, or intimately interconnected. They also emphasize developing organizational architectures that are capable on handling and acting upon changes in their environment. However, activities within the organization need to be aligned to avoid double work, and minimize opposing approaches. Strategies are therefore formulated as a tool or reference that employees use to ensure that the activities they conduct align with the direction in which the company is headed. Additionally, some companies consider activities as important for their strategy, both on the macro and micro levels, as activities are crucial for value creation in relation with digital resources.

Organizing

Bygstad et al. (2021) notes that establishing governance of digital resources is an important component of digital management. Top managers in the private sector do not emphasize this aspect as much as the ones in the public sector. These kinds of tasks are often distributed throughout the organization to specialized personnel. Some of the informants even report that they emphasize

minimal governance, but security measures. They have managerial approaches that emphasize trust, and they rely on their employees to make wise decisions regarding adopting new technology.

In one case, a company had implemented Westerman et al.'s (2015) governance committee implemented: Schibsted's forum that governs their data platform. Similar to Westerman et al.'s suggestions, Schibsted makes investment and resource allocation decisions in this forum, and aligns activities affecting their data platform and strategy with the group's strategy.

Furthermore, Bygstad et al. (2021) mentions building digital architecture and ecosystems as being key managerial activities. Half of the informants in the sample are currently aiming to establish internal digital platforms to leverage data across the organization and integrate isolated services. In other words, the investment in internal digital platforms can be seen as an investment in making the data global, general, generative, and generous. The data becomes more shareable and re-usable when available across the organization, further increasing the potential value that lies in the data.

Furthermore, the most digitally mature organizations have established internal or external platforms, and often connect to larger ecosystems of partners and customers. Thus confirming Bygstad et al. (2021) in that top managers engage actively in building digital architectures and ecosystems.

The remainder of the informants were in different situations in terms of digital infrastructures and platforms, where most of them had fragmented systems in IT-silos. However, some common features among these were observed. They were focused on working with integration between existing systems, and looked for ease of integration when acquiring and developing new systems. This shows that the top managers understand the value that lies in global and general data, and that seamless systems are important to being competitive going forward.

Top managers are involved in building digital architecture in other ways. As Snow et al. (2017) established, actors need processes, protocols, and infrastructures to be able to self-organize and perform their work. At the informants organization, top managers invest in platforms for coordinating activities (i.e. project management software) and transmitting information (i.e. databases, communication platforms, e-mail), but minimize guidance on how these platforms should be used. In other words, aligning with Snow et al. (2017), empowering employees to self-organize. The software companies had an even more radical approach, where teams could choose the software they apply in their development processes themselves, as long as they adhered to security requirements.

The top managers realize the importance of and partakes in establishing and maintaining knowledge and shared situation commons (Snow et al., 2017), and knowledge infrastructures (Edwards et al., 2013). The managers orchestrate these resources so that they are continuously maintained and developed with little involvement from the top managers. Then, the resources, databases, and infrastructures are used to facilitate individual empowerment across the organization.

As we will discuss in further detail later, a key motivation for top managers' adoption and development of digital resources is facilitating individual empowerment. This means that they try to distribute knowledge and insights across the organization to make high-quality strategic and tactical decision-making possible. The top managers in the sample try to incorporate past experience, current production data, and future predictions to increase decision quality. They decide what kind of data is gathered, analyzed and made accessible to guide employee activities. In addition to these insights, the top managers schedule knowledge sharing sessions, and try to establish a sharing culture within the companies. They find these measures important to ensure that knowledge is transmitted and stored within the organization, and not simply "lost" together with their employees.

Furthermore, another product of facilitating individual empowerment is breaking down hierarchies. The top managers in the most digitally mature companies experiment with new organizational structures (such as matrix-structure) to better align the activities within the organization. These structures are made possible by high information quality and high information flow within the company. Kahoot! is a prime example of how some companies eliminate hierarchies: important information from the CEO to the staff is communicated in a Slack channel which all employees are a member of. Anyone can comment on and critique the content that is posted to this channel. As mentioned, their low communication overhead allows for the partial demolition of their organizational hierarchies.

In addition, top managers in the private sector regularly consider their organization's and their digital resources' information security, even though it might not be part of their daily tasks. Almost two thirds of the informants mentioned this as crucial for their businesses, or as something that "keeps them up at night". Incidents in the recent years have proven that information security *is* crucial to keep in mind, and the informants in this selection realize this. This is partly visible in their governance measures, as security is the main observed concern. For software companies, it is also visible in their development methodologies, as they adopt DevSecOps and the likes. While not present at all the informants, some of the informants generally consider governance as important, but not part of their day-to-day tasks or something they consider regularly, unless this is central to their specific role. Like previously mentioned, some companies even emphasize designing processes, methods, and requirements such that teams can adopt whatever tools they want as long as they adhere to security standards. The managers consider retaining and strengthening information security as crucial for businesses, as weak information security posits a major risk for modern interconnected businesses.

Leading

Change management is a research field of its own, and an important aspect of digital management, as digitalization requires change. Bygstad et al. (2021)

comments that managing organizational change is an important activity when managing digital resources. The motivation is twofold: both to draw benefits from the introduction of digital resources and to develop new competencies and skills. Zeike et al. (2019) state that digital leadership capabilities are how managers drive change. The results show that change management is an important digital management skill in the private sector, and that top managers are motivated by the same factors as mentioned in Bygstad et al. (2021).

The value in digital resources is to a significant degree created by employees' and others' interaction with the resources. When introducing new digital resources to the organization, the managers generally have two approaches: either adapt the organization to the digital resource, or adapt the digital resource to the organization. For instance, some organizations buy their digital platform from a supplier and have to adapt their processes and organizational design so they are in scope with their suppliers' specifications. Others have their digital platform tailored to their own specifications so they are free to apply whichever processual and organizational design they like.

