



Interrelation of Digitalization and Digital Transformation in a Maritime Company

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Abstract. Many organizations must undergo digitalization and digital transformation (DT) simultaneously; in itself, either is daunting. For 15 months, we followed the ongoing digitalization and DT activities at a maritime company with over 3700 employees through a qualitative analysis of 20 interviews, a workshop, and several documents. We see how digitalization and DT are inherently interrelated; DT and digitalization have common enablers through technology such as AI, and common processes in continuous software development. They also share many challenges, including lack of resources and internal resistance against change. Through acquiring data in the digitalization of core services, companies can undergo DT by utilizing data in new and profound ways to build services with new value propositions. In conclusion, digitalization and DT are necessary for incumbent companies and require careful balancing of resources, competence, and technology.

Keywords: Digitalization · Digital transformation · Product management

1 Introduction

Today's companies are challenged by being ever more efficient in how they develop and apply technology, not only for improving existing services but also for innovation and development of new services and products. Through software development or purchasing and implementation of off-the-shelf products [15], organizations aim to undergo the digitalization of services to achieve these improvements. Digitalization can be defined as how technology is used to change business processes through automation of tasks [7] or changing business processes for improved communication and coordination between business processes [19]. The maritime industry has notably been lagging behind other sectors [13]. This lag has introduced a much larger technology gap where the maritime industry not only has to consider the digitalization of internal processes but also the effects on how: 1) sensors on ships provide exponentially

more data, 2) artificial intelligence can be applied to generate new insights from sensors and other data sources, and 3) Big data and its ability to provide insights across more extensive data sets spanning entire fleets of ships [13].

Digitalization is a challenging and daunting task; it involves changing how a company operates by introducing technology to personnel that previously have not been using software quite that way [16]. While digitalization and improvements are well and good, this is not sufficient to compete in an ever-increasingly disruptive domain where organizations and people expect increasingly effective digital solutions.

Various research has aimed to clarify and define the concept of digital transformation [14, 19, 20, 22]. Vial [20] proclaims that digital transformation is “*a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies.*” However, if digital transformation is more advanced, disruptive, or indeed a different concept than digitalization, it would need to be built on top of digitalization in incumbent companies.

Motivated by the increasing digitalization of the maritime industry, the potential and uncertainty of digital transformation, and its illusive connection to digitalization, we ask the following research question:

How are digital transformation and digitalization interrelated?

We will first outline the interrelation by applying the notion that digitalization and digital transformation are distinct in themselves and differ in how they affect the companies’ value proposition [22] while observing how AI, business models, data, and software developments affect both phenomena.

We present rich insight into a large software- and data-intensive organization that has established an innovation framework as part of a transformation initiative. Our findings provide insight into transformation strategies and challenges, and even more so, insights into how digitalization and digital transformation should be seen as a joint approach.

The remainder of the paper is organized as follows: In Sect. 2, we present relevant literature on digitalization and digital transformation and a framework we use for understanding both concepts. In Sect. 3, we describe our case company and research method in detail. In Sect. 4, we present results from a case study and discuss our findings in Sect. 5. Section 6 concludes and presents key findings from the study.

2 Background

In this chapter, we explain *digitalization* and *digital transformation* as distinct concepts and how they relate to each other before looking into the capabilities that are necessary for both to succeed.

2.1 Digitalization vs. Digital Transformation

In digital transformation, technology is central in redefining companies’ value propositions, which causes the emergence of a new organizational identity. There-

fore, digital transformation hit barriers such as hierarchical leadership [2], poor alignment of organizational units [14], conflicts between existing and new business strategies [23], and resistance from employees [20, 22]. Such barriers and frictions cause interruptions, as development, operations, and business teams constantly need to be involved in complex alignment activities to succeed in the transformation. In contrast, digitalization involves using digital technology to support an existing value proposition, implying that an organization's existing identity is reinforced [22], although not redefined. As the identity is not changed, digitalization is less likely to experience the same internal barriers as found in a digital transformation. However, little is known about barriers and enablers when undertaking digitalization and digital transformation simultaneously as an interrelated process.