Our informants have different opinions on these two approaches, and the top manager at OBOS is not alone when he mentions that the challenge of managing change lies in changing people's behavior, and not necessarily in the technology. Those who have the flexibility to quickly adjust processes prefer to adapt their organization to the digital resource. For those with strict requirements from stakeholders or authorities, systems need to be tailored to these specifications, and the organization, in turn, adapted to those systems. Furthermore, to oppose these requirements may be costly, even though the intended changes might yield rewards in the long run. The informants from older firms noted that getting their employees "on board" is often the hardest task when introducing digital resources. In these cases, they apply change management techniques.

These types of challenges are a natural consequence of digitalization, as it changes the way an organization work and the interaction with the customers (Larjovuori et al., 2018). The top managers that met these challenges engaged their employees through establishing either internal or external teams that had the responsibility of communicating progress, facilitating training, promoting participation and more. These change management measures is aligned with Larjovuori et al.'s (2018) suggestions. Additionally, top managers were careful to link the transformation efforts to a more grand, long-term vision, following Westerman et al.'s (2015) suggestions. However, while this way of leading change did ensure success for some, realizing benefits took considerably longer than expected for other informants.

Bygstad et al. (2021) do not explicitly address the "softer" aspects of digital management in their framework. However, the informants realize these aspects are important, and also emphasize that they need to get their employees "up-to-speed" quickly when adopting new technologies or hiring new employees. They also understand that employees might retain crucial tacit knowledge and try to retain them as long as possible by applying transformational leadership prac-

tices (Bass and Riggio, 2006), and creating humanized workplaces (El Sawy et al., 2016). They find that relating "micro-work" to "macro-circumstances" is important in sustaining employees' motivation, utilizing a component of transformational leadership: inspirational motivation (Bass and Riggio, 2006).

Furthermore, top managers are conscious of how they can motivate their employees to utilize new digital resources. There is a contrast between the "born digital" companies and the digitalized companies in their approach to adopting new technology. The "born digital" companies in this selection are, in general, more technology optimistic, and experiment willingly with new technologies, new processes, and new approaches. Their employees require little or no convincing, as new digital technologies and changes are often initiated from the employees themselves. In the older companies, it was observed that employees are more skeptical and less optimistic towards new technology and new digital resources.

The top managers in these companies commented that they have two approaches to addressing this challenge: either forcing changes, or by creating enthusiasm, motivation, and curiosity. There is a difference between the companies that actively try to establish individual empowerment in this respect. They more often stimulate use through motivational activities, training sessions, highlighting small wins, and providing high-quality support.

To utilize these digital resources, employees often have to develop new skills and competencies. The top managers are conscious of this and employ various methods to ensure that their employees get the opportunities they need to acquire these skills. Most prominently, companies establish internal learning platforms, where employees have freedom to choose from a large variety of courses hosted by the company itself. Another observation, is the utilization of external consultants that are brought in to assist in both the implementation and the training on using the digital resources. The informant at OBOS stated that the challenges associated with change lie with the people, not necessarily with technology. Top managers therefore need to clearly communicate "the why", motivate adoption and adaptation, and establish mindsets that are more technology optimistic.

Another important approach to leading digital resources is that of visualizing data and information. Bygstad et al. (2021) note that production data can be aggregated and made accessible throughout the organization to ensure that employees have the information they need to make decisions. Grieg Seafood actively utilize their production data to both increase the quality of their decisions, but also to conduct long-term analysis to improve their farming efficiency. Top managers and product managers at Kahoot! regularly monitor usage data in a data dashboard, and use these data to make informed decisions on improving their services, and to assess their progress towards their strategic and tactical goals.

Gjensidige has other approaches to data-driven decisions, combining qualitative and quantitative data, and presenting the data for the one that makes decisions. They try to utilize their vast amounts of historic data to be more

precise in pricing of insurance. They aim to design their systems in a way that an employee can get the data they need when they make a decision. Top managers in this sample approach visualization in much the same way that Bygstad et al. (2021) suggests.

Furthermore, the software companies Kongsberg Digital, Vipps, and Kahoot! offers visualization services to aid their customers to make data-driven decisions, by automating data gathering, analysis, and visualization. Kongsberg Digital provides their customers with a platform that allows their customers to gather data from multiple sources and perform analysis on these data. Vipps provides their customers with transaction data and reports, as well as a dashboard. Kahoot! automatically gather data on successful responses in their quizzes and allows, for instance, teachers to uncover which areas of a topic they need to focus on for the next period. With these offerings, these companies allow their customers to visualize data for decision support or situation awareness as Bygstad et al. (2021) suggest.

Digitalization presupposes organizational or processual changes, and these changes need to be managed to ensure benefits realization (Bygstad et al., 2021; Terlizzi et al., 2017). The "born digital"-companies in this sample are generally more technologically optimistic, and the employees are excited about opportunities to test out new technology. The other companies try to create enthusiasm, curiosity, and motivation. Bygstad et al. (2021) also suggest that visualizing data for decision support is an important aspect of leading in the digital management paradigm. The data confirm this. The informants utilize these principles internally, and offer these capabilities to their customers. Thus, it can be determined that the top managers in the private sector conceptualize digital management similarly to Bygstad et al.'s (2021) findings from the public sector.

In addition to confirming Bygstad et al.'s (2021) assertion, in that managing change, stimulating use, and visualizing are important leading activities, Managers utilize strategy and vision as a tool for alignment of activities within the organization. This is a "leading" management function, as it guides employees' decisions and activities, and in turn the strategy the company *does* (Johnson et al., 2003; Whittington, 2006). Furthermore, several of the top managers explicitly acknowledge that motivating their employees through individualized efforts is important, as the employees are crucial for the value realization of the digital resources.

Following-up

Addressing the managerial activity of following-up digital resources, we found many similarities to Bygstad et al.'s (2021) framework. There is explicit examples of monitoring activities on digital resources in nearly all of the interviews, but one third of these organizations find it challenging to utilize data as insights. The informants are to a large degree experimenting and implementing

mechanisms that allow them to meet these challenges. The informants are actively following up on key metrics through monitoring performance, customer behavior and satisfaction, and usage statistics, to oversee the initiatives that ultimately affect the strategic business goals. For instance, the informant at Grieg Seafood reflects that they have reached a point where they go from being experience-based to fact-based, which testifies to the conscious utilization and improvements of monitoring activities over time.

The exploitation of network effects was only observed in the organizations with platform ecosystems, in various ways. For instance, Vipps experiences positive network effects in that the more users that participate on the platform, the value increases. Additionally, as users participate, companies would like to utilize Vipps' payment services as they gain access to a large base of potential users, in turn increasing the value for users' participation. Schibsted use data and insight to navigate traffic among their closed platform to drive network effects among themselves. Their efforts aim to increase the consumers' value of participating on the network as they receive more personalized recommendations and better services, while increasing the traffic and revenue for their different brands. When successful, Schibsted exploits multi-sided network effects (Parker et al., 2016b), similar to Vipps. This confirms Bygstad et al.'s (2021) theory that leaders of developed ecosystems will identify and exploit network effects.

El Sawy et al. (2016) note that no business can be successful without being aware of what moves in their business ecosystem. The informants keep aware of their ecosystems of customers, end-customers, and partners through different methods. Some are customer-responsive and keep up-to-date with them through regular check-ins, customer surveys, analyzing usage data, or checking portals for bid and tender proposals. Others are positioning close to their partners, and work closely with them to develop the ecosystem's offerings. The top managers' motives do, however, align. They want to discover what customers need, and gain access to the capabilities they need to deliver on them, in turn confirming parts of El Sawy et al.'s (2016) definition of digital management: "Doing the right things for the strategic success of digitalization for the enterprise and its business ecosystem".

In this sample, where platform ecosystems are important for the company's value creation, the top managers noted an emphasis on their relationships with partners, in both technical and strategic respects. Bygstad et al. (2021) found that digitalization requires a more relational approach, moving from exchanging goods to developing partnerships, enabling more cross-disciplinary cooperation, and co-learning, to develop good solutions. These data confirm Bygstad et al. (2021), but add that platform ecosystems, if configured correctly, facilitate better foundations for multilateral relationships, and rapid innovation on top of extensible platforms. These platforms enable their owners to leverage their external reach for recombination and serendipitous discoveries, allowing them to innovate faster, with a higher degree of accuracy, and at a lower cost. For top managers and businesses to effectively leverage the advantages these ecosystems

create, managers need to orchestrate collaboration on and around their platform ecosystems, further necessitating the development of these skills.

Furthermore, an important part of the follow-up activity is related to learning, increasing the knowledge both among the individuals and the organization as a whole. Davenport (2005) claims that “value creation in knowledge-heavy industries is reliant on the systematic application of knowledge” and most of the informants represent these industries, and accordingly are focused on getting this right. They report that effective knowledge management has emerged as one of the key aspects of modern management. This shift encompasses not only the need of knowing “who knows what”, but affects the design of onboarding and offboarding processes, creation and maintenance of knowledge infrastructures, incentive structures, internal promotions, hiring processes, company culture, business models, strategy, and more. This is an illustration of generous and general data, where the organization can use them to spike the performances of several independent processes. The managers in this sample monitor individual and organizational performances to evaluate and adjust activities related to improving their people and organization, and acknowledge the need to develop sharing cultures, new mindsets, and new skill sets to cope with these challenges.

As the companies in this selection learn from the products and services they develop, experiments they run, or activities they conduct, they want to retain that knowledge. The companies that have established or are developing knowledge infrastructures are aiming to have predictable methods of retaining these types of knowledge through formal and informal documentation. These top managers actively take part in shaping incentives and cultures that supports sharing within the organization, as well as creating, managing, and retaining knowledge.

Bygstad et al. (2021) suggest that managers monitor progress of digital resources, along with exploiting network effects as follow-up activities of digital resources. The findings from the private sector to a large degree confirm them in this. However, some informants considered using data as insights very challenging, and very important. The exploitation of network effects was only observed in the companies with established platform ecosystems. However, almost all of the informants are leveraging their ecosystems in mainly two respects: to tap into other competencies, and to expand their knowledge and shared situation commons (Snow et al., 2017). Lastly, managers consider individual and organizational learning as an important part of the following-up of digital resources, again, as employees are crucial for the value realization of digital resources.

Bygstad et al. (2021) contributed to the field of digital management by describing how digital resources can be planned, organized, led, and followed-up. Their conceptualization is based on research in the Norwegian public sector. The results from this study largely confirm their findings, but also adds to them. Notably, top managers in the private sector do not apparently need

to build up their capabilities of understanding digital technologies to manage these digital resources. They describe that understanding these technologies and knowing how to apply them is a prerequisite in modern businesses. Our other contributions to their framework is summarized in table 6 at the beginning of this section.

6.2 How do Top Managers in the Private Sector Conduct Digital Management?

The second part of our research question aims to address how top managers conduct digital management in the Norwegian private sector. Bygstad et al. (2021) found that top managers are less focused on strategy and more on continuous development through recombination, and continuous learning. In their view, it is crucial that digital managers leverage “the power of digital technologies to increase the performance of the organization” (Bygstad et al., 2021). These findings suggest that top managers leverage digital resources to facilitate continuous development, and to empower teams and individuals. The top managers emphasized these points as they directly influence both their employees’ responsibilities and day-to-day work.