Both digitalization and digital transformations are by themselves challenging and hard to undertake, and companies are required to do both at the same time [14]. Netflix shows a public example, where they started out by physically delivering DVDs to the customers' mailboxes. Then realizing the potential of streaming, building up a streaming platform for delivering movies and tv-series to the customer, piggybacking on the increasing internet capacity. Then when challenged by other movie studios, Netflix understood the potential value of data from their streaming service about what movies and shows the users watched, how long they watched, and whether or not they liked it. Netflix could now accurately predict what type of content customers wanted and then started producing shows and movies based on the data from the streaming service. In short, Netflix went from a digitalized DVD provider to a digitally transformed tv and movie studio. However, they are still delivering all three types of services. DVDs provided Netflix in 2021 with 200M \$ of revenue [11], showing a need to balance different types of services and strategies.

The challenge of supporting the existing value proposition while at the same time creating new value propositions through innovation is challenging [10]. This challenge is also known as the innovator's dilemma [3] where existing companies fail to innovate due to the success of their existing portfolio, which is further exacerbated by digital technology and digital transformation, increasing the speed and ability of smaller companies to challenge the existing companies in new ways. Nagji et al. [10] argue that a company's innovation portfolio needs to be tailored for the company to thrive, i.e. there is a need to balance digitalization and digital transformation.

2.2 Capabilities for Digitalization and Digital Transformation

Building on the distinction between digitalization and digital transformation, there is still a question of what is needed to undertake a digitalization or digital transformation journey. Bosch and Olsson [1] outline four necessary dimensions when transitioning from traditional to becoming a digital (transformed) company. This research based on incumbent companies, is very similar to the context of MarComp as they both have existing physical services that need to be main-

tained simultaneously as they undergo digitalization and digital transformation. They identify four orthogonal dimensions in which companies need to evolve:

- Product upgrade
- Data exploitation
- AI/ML/DL
- Business Model

These dimensions are necessary vectors for change that companies have used to be able to both digitalize and digitally transform.

Product upgrade outlines how software allows the product to be upgraded. Bosch and Olsson [1] describe a development going from a traditional physical product, or in the case of software products where the product is 1) “sold as-is,” developing towards 2) more frequent deployments due to quality improvements, followed by 3) data from the use of the products are used to improve the features of the product. In 4) continuous software updates, the system is continuously improved, and finally, 5) all the previous steps are combined into a fully digital product delivery.

Data exploitation is a prerequisite for digitalization and digital transformation. Data can be exploited across five key areas: 1) Quality assurance and diagnostics using system behavior data. 2) Product performance and feature usage, where features and performance data are collected and used for product and software development. 3) Customer KPIs, where specific data for the customer are streamed, analyzed, and served back to the customer to provide operational insight. These can be understood as Data Products. 4) Data-as-an-asset, which is data captured from multiple customers, analyzed across the customer base, and served as insights, showing not only operational data compared to one customer, but for all customers. And 5) Secondary customer base, where data from the existing customer base is used to develop and monetize customers outside the traditional customer base.

Artificial intelligence (AI), machine learning (ML), and deep learning (DL) are technologies driving the potential of digital technology forward. 1) Data analytics utilize ML for automation and optimization of processes. 2) A data set centric way of working where data permeates the applications, and machine learning models are trained on static data and used directly by the applications. 3) Dynamic data stream, where models are dynamically retrained based on data changes or system behavior changes. Data and changes across the customer base are used to retrain and expand the models. 4) Federated local training and customization, where models and data are deployed and target specific customers with their own set of customization and local models, with dynamic retraining. 5) Fully autonomous usage where the system itself has authority over decisions, mostly associated with autonomous vehicles. One notable challenge with using AI/ML is the risk aversion of top management [8], which limits the potential success of AI initiatives.

The business model shifts when a company is transforming. One example is going from a transactional model of selling services and products to subscription-based models where insight and data are an additional value add for the customers. The shift in business models is also found in other research on digital transformation; Tkalic et al. [17] outline how digital transformation and digitalization simultaneously change the four interrelated elements of a business model: product strategy, revenue logic, distribution model, and the service and implementation model. These changes introduce tensions, which require organizational changes to be overcome.