6.2.1 Continuous Development

The analysis of data showed three main ways in which top managers in the private sector utilizes the principles of continuous development: continuous development of strategy; of platform, services, and products, and of the organization and its resources. In the next sections, we will discuss how the top managers in this selection utilize these principles.

Continuous Development of Strategy

Traditionally, strategy has been performed by envisioning the future with a 3-5 years horizon, where the goals of the strategy were formulated and then the means. Many organizations have succeeded with this method. However, digital businesses reach different customer groups and industries simultaneously, and advanced technologies are rapidly developing and changing. Therefore, many companies need to conduct episodes of strategic praxis (Whittington, 2006) more often, as the organizations now need to respond quicker to changes to avoid being outcompeted. Thus, the top managers are now working on designing processes to continuously develop strategy.

Our results show that ten of the informants in this sample plan digital resources by continuously adapting their strategy to changing conditions. Even though they work strategically in shorter iterations, the top managers still define long-term visions. They view strategy in two different ways: (i) as guiding visions that ensure alignment of people and activities within the organization, and (ii) as a baseline for monitoring progress toward their strategic ambition and changes in their environments. These results suggest that the main difference between a long-term strategy and continuous development is the frequency

with which strategy is readjusted.

The top managers in this sample describe their strategy documents as dynamic, changing with new insights about their markets, new technologies, or internal progress. Furthermore, three of the informants report that their strategy evolves related to their customer base and the tenders they respond to - their organization is effectively shaping their activities to align with market demand. Top managers are proactive in their approach to explore new opportunities, as they need to be in control of what is happening in the environments around them. For instance, they establish new departments, teams, and products that are specialized in experimenting with modern technology, to prepare the organization to exploit opportunities when they arise. Lastly, the software companies excelled at delegating strategic responsibility, enabling product teams to “own” a product from development to after-sales, which creates shorter feedback loops and reduces time to deploy improvements. The conscious application of feedback loops is an example of how the top managers and companies follow-up digital resources. Having embedded these feedback loops, enables the top managers to evaluate the baseline and make adjustments. Feedback loops are essential in continuous development efforts throughout this section.

Continuous Development of Platforms, Services, and Products

Bygstad et al. (2021) describe the continuous development process as the extension of a digital infrastructure in production, with new products and services that respond to new customer demands and digital options. Working on continuously extending the available services on top of these kinds of digital infrastructures ties neatly into El Sawy et al.’s (2016) suggestion to establish a mindset of “iterating to success”. These top managers encourage their employees to establish and perform feedback loops that enable them to make data-driven decisions on the performance of innovations.

The software companies in this sample all report having structured processes for strategic experimentation and data-driven development. These data can both be user-centric or performance-centric, depending on the specific requirements of the development at hand. In both cases, data gathering is built into the technologies, and reporting is automated so that teams get rapid and accurate feedback on the changes they implement. These data are then often combined with more qualitative data (i.e. user interviews), further informing the development processes.

These data can also be used for reporting in the form of KPIs and OKRs, facilitating cross-organizational transparency, in the cases where all employees have access to these. The informants state that the implementation of these mechanisms mainly help ensure product-market fit and customer satisfaction, but they also feed into the company’s knowledge infrastructure. These data can then be reused at later points, or used as base for other innovations. This illustrates the before-mentioned potential that lies in data that are general, global, generative and generous. The recombination and re-use of data to ensure product success and extensions of product reach, while improving the internal organization.

When the top managers allows the adoption of agile methodologies for product development, they emphasize that being "agile" for its own sake is without purpose. They do state, however, that the mindset agile methodologies are built upon is crucial for the success of modern, complex product and service development. In this respect, they assert that El Sawy et al.'s (2016) suggestions regarding the "iterating to success" mindset are effective.

In much the same way that products are improved, the informants report working towards service improvement. They primarily gather data, analyze them, and visualize them to gain understanding on service performance, and continually adjust their contents to increase their value.

Two of the informants with established platform ecosystems open up for third-party actors to build upon the platform, enabling external contributions to finding use-cases and new opportunities to use applications. The top manager at Vipps explains that this grants them external reach when it comes to accessing the smartest people, which refers to an ability to involve the right people to contribute on the platform. These contributions can further be re-used and recombined to innovate, and continuously improve and develop the platform ecosystem. These methods of innovation reconceptualize how innovation and improvement processes are conducted by expanding the number of stakeholders, and significantly lowering the "innovation overhead", i.e. lowering time-to-launch.

El Sawy et al. (2016), along with Parker et al. (2016b) suggest that companies leverage their ecosystems of partners for digitalization competencies. The informants with platform ecosystems or a significant ecosystem of partners do this. Additionally, the expanded network of partners and stakeholders helps feed into a company's "commons" (Snow et al., 2017), i.e. increasing the number of data sources and resources available, effectively increasing the quality of the shared situation awareness. Based on the new use-cases and functionalities on the platform, the top managers make adjustments to the strategy, and thus continuously develop and improve the platforms, services and products.

When companies include partners in the development of offerings, ensuring strategic alignment can be considered especially important. Partnerships are established mostly to gain access to resources or competencies a company does not possess themselves. While this might be self-evident to some, the partners must be strategically complementary to the company. Top management handles strategic alignment through dialogue and by their selection of partners.