2.3 Continuous Software Development

The digital dimensions of AI, data, and products require that the company has software development practices to deliver software with higher frequency, quality, and security. Further, a fundamental principle in digitalization and digital transformation is to provide working software to users at regular short intervals to ensure an increase in customer value through feedback.

In practice, there needs to be a close and continuous linkage between business, software development, and operations, described as continuous software engineering [6]. A case study by Mikalsen et al. [9] illustrates how cross-functional teams - consisting of business representatives from business development, IT developers, testers, and user experience (UX) designers achieve a continuous business planning process, development, and maintenance. The need for agile software development teams to interact with other units in the organization dynamically and responsively is why companies today aim to scale agile methods beyond software development. Mixing AI/ML/DL, data, and digital business offerings into these activities have made software development more complex. The reason is that agile software teams must cooperate with non-agile units. Agile teams work highly iterative in a sense and response manner while other organizational functions may operate at a steady pace, avoiding change [5].

3 Method

We report findings from a company that was focusing on both digitalization and digital transformation. Their product development area is our unit of study. It allows us to understand how multiple disciplines from multiple organizational units interact when improving existing and creating new software-based products. Some of the new products supported the existing value proposition while others were redefining it. Our study is a holistic case study [24]. According to Yin, case studies are the preferred research strategy when a “question is being asked about a contemporary set of events over which the investigator has little or no control” (ibid, p. 9). We followed the five-step process proposed by Yin: 1) Case study design. 2) Preparation for data collection. 3) Collecting evidence: execution of data collection on the studied case. 4) Analysis of collected data, and 5) Reporting.

3.1 Case Company

MarComp (name suppressed for anonymity) is a multinational provider of services for the energy, process, and maritime industries with over 3700 employees. They were chosen because they participated in a research program on digital transformation. The company recognized a critical issue of missing interaction between software development, sales, marketing, and operations, which led to a transformation initiative. In 2019 the company established an innovation framework based on the Corporate Startup [21]. The framework consists of a six-part stage-gate process in which a committee controls which initiatives to move to the next stage or are to be stopped. MarComp has set out a dual transformation agenda, renewing and growing their existing services through digitalization and establishing new digitally transformed services on top of existing ones.

Table 1. Data sources

Data source	Location	Time	Participants	Data gathered
Innovation framework, lean startup	Virtual	Sep. 2020–May. 2021	15 Interviews with 5 product managers	Interviews on the startups, innovation process, work processes, software development process, context, stakeholders
Digitalization program	Virtual & physical	May. 2021–Jun. 2021	5 interviews with discipline leaders	Interviews on transformation of discipline, road-maps, transformation process, context
Workshop and meetings	Physical	Oct. 2021	1 Digital transformation workshop (1 manager, 1 data science lead, 2 leaders of software development, head of AI and data analytics, 2 program managers)	Written notes, written material from participants
Strategy documents		Apr. 2021–Dec. 2021		Strategy documents, project descriptions, road-maps

3.2 Data Collection and Analysis

Our data collection (Table 1) started in 2020 when the company needed to rethink the product development process to reach the estimated earnings of several digital solutions. The ideas and initiatives in the innovation framework can be categorized as digitalization efforts or digital transformation efforts. The researchers participated in internal meetings, customer meetings, and workshops initiated by the innovation framework. All activities were documented by taking notes, meeting minutes, and pictures of materials produced in the workshops. Also, we got access to product documentation, contracts, and data on user activity on some of the digital products. We ended the data collection in December 2021. The results were presented back to the practitioners in feedback meetings.

We used a variety of strategies to analyze the material [12]. Through several iterations, we utilized a combination of descriptive and holistic coding to build an understanding of the data. Firstly, building up a set of descriptive codes before consolidating them into groups of themes based on the dimensions (AI, data exploitation, business model, product upgrades) as outlined by Bosch and Olsson [1]. After grouping into themes, we applied Strauss and Corbin's [4] coding paradigm that involves context, causal conditions, intervening conditions, strategies, and consequences. This method was then used to structure the strategies, intervening conditions, and consequences for the phenomenon of digitalization and digital transformation based on the distinction by Wessel et al. [22]. The qualitative coding was done using NVIVO 1.6.2 and performed on both documents and transcribed interviews. This combination of top-down and bottom-up coding ensures that the codes stay true to the data and that relevant literature is considered.