Continuous Development of the Organization and its Resources

The top managers lead digital resources by designing processes that aim to continuously update the organization's knowledge commons (Snow et al., 2017) as the organizations gain experience and adopt new knowledge. Teams, individuals, and managers draw principles from continuous development of software and apply them to the development of their knowledge commons. The informant at Kongsberg Digital said that "the knowledge from one project was reused in other projects". They used this specific knowledge common for onboarding, process

documentation, and to “scale programming activities”. While some employees organize these processes themselves, other times the top manager needs to define a system or process in which the “commons” are continuously developed, i.e. through feedback loops like project-retrospectives or customer feedback. Furthermore, they facilitate and organize the organization to take responsibility for the commons, meaning that employees are responsible for developing and maintaining them.

The second type of common, shared situational awareness, provides an “up-to-date portrait of problems and opportunities, as well as the current availability of resources to address those problems and opportunities” (Snow et al., 2017). For instance, Kahoot! implements this concept by allowing all employees access to their data dashboards. The data is visualized in different ways, according to each specific KPI. For Kahoot!, the responsibility of continuously improving the common is delegated to a data team that ensures high data quality, and that the KPIs are accessible, and tailored to the organization’s needs. They also distribute the responsibility of developing and designing commons to those who generate content or data that “feeds” into the common. This presupposes a high level of trust between the top managers and the organization, but enables the top managers to ensure the continuous development and continuous improvement of both products, services, everything in between, in addition to internal processes.

Snow et al. (2017) established processes, protocols, and infrastructures as another important aspect of the actor-oriented organizational architecture. These findings suggest that designing and maintaining processes for maintaining and updating the organization’s commons with high-quality information will help the self-organizing actors to continuously improve their own processes as well. These informants highlight cross-department knowledge-sharing sessions that enable employees to draw inspiration from others’ experiences; a centralized, searchable database making experiences, documentation, templates, and more available across the organization.

Some of the informants have established structured processes or roles that solely focus on improving a teams’ performance. The performance relies not solely on pure output, but in employee well-being. At Vipps, they have established dedicated roles within each product team that work to improve team dynamics and work processes. They have regular meetings with the entire team to reflect on their progress, and try to iteratively improve their work environment. Again, this is an application of El Sawy et al.’s (2016) “iterating to success”-mindset. In this case, this was a result of an initiative from this informant. Other managers have regular touch-points with their employees and aim to facilitate their work environment according to each individual’s preferences, adhering to Bass and Riggio’s (2006) suggestions.

We have talked about the implications of feedback loops, strategy, and the continuous utilization of digital resources. The top managers also expressed an increasing need to continuously develop knowledge infrastructures to fit changing demands from people and the environment. Larjovuori et al. (2018) find leading cultural change as vital to digital business transformations, as it encompasses how an organization adapts to more experimentation, piloting, and more

agile processes. The top managers in this sample reports that they trust their people, and that it's their job to ensure that their employees have the facilities and baseline to comfortably express themselves in driving organizational development.

These results indicate that the top managers in the private sector, similar to Bygstad et al.'s (2021) results from the public sector, focus less on strategy and more on continuous development. They establish baselines for both their products and internal processes, and create systems with feedback loops that gather input to form insights and decision support when making adjustments. To do this, the top managers are focused on motivating and encouraging the employees through delegation of responsibility and decision-making authority, like Snow et al. (2017) proposes with "the digital organization", to enable individuals and teams to continuously contribute to the organizational development. Therefore, we argue that the most proficient top managers realize that development is quicker and of higher quality when delegated to the practitioners close to the business area. The top managers conduct digital management through guiding strategies and inspiring the organization to share the continuous development mindset.

6.2.2 Individual Empowerment

Half of the top managers in this sample report that teams and individuals have the mandate to make tactical and strategic decisions, within certain boundaries. While "individual empowerment" is not limited to this notion, it was certainly advertised by the top managers as important, because it made the employees feel important, valued, and respected. We also found that an important component of individual empowerment is facilitating the employees' learning by allowing them a certain degree of autonomy. In this section we will discuss how top managers conduct digital management by using strategy as a tool to ensure alignment of activities, and how they apply other technologies, processes, and more to move from strict hierarchies towards individual empowerment.

The companies develop these organizational architectures to be more responsive to changes in their environments. By configuring activities and promoting the organization's adoption of a more agile mindset, along with providing employees with access to commons (Snow et al., 2017), the top managers aim to reduce the time it takes to respond to changes in the market or when new technologies are released. This is possible as the strategic responsibility for different business areas, be it products, services, or markets, is distributed throughout the organization. If the employees are provided with sufficient autonomy, along with the commons necessary to make decisions, companies can reap the benefits from delegated strategic responsibility in the form of shorter time-to-market and shorter response times. Additionally, these informants claim that their employees appreciate this kind of flexibility and autonomy, as well as the trust top

managers put in them.

Snow et al. (2017) point out that introducing digital resources to organizations allows for a new kind of organization: "the digital organization", which is organized around self-organizing "actors". These informants confirm that facilitating self-organized actors is important, and indicate that empowering the individual is especially important in knowledge-intensive sectors. They state that distribution of decision making authority is a necessity to effectively respond to new technology, market changes, and other unforeseen events. The top managers focus on leading by communicating the strategy and vision, and empower employees explicitly by giving them mandates. For instance, top managers at Vipps delegate responsibility of a product from onboarding, to product development, and after-sales to product teams. Additionally, these teams are free to organize their work in their preferred fashion, and periodically choose which strategic aspects they focus on. These results suggest that digitally mature companies deploy these resources in their organization to materialize the principles of Snow et al. (2017).

Our informants that have established individual empowerment or actor-oriented architectures highlight the importance of actors having access to the right kind of information to enable self-organizing teams to be efficient. Half of the top managers from this sample inform us that they are investing in internal platforms to expose structured data in APIs across the organization. This facilitates distributed decision-making across the organization, as all employees have access to real-time production data, visualization of KPI progress, usage statistics, and more. The internal platform is an example of an application of Snow et al.'s (2017) knowledge and shared situation commons.