4 Results

We present the challenges and enablers for software development in digitalization and digital transformation, respectively, and demonstrate how they interrelate. Table 2 contains the complete list of identified intervening conditions and strategies uncovered in the analysis. In the following sections, we will detail some of the findings.

4.1 Strategies for Digitalization

Machine Learning is a Crucial Enabler for Digitalized Services. This is exemplified by a service where ML is used to assist customers in answers to questions with the combination of domain experts providing the learning input to the machine learning algorithms. Another example is a service used to predict the wear and tear on various parts of a ship (predictive maintenance). The strategy highlights AI's role in current and future services, which rely on vast amounts of data. Moreover, the roadmap for the digitalization program highlights the need for a common data platform.

Table 2. Strategies and challenges for digitalization and digital transformation

	Strategies	Intervening conditions
Digitalization	Machine learning and AI capabilities Data scientists understanding the business domain and context Digital transformative services (new value proposition) are used to coerce customers into sharing data Data standards as an opportunity Customer self-service through digital services	Digitalization of services through cross-department alignment Lack of resources Key performance indicator setup Charging extra for digitalized services Aligning data science with software development Slow uptake of data standards Top management sees lean startup as a risky approach Risk aversion to AI in management and explainable AI Mixing legacy and digital solutions
Digital transformation	Data from digitalized services enables digital transformation Machine learning is a key enabler for digital transformed services Organizational changes Customer contact to validate problem and solution	Aligning data science with software development Selling digital services with different value proposition is challenging Order2Cash process and ERP system do not support new services Legal basis for using data for new services Lack of resources New service might change how Mar-comp is viewed Top management sees lean startup as a risky approach Risk aversion to AI in management and explainable AI

Data Scientists Understanding the Business Domain and Context. This is presented as an essential aspect from the data scientist perspective and the business side. The program managers and the head of AI emphasize the importance of data scientist knowledge of the business domain and the project manager’s understanding of the possibilities and implications of using AI. This is shown when the data scientists and business development people have joint workshops to educate each other about the business and machine learning domains. The head of AI explains: *“We did not have to bring the data scientist into the workshops, but we invited a lot of them, it is important that they get to know each other. Get to learn what is important for the business and what projects are coming”*.

Digital Transformative Services (New Value Propositions) are Used to Coerce Customers Into Sharing Data. One key challenge with digitalization is the change from the customers reporting information manually through documents and forms to direct data connections to sensors. However, the incentive for the customer/partner to participate in data sharing is elusive, asking the question *“What’s in it for me?”* One explained *“It is not sufficient to deliver the same services as today, you have to provide a new kind of value. The value lies within the new opportunities that arise. You can make it more efficient and easier for the customer, but the customer is interested in new services.”* This requires collaboration with the customer vendors producing the various components that go into a product. One project manager explained: *“The vendor*

could see themselves wanting new functionality building on the sensor data. They lacked machine learning expertise, so we proposed to develop the module jointly when we had the data in our systems.”

Cross Department Workshops. Digitalization is a cross-organizational effort where groups with various responsibilities, tasks, and competencies share knowledge and coordinate their action. This can be achieved through cross-organizational workshops. Digitalization represents an opportunity to understand how work processes go across departments. In addition, the digitalization effort will directly affect how the different departments’ daily work will be affected, and the personnel must have ownership of the new digital solutions. A project manager explained: *“It is not just about us as a project coming in and telling them what to do, we want them to have ownership, we need to have participants from different departments in order to capture challenges across the departments.”*

Customer Self-service Through Digital Services. When the customer is able to assist themselves without involving MarComp personnel, the workload on both customers and internal resources is reduced. Multiple initiatives at MarComp aim to automate jobs usually performed manually by either the customers or the employees of the company. In addition, the self-service systems also provide additional capture of data about the users, both internally and externally, providing the possibility to develop services further. *“The digital channels give us direct contact with the technical personnel at the company, thus providing us with the data and insight to develop new services”* (Project manager).