These top managers aim to distribute strategic responsibility by giving actors access to information, so they can more competently and quickly make decisions that affect business. The software companies are typically more advanced in these respects, and have distributed strategic responsibility for specific offerings to product teams. They continuously innovate and improve their offerings on top of the company's digital platform, according to the company's strategy.

Collaboration is a key word for all of the informants and the top managers are looking to software applications to orchestrate collaboration between internal and external actors. For self-organizing teams it is important to have the infrastructure necessary to communicate, manage resources, or delegate tasks (Snow et al., 2017).

Bygstad et al. (2021) claim that the top manager's role is to conduct the orchestration of digital resources, empowering rapid and adequate decision making. In this sample, only a handful of the top managers mentioned orchestration of digital resources as being one of their day-to-day tasks. Mostly, they make the decision to buy or develop a collaboration or communication platform, and then allow their employees to organize their work whichever way suits them. The more digitally mature companies, however, orchestrate collaboration in structured ways. To provide an example, Schibsted has a shared data platform

for all of their brands (the companies in Schibsted's group), in which the top managers at each of these brands gather to revisit their data strategy. In this forum, Schibsted is able to continuously orchestrate the interaction between the brands and the group's digital resources, and make the necessary adjustments when deemed fit.

Knowledge Management, sharing cultures and transformational leadership

The top managers in this sample comment that managing organizations' and individuals' knowledge is of vital importance when distributing responsibility and decision-making authority. Managing knowledge efficiently allows businesses to actively utilize the knowledge as a strategic resource, and can help facilitate collaborative mechanisms. Most of these informants highlighted this importance and manage knowledge and individuals by describing three measures they actively put in place: creating knowledge infrastructures, establishing a company-wide sharing culture, and improving the employees' capabilities for sharing, which we will discuss in the next paragraphs.

The knowledge infrastructure (Edwards et al., 2013) is represented by these informants in many shapes: Sopra Steria emphasizes sharing of expertise through internal training, incentivizing the communication of own expertise, and an internal nation-wide conference; Kongsberg Digital describes continuously updated onboarding processes, documentation, and knowledge databases; Bahr has a centralized repository for storing, sharing and reusing experience and previous documents; and Kahoot! points out their low communication overhead, along with high communication volume. The knowledge infrastructures are adapted to the needs of each company, for instance, a software company has vastly different requirements than those of a legal service provider.

Knowledge is generated throughout the organization, but not necessarily stored and shared. While some might not consider documenting processes especially "empowering", it is important to maintain the company's capabilities for individual empowerment. Therefore, it is necessary to get employees "on board" with the idea of knowledge sharing through formal or informal means through establishing a sharing-friendly culture. If the processes are clearly defined, and employees know how to utilize, store, and update knowledge in the organization's commons (Snow et al., 2017), employees can leverage the knowledge in multiple respects. If employees find value in using these resources, one can also argue that they would be more likely to update them, although we do not have the data to support this statement.

To enable a well-functioning sharing culture, the top managers state that they need to continuously improve the employees' capabilities for sharing. They implement software and tools for communication both in projects and outside of them, and establish more social and "fun" forums and groups for the employees to connect on other platforms than in business. One company was radical in their approach, and established a policy which can be described as "free sharing". The informant said that the CEO's letters to the employees go through Slack, an instant messaging software, which facilitates a totally different kind

of interaction. Everyone can share content to each other and there is little to no access control, illustrating a continuously developing environment where the capabilities for sharing in theory have no limit.

Tacit knowledge is a particular challenge in the knowledge economy. This kind of knowledge can be crucial for the realization of value in digital resources, and the managers in this sample point out that they try to retain and utilize tacit knowledge in various ways. While Davenport (2005) suggest that long-term mentorships are the most viable way to transmit tacit knowledge, offboarding processes and the previously mentioned feedback loops are important to retain tacit knowledge within the organization. The companies need to know roughly which employees possess what knowledge, and what to focus on in offboarding conversations. Naturally, this is only possible where the employment termination is amicable. Onboarding processes are important to transmit tacit knowledge to new employees. Increasingly, companies are establishing mentorships between new and experienced employees to transmit industry and company-specific knowledge during onboarding.

12 of the top managers in this sample, report that they are actively trying to enable the employees to share their experiences and knowledge. They facilitate this through the aforementioned knowledge infrastructures, and are focused on rapidly communicating and encouraging usage of the infrastructure. For instance, the top managers at Sopra Steria try to create a culture focused on positivity where others want to contribute and this informant explains that they have changed from being few experts on an area, to a culture where they create experts that want to share and build competency. The top manager's role is to incentivize the organization and make the talents visible to the organization.

Our informants' digital resources are either used or developed by employees, thus, people and digital resources can be considered as tightly tangled. Therefore it is important when discussing management of digital resources to consider how managers lead their employees. Bass and Riggio (2006) argue that transformational leadership is the best fitting model in the modern economy. The majority of the top managers in this selection report their implementation of the components of transformational leadership: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration (Bass and Riggio, 2006). El Sawy et al. (2016) mentions that employers need to create an "attractive workplace for tech-savvy people", and most of the top managers try to establish this "humanized workplace with more interesting and meaningful work" (El Sawy et al., 2016). The top managers claim that hiring and retaining talented employees' is a key challenge. Thus, they try to adapt their leadership practices so that employees enjoy their workplace and find their work meaningful.

The top managers apply the principles of transformational leadership by leading by example, i.e. actively seeking out learning opportunities, or using the digital resources themselves. They also communicate bold visions and ambitions on behalf of their companies, relating "micro"-work to a "macro"-circumstance, for instance showing how customers use Kongsberg Digital's data

analysis platform to be more energy efficient, and explicitly illustrate the value of their work. Davenport (2005) argues that the intellectual stimulation aspect is important for knowledge workers, but the top managers in this sample did not emphasize this aspect. They try to individually adapt roles to their employees where possible, and try to promote internally, as well as facilitate internal mobility, instead of losing employees to competitors, or others.

Informants designing their organizations for individual empowerment note that their employees are motivated by the trust and authority they are provided in this paradigm. Therefore, when top management facilitates individual empowerment, they gain an additional benefit: employee satisfaction. They theorize that satisfied employees will be more productive and furthermore add back into the knowledge infrastructure, and the organization's commons, promoting the organization's capabilities for individual empowerment.

The top managers report that they reflect on and try to increase their employees' motivation with regards to using new digital resources i.e. "stimulating use" Bygstad et al. (2021). The "born digital" companies were observably different from the others. These companies employ many technologists, and try to attract curious and passionate employees. These top managers often comment that their employees simply "are motivated", but try to enhance their motivation by letting them participate in decision-making, actively listening to them, and ensuring that they know their value, and more. The other companies note other factors are important in motivating their employees. Some emphasize each employees' impact on their customers' experience, and others yet ensure that employees get proper training and support.

As companies move from hierarchies towards individual empowerment, the responsibility resting upon each individual increases, emphasizing the need for effective leadership. Thomas Davenport's (2005) shifts regarding managing knowledge workers partly align with the reported efforts for facilitating individual empowerment. Davenport mentions that: (i) managers go from organizing hierarchies to organizing communities; (ii) that employees move from building manual skills to building knowledge skills; (iii) managers move from ignoring culture to building a knowledge-friendly culture; and (iv) that managers no longer support bureaucracy, but fend it off. All of these observations are consistent with our findings: (i) Sopra Steria's management values the continuous sharing of expertise across the organization and regularly schedules cross-department, formal and informal communities. (ii) Gjensidige facilitates sessions for training employees in complex data analytics software and techniques. (iii) Kongsberg Digital wants to build a culture of curiosity through highlighting success stories and inner-open-sourcing processes. (iv) Kahoot! has almost eliminated communication overhead, and provides most employees access to key measurements in dashboards, effectively removing hierarchies. The top managers conduct digital management through facilitating and supporting the individuals to effectively be able to perform their work.

Our results suggest that the top managers in the Norwegian private sector, in addition to continuous development, consider facilitating individual empowerment crucial for their successful digital management. In order to organize a functioning digital organization, they develop knowledge management systems and sharing cultures, through transformational leadership techniques. All of these perspectives reflect how the top managers conduct digital management of digital resources, as the employees are more involved in the impact and value creation of the organization. We argue that the top managers in the private sector use digital resources to break down hierarchies and “grow flatter”. This way, they ensure that the organization are able to react to both predictable and unpredictable events. Our findings reveal that the top managers do not shy away from the challenges and opportunities that lie in digital resources. Instead, they rather embrace new technology and shape the organization to effectively adopt and respond to them.

6.3 Limitations

As this is an underdeveloped field of study, we acknowledge that certain aspects of our research require further studies to provide additional evidence to determine completely. Bygstad et al. (2021) performed a similar study in the Norwegian public sector two years ago. Our thesis replicates most of their study, aiming to increase the external validity of their results with findings from the private sector. Confirming numerous findings, the top managers in our sample emphasized some additional points to those of Bygstad et al. (2021). In much the same way, comparing our results to theirs increases the external validity of our findings. Additionally, we have compared our findings with other definitions of digital management.

There are some limitations regarding the research design. As this is a master’s thesis researched and written in under six months, the study was subject to significant time constraints. This meant that our results merely reflect a “snapshot” of digital management in the private sector. As technologies and competition move swiftly in these industries, it is reasonable to assume that managerial practices reflect these changes. Additionally, as the study is one of brief duration, the scope of the study involved interviewing each participant once. This left us with some topics we were not able to address in sufficient detail: information security, establishing governance, and digital management in platform ecosystems.

Finally, we noticed that the top managers tend to focus more on success stories in their interviews, rather than efforts that might not have succeeded. We have tried to provide an accurate reproduction of their accounts, but realize that more research is necessary for a more comprehensive account of their approach to digital management.

7 Conclusion

Digital technologies have considerable impacts on all levels of a business. Therefore, management of these technologies should not be assigned to isolated departments, but rather embraced by the entire organization. The role of management in the digital age is an evolving field of research. Neither researchers nor practitioners have as of yet reached consensus on how to conceptualize or conduct digital management. This thesis constitutes an attempt at providing this growing field with additional insights.

The aim of this study has been two-fold: Firstly, we have investigated how top-managers in the Norwegian private sector conceptualize digital management and compared our findings with Bygstad et al.'s (2021) framework, and other theorizations of digital management (El Sawy et al., 2016; Larjovuori et al., 2018; Snow et al., 2017; Westerman et al., 2015). Secondly, we have studied how top managers conduct digital management. The answers to these questions were illuminated based on 16 interviews with top-managers in 15 Norwegian businesses.

Our empirical evidence suggests that digital resources are purposefully embedded in all aspects of modern businesses: its strategy, organization, and processes. To a large degree, top managers in the private sector conceptualize digital management in the same way as in the public sector (Bygstad et al., 2021). They consider planning, organizing, leading, and following-up digital resources as important to fully leverage their strategic potential. Additionally, we found that top managers in the private sector emphasize the importance of managing their employees to fully materialize the potential in digital resources. We also found that most of the organizations in our sample seems to be ahead of some in the public sector in terms of integrating digital resources in strategizing and organizational efforts.