Data Standards as an Opportunity. The establishment of public data standards through ISO was seen as a strategic move to enable other vendors and technical solutions to use the standard the company used internally. This enables the company to much easier integrate different data sources into their data ingestion platform as the standards match.

4.2 Intervening Conditions for Digitalization

Aligning Data Science with Software Development. Data science as a new practice (including roles, competency, tools, etc.) extends the organization with new capabilities. This must be aligned with established software development for the two functions to coordinate and collaborate. A data analytics team cannot contribute without a coordinated effort with, e.g., software development or business development. Hence, further, development needs to clarify which parts of the organization need to align so that they together drive digitalization as a joint effort without hampering each other.

Lack of Resources. Digitalization requires new competence and resources, e.g., data scientists and/or changes in the technological platform. The simultaneous software initiatives further exacerbate the issue by adding additional parallel projects. In addition, the involvement of employees in understanding the current work process is essential. One project manager complained *“Even though NN*

does not have the capacity, he is the person we need. But he works in a small unit, so there are not many people to help out if he is not working operationally.” This also serves as an example of core personnel needing to balance the innovation of new services and the operation of existing ones. For data science, this was a particular problem as the requirement for understanding the business domain was critical. To the level that new data scientists could not understand existing code and had to rewrite it.

Key Performance Indicator setup. Existing KPIs are set up as a quantitative representation of the production of, for example documents. In one initiative, we found that the goal of the digitalized solution is to reduce the number of manual document checks and instead provide a digital solution. However, the current KPIs measure the number of documents handled per week per employee. Thus, there is no incentive for the employee to help with digitalization. On a departmental level, this is also found where the departments are measured through the cost center. Still, the digital solution does not have the possibility of granulating the cost per department.

Charging Extra for Digitalized Services. Investing in digitalization efforts and expecting the customer to pay extra for the new digital service is challenging. As described by a product manager, *“What should it cost for the customer, if they respond ‘why should I pay more for this?’.* But it costs money to develop the service, how should you respond to that?” One approach was to add “buy” buttons that the users could click to measure their willingness to pay.

Slow Uptake of Data Standards. Digitalization driven by increased production, sharing, and use of data increases the need for data with the right quality and transferability. One challenge is getting access to the data in a timely fashion, another critical aspect is the format and structure of the data. Each vendor with a different format and structure requires the data scientist and the managers to collaborate and discuss with the vendor to understand and contextualize the data.

4.3 Strategies for Digital Transformation

Data from Digitalization Enables Digital Transformation. Identifying new ideas is possible due to the data gathered through previous digitalization efforts. Using existing data to build new solutions has benefits, such as making it easier to explain and get user feedback due to using actual customer data. Building on this, the company can further scale the new solutions easier as the data is already captured and understood. One project manager reflected: *“It is important that we take advantage of the opportunity we get from the availability of the new data. It is important not only to capture the data but to build on it.”*

Machine Learning is a Key Enabler for Digitally Transformed Services. However, for the digitally transformed services, the ML capabilities are not mainly used to optimize current processes but to create new solutions based on the digitalized data. Examples are utilizing ML and AI methodologies on historical data to build predictions on how ships and components will behave.

Organizational Changes. The digital transformed services are different in value proposition than existing services. This leads to higher uncertainty, and several iterations and pivots are needed before a working version is discovered. Further, product managers are moved out of the production line to have decision authority and the ability to work on the development of the new product. One product manager elaborated *“This program gives us the possibility to take decisions on our own product, compared to previously this has dramatically reduced the amount of discussion and coordination between other initiatives.”*

Customer Contact to Validate Solutions. Contact customers or users to validate a service with a new value proposition. Through contact, the product managers are able to pivot the solution and try new approaches. This was made easy when the service was using existing customer data as a basis for the solution. One product manager said *“We got lots of good feedback because it was based on real data. They could click around and try stuff. And we got great feedback from just four-five customers. Based on that, we were able to build a new version pretty fast.”*