Top managers apply these resources to facilitate the continuous development of strategy, the organization's offerings, and the organization itself. This is possible through transmitting knowledge and data, using digital infrastructures, effectively establishing knowledge and shared situation commons (Snow et al., 2017). These commons are then used by self-organizing actors to decrease response time, and to delegate decision-making authority across the organization. Furthermore, we found that top managers are increasingly looking at strategy as a tool for aligning the organization and utilize digital resources to empower the individuals to take part in, and shape the organizational growth.

Further Research

Some of the limitations of this study are linked to the research design, and also time constraints. We therefore recommend that repeated studies be conducted, both in the same and in different companies to confirm these findings. Additionally, we would like to see studies on digital management be conducted internationally, to validate these findings across cultures. We also call upon the

scientific community to research how digital management affects employees, as this study solely focuses on top managers' perspectives on the subject matter.

Furthermore, we uncovered what seems to be a difference in approach towards digital resources in traditional, hierarchical organizations and distributed, actor-oriented organizations. We suggest a study be conducted on how different organizational architectures affect digital resource development and maintenance, and to uncover possible negative effects.

Additionally, during our research we found that top managers think and ruminate about information security and governance of digital resources. However, we did not have the time or opportunity to investigate this further, as it was not in scope for this research project. Therefore, we suggest that researchers study how top managers adhere to information security and governance demands in the modern, technological world.

Lastly, an interesting avenue for further research might be to make an attempt to uncover the relations between the management of digital resources and value creation and company performance. This kind of research could help unveil the potential digital management presents to modern businesses.

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9 Appendices

Complete Overview of Findings

Finding number	Management Activity	Finding	Description
1	Planning	Digitalization is anchored in top management	That top management understands why digitalization is performed, including the process, their role, and contributions.
2	Planning	Digital resources are crucial for the organization's value creation	Data, algorithms, and digital infrastructure Bygstad et al., 2021 are at the core of an organization's product- and service development, fueling the value created towards stakeholders and customers.
3	Planning	The digital strategy and business strategy is one and the same	The digital strategy, meaning an organization's plan for digitalization and technology, and the business strategy is either unified or directly linked.
4	Planning	From reactive to the market to proactive in the market or ecosystem	Describing a shift from observing changes and acting based on historical information to actively search, test, and deploy changes based on prediction of a future.
5	Planning	From optimization to reconceptualization	Describing a shift from utilizing digital technology to effectivize task, processes, and methods to fully transform it as fully perfect, functional and effective as possible.
6	Planning	From strategy to continuous development	A shift from approaching strategy as a continuous rather than cyclical process.
7	Planning	Digital technology utilized to reposition in value chain	The utilization of technology to change the interplay with other actors to gain benefits beyond the organization.

8	Planning	From customized systems to off-the-shelf systems	The procurement of systems that are standardized, rather than customized to fit.
9	Planning	Adopting "cutting-edge" technology	The ability to adopt and create value from new and advanced digital technologies.
10	Planning	Ownership structure affects approach towards digitalization	The differences in how organizations plan digitalization based on ownership structure.
11	Organizing	From intuition and market surveys to actively using customer data in product and service development	Automated gathering and utilization of customer data rather than manually pushing surveys or relying on intuition.
12	Organizing	From IT silos to platform ecosystems	Going from several separate systems to an integrated network of systems, facilitating sharing of information and seamless internal and external interaction
13	Organizing	From archives to shared knowledge infrastructures	From having separate archives for storing knowledge to building larger systems to capture and curate knowledge.
14	Organizing	Delegated strategic responsibility for each digital resource	The responsibility to organize and administer the maintenance and development of digital resources

15	Organizing	From IT department to Digitalization/Innovation departments	A transition from having innovation in IT department, to the IT being IT management, while having digitalization and innovation separate departments
16	Organizing	From relationships to partnerships	A shift from establishing relationships to vendor and suppliers to establishing long-term co-developing contracts.
17	Organizing	From manual, repetitive tasks to fully automated administration	A direct result from digitalization in the administration. Manual tasks are automated to reduce costs and increase data gathering and quality.
18	Organizing	"Lighthouse employees" that encourage and train co-workers in adoption technology + transforming	A method of implementing and adopting systems - having users of the system involved early to shape processes and standards, and later functioning as a "lighthouse employee"
19	Leading	From hierarchies to individual empowerment	A shift from having strict hierarchies to delegating responsibility and authority to the middle-manager and operational level.
20	Leading	From information silos limiting sharing to focus on developing sharing cultures	A shift that illustrates how digital leaders go from valuing experts, to an organizational culture that values the sharing of knowledge and expertise.
21	Leading	Omnichannel intra-communication	Ensuring top-down communication is accessible to any and all channels in the entire company.

22	Following-up	Focus on developing data-driven capabilities	The embracing of data and technology to reshape strategic and operational processes to improve product and service quality through data-driven initiatives.
23	Following-up	From benefits realization to position in ecosystem	Utilizing digital resources not only for internal “benefits realization”, but to orchestrate interplay between businesses in ecosystems.
24	Following-up	From PowerPoint to Dashboards	A shift from having reporting and presentations in manually developed PowerPoint decks, to having continuous reporting in dashboarding technology.

Table 7: Complete overview of findings

Interview Guide

Introduction

- Short introduction to the topic of digital management

Main Questions

- How is digitalization planned?
- How is digitalization organized?
- How do you work with motivation?
- How do you follow up results?

Ending

- Do you have anything in mind that you haven't said, or do you have a feeling that we have forgotten to ask about something?
- Based on the subject, what keeps you awake at night?