4.4 Intervening Conditions for Digital Transformation

Selling Digital Services with Different Value Propositions. Sales of digital services with a new value proposition are fundamentally different from sales of traditional services. The new services target different parts of the customer organization than what the current sales network knows. It also changes from a more transactional contract-based model to a more subscription or one-time buy model. One project manager explained *“There is no good plan for how to take the products to market. We need someone to develop products. Previous projects have shown that the current setup does not work.”*

Order2Cash Process and ERP System Do Not Support New Services. To support new payment models and subscription-based services, the Order2Cash process needs to accommodate new ways of ordering and invoicing services matching the new business model. Developing the necessary changes to the ERP system has high costs and is challenging to execute. A product manager told us *“There was a lot of resistance. We cannot change the systems just because of one service; we need a bigger discussion around this. We have been waiting for over a year.”*

New Services Might Change how MarComp is Viewed as a Brand. Some concerns have been raised about the focus on new services beyond the current service offering MarComp is delivering and the effect this can have on the commercial side.

Top-Management Sees Lean Startup as a Risky Approach. Through the use of lean startup concepts, there is an emphasis on getting feedback from customers as soon as possible to validate the problem and eventual solution. The idea of bringing unfinished systems and presenting them to customers is

not received well by top management; one product manager said *“They hold back, they are not willing to let it out for us to test, they were not negative to the product, but letting it out.”*

Risk Aversion to AI in Management and Explainable AI. By utilizing AI and machine learning, new predictive solutions are developed, limiting the number of manual inspections of ships that the company has to do. Implementing the system in production can be challenging due to risk aversion in management, not trusting the algorithms, and how accurate they are as compared to trusted manual services. Further, it is difficult to explain how machine learning works and how the outputs are calculated. One project manager said *“We have a fantastic system, but it is very difficult to tell the users so they know how to use it properly.”*

5 Discussion

Motivated by the need to understand the interrelation between digital transformation and digitalization, we conducted a longitudinal case study in MarComp, a multinational provider of services for the energy, process, and maritime industries. We have reported on strategies and intervening conditions for digitalization and digital transformation and how these factors are related. We now discuss the case in light of our research question.

How are digital transformation and digitalization interrelated?

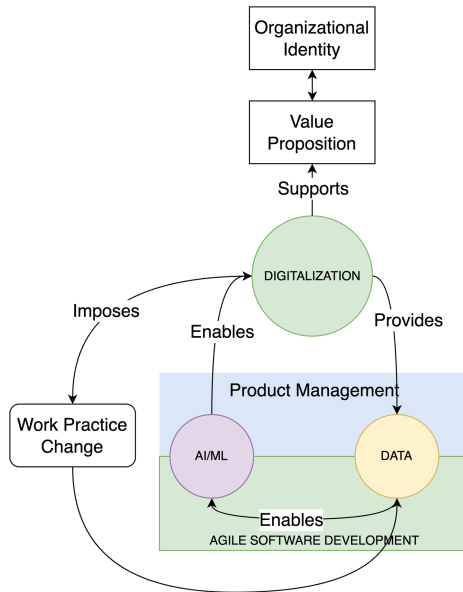


Fig. 1. Digitalization provides data

Firstly we note that data from digitalization is a crucial enabler for digitally transformed services, providing the underlying data for innovation which may redefine and/or create new value propositions in the company. So to succeed with digital transformation which is a data-driven process, digitalization is important as it gives access to the needed data. We observe this relationship in our results, where data is first gathered through the digitalization of some product or services; this can be seen in Fig. 1. There are multiple intervening conditions for developing digital services, one being the ability to obtain, capture, and consume data from third parties. This corroborates well with Vial [20], where data availability is seen as a key building block for digital transformation.

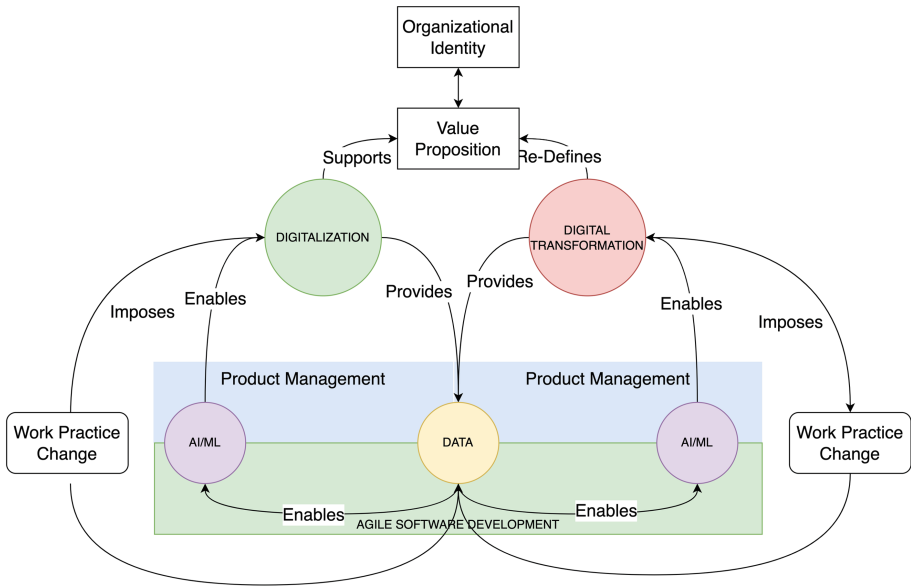


Fig. 2. Interrelation between digitalization and digital transformation

Further, we observe that MarComp, after gaining experience with digitalization and novel new products with a different value proposition from previous products, defines a dual digitalization and digital transformation. In Fig. 2, we observe how the relationship between digitalization and digital transformation unfolds.

We also see shared strategies and intervening conditions; AI/ML integrated into the teams is a strategy for both phenomena, just as lack of resources hinders both. In addition, we find a need for a mediating role between the different aspects of the dual transformation, AI, Data, agile software engineering, and changes in work practice (internally or externally). In our case, we see that product management takes this mediating role, which is in line with other studies [18].

Most notably, we see that not only is data from digitalization crucial for kick-starting digital transformation, but the promise of digital transformations, through its significantly different value proposition, is a way for the company to acquire more data for digitalization. The customers and vendors are interested in new services and the added benefit it can provide them beyond just giving data away. Especially co-creation of value through shared data and insights was perceived as valuable. The concept of delivering more value to the customers corroborates well with Bosch and Olsson [1], where the customer's KPIs were used to provide more value to the companies, although in our case, this also involved vendors.

Thus, the relationship between digitalization and digital transformation is more complex than simply that the one is enabling the other. This does not necessarily mean that an organization must fully complete digitalization before transforming, but that parts of the business model can be addressed individually. Over time, this can become a system of careful experimentation, where confidence in the ability to transform grows over time, similar to how the innovation portfolio needs to be balanced as reported by Nagji and Tuff [10], and where companies need to further engage in innovative activities on top of digitalized products.

From our case study, we have found that digitalization and digital transformation share many of the same intervening conditions and strategies and are related. Wessel et al. [22] described two cases showing two distinct paths where company A chose the path of digitalization. In contrast, case B showed a big bang transition towards a new organizational identity i.e., digital transformation. Our data shows that there is no clear distinction between these two phenomena.

6 Conclusion and Future Work

We have conducted a 15-month study of professionals in a maritime company. We found that digitalization and digital transformation are interrelated and that it is more complex than simply that the one is enabling the other, i.e., it is not necessarily that an organization needs to complete digitalization before it can transform. We even found that digital transformation enables continuous digitalization. We found several intervening conditions and strategies for digitalization and digital transformation; some where shared, and some where unique to the phenomenon. In addition, we noticed that balancing digitalization and digital transformation is crucial to both concepts due to the interrelation between them. Future work should dive deeper into the strategic element of balance and what roles and processes are needed to undertake digitalization and digital transformation.

